

**Arizona Water Protection Fund
FY 2009 Grant Application Review**

Application # WPF0377 Applicant: NORTHERN ARIZONA UNIVERSITY
Title of Project: VERDE RIVER INVASIVE SPECIES 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, 4th Floor, Phoenix). The additional materials available are the following:

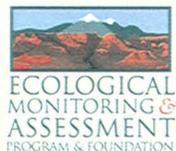
Maps
 Photographs
 Disk APPLICATION
 Other

Verde River Invasive Species Project



Submitted to
the Arizona Water Protection Fund Commission
June 11, 2008

by the Ecological Monitoring & Assessment (EMA) Program
at Northern Arizona University



Executive Summary

The Verde River riparian corridor is one of the most extensive Cottonwood/Willow gallery forests in Arizona. The forest is home to many species of plants and animals (including fish, reptiles/amphibians, mammals, birds, and insects) some of which are sensitive, threatened or endangered. The riparian ecosystem relies on a balance of many factors to stay healthy and functioning as habitat for many species. Over 80% of all animals in the area rely on open water for at least part of their life history. One of the threats to healthy riparian ecosystems is non-native invasive plant species infestations. The only way the populations of these plants will be controlled is through cooperation of all the land managers and owners in the area. This project aims to educate and assist those managers and owners with identification, information sharing, and eradication of some of these species. The project will accomplish these goals by providing workshops and organizing work days to help individuals and organizations who have expressed a need for help in controlling these species. The Verde NRCD has identified three species of particular concern -Giant reed (*Arundo donax*), Salt cedar (*Tamarix* sp.) and Tree of Heaven (*Ailanthus altissimum*)- so these will be the focus of the project. At workshops all non-native species in the area can be identified and discussed.

Project Overview

Background: The Verde River is an important resource to Arizona as one of the longest free-flowing rivers in the state with many sensitive species. These species and their habitat are threatened by invasive non-native species. The Verde Natural Resources Conservation District has identified three species that are specifically a problem. These are Giant reed (*Arundo donax*), Salt cedar (*Tamarix* sp.) and Tree of Heaven (*Ailanthus altissimum*).

Private citizens are concerned about the invasive species and willing to eradicate these species from their property, but they need education to identify, assistance with the removal and assurance that they will not return. The safest and most effective method is removal (and destruction) and then applying approved pesticides.

Goals and Objectives:

Goal 1: Conduct identification and information workshops on non-native invasive plant species.

Objective 1: Have an informational meeting co-organized by the Verde NRCD

Objective 2: Conduct a workshop for area residents to learn about non-native invasive species in the area and how they may affect them, others around them, and wildlife in the area.

Objective 3: Present the information on this project at the end of this project to encourage continued collaborations and cooperation.

Goal 2: Organize volunteer groups to eradicate invasive non-native plant species.

Objective 1: Organize five work days and invite volunteers to assist land managers and property owners in the riparian area who have asked for assistance.

- Cut or chop the plants

- Have a certified pesticide applicator paint or spray stumps with riparian approved pesticides (Habitat[®] or Rodeo[®] - glyphosate)

- Proposed sites

 - 2 sites at Verde River Greenway State Natural Area (five eradication workshops on the two sites)

Objective 2: Document the efforts at each of the five workshops

Goal 3: Provide information regarding non-native species and effective control methods on the EMA website.

Objective 1: Give the public access to the final report in pdf format on the EMA website.

Objective 2: Provide information on identification and effective eradication on the website.

Objective 3: Give information on how volunteer community efforts can help control the threat of non-native invasive plants, and specifically how that has worked in the Verde River riparian area.

Statement of Problems/Causes: Invasive non-native plant species threaten native ecosystems and the well-being of residents along the riparian areas of the Verde River. These species are persistent, prolific and widespread. Eradication efforts in individual properties or public spaces are ineffective because of surrounding populations that re-infest the areas.

Statement of solutions- The solution will be a community-wide awareness of the threat and volunteer efforts to remove the species.

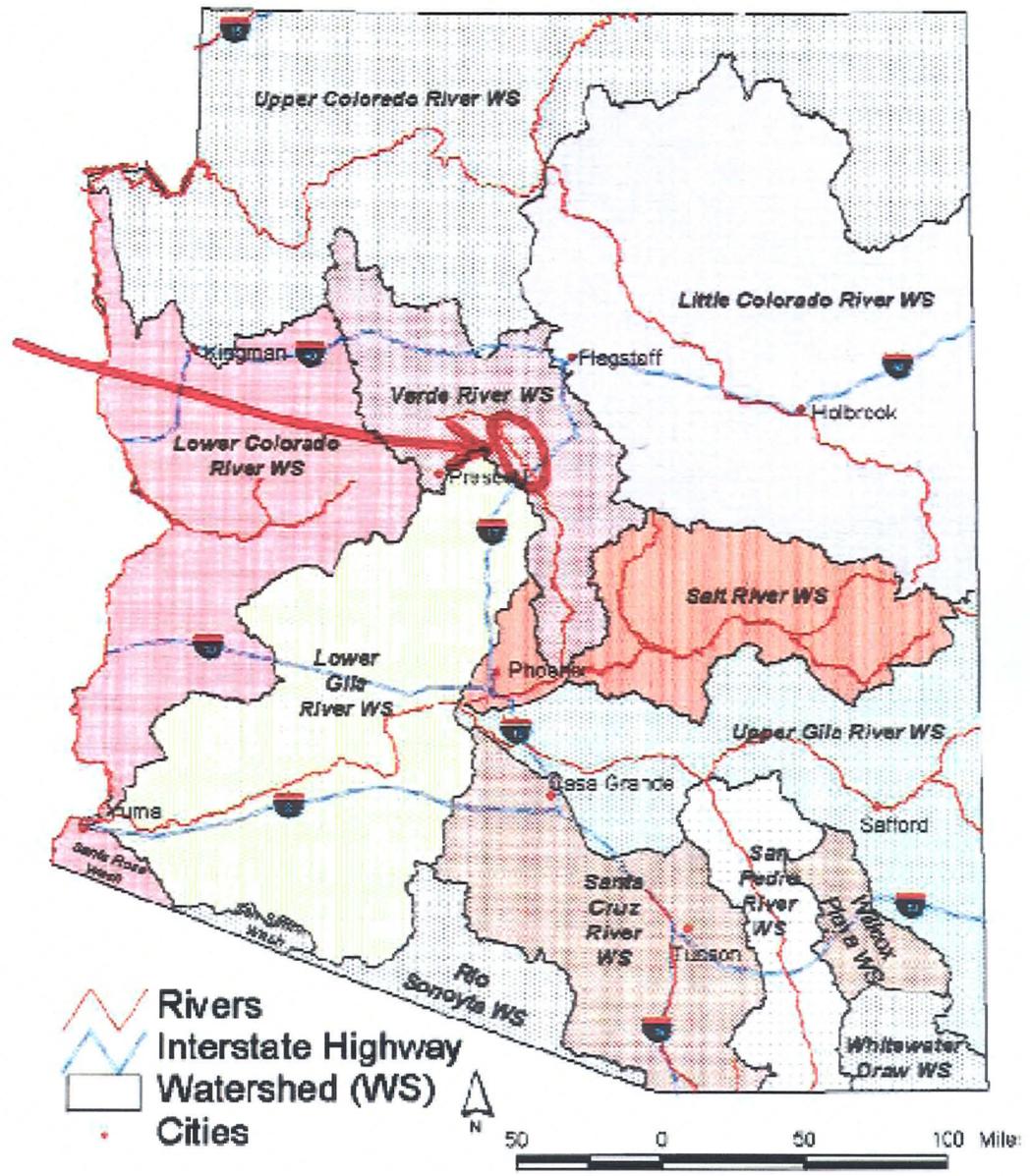
Statement of project years of benefit- The project will have long-term benefits to the riparian area into the unforeseeable future, not only because of the removal of invasive non-native plants, but also because of the education and outreach focus of the project. The only way for control to be effective is if the communities along the Verde River unite in their efforts.

**Project Location & Environmental Contaminant Information
FY 2009**

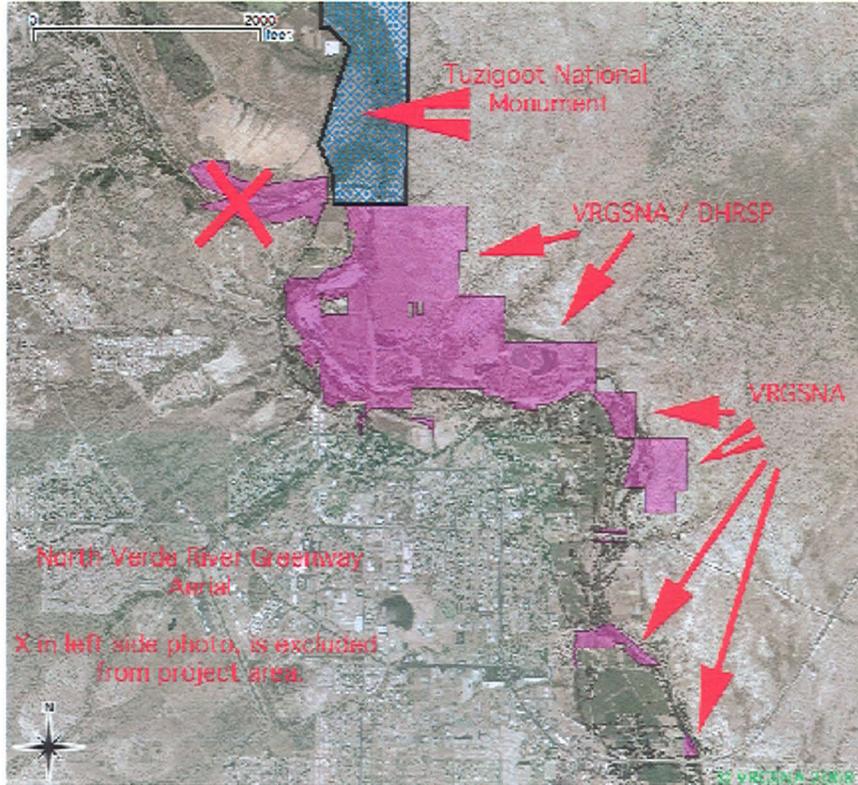
Project Location Information			
1. County: <u>Yavapai</u>	2. Section: <u>27, 2</u>	3. Township: <u>16N</u>	4. Range: <u>R3E</u>
<p>5. Watershed: <u>Verde River</u></p> <p>6. Name of USGS Topographic Map where project area is located: <u>Cottonwood</u></p> <p>7. State Legislative District: <u>1</u> (Information available at http://156.42.40.10/mapping/default2.asp?tname=Interim.2004.Legislative.Map)</p> <p>8. Land ownership of project area: <u>AZ State Parks</u></p> <p>9. Current land use of project area: <u>Riparian corridor, State Park lands</u></p> <p>10. Size of project area (in acres): <u>19 in Verde River Greenway State Natural Area</u></p> <p>11. Stream Name: <u>Verde River</u></p> <p>12. Length of stream through project area: <u>2000 ft in Verde River Greenway</u></p> <p>13. Miles of stream benefited: <u>6 + miles</u></p> <p>14. Acres of riparian habitat: <u>19 acres</u> will be:</p> <p style="margin-left: 400px;"> <input checked="" type="checkbox"/> Enhanced <input checked="" type="checkbox"/> Maintained <input checked="" type="checkbox"/> Restored <input type="checkbox"/> Created </p>			
<p>15. Provide directions to the project site from the nearest city or town. List any special access requirements: Site 1: Cottonwood to N. 10th St. right on N 10th to Dead Horse Ranch State Park, left Dead Horse Ranch Road to Flycatcher Road to end of Road. Site 2: Park at Jail Trail Museum on Main Street in Oldtown Cottonwood and go north towards the Verde River on the "Jail Trail."</p>			
Environmental Contaminant Location Information			
<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>			

Project maps and schematic:

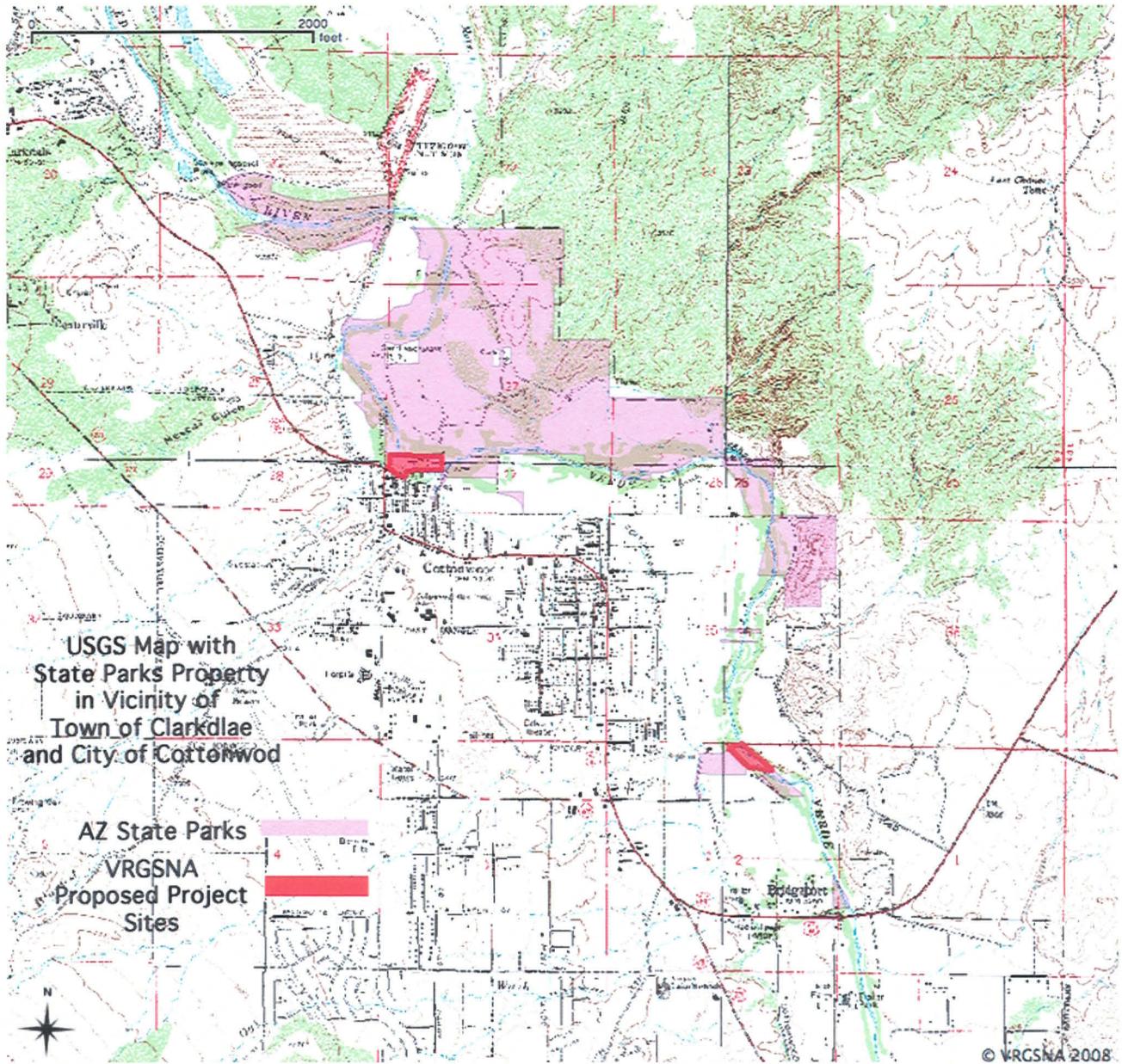
Arizona Watershed Map FY 2009



Title of Project: Verde River Invasive Species Project



VRGSNA north area aerial photo showing AZ State Parks management in pink color. Area with the red X is not included in this project area. The area with the red X is included with NPS as part of another invasive removal program.



Scope of Work:

Task #1: Permits, clearances, authorizations and agreements

Obtain and submit to the Project Manager all necessary permits, authorizations, clearances and agreements, and perform any consultations required to complete the tasks listed in the Scope of Work. The requirements will be met before any work in the project areas is performed and shall include, but not be limited to the following:

- Research permit for Arizona State Parks
- Any pesticide application permits needed on private lands
- Any pesticide application permits needed on Arizona State Park lands

Task purpose: To comply with all local, state, federal permit requirements, environmental laws, and obtain legal access to the project area.

Deliverable description: 1) Copies of Permit from Arizona State Parks
2) Copies of Letters of permission from private property owners
3) Copies of any other permits needed to complete the project

Deliverable due date: Prior to May 31, 2009

Reimbursable cost: \$2755.41

Task #2: Develop an Invasive Species Control Plan, Outreach and Education Plan, and Monitoring Plan

We shall prepare and submit the following plans that describe other activities to be performed: An Invasive Species Control Plan and an Outreach and Education Plan. Each plan shall include the objectives, methodologies, and equipment necessary to implement the plan.

- Invasive Species Control Plan shall describe all activities necessary for conducting five 1-day hand's-on workshops that include eradication of invasive non-native species each at a different site. The Plan shall describe the specific control workshop schedule and timing for all aspects of the program. The Invasive Species Control Plan shall include but is not limited to:
 - Map(s) to scale, of the project clearly showing the proposed control sites
 - List of species to be controlled at each site
 - Procedures used to control species present at the site

- Materials and equipment list
 - Discussion of safety issues
 - Discussion of procedures for documentation at each site
 - Personnel responsible for completion of the task
- The Outreach and Education Plan shall describe all activities to be performed for the duration of the Project to inform and educate the public, government committees, agency staff, researchers, volunteer groups, and other interested parties about the Project. One year after the eradications a survey will be sent to participants to evaluate the effectiveness of the hands-on training, and retention of the information presented. The Outreach and Education Plan shall include, but is not limited to:
 - Proposed activity objectives and descriptions
 - Each activity's target audience
 - A description of each event and the informational material to be produced
 - Event schedule
 - Proposed website outreach and education
 - Plan for outreach and education evaluation (survey for participants)
 - The Monitoring Plan shall describe all activities to be performed for the duration of the Project to monitor the effectiveness of the control efforts. The Monitoring Plan shall include, but is not limited to:
 - Plan for site visits
 - Planning for documentation of the control areas
 - Proposed site assessment forms
 - Schedule of site visits

The Grantee shall obtain written approval from the Project Manager prior to implementation of each individual plan. The Grantee may request a modification to the approved Plans. A modification request shall be submitted in writing to the Project Manager for approval. The request shall describe the modification and address the effect of the modification(s) on achieving the objectives in the specific Plan. The Grantee shall obtain written approval from the Project Manager prior to implementation of any modification to approved Plans.

Task purpose: To develop the following detailed plans: the Invasive Species Control Plan, the Outreach and Education Plan, and the Monitoring Plan to fulfill those components of this project.

Deliverable description:

- 1) Invasive Species Control Plan
- 2) Outreach and Education Plan
- 3) Monitoring Plan

Deliverable due date: 1) May 31, 2009
2) July 31, 2009
3) January 31, 2010

Reimbursable cost: \$6579.51

Task #3: Implementation of the Outreach and Education Plan

Grantee shall implement the approved Outreach and Education Plan submitted as a component of Task 2. Grantee shall document each activity with a brief description of the activity, photographs, copies of meeting, conference, or field trip agendas, attendance lists, and any outreach materials produced in a Public Outreach Report. Reimbursements pertaining to this task will be made upon the submittal of approved copies of receipts and invoices for materials, labor and equipment.

Task purpose: To describe outreach activities.

Deliverable description: (1) Annual Outreach and Education Reports
(2) Summary of public outreach activities in the Final Report

Deliverable due date: (1) May 31, 2010, 2011, 2012
(2) May 31, 2013

Reimbursable cost: \$9917.25

Task #4: Implementation of the Invasive Species Control Plan

The Grantee shall document control activities and submit the information in a report after year one and include this information in the Final Report. To eradicate non-native invasive species at 5 sites in two locations (two sites at Verde River Greenway State Natural Area

Task purpose: To document invasive species control activities.

Deliverable description: 1) Report on the control activities
2) Incorporation of information on control efforts in the final report

Deliverable due date: 1) January 31, 2010
2) May 31, 2013

Reimbursable cost: \$18,307.80

Task #5: Implementation of the Monitoring Plan

Each of the five sites on which non-native species are eradicated will be monitored and photographed each year following the project.

Task purpose: To evaluate the effectiveness of the treatments

Deliverable description: 1) Copy of report of findings one year after eradications (including photos)
2) Copy of report of findings two years after eradications (including photos)
3) Copy of report of findings three years after eradications (including photos)
4) Monitoring activities documented in Final Report

Deliverable due date: 1) February 28, 2011
2) February 28, 2012
3) February 28, 2013
4) May 31, 2013

Reimbursable cost: \$5454.54

Task #6: Final Report

A comprehensive Final Report shall be prepared and submitted in accordance with the Arizona Water Protection Fund Final Report Guidelines. The Final Report shall include a summary of all methodologies used, outcomes of the Tasks, analysis of all Project data, suggestions for any changes or future actions, and an evaluation of the effectiveness of meeting Project objectives.

Task purpose: To describe the goals and accomplishments of the project.

Deliverable description: Final report

Deliverable due date: May 31, 2013

Fixed cost: \$1625.19

Detailed Budget Breakdown:

**DETAILED BUDGET INFORMATION- Verde River
Invasive Species**

TASK	UNIT COST	# OF UNITS	UNIT	TOTAL COST	TOTAL PER TASK
1 Permits, Authorizations, Agreements					
Project Coordinator	30.32	60	hours	\$1,819	
Student Assistant	13.00	30	hours	\$390	
Deliverables					
Photocopies	0.15	100	each	\$15	
Travel					
Travel to Phoenix for permitting with ASP	200.00	1	per trip	\$200	
Travel to the Verde Valley for permitting (2X)	100.00	2	per trip	\$200	
subtotal					\$2,624.20
Admin costs (5%)					\$131.21
TOTAL for task					\$2,755.41
2 Develop Plans: Invasive Species Control Plan, Outreach and Education Plan, and Monitoring Plan					
Program Coordinator	30.32	160		\$4,851	
Student Assistant	13.00	60		\$780	
Deliverables					
Copies of each plan	0.15	900		\$135	
Travel					
Travel to Phoenix for permitting with ASP	200.00	1	per trip	\$200	
Travel to the Verde Valley	100.00	3	per trip	\$300	

subtotal		\$6,266.20
Admin costs (5%)		\$313.31
TOTAL for task		\$6,579.51

3 Implementation of the Outreach and Education Plan

Program Coordinator	30.32	250		\$7,580
Student Assistant	13.00	100		\$1,300
Deliverables				
Printing for workshops	0.15	1000		\$150
Printing for reports	0.15	100		\$15
Travel				
Travel to the Verde Valley	100.00	4	per trip	\$400

subtotal		\$9,445.00
Admin costs (5%)		\$472.25
TOTAL for task		\$9,917.25

4 Implementation of the Invasive Species Control Plan

Program Coordinator	30.32	300		\$9,096
Student Assistant	13.00	200		\$2,600
Supplies, small equipment, and materials				
Aquatic-safe herbicide (10 gallons)	10	100	per gallon	\$1,000
Sprayers \$35 X 2	35.00	2	each	\$70
Ditch witch rental (4 day)	200.00	4	day	\$800
Loppers (for vegetation cutting) \$30 X 10	30.00	10	each	\$300
Chipper rental for 5 days (\$488 per day)	488.00	5	day	\$2,440
Diesel for chipper (10 gal/day at \$5/gal)	50.00	5	day	\$250
Gloves \$8 X 10	8.00	10	each	\$80

Travel					
Travel to the Verde Valley	100.00	8	per trip	\$800	
					\$17,436.00
Admin costs (5%)					\$871.80
TOTAL for task					\$18,307.80

5 Implementation of the Monitoring Plan

Program Coordinator	30.32	140		\$4,245	
Student Assistant	13.00	40		\$520	
Deliverables					
Photocopies	0.15	200		\$30	
Travel					
Travel to the Verde Valley for monitoring (2X) subtotal	100.00	4	per trip	\$400	
					\$5,194.80
Admin costs (5%)					\$259.74
TOTAL for task					\$5,454.54

6 Final Report

Program Coordinator	30.32	40		\$1,213	
Student Assistant	13.00	20		\$260	
Deliverables					
Copies of report	0.15	500		\$75	
subtotal for task					\$1,547.80
Admin Fees (5%)					\$77.39
Total for task					\$1,625.19

TOTAL PROJECT BUDGET \$44,639.70

Detailed In-Kind Breakdown:

Detailed In-Kind Contributions: Verde River Invasive Species Project

TASK	UNIT COST	# OF UNITS	UNIT	TOTAL COST	TOTAL PER TASK
1 Permits, Authorizations, Agreements					
		total for task	48%	5%	total foregone
Forgone indirect costs (total task cost* .48) - (total task cost*.05)= forgone indirects	2,624.20	1260	131	\$1,128	
					\$1,128.41
2 Develop Plans: Invasive Species Control Plan, Outreach and Education Plan, and Monitoring Plan					
		total for task	48%	5%	total foregone
Forgone indirect costs (total task cost* .48) - (total task cost*.05)= forgone indirects	6,266.20	3008	313	\$2,694	
					\$2,694.47
3 Implementation of the Outreach and Education Plan					
Web designer	35.40	15	hrs	\$531	
		total for task	48%	5%	total foregone
Forgone indirect costs (total task cost* .48) - (total task cost*.05)= forgone indirects	9,445.00	4534	472	\$4,061	
					\$4,592.35
4 Implementation of the Invasive Species Control Plan					
Certified Applicator volunteer from Verde NRCD	55.00	24	hrs	\$1,320	
Volunteers for control efforts (10 volunteers X 6 days X 5 hours X \$6.90/hr)	6.90	300	hrs	\$2,070	

	total for task	48%	5%	total foregone
Forgone indirect costs (total task cost* .48) - (total task cost*.05)= forgone indirects	17,436.00	8369	872	\$7,497

\$10,887.48

5 Implementation of the Monitoring Plan

	total for task	48%	5%	total foregone
Forgone indirect costs (total task cost* .48) - (total task cost*.05)= forgone indirects	5,194.80	2494	260	\$2,234

\$2,233.76

6 Final Report

	total for task	48%	5%	total foregone
Forgone indirect costs (total task cost* .48) - (total task cost*.05)= forgone indirects	1,547.80	743	77	\$666

\$665.55

TOTAL Matching BUDGET

\$22,202.02

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: Arizona Water Protection Fund Commission
2. Project Title: Verde River Invasive Species Project
3. Applicant Name and Address: Ecological Monitoring & Assessment Program, Northern Arizona University, P.O. Box 5845, Flagstaff, Arizona 86011
4. Current Land Owner/Manager(s): AZ State Parks Verde River Greenway / Dead Horse Ranch State Park
5. Project Location, including Township, Range, Section: T16N R3E Sections 27 & 2 for the Clarkdale, Cottonwood area
6. Total Project Area in Acres (or total miles if trail): Two sites within a 6-mile river stretch of the Verde River in the vicinity of Cottonwood, AZ for a total of 19 acres.
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: cutting, spraying and chipping of invasive plants along the main stream of the Verde River in the vicinity of the Towns of Clarkdale & Camp Verde and the City of

Cottonwood. Ground disturbance would be minimal- caused by walking, equipment moving chipper and any disturbacne while cutting larger invasive plants species.

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 area that the project will take place in is located in the active floodplain of the Verde River in central AZ. This floodplain has been very active in the last several decades with major floods changes have included cutting and filling floods with the channel moving back and forth across the river floodway.

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 UNKOWN

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.

Wilma G. Ennenga - 19 June 08
Applicant Signature /Date

WILMA G. ENNENGA
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*)

SHPO Comments

For State Historic Preservation Office:

Date:

Patricia Ann West

**Ecological Monitoring & Assessment (EMA) Program & Foundation
Northern Arizona University,
P.O. Box 5845, Flagstaff, AZ 86011
(928) 523-0736
Patty.West@nau.edu**

Education

Northern Arizona University, BS. - December 1996
University of Arizona, MS. Renewable Natural Resources- May 2002

Professional Experience

Twelve years of professional experience as a botanist, with ten years as an ethnobotanist:
Program Coordinator, Ecological Monitoring & Assessment (EMA) Program
Senior Research Specialist, Center for Sustainable Environments
Park Ranger, Verde River Greenway State Natural Area
Botanist, Inventory and Monitoring Program
Research Assistant and Program Coordinator, Arizona-Sonora Desert Museum
Research Associate, San Diego Natural History Museum
Assistant Research Botanist, Arboretum at Flagstaff
Botanist, NAU, Forestry Department, Ecology Lab (now ERI)

Honors and Awards

National Council of State Garden Clubs Scholarship, 1994, 1995, 1996, 1999, 2000, 2001; Pacific Region of the Federation of Garden Clubs Scholarship, 2000; Federation of AZ Garden Clubs Scholarship, 1993
Botany Academic Achievement Award, 1996; Deans Honor List, 1992-1996; Member of Phi Kappa Phi Honor Society, 1995-present; Arizona Nursery Association Stipend-Propagation, 1994; Federation of AZ Garden Clubs Scholarship, 1993

Publications

- Hansen, M., P. West, and K. Thomas. 2002. Plants of Petrified Forest National Park. United States Geological Survey- Biological Research Division. Flagstaff, Arizona.
- Nabhan, G.P., P. West, and R. Pirog. 2005. Linking Arizona's Sense of Place to a Sense of Taste: Marketing the Heritage Value of Arizona's Place-based Foods. Center for Sustainable Environments, Northern Arizona University, Flagstaff, Arizona.
- Nabhan, G. P., P. A. West, R. S. Felger, M. O'Brien, J. O'Brien, T. Van Devender, A. L. Reina G., S. McLaughlin, P. Jenkins, J. Stromberg. 2002. Exotic Plants in the Sonoran Desert Region: Plants *in* B. Tellman (ed). Invasive Exotic Species in the Sonoran Region. Univ of AZ Press, Tucson, AZ.
- West, P.A., M. Coder, S. Smith, G. P. Nabhan, and Zsuzi Kovacs. 2006. The Non-Timber Forest Products and Ethnobotanical Database for the Four Corners region of southwestern United States. Northern Arizona University, Flagstaff, AZ.
- West, P. A. and G. P. Nabhan. 2002. Invasive weeds: their occurrence and possible impact on the Central Gulf Coast of Sonora and the midriff islands of the Sea of the Cortés in B. Tellman (ed). Invasive Exotic Species in the Son Region. Univ. of AZ Press, Tucson, AZ.
- West, P. A., J. Rebman, G. A. Polis, and H. D. Humphrey. 2002. Appendix 4.4: Plants of some smaller islands in Case, T. J. and M. L. Cody. Island Biogeography in the Sea of Cortéz, second edition. University of California Press. Los Angeles, CA.

Project Site Photos:



Ailanthus altissima removal project near 10th St. bridge at Dead Horse Ranch State Park, March 2008.



arundo donax (giant reed) and *ailanthus altissima* tree along Verde River

Dead Horse Ranch State Park.



Russian olive tree along Verde River Dead Horse Ranch State Park



Tamarisk plant along Verde River Dead Horse Ranch State Park

eradication, and again each year after the project has been completed. The Verde NRCD, EMA and Verde River Greenway State Natural Area will collaborate on this monitoring.

- Description of re-vegetation/restoration plans or research design: This project will rely on natural revegetation to occur because there is a healthy native plant community that is readily reproducing in the area. This has been witnessed by local residents and horticulturalists bare ground or pots of soil will fill with cottonwood seedlings in less than one year. Ground that is threatened by erosion should be revegetated and this will be the responsibility of the land owners and managers. This may also be a continuation of this project, but is not in the scope of this proposal.

Description of Invasive Species Control Plan:

In hands-on workshops, volunteers will be cutting and chopping non-native vegetation and a certified pesticide applicator will be applying Rodeo® - glyphosate- or Habitat® to the cut stumps of the plants. The plant materials that are cut off are removed from the site so that they will not reroot. This is an effective way to kill the plants and prevent regrowth.

Description of existing plans and agreements-

SITE WEED MANAGEMENT PLAN

for

**Verde River Greenway Natural Area
and
Dead Horse Ranch State Park
Cottonwood, Arizona**

PERIOD 2006 - 2010

DRAFT

PREPARED BY S. Max Castillo, Unit Manager VRG, SNA, and Amy Gaiennie, RIM Volunteer
Arizona State Parks

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- B. How weeds interfere with management goals
- C. Inventory of highest priority plants that interfere with management goals

2. OVERVIEW OF WEED MANAGEMENT PLAN

- A. Management Philosophy and Setting Priorities: An Adaptive Management Approach
- B. Summary of Specific Actions Planned for the Verde River Greenway
- C. Management Tables

3. SPECIFIC WEED CONTROL PLANS

- Bermuda grass
- Cheat grass
- Cattail species
- Dalmatian toadflax
- Eurasian water milfoil
- Filaree
- Giant reed
- Johnson grass
- Lehmann lovegrass
- London rocket
- Malta Star-thistle
- Pampas grass
- Puncture vine
- Red brome
- Ripgut brome
- Russian knapweed
- Russian olive
- Russian thistle
- Sahara mustard
- Salt cedar/Tamarisk
- Siberian elm
- Sweetclover species
- Tree of Heaven

4. REFERENCES

5. APPENDICES (See tabbed dividers)

Priorities

Species Notes

Control Methods

Maps and Data

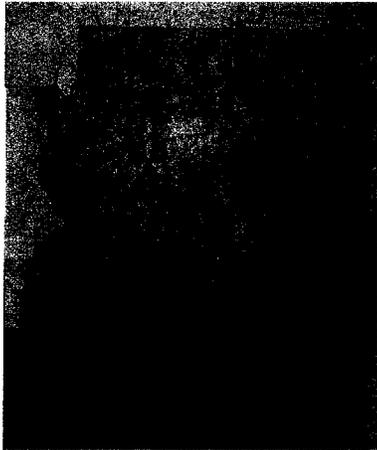
Photopoints and Photographs

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1. INTRODUCTION

A. Verde River Greenway and Dead Horse Ranch State Park Description and Purpose

The Verde River Greenway Natural Area (VRGNA) is a linear park unit of Dead Horse Ranch State Park (DHRSP) located along a 34-mile reach of the 180 Verde River in Central Arizona adjacent to the Town of Clarkdale, the City of Cottonwood and south of the Town of Camp Verde. The boundaries of the VRG since the May 2005 AZ State Parks Board meeting are the Tuzigoot Bridge to the north and the Beasley Flats River Use Area on the south. This is an area of approximately 34 river miles. The most significant natural resource in the Greenway, besides the year round flowing river, is the dense forest of riparian trees and shrubs along its riverbanks. This Fremont cottonwood / Gooding willow Riparian Gallery Forest is one of five remaining in Arizona and one of twenty such stands in the world. Many rare animals and plants inhabit this uncommon habitat. Three native fish known to exist in the Verde are on the Federal register of endangered species: spikedace minnow, Colorado pike minnow and razorback sucker. The Verde River and the area just outside the riparian corridor, support nearly twenty threatened or endangered species including river otter, southwestern bald eagle, southwestern willow flycatcher and lowland leopard frog. The tertiary lakebed deposits in the foothills adjacent to the Verde River contain Arizona cliffrose (*purshia subintegra*), Verde Valley Sage (*salvia dorrii mearnsii*) and Ripley's wild buckwheat (*erigonum ripleyi*), all three are considered rare or endangered. Dead Horse Ranch State Park is located almost in the middle of the Verde River Greenway and is comprised of mainly the upland areas associated with the riparian areas along the river, including mesquite (*prosopis velutina*), catclaw acacia (*acacia greggii*), desert willow (*chilopsis linearis*), Utah juniper (*juniperus osteosperma*) and other upland vegetation types. The purpose of both Dead Horse Ranch State Park and the Verde River Greenway are to provide recreational opportunities while meeting the AZ State Parks Mission Statement.



General location map VRG in center of state.



More detailed map of VRGNA with Clarkdale, Cottonwood and Camp Verde shown along the river.

B. How weeds interfere with management goals

Much of the area that is included in the Verde River Greenway State Natural Area and Dead Horse Ranch State Park has been historically used as agricultural land or even for gravel mining operations. The flood plain portion of the Verde River has been subjected to severe floods throughout history the latest being in 1993 and 1995. These two flood events, estimated to be 70-100 year events, scoured most of the vegetation from along the river channel as well as incising the channel and adjacent washes that feed into the river. Being adjacent to the Town of Clarkdale and the City of Cottonwood as well as unincorporated areas of Yavapai County the natural process of fire has been restricted in this habitat community (due to the urban wild land interface). Flooding still occurs on an annual basis with the severity of a flood event varying between bank full and 100-year flood events. The minor floods help with the natural recruitment of vegetation along the banks of the river and the flood plain; these flood events also spread the seeds for some of the invasive plants. The area of the Verde River has many challenges when considering the different types of plants that compete for space in the habitat. There are the cottonwoods and willows as well as Salt Cedar, Tamarisk (*Tamaricaceae*), Tree of Heaven (*Ailanthus altissima*), Pampas Grass (*Cortaderia selloana*), Giant Reed (*Arundo donax*) and Russian olive (*Elaeagnus angustifolia*) as well as others. These invasive species are competing and winning against the native species in much of this habitat. Invasive plants can carry fire in a different manner than native species possibly causing wild land fires to be more damaging than if they occurred in natural vegetation. Plants such as Tamarisk (*Tamarix* species) burn hotter but then will recover faster than a native plant after a fire and possibly taking over that niche in the environment. Tree of Heaven (*Ailanthus altissima*) grow very quickly and can shade out the native species competing for sunlight in the riparian area as well as in the uplands, they also regenerate quickly after a fire event and can become a monoculture.

The goals for the Verde River Greenway and Dead Horse Ranch State Park are that the invasive species will be controlled and the native species will continue to thrive in this habitat community providing:

1. Fremont cottonwood / Gooding willow gallery forest, with multi levels of habitat for birds and animals both migratory as well as indigenous.
2. Habitat suitable for, river otter, southwestern bald eagle, southwestern willow flycatcher and lowland leopard frog and native fishes.
3. A riparian area with a proper riparian condition.
4. Water shed (upland) suitable for native species and as free of invasives as possible.

Many of the invasive species currently occur in numbers that could be controlled through the use of a combination of mechanical and chemical control. There may also be the chance to try some biological control methods on some species in the area. In order to control these species there will need to be an outlay of not only labor resources but also of fiscal resources. We will need to pull, cut, burn, mow or spray many of these problem plants to gain control of them. Some of these control techniques may require special training, pesticide applicator licensing. Some may require special equipment, mowers, sprayers or even special chemicals or biological controls. Some of the plants species may require several applications of whichever method is used to control it and the applications may need to be done over several years, as the viability of the seed source in the environment may be measured in years.

Many of the invasive species that we are targeting in this plan can adversely affect the environment by out competing the native species, displacing the birds and animals that depend on the native species for food, shelter and nesting sites. Some of the plant will out compete the native species and then become a

monoculture removing the diversity of elevations and types of vegetation located along these riparian areas. Some of these plants can make a visit to this area unsatisfactory by causing discomfort and mechanical malfunction of recreational equipment (flat tires and sore feet), puncture vine is one example as well as being spread to other areas of not only the state but possibly on globally by being carried home by park visitors.

Education of adjacent property owners pertaining to the planting of non-native ornamentals vs. native plants will be part of the goals for this program. Many of the invasive plants along the Verde River Greenway are escapees of cultivation and landscaping such as Pampas Grass (*Cortia selloana*), Russian olive (*Elaeagnus angustifolia*), tree of heaven (*Ailanthus altissima*), and Siberian elm (*Ulmus pumila*).

C. Inventory of high priority plant species that interfere with management goals (This list has been annotated using the Arizona Wildlands Invasive Plant Working Group's ranking of invasive species. See definitions of rankings below):

- Bermuda grass (*Cynodon dactylon*)—M
- Cheat grass (*Bromus tectorum*)—H
- Cattails (*Typha* species)
- Dalmatian toadflax (*Linaria dalmatica* (L) P. Mill)—M
- Eurasian watermilfoil (*Myriophyllum spicatum*)—H
- Filaree (*Erodium cicutarium* (L.) L'Her. Ex Ait.)—M
- Giant reed (*Arundo donax*)—H
- Johnson grass (*Sorghum halepense*)—M
- Lehmann lovegrass (*Eragrostis lehmanniana*)—M
- London rocket (*Sisymbrium irio*)
- Malta Star-thistle (*Centaurea melitensis*)—M
- Pampas grass (*Cortia selloana*)—M
- Puncture vine (*Tribulus terrestris*)—EBNL
- Red brome (*Bromus rubens*)—H
- Ripgut brome (*Bromus rigidus*)—M
- Russian knapweed (*Centaurea repens* L)—H
- Russian olive (*Elaeagnus angustifolia*)—H
- Russian thistle (*Salsola vermiculata* Sennen)—M
- Sahara mustard (*Brassica tournefortii*)—M
- Salt cedar, Tamarisk (*Tamarix* species)—H
- Siberian elm (*Ulmus pumila*)—M
- Sweetclover species (*Melilotus officinalis*)—M
- Tree of Heaven (*Ailanthus altissima*)

Arizona Wildlands Invasive Plant Working Group's ranking of invasive species

High: These species have severe ecological impacts on ecosystems, plant and animal communities, and vegetational structure; invasiveness attributes are conducive to moderate to high rates of dispersal and establishment; and species are usually widely distributed, both among and within ecosystems/communities.

Medium: These species have substantial and apparent ecological impacts on ecosystems, plant and animal communities, and vegetational structure; invasiveness attributes are conducive to moderate to high rates of dispersal, often enhanced by disturbance; and ecological amplitude (diversity of ecosystems/communities) and distribution

Low: These species have minor yet detectable ecological impacts; invasiveness attributes result in low to moderate rates of invasion; ecological amplitude and distribution are generally limited, but the species can be problematic locally.

Alert: Additional designation for some species in either the high or medium category, but whose current ecological amplitude and distribution are limited. This designation alerts site managers to species capable of invading unexploited natural communities, based on initial, localized observations or behavior in similar ecosystems/communities elsewhere.

EBNL: Evaluated but not listed

D. The following invasive weeds have been documented and mapped on TOPO! (See Appendix 4 for maps and data).

Dalmatian toadflax
Giant reed
Lehmann lovegrass
Malta Star-thistle
Pampas grass
Russian knapweed
Russian olive
Sahara mustard
Salt cedar, Tamarisk
Tree-of-heaven

E. A distribution map has been prepared for the following species based on RIM Volunteers Ken Kingsley and Amy Gaiennie's report for Arizona State Park, "??". See Appendix 4 for maps and data

G. Additional non-native species: See Appendix 2 Species Notes.

2. OVERVIEW OF WEED MANAGEMENT PLAN

A. Management Philosophy and Setting Priorities: Adaptive Management Approach

Weed control is part of the overall site management and restoration program. We focus on the species and communities we want in place of the weed species, rather than on simply eliminating weeds. We will implement preventative programs to keep the site free of species that are not yet established there but which are known to be pests elsewhere in the region. We will set priorities for the control or elimination of weeds that have already established on the site, according to their actual and potential impacts on native species and communities, particularly on our conservation targets. We will take action only when careful consideration indicates leaving the weed unchecked will result in more damage than controlling it with available methods.

We use an adaptive management strategy. First, we establish and record the goals for the site. Second, we identify species that block us from reaching these goals and assign them priorities based on the severity of their impacts. Third, we consider methods for controlling them or otherwise diminishing their impacts and, if necessary, re-order priorities based on likely impacts on target and non-target species. Fourth, we develop weed control plans based on this information. Fifth, the plan is implemented, and results of our management actions are monitored. Sixth, we evaluate the effectiveness of our methods in light of the site goals, and use this information to modify and improve control priorities, methods and plans. Finally, we start the cycle again by establishing new/modified goals.

We set priorities in the hope of minimizing the total, long-term workload. Therefore, we act to prevent new infestations and assign highest priority to existing infestations that are the fastest growing, most disruptive, and affect the most highly valued area(s) of the site. We also consider the difficulty of control; giving higher priority to infestations we think we are most likely to control with available technology and resources.

In addition to the TNC guide for prioritizing species and specific infestations, we made use of the Arizona Wildlands Invasive Plant Working Group's ranking of invasive species and the ranking system employed in

the *Exotic Management Plan for Montezuma Castle and Tuzigoot National Monuments* (See Appendix 1, Set priorities using TNC guidelines)

B. Summary of Specific Actions Planned for the Verde River Greenway

The process followed for setting priorities for pest plant species is presented in Appendix 1. Treatment schedules, cost estimates, treatment implementation and post-treatment monitoring are presented in Section 3 of this report. Highest priority was given to plants that interfere with the most important management goals for Verde River Greenway/Dead Horse Ranch State Park; species selected for treatment were those whose populations were judged to be controllable given current levels of staffing and funding. Cost estimates need to be completed as appropriate funding and staffing are available.

We recognize that an integrated approach to invasive species management that includes revegetation by and, in some cases, restoration of native plants is ideal. Long term goals for invasive species management (as Arizona State Parks increases its commitment to funding and staffing or as available funding is found) is to

- 1) Develop a pool of community-based volunteers, including public school students.
- 2) To team with agency partners (such as the Coconino National Forest, Arizona Game and Fish Department, Verde Valley Weed Management Association), university research departments, private landowners and the surrounding communities to identify and eradicate newly invading pests and to contain and/or reduce older, more established populations.

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3. SPECIFIC CONTROL PLANS FOR HIGH PRIORITY WEED SPECIES

Common name: Bermuda grass

Scientific name: *Cynodon dactylon*

PRIORITY

Low at this time, as it is being used to prevent the spread of invasives adjacent to the site and for landscaping at Dead Horse Ranch State Park.

DESCRIPTION

Native of South Africa; lawn and forage grass; reproduces vegetatively by rhizomes and stolons; relatively low seed production, relatively long seed life in ground; erect and prostrate stems; sandy or saline soils of open sites, incl. roadsides, ag fields, irrigation canals, orchards, waste places. Serious agricultural pest.

CURRENT DISTRIBUTION ON THE SITE

See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Continue yearly monitoring and review current management practices related to this species

CONTROL OPTIONS

Spray Round Up in the fall; Pre-emergent herbicides: quizalofopryl + terbuthylazine, chlorsulfuron + terbuthylazine, and metribuzin have been shown to be an effective control. Insect pathogens. Some cultivated strains are susceptible to infestation by rice borers. Other insects reported to infest cultivated Bermuda grass include crickets, fall army worms, and several hemiptera

TREATMENT SCHEDULE

None at this time.

COST ESTIMATE

None at this time.

IMPLEMENTATION

POST-TREATMENT MONITORING

Common name: Cheat grass

Scientific name: *Bromus tectorum*

PRIORITY

High; however, control of this species is beyond the capability of staff and finances at the present operational levels.

DESCRIPTION

Winter or spring annual (depends on rain); "cheats" native grasses by maturing and setting seed much earlier in season; spikelets readily penetrate fur, socks and pants—may be widely dispersed by people and animals; invades communities in the absence of disturbance; flowers and dies in summer providing fuel for wild fires—infested areas burn at a much greater frequency (3-5 yrs.) than those of native community (60-100 yrs). At 3-5 yr. intervals native community cannot recover and cheat grass monoculture develops. From Medit, Eurasia; grows on roadsides, waste areas, mixed pastures, rangelands, cultivated crops, open slopes, salt desert shrub, sagebrush, pinyon juniper, even aspen-conifer; Best on sandy, gravelly soils; seeds dispersed within a week of maturity; contaminates hay, grain, straw, machinery

CURRENT DISTRIBUTION ON THE SITE

See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Continue to monitor presence and size of populations.

CONTROL OPTIONS

Cheat grass—most commonly controlled with herbicides, appropriately timed (including glyphosate in early spring before perennials have emerged); repeated mowing (every 3 weeks) can eliminate seed production; native perennials should be plugged or re-seeded following treatment.

TREATMENT SCHEDULE

None at this time.

COST ESTIMATES

None at this time.

IMPLEMENTATION

POST TREATMENT MONITORING

Common name: Cattail species

Scientific name: *Typha* species

PRIORITY

Low, since this is a native species; the population is expanding at springs, marshes, and the river corridor and may require treatment in the future.

DESCRIPTION

Advantage to Natural Areas: prevent erosion of shorelines, help remove excessive nutrients from water, food and shelter for wildlife. Disadvantage to controlled aquatic systems--interferes with management goals; pollen is common allergen. Reproduces from seed but mainly vegetatively (rhizomes); fruits fall near parent plant or disperse with wind, water or soil movement, human activities, clinging with mud to feet, fur, feathers; Can reproduce from rhizome fragments and disperse with tillage, water or soil movement. Rhizomes survive for less than 3 years.

CURRENT DISTRIBUTION ON THE SITE

Area of concern is the two lagoons (east and middle) that are currently used as a recreational fishing resource. The west lagoon is not currently used as a fishing lagoon. Cattails are also present throughout the Verde River Greenway along the Verde River. These do not interfere with current recreational uses and provide food and habitat for wildlife.

MEASUREABLE OBJECTIVES AND GOALS

Goal: Control at lagoons for recreational purposes.

1. Continue to control for recreational uses around DHR lagoons.
2. Yearly monitor expansion of populations along VRG river corridor, marshes, and springs.

CONTROL OPTIONS

For Dead Horse Ranch State Park, contract Verde Valley Weed Control (928-649-9053) to apply herbicide when the cattails are about two feet tall, approximately August 1. Verde Valley Weed Control uses a combination of Rodeo, Roundup and L1-700. They recommend that the herbicide be applied when the cattails are about two feet tall, around August 1. They also suggest spraying twice a year.

TREATMENT SCHEDULE

Dead Horse Ranch State Park treatment in August of each year when plants are approximately 2' tall. Follow up raking and hauling of cattails is very labor intensive.

COST ESTIMATE

Labor (90 hours at \$18/hour)	= \$1,600
Contract spraying	\$ 365
	\$1,965

Other costs not calculated at this time include fuel for trucks to haul slash.

IMPLEMENTATION

POST TREATMENT MONITORING

Common name: Cheat grass

Scientific name: *Bromus tectorum*

PRIORITY

High; however, control of this species is beyond the capability of staff and finances at the present operational levels.

DESCRIPTION

Winter or spring annual (depends on rain); "cheats" native grasses by maturing and setting seed much earlier in season; spikelets readily penetrate fur, socks and pants—may be widely dispersed by people and animals; invades communities in the absence of disturbance; flowers and dies in summer providing fuel for wild fires—infested areas burn at a much greater frequency (3-5 yrs.) than those of native community (60-100 yrs). At 3-5 yr. intervals native community cannot recover and cheat grass monoculture develops. From Medit, Eurasia; grows on roadsides, waste areas, mowed pastures, rangelands, cultivated crops, open slopes, salt desert shrub, sagebrush, pinyon juniper, even aspen-conifer; Best on sandy, gravelly soils; seeds dispersed within a week of maturity; contaminates hay, grain, straw, machinery

CURRENT DISTRIBUTION ON THE SITE

See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Continue to monitor presence and size of populations.

CONTROL OPTIONS

Cheat grass—most commonly controlled with herbicides, appropriately timed (including glyphosate in early spring before perennials have emerged); repeated mowing (every 3 weeks) can eliminate seed production; native perennials should be plugged or re-seeded following treatment.

TREATMENT SCHEDULE

None at this time.

COST ESTIMATES

None at this time.

IMPLEMENTATION

POST TREATMENT MONITORING

Common name: Dalmatian toadflax

Scientific name: *Linaria dalmatica* (L.) P. Mill

PRIORITY

High; low population numbers at this time and easy to control.

DESCRIPTION

Perennial; persistent, aggressive invader capable of forming colonies; competes with native grasses and other perennials; quick to colonize open sites; adaptable to a wide range of environmental conditions; sandy or gravelly soil; southeastern Europe and Mediterranean; ornamental; found in oak, aspen, sagebrush, mountain brush and riparian communities; roadsides, rangeland, waste places, cultivated fields, semi-arid regions; perennial; reproduces by seeds and rapidly spreading rhizomes; seeds dispersed by wind and animals, last up to 10 yrs. in soil, germinate in spring or fall; seedlings do not compete well with natives for soil moisture.

CURRENT DISTRIBUTION ON THE SITE

Three plants identified and removed by RIM Volunteers Amy Gaiennie and Ken Kingsley in the floodway of the Verde River. See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Goal: Identify any new plants and eradicate immediately

1. Continue yearly surveillance for new invasions of Dalmatian toadflax

CONTROL OPTIONS

Extensive, deep root system along with a waxy leaf make plant very difficult to control. Mechanical: Can be obtained using clean cultivation, but requires 8-10 cultivations for the first year and 4-5 cultivations in the second year. Planting competitive perennial and winter annual grasses is also required. Biological control: Currently, no agents are considered wholly effective. Chemical: Herbicides registered for control of Dalmatian toadflax and butter and eggs include dicamba, 2,4-D, and picloram. Picloram at 2.25 kg/ha controlled toadflax for two years. Combinations of picloram at lower rates with fluroxypyr also are effective. Studies have found combinations of picloram at lower rates with fluroxypyr also are effective. Studies have found that the best time for application are when the carbohydrate reserves are lowest. For Dalmatian toadflax, the reserves are generally highest in the fall at the end of the growing season, and are lowest at the beginning of flowering (in the summer).

TREATMENT SCHEDULE

Mechanical removal of plants by hand before seed set. Flowering occurs from May to August. RIM Volunteers Ken Kingsley and Amy Gaiennie found flowering plants on August 5, 2006 and removed them.

COST ESTIMATES

Minimum, due to small population at this time; removal will be accomplished along with routine patrol and maintenance duties.

IMPLEMENTATION:

RIM Volunteers Ken Kingsley and Amy Gaiennie removed three plants from the Verde River floodway on August 5, 2006. See Photopoints and Photographs.

POST TREATMENT MONITORING

DRAFT

Common name: Eurasian watermilfoil

Scientific name: *Myriophyllum spicatum*

PRIORITY

High; however, control of this species is beyond the capability of staff and finances at the present operational levels.

DESCRIPTION

Develop large colonies that form mats that interfere with water flow, boat traffic, recreational activities; create mosquito habitat and displace natives; reproduce from rhizomes and stem fragments; stem frags disperse with water, cling to feet or feathers of birds, and human activities, such as boating, mechanical harvesting, dumping of unwanted aquarium contents; Seeds consumed by water fowl may be carried great distances and survive up to 7 yrs. in dry conditions. Plants survive under a wide range of environmental conditions. Do better in ponds and lakes than in faster moving streams and rivers, but may be found there as well.

CURRENT DISTRIBUTION ON THE SITE

Known populations in Dead Horse Ranch State Park lagoons and along Verde River from Tavasci Marsh outflow downstream to current Verde River Greenway boundary at 89A Bridge.

MEASUREABLE OBJECTIVES AND GOALS

We only have resources to attempt control in the park lagoons at Dead Horse Ranch State Park. Any effort to control population along Verde River would require multi-agency teamwork.

CONTROL OPTIONS

Mechanical harvesting decreases stem density but root fragments escape; remove stem frags from equipment; may be controlled by several aquatic herbicides; excellent control is reported with 2,4-D, diquat, diquat and complexed copper, endothal and potassium salt, and endothal and complexed copper; good control with fluridone also reported. To be effective, fluridone concentrations of 10-15 ppb must be maintained in the water column for 10-12 weeks. Follow-up diver surveillance and hand-pulling of surviving plants is essential to the success of this technique. The herbicide triclopyr is undergoing federal aquatic registration and holds great promise for Eurasian watermilfoil control. Unlike fluridone, triclopyr requires a short contact time (18 to 48 hours) and will selectively control Eurasian watermilfoil while leaving many other aquatic plants relatively unaffected.

TREATMENT SCHEDULE

Dependent on availability of Arizona Game and Fish Department mowing barge.

COST ESTIMATES

None at this time.

IMPLEMENTATION

POST TREATMENT MONITORING

Common name: Filaree

Scientific name: *Erodium cicutarium* (L.) L'Her. Ex Ait

PRIORITY

High; however, control of this species is beyond the capability of staff and finances at the present operational levels.

DESCRIPTION

Common on any disturbed soil; large expanses of filaree leaves, sometimes with overlapping layers, quickly smother other seedlings, including native grass seedlings.

CURRENT DISTRIBUTION ON THE SITE

Roadsides, abandoned agricultural fields, disturbed soils throughout both DNR and VRCA area. See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Monitor populations yearly and note any expansion into natural areas.

CONTROL OPTIONS

An early successional species that is intolerant of mulch accumulation. RoundUp (glyphosate) has been recommended for control in some reserve areas; broadcast spray of this chemical could be tried in areas where the densest patches occur. Seeding natives after treatment is recommended. Follow-up treatments will likely be necessary, due to a potential target seed bank.

TREATMENT SCHEDULE

None at this time.

COST ESTIMATES

None at this time.

IMPLEMENTATION

POST TREATMENT MONITORING

DRAFT

Common name: Giant reed

Scientific name: *Arundo donax*

PRIORITY

High

DESCRIPTION

Giant reed is a perennial growing to 8 meters tall with well developed rhizomes. It reproduces vegetatively from the rhizomes and stems; viable seeds have not been observed in North America. Giant reed can tolerate periodic flooding. It represents a threat to the health and functioning of the river and its associated riparian plants and animals. It may also be a fire hazard. Dense monocultures can form and displace native vegetation, diminish wildlife habitat, and increase flooding and siltation. It is adapted to periodic fire and is readily flammable throughout the year. Large stands can significantly increase water loss from underground aquifers in semiarid regions.

CURRENT DISTRIBUTION ON THE SITE

See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Goal: Eradicate

1. Continue to identify and map all specimens in the Natural Area
2. Eradicate existing plants within 4 years.
3. Continue yearly surveillance.

CONTROL OPTIONS

Cut stump method: Cut stems using machetes and loppers. Within no more than 20 minutes of cutting stems, apply a 50% solution of glyphosate with an SP1 backpack sprayer. Cut stump method is very labor intensive because of the amount and difficulty of access for many individuals of this species.

TREATMENT SCHEDULE

July through November

COST ESTIMATES

Labor: 40 hours \$800
Chemicals: \$143.00 for 2.5 gallons of glyphosate
\$943.00

Cost estimated for treating approximately 12 populations varying in size from < 1 x 1 meters to > 4 x 5 meters along four miles of river bank.

IMPLEMENTATION

In a contract agreement between Arizona State Parks and Coconino National Forest, giant reed and pampas grass were eradicated on 8-29-06 and 8-30-06 using the cut stump and foliar spray methods. Prior to the application of herbicide, giant reed and pampas grass were mapped and documented by Arizona State Parks rangers and volunteers.

Participants: Arizona State Parks: Verde River Greenway Coordinator Max Castillo, Rangers Rob Burson and Dick Neimi, Volunteers Amy Gaiennie and Bill Turner, Coconino National Forest: Laura Mosher and two assistants.

On the two days of the herbicide application, giant reed stems were cut using machetes and loppers. A 50% solution of glyphosate was applied with an SP1 systems backpack sprayer no more than 20 minutes after cutting of the stems.

A 2% solution of glyphosate was applied with an SP1 systems backpack sprayer for foliar spraying of pampas grass. Pampas grass leaves were cut several weeks prior to application.

Several giant reeds were removed mechanically by hand and by truck on the parcel near Tuzigot Bridge. These plants were on the eroding bank of the Verde River and difficult to reach by cutting. Roots were also extracted and moved away from potential flooding.

POST TREATMENT MONITORING

DRAFT

Common name: Johnsongrass

Scientific name: *Sorghum halepense*

PRIORITY

High; however, control of this species is beyond the capability of staff and finances at the present operational levels. At this time control of this species should focus on containment of current infestations.

DESCRIPTION

Prolific seed production, extensive rhizome system, rhizome frags can sprout, ability to grow in a wide range of environments; 5 year old seeds -50% viable; 1 plant = 200-300 ft. of rhizomes in one month and 10 bushels of seeds on 1 acre in 1 season; seeds dispersed by water, wind, livestock, machinery, grain, hay; seeds pass unharmed through birds and cattle; may have allelopathic compounds; may be cause of allergies; extreme fire hazard; cyanogenic compounds may be a threat to cattle and wildlife. Shades out other plants decreases nutrient and moisture availability to other plants (Research needed for control in natural areas.

CURRENT DISTRIBUTION ON THE SITE

Located along ditch banks and in irrigated areas of DHRSP; some populations along Verde River. See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Goal: Contain and reduce area of infestation in DHR and VRG within 4 years.

1. Mow before seed set.
2. Change land management of lagoon terraces to limit growth.

CONTROL OPTIONS

Implement control during first weeks of growth (rhizome development not begun, carb levels low); carb level again low during fall; mowing, tilling and herbicide application may be best, followed by rapid revegetation; maintain undisturbed habitat to invaded area to prevent spread Mechanical: 2 clippings within the first 2 weeks of growth for plants growing from rhizomes; 1 clipping required for seedlings. Best time for mowing before seed set. Chemical: glyphosate and dalapon recommended in natural sites; multiple applications for several years. Apply when plants are actively growing > 18 inches tall.

TREATMENT SCHEDULE

Continuous.

COST ESTIMATES

None at this time.

IMPLEMENTATION

POST TREATMENT MONITORING

Common name: Lehmann lovegrass

Scientific name: *Eragrostis lehmanniana*

PRIORITY

High; however at this time, control of this species is beyond the capability of staff and finances at the present operational levels.

DESCRIPTION

Early production and maturation of an abundance of seeds; pioneer of disturbed sites; responds positively to fire and grazing and will replace native grasses; can be confused with some native grasses. In both its native range and in naturalized areas, London rocket is reported from abandoned fields, waste places, roadsides, and orchards.

CURRENT DISTRIBUTION ON THE SITE

Roadsides, trails including Mesa, VRG, Lime Kiln and Kish Trail. Scattered populations in uplands. See map and data in Appendix 4.

MEASUREABLE OBJECTIVES AND GOALS

Continue to monitor yearly.

CONTROL OPTIONS

Herbicide treatment followed by mowing will produce a mulch layer which then acts to suppress new sprouts while encouraging native seedlings. Glyphosate may be used.

TREATMENT SCHEDULE

None at this time

COST ESTIMATES

None at this time.

IMPLEMENTATION

POST TREATMENT MONITORING

DRAFT

Common name: London rocket

Scientific name: *Sisymbrium irio*

PRIORITY

High; however, control of this species at this time is beyond the capability of staff and finances at the present operational levels.

DESCRIPTION

Flowers from December through the summer and will continue until temperatures get too hot. It is a prolific seeder. Competes with or displaces native annual plant species

CURRENT DISTRIBUTION ON THE SITE

See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Continue to monitor yearly

CONTROL OPTIONS

No literature was found that reported microbial or insect pathogens. Several herbicides have been used to control *Sisymbrium* spp., including 2,4-D, imidazolinone, sulfonylurea, and triazolopyrimidine herbicides; Ohr et al (1996) reported effective sterilization of soil and complete control of weeds, including *Sisymbrium irio*, using methyl iodide instead of methyl bromide

TREATMENT SCHEDULE

None at this time

COST ESTIMATES

None at this time.

IMPLEMENTATION

POST TREATMENT MONITORING

DRAFT

Common name: Malta Star-thistle

Scientific name: *Centaurea melitensis*

PRIORITY

High

DESCRIPTION

Malta Star-thistle is a winter annual that germinates in the fall and winter and flowers and seeds in the spring. Typically each plant produces 100,000 seeds, the majority of which fall near to the plant. The seeds remain viable in the soil for 3 – 5 years. Seeds may be transported by wind and birds, in infested hay/seed, construction and fire fighting equipment, and by hikers along trails.

CURRENT DISTRIBUTION ON THE SITE

See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Goal: Eradicate.

1. Continue to monitor and map for new infestations.
2. Eradicate all infestations within 4 years.

E. CONTROL OPTIONS

Note: If mowing is done at the wrong time of year, it will transport seeds.

1. Window of opportunity exists at the beginning of flowering (2% flowering). The plants may be mowed, burned, grazed and/or hand pulled.
2. Chemical alternatives (most effective in the spring from seedling to rosette with first bud in center): Picloran 1 – 1.5 pints Tordon/A—all broadleaf plants are also injured or killed; Clopyralid ¼ - 2/3 pint Transline/A—adversely affects plants in Composite and Legume families; Tilling ground and/or grazing may improve effectiveness of herbicide application. Minimum 3 – 5 year management plan should be developed.

TREATMENT SCHEDULE

Late winter, early spring removal by mechanical and herbicide treatment.

COST ESTIMATES

Labor intensive for one to two weeks.

IMPLEMENTATION

RIM volunteer Amy Gaiennie took approximately 12 hours to remove populations at the Flycatcher Road parking area, the Raven Loop restroom site, the Mesquite Day Use Area cabins, the Jay Loop irrigation benches, and the Arroyo Nature Trail.

POST TREATMENT MONITORING

Common name: Pampas grass

Scientific name: *Cortaderia selloana*

PRIORITY

High

DESCRIPTION

Perennial; ornamental native to Argentina, Brazil and Uruguay; reproduces vegetatively by fragmentation of parent plant or tiller fragments; fire hazard with excessive build-up of dry leaves, leaf bases, and flowering stalks; in conservation areas, competes with natives and increases fire potential; flowering in late August-September, sometimes in winter; roots of a single plant can occupy a soil volume of approx. 1,100 square feet; lateral roots can spread to 13 ft. in diameter and 1 1/2 ft. in depth. Individual plants can survive 15 yrs

CURRENT DISTRIBUTION ON THE SITE

See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Goal: Eradicate

1. Continue to identify and map all specimens in the Natural Area.
2. Eradicate existing plants within 4 years.
3. Continue yearly surveillance.

CONTROL OPTIONS

1. Foliar spray method: Cut the leaves before plants bolt and 2 weeks before application of foliar spray of a 2% solution of glyphosate with an SP1 backpack sprayer. Very labor intensive as leaves must be cut and hauled away from the site before returning to spray. Individuals are often difficult to access in thick understory on river bank.

TREATMENT SCHEDULE

July through November

COST ESTIMATES

Labor: 80 hours @ \$7.50 = \$600

Chemicals: \$143.00 for 2.5 gallons of glyphosate.

Plants were much closer together than the giant reed populations and varied in size from <1 meter to >2 meters.

IMPLEMENTATION

In a contract agreement between Arizona State Parks and Coconino National Forest, giant reed and pampas grass were eradicated on 8-29-06 and 8-30-06 using the cut stump and foliar spray methods. Prior to the application of herbicide, giant reed and pampas grass were mapped and documented by Arizona State Parks rangers and volunteers.

Participants: Arizona State Parks: Verde River Greenway Coordinator Max Castillo, Rangers Rob Burson and Dick Neimi, Volunteers Amy Gaiennie and Bill Turner; Coconino National Forest: Laura Mosher and two assistants.

On the two days of the herbicide application, giant reed stems were cut using machetes and loppers. A 50% solution of glyphosate was applied with an SP1 systems backpack sprayer no more than 20 minutes after cutting of the stems.

A 2% solution of glyphosate was applied with an SP1 systems backpack sprayer for foliar spraying of pampas grass. Pampas grass leaves were cut several weeks prior to application.

Several giant reeds were removed mechanically by hand and by truck on the parcel near Zigzoot Bridge. These plants were on the eroding bank of the Verde River and difficult to reach by cutting. Roots were also extracted and moved away from potential flooding.

POST-TREATMENT MONITORING

Formal monitoring has not yet taken place; however, in two separate incidents Verde River Greenway Coordinator Max Castillo and RIM Volunteer Amy Gaiennie observed pampas grass plants that had been treated in August. Individual plants growing close together apparently responded differently to treatment. Amy observed two individuals; one plant was obviously severely stressed; the plant next to it was still robust. Max observed several instances of plants being stressed while those nearby were growing very robustly, indicating that the robustly growing plants may not have been treated.

DRAFT

Common name: Puncture vine, Goat head, Caltrop

Scientific name: *Tribulus terrestris*

PRIORITY

High

DESCRIPTION

Plant is characterized by "four projecting spikes so arranged that when three of the spikes are on the ground, the fourth points upward to poke a tire or hoof." Plant is a summer annual broadleaf weed growing in dense mats 2 – 5 ft. in diameter. Each seed pod has 5 flat spiny burrs and each spiny burr can contain up to 5 seeds. From 200 – 5,000 seeds are produced per plant per growing season depending on conditions, and the seeds can remain viable for up to 5 years in the soil. Puncture vine germinates in the spring and summer from seeds of the previous year. A rapidly growing deep taproot allows it to withstand dry soils. Can cause serious injury to livestock, people and pets and can puncture bicycle tires. Livestock may be injured from grazing on the burrs and from nitrate poisoning (sheep and cattle). The seeds are dispersed when they stick to tires, shoes, clothing of people and fur, feathers, and feet of animals.

CURRENT DISTRIBUTION ON THE SITE

Roadsides, agricultural fields, campgrounds and trails. Individuals are beginning to grow onto the USFS trail system leading out of DHRSP.

MEASUREABLE OBJECTIVES AND GOALS

Goal: Eradicate

1. Continue to identify and map all specimens
2. Eradicate existing plants within 4 years using integrated pest control
3. Continue yearly surveillance

CONTROL OPTIONS

1. Mechanical: Hand removal or hoeing (cut the plant off at its taproot) with small infestations; for example, in areas where the plant has just begun to establish. Areas where mechanical control might be effective include trails throughout the park, especially at the beginnings of trails which start in the park and travel onto Forest Service lands.
2. Mechanical mulching using organic or synthetic mulches to screen out all light. The organic mulches should be at least 3" thick (however, plant can establish on surface due to deep taproot). Synthetic mulches provide a physical barrier to seedling development. Experimental harvest of seeds by vacuum or carpeted roller, thus removing seed source from treatment area, will be attempted.
3. Aeration of compacted sites and planting of competitive desirable plants
4. Biological methods: Release of both seed weevils (*Microthous lareynii*) and stem weevils (*Microthous typriformis*), which are approved for use in the state of Arizona. This treatment is most effective when both weevils are used and plants are moisture-stressed. It may also be best to collect them in the area where they will be used, if possible.
5. Chemical controls: Chemical controls: Post-emergent: 2,4-D or glyphosate--the smaller or younger the plant the more effective; since glyphosate will kill or injure most plants, use as spot treatment or on solid stands.

TREATMENT SCHEDULE

Late spring, early summer for herbicide and weevil application. Mechanical treatment preferably before seed set. Seed gathering would have to occur after seeds drop until plants start growing again.

COST ESTIMATES

Costs vary with treatment type:

Puncture vine seed and stem weevils application rate is 1 unit per acre @ \$75 per unit plus labor for application.

Herbicide treatment is at a rate of 3 oz. glyphosate per gallon of water. The product cost in 2006 was \$2.48 per 3 oz. of glyphosate. Cost will vary with infestation size; we will be spot treating.

Mechanical will need to be calculated on the price of renting large yard vacuum or using a carpeted roller to pick up seeds for seed harvesting. Hoeing will be calculated on hourly rate for labor.

IMPLEMENTATION

Verde River Greenway and Dead Horse Ranch State Park developed an unusually large infestation of puncture vine following summer rains. Large, monoculture stands were observed in campgrounds, especially in Quail Loop, along the Verde River Greenway trail, at the entrances to the Mesa and Lime Kiln trails, and in the agricultural fields adjacent to the lagoons. Rangers, volunteers, and visitors expressed concern for possible injury to themselves, their pets, and their equipment, such as tents and bicycles.

Control options were assessed and the decision was made to employ current biological controls available commercially: They were puncturevine stem weevil (*Microlarinus lypriformis*) and puncturevine seed weevil (*Microlarinus lareynii*). A company in Oregon that sold the weevils was identified through an Internet search following contact with Arizona Biological Control, which does not currently offer the weevils for market. Six units of weevils were ordered through I.R.V. Goatheads on August 16, 2006. Ordering was done through Alvin at 541-922-4455. Roak D. Teneyck, the owner of I.R.V. Goatheads, was reached by cell phone at 541-771-5335 and was very accessible for advice and consultation.

Three locations were chosen for weevil distribution for the following reasons:

1. The River Day Use areas adjacent to a chemical free zone. Use of biological control agents supports this non-chemical treatment of puncture vine. This area also experiences the greatest winter cold as it is one of the lowest elevation locations at the parks.
2. Quail Loop is a high-use, sometimes congested campground with one of the largest infestations of puncturevine at Dead Horse Ranch State Park.
3. The entrance to Golden Eagle Road is relatively quiet and undisturbed. Puncturevine weevils do best in areas of least disturbance.

The first shipment of weevils was due on August 24. These did not arrive on the anticipated date due to UPS error; shipment was returned to I.R.V. Goatheads when it arrived on August 25. I.R.V. Goatheads shipped a new order, which arrived August 31. One unit arrived dead. The remaining units were distributed at the River Day Use area, Quail Loop, and the entrance to the Ranger Residence (entrance to Golden Eagle Road). They were distributed (following Roak Teneyck's instructions) in units of 25 weevils at intervals of 15 feet. The locations of weevil distribution were pin-flagged.

The replacement unit arrived September 8. These were distributed at new sites at Quail Loop and the entrance to Golden Eagle Road.

POST TREATMENT MONITORING

Following placement of the weevils, the sites were monitored on September 6, September 7, September 14, and October 3. The greatest amount of damage to the seeds and stems was observed on the puncturevines at the entrance to Golden Eagle Road. On September 14, most plants at this site had enlarged, discolored (purple in hue) seeds. On October 3, stem scars were also observed on many of these plants. In addition, RIM Volunteer Amy Gaiennie observed damage to puncturevine seeds in the lagoon parking median strip north of the entrance to Golden Eagle Road; apparently the seed weevils migrated to these plants.

No damage to the puncturevine plants appeared to have been done in Quail Loop, although a very robust population was growing there. There are several possible causes: 1. weevils were in a weakened condition after travel. 2. Quail Loop is a very active campground and the level of disturbance, particularly on Labor Day, may have disrupted the weevils. It was very difficult to assess the damage to the puncturevine plants at the River Day Use Area. By the time the weevils were dispersed, the plants had been stressed by mowing and, possibly, lack of water (the summer monsoon had ended by this time). The weevils may not have had an adequate population of stems and living seeds for reproduction and forage. For next year, it is recommended that weevils be ordered at the beginning of June for July 1

It has been reported that the seed and stem weevils can use a native caltrop, summer poppy () for food (See Sonoran Desert). Summer poppy plants in the vicinity of treated puncturevine plants should be monitored for any damage. Care should be taken not to place weevils in areas where puncturevine and summer poppies grow together. A large, robust population of summer poppies was observed by RIM Volunteers in the uplands along the Bill Ensign Trail. These populations could potentially be used for repopulating any damaged summer poppies.

DRAFT

Common name: Red brome

Scientific name: *Bromus rubens*

PRIORITY

High; however, at this time, control of this species is beyond the capability of staff and finances at the present operational levels.

DESCRIPTION

Hot dry summers and mild, moist winters preferred; killed by winter freeze; grows readily below cottonwoods, willows and mesquites where light penetrates; lacks shade tolerance; grazing and burning may increase quantity; awns and florets are a direct threat to wildlife and livestock; associated with increased density of rabbits, grasshoppers and kangaroo rats; fire hazard because of slow decay process.

CURRENT DISTRIBUTION ON THE SITE

Found throughout the Verde River Greenway and Dead Horse Ranch State Park. See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Continue to monitor yearly.

CONTROL OPTIONS

Red brome difficult to control; no herbicides known that would not have impact on natives as well; pre-emergent most effective (1-2 applications before seed sets) Management goals: reduce seed production and increase competition from native plants and grasses; Mechanical: hoe or pull with small infestations; spring raking of dead stems reduced fire hazard; mulching may help (testing of method recommended); limited and controlled grazing by sheep. Chemical: pre-emergent herbicide may affect natives

TREATMENT SCHEDULE

None at this time.

COST ESTIMATES

None at this time.

IMPLEMENTATION

POST TREATMENT MONITORING

DRAFT

Common name: Red brome

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CURRENT DISTRIBUTION ON THE SITE

Found throughout the Verde River Greenway and Dead Horse Ranch State Park. See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Continue to monitor yearly.

CONTROL OPTIONS

Red brome difficult to control; no herbicides known that would not have impact on natives as well; pre-emergent most effective (1-2 applications before seed sets) Management goals: reduce seed production and increase competition from native plants and grasses; Mechanical: hoe or pull with small infestations; spring raking of dead stems reduced fire hazard; mulching may help (testing of method recommended); limited and controlled grazing by sheep. Chemical: pre-emergent herbicide may affect natives

TREATMENT SCHEDULE

None at this time.

COST ESTIMATES

None at this time.

IMPLEMENTATION

POST TREATMENT MONITORING

DRY

Common name: Ripgut brome

Scientific name: *Bromus rigidus*

PRIORITY

High; however, at this time, control of this species is beyond the capability of staff and finances at the present operational levels.

DESCRIPTION

Breaks off into single slender seeds with backward pointing stiff hairs which can't be seen by the naked eye but can be felt. Seeds can become embedded in clothes or socks and can only be pulled out sharp-end first; can work its way into eyes and soft tissues of animals; eaten by cattle early in the season when basal leaves are soft and wide. Preferred along with wild oats by gophers and thrives in disturbed soil that makes up gopher piles.

CURRENT DISTRIBUTION ON THE SITE

Populations found throughout Verde River Greenway and Dead Horse Ranch State Park.

MEASUREABLE OBJECTIVES AND GOALS

Continue to monitor yearly.

CONTROL OPTIONS

Mechanical: Tilling effective.; Chemical: Pre-emergent chemicals cyanazine + terbutylazine, chlorsulfuron + terbutylazine, and metribuzin have been shown to be an effective control. Biological: None known. Cultural/preventative: Establish native perennial grasses to prevent invasive annual emergence

TREATMENT SCHEDULE

None at this time.

COST ESTIMATES

None at this time.

IMPLEMENTATION

POST TREATMENT MONITORING

DRAFT

Common name: Russian knapweed

Scientific name: *Acroptilon repens*

PRIORITY

High

DESCRIPTION

This is a very aggressive, competitive plant that may form monocultures. The plant secretes allelopathic chemicals (polyacetylenes) that inhibit the growth of other plants. The plant also accumulates copious quantities of zinc in its foliage (inhibiting the effectiveness of Round Up). Infestations may survive extended periods (recorded at 75 -> 200 years) and become a permanent part of the ecosystem. It is toxic to horses ("chewing disease") and may also affect human health when handled without proper equipment (allergic dermatitis, difficulty in breathing). Mowing and tilling increases density.

CURRENT DISTRIBUTION ON THE SITE

See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Goal: Eradicate

1. Continue to identify and map all specimens in the Natural Area.
2. Eradicate existing plants within 4 years.
3. Continue yearly surveillance.

CONTROL OPTIONS

(1) Lasting control requires an integration of mechanical, chemical, and biological control, proper land management, and vegetative suppression. An effective management program must first control existing infestations, and then promote repopulation by native plants. Continued monitoring and follow-up treatments should be conducted annually to eliminate any infestations. (2) The keys to controlling this invasive are to a) stress the weed and cause it to expend nutrient reserves in its root system, b) eliminate new seed production, and c) control vegetative spread. **Mechanical:** Pulling plants two to three times annually if sufficient labor is available; Cutting, mowing or discing several times annually will control the existing topgrowth. **Chemical** (if infestation is too large for mechanical control): Tordon (picloram), Transline (clopyralid), Curial (clopyralid + 2,4-D), and Roundup (glyphosate) are herbicides that have been shown to be effective. **Biological:** Two agents have been released in the United State-Subanguina picridis, a gall forming nematode, and *Aceria acroptiloni*, a seed gall mite. (3) Research studies by universities of potentially effective alternate herbicides with native vegetation for restoration.

TREATMENT SCHEDULE

None at this time.

COST ESTIMATES

None at this time.

IMPLEMENTATION

RIM Volunteers Ken Kingsley and Amy Gaiennie took approximately 6 hours to remove plants by hand and hoes from an agricultural field roadside and to hand pull all plants found along the Verde River at the Verde River Greenway Trail.

POST TREATMENT MONITORING

DRAFT

Common name: Russian olive

Scientific name: *Elaeagnus angustifolia* L.

PRIORITY

High

A. DESCRIPTION

The root system of this tree is deep with many well-developed lateral roots. It can resprout from the crown and roots. It reproduces by seeds, which are distributed by animals, especially birds. This tree is especially invasive in seasonally wet riparian habitats and can replace native willows and cottonwoods at some locations. The seeds can germinate under a broader range of conditions than willows and cottonwoods, and the seedlings can survive under a cottonwood-willow canopy, growing rapidly with the loss of one of those trees. Willow and cottonwood seedlings rarely survive under a Russian olive canopy. With the loss of a native tree, it can then grow rapidly, up to six feet on one year.

CURRENT DISTRIBUTION ON THE SITE

See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Goal: Eradicate

1. Continue to identify and map all specimens in the Natural Area
2. Eradicate existing plants within 4 years.
3. Continue yearly surveillance.

CONTROL OPTIONS

1. Cut stump method is designed to kill the root system. Enough herbicide should be applied to get 80-90% root kill. Do not use the cut stump method when deciduous trees are greening up. Recommended herbicide is Garlon 4.
2. Round Up at a 5% solution. Foliar application in late spring through early summer.

TREATMENT SCHEDULE

Fall to early winter when trees are taking sap into roots for winter dormancy.

COST ESTIMATES

Not yet available.

IMPLEMENTATION

On October 19, 2004, Russian olive seedlings were removed from the lagoon perimeter using the cut stump method. Rangers Rob Burson, Dick Niemi and RIM Volunteer Amy Gaiennie spent approximately 1 ½ hours cutting Russian olive seedlings with loppers and applying a 50% solution of glyphosate to the stumps. Approximately 30 trees were removed ranging in size from < 1 meter to >2 meters.

POST TREATMENT MONITORING

Common name: Russian thistle

Scientific name: *Salsola kali*

PRIORITY

High, however, at this time, control of this species is beyond the capability of staff and finances at the present operational levels.

DESCRIPTION

Most common in areas that are repeatedly disturbed; growth suppressed when other plants establish first and have adequate moisture to outcompete the weeds; mowing tends to encourage growth but repeated mowing may help.

CURRENT DISTRIBUTION ON THE SITE

Widespread throughout Verde River Greenway and Dead Horse Ranch State Park. See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Continue to monitor yearly.

CONTROL OPTIONS

(1) Reestablish healthy native plant community in disturbed areas where Russian thistle grows. "Growth is suppressed when other plants establish first and have adequate moisture to out compete the weeds."
(2) For small infestations pull or uproot young plants or hoe just below the ground level before seed sets in early summer. (3) Mowing tends to make the plants grow but repeated mowing may afford some control.

TREATMENT SCHEDULE

None at this time.

COST ESTIMATES

None at this time.

IMPLEMENTATION

POST TREATMENT MONITORING

DRAFT

Common name: Sahara mustard

Scientific name: *Brassica tournefortii*

PRIORITY

High; small population at this time.

DESCRIPTION

Fast-growing, drought tolerant winter annual that prefers sandy soils*; Large plants produce up to 9,000 seeds; tumble like Russian thistle; when wet, seeds are sticky and can be transported long distances by animals and vehicles; out competes natives; in wet years 100% ground cover; catches fire when it dries (burned areas become wastelands of nearly pure Sahara mustard)

CURRENT DISTRIBUTION ON THE SITE

A few plants identified and removed by RIM Volunteers Ken Kingsley and Amy Gaiennie at the Dead Horse Ranch State Park entrance bridge and Forest Loop Trail. See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Goal: Detect any established plants and eradicate immediately.

1. Continue yearly surveillance for new invasions of Sahara mustard

CONTROL OPTIONS

In small areas can be eradicated by pulling plants before they set seed; herbicide treatment may be effective-use in early spring before natives begin to grow. From Sonoran Desert Museum Invaders program; Due to its development early in the season, chemical control may be a good option. Can be controlled with 2, 4-D dicamba (1.6 lb/acre), or glyphosate (1.5 lb/acre) Application would be done prior to desirable native plant development.

TREATMENT SCHEDULE

Monitor fall and winter rains; remove plants as they grow.

COST ESTIMATE

Cost is included in other areas such as patrol or litter cleanup.

IMPLEMENTATION:

RIM Volunteers Ken Kingsley and Amy Gaiennie removed all plants found at the entrance bridge vicinity on May 31, 2006. Estimated population size < 20 plants.

POST-TREATMENT MONITORING

Common name: Salt Cedar, Tamarisk

Scientific name: Tamarix sp.

PRIORITY High

DESCRIPTION

In worst cases existing today, salt cedar has completely replaced cottonwood/willow communities, altered the hydrology and flood regime, and lowered the water table; in such advanced stages revegetation after eradication must be shrub-grass community—willows and cottonwoods are no longer an option. One estimated water use figure: 300 gallons/tamarisk/day

CURRENT DISTRIBUTION ON THE SITE

Refer to Appendix 2 for maps and data.

MEASUREABLE GOALS AND OBJECTIVES

Goal: eradicate

4. Continue to identify and map all specimens in the Natural Area
5. Eradicate existing plants within 4 years.
6. Continue yearly surveillance.

CONTROL OPTIONS

- 1). Backpack sprayer and hand gun. It is recommended that a dye be mixed with the spray so that the sprayer can see where the spray has been applied. When the sprayer can see the dye, he or she has applied enough spray. The spray should be applied to the top of the tree (reach apical points) and down through the middle, getting the tree thoroughly wet. Note: Do not use spray that will adversely affect the native community (for example, Arsenal is very bad for willows)
- 2). Top remove and spray re-sprouts when they are 4 – 6 feet tall. Let the re-sprouts sit for two full growing seasons at a minimum before top removing, or they will resprout.
- 3). Cut stump method is designed to kill the root system. Enough herbicide should be applied to get 80-90% root kill. Do not use the cut stump method when deciduous trees are greening up.
- 4). Hand pull seedlings where found. Salt cedar is easiest to remove at this stage. Seedlings are found along the river bank, and on the floodplain and terraces. They are also found growing around the lagoons at Dead Horse Ranch. This method should be used in combination with the above.

TREATMENT SCHEDULE

Fall to early winter when trees are taking sap into roots for winter dormancy.

Pull seedlings from lagoon area when performing routine duties such as patrol and litter cleanup

COST ESTIMATES

None at this time

IMPLEMENTATION

RIM Volunteer Amy Gaiennie took 3 1/2 hours to remove 131 seedlings from the lagoon perimeters by hand pulling of plants. This was done in conjunction with other activities, such as plant surveys.

POST TREATMENT MONITORING

Common name: Siberian elm

Scientific name: *Ulmus pulmila*

PRIORITY

High

DESCRIPTION

Dry to mesic prairies and stream banks are vulnerable to Siberian elm invasion. Thickets of seedlings soon form around seed-producing trees, bare ground areas, animal and insect mounds, and other disturbed areas. Wind carries seed to distant areas where new colonies can form. This tough exotic survives under conditions not easily tolerated by other species, allowing it to take advantage of open ground and resources otherwise used by native plants. Fast growing seedlings of Siberian elm quickly overtake native vegetation, especially shade-intolerant species. This often leads to invasion by additional weedy species, compounding the problem.

CURRENT DISTRIBUTION ON THE SITE

Jail Trail area, 89A River Access Point area.

MEASUREABLE OBJECTIVES AND GOALS

Goal: Eradicate

1. Continue to identify and map all specimens in the Natural Area
2. Eradicate existing plants within 4 years.
3. Continue yearly surveillance.

CONTROL OPTIONS

1. Cut stump method is designed to kill the root system. Enough herbicide should be applied to get 80-90% root kill. Do not use the cut stump method when deciduous trees are greening up. Recommended herbicide is Garlon 4.

TREATMENT SCHEDULE

Fall to early winter when trees are taking sap into roots for winter dormancy.

COST ESTIMATES

None at this time

IMPLEMENTATION

POST-TREATMENT MONITORING

Common name: Sweetclover species

Scientific name: *Melilotus officinalis*

PRIORITY

Low at this time; control of this species is beyond the capability of staff and finances at the present operational levels.

DESCRIPTION

This tree has been planted and escaped throughout the Cottonwood, Clarkdale and Bromo area. It has also been planted as a shade tree at Dead Horse Ranch State Park and on other state park properties. It is found on private property along the Verde River. It grows rapidly (seedlings establish well-formed tap root in less than 3 months), does well on poor soils, has a high degree of shade tolerance, and sprouts vegetatively from stumps and root portions. The roots secrete allelopathic chemicals that inhibit the growth of other plants. Mature trees can produce up to 325,000 seeds and are wind-dispersed. Root system is aggressive enough to cause damage to sewers and foundations.

CURRENT DISTRIBUTION ON THE SITE

Throughout Verde River corridor and around DHR Lago

MEASUREABLE OBJECTIVES AND GOALS

Monitor changes in populations along Verde River

CONTROL OPTIONS

Prescribed burns and mowing; mechanical pulling-T&C; mowing plants at the end of the summer can result in high mortality; Dicamba or mixture of 2,4-D and dicamba were recommended by Lorenzi and Jeffery (1987) for both white and yellow sweetclover. No other literature pertinent to herbicide control was found.

TREATMENT SCHEDULE

Monitoring will take place while doing other patrol tasks.

COST ESTIMATES

IMPLEMENTATION

POST-TREATMENT MONITORING

Common name: Tree of heaven

Scientific name: *Ailanthus altissima*

PRIORITY

High

DESCRIPTION

This tree has been planted and escaped throughout the Cottonwood, Clarkdale and Jerome area. It has also been planted as a shade tree at Dead Horse Ranch State Park and on other state park properties. It is found on private property along the Verde River. It grows rapidly (seedlings establish well-formed tap root in less than 3 months), does well on poor soils, has a high degree of shade tolerance, and sprouts vegetatively from stumps and root portions. The roots secrete allelopathic chemicals that inhibit the growth of other plants. Mature trees can produce up to 325,000 seeds and are wind-dispersed.

CURRENT DISTRIBUTION ON THE SITE

See Maps and Data.

MEASUREABLE OBJECTIVES AND GOALS

Goal: eradicate

1. Continue to identify and map all specimens in the Natural Area.
2. Eradicate existing plants within 4 years.
3. Continue yearly surveillance.

CONTROL OPTIONS

(1) Cut stump method is designed to kill the root system. Enough herbicide should be applied to get 80-90% root kill. Do not use the cut stump method when deciduous trees are greening up. Recommended herbicide is Garlon 4.

TREATMENT SCHEDULE

Year round with cut stump treatment best as trees take sap into root for winter dormancy. Mechanical can be done at any time of year.

COST ESTIMATES

None at this time. Any method of treatment is very labor intensive.

IMPLEMENTATION

In the past the trees have been removed mechanically along the irrigation ditch in Mesquite Cabin Camp site are with tractor and winch to pull stumps. The tree removal opened the canopy for about two years but the trees resprouted from root fragments and seeds. We went back into that area and cut the sprouts and treated with 50% glyphosate on approximately 200 feet of trail, have not gone back to check on effects. Volunteer has cut the trees at the west end of west lagoon, the stumps resprouted and have been cut twice more while they still resprout, we will treat this area with glyphosate as soon as possible. (fall of 2006)

POST TREATMENT MONITORING

4. REFERENCES

5. APPENDICES (See tabbed dividers)

Priorities

Species Notes

Control Methods

Maps and Data

Photopoints and Photographs

DRAFT



United States
Department of
Agriculture

Forest
Service

Coconino
National Forest,
Supervisor's Office

1824 S. Thompson Street
Flagstaff, AZ 86001-2529
Phone: (928) 527-3600
Fax: (928) 527-3620

File Code: 1580

Date: June 23, 2006

RE: ISA PR06-301

FS Agreement #06-PA-11030420-766

Margaret Fernandez, Procurement Officer
Business Services Unit
1300 W Washington, Room 200
Phoenix, AZ 85007

Noxious weed removal at Dead Horse
State Park and the Verde River
Greenway State Natural Area

GRANTS & AGREEMENTS TRANSMITTAL LETTER

X Enclosed is 1 original and 0 copy(ies) of the referenced documents which has been signed on behalf of the USDA Forest Service, Coconino National Forest.

Please return a fully executed copy for our files.

X We have retained a fully executed copy for our files.

Please note and initial change(s), then return a fully executed copy for our files.

----- Please have all the copies signed by an authorized individual and return all copies to the above address: attention Elizabeth Vensel, Grants and Agreements Specialist.
A fully executed copy will be returned for your files.

X We are submitting a fully executed copy for your files.

If you have questions, please call me at (928) 527-3561, or email to evensel@fs.fed.us.

Sincerely,

ELIZABETH A. VENSEL
Grants & Agreements Specialist

cc: Laura Moser



Caring for the Land and Serving People

Re-use or Recycle Please



FINANCIAL PLAN

COST ELEMENTS	FOREST SERVICE			COOPERATOR					(i) Total
	(a)	(b)	(c)	(d)	(e)	(f)			
	Non-Cash Contrib.	Value of In-Kind Contrib.	Reimb. Coop. Expense	Non-Cash Contrib.	Value of In-Kind Contrib.	THIRD PARTY			
						Cash Contributions			
					Coop.	Non-Fed	Federal		
Direct Costs									
Salaries/Labor	\$7,572.00								\$7,572.00
Travel	\$390.00								\$390.00
Equipment Use									\$0.00
Supplies	\$1,466.00								\$1,466.00
Materials									\$0.00
Printing									\$0.00
Subtotal	\$9,528.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$9,528.00
Indirect Costs	\$272.00								\$272.00
Total	\$9,800.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$9,800.00

(j) Estimated Program Income (subtract from total of column (i));
 (k) Net Total Project Value: \$9,800.00

Matching Costs Determination		Reimbursement Calculation	
Total Forest Service Share = (a+b+c) + (k) = (l)	(l)	Forest Service Reimbursement percent (c) + [(d+f+g+h) - (j)] = (q)	(q)
	100.00%		#DIV/0!
Third Party Cash Contribution Federal = (h + k) = (m)	(m)	Cooperator expenses NOT reimbursed by FS (d+f+g+h-j) + (c+d+f+g+h-j) = (r)	(r)
	0.00%		#DIV/0!
Total Federal Share = (l+m) = (n)	(n)	Reimbursable Amount = Total actual cost incurred to date (sum of cost elements from the Cooperator's invoice as prescribed in provisions and multiplied by #DIV/0! (q) minus any previous Forest Service payments, not to exceed the subtotal amount listed in column (c) minus any estimated program income.	
	100.00%		
Total Cooperator Share (d+e+f+g) - (j) + (k) = (o)	(o)		
	0.00%		
Total (n+o) = (p)	(p)		
	100.00%		

Instructions

- Use Cost Elements that apply to the particular project. The Cost Elements listed are examples of those commonly used. Delete those that don't apply. Value assessed for volunteer labor should be commensurate with local labor rates for similar work. Donated materials, equipment and supplies should be valued at rates and prices available in the current local market.
- (a) **Forest Service Non-Cash Contribution:** Forest Service employee salaries, travel, equipment, supplies, etc., provided toward completion of the project. Total Forest Service indirect cost (overhead) is also included in this column. All the costs listed here are an expense to the Forest Service.
- (b) **Value of Forest Service In-Kind Contribution:** Forest Service contributions toward completion of the project for which the Forest Service has incurred no expense. These contributions include such items as volunteer labor, donated materials, equipment, supplies, etc., contributed by third parties directly to the Forest Service. Forest Service volunteer and/or equipment rental agreements should be used to document the donated services.
- (c) **Reimbursable Cooperator Expenses:** The figure(s) listed are both the maximum Forest Service funds to be obligated for reimbursement and Cooperator expenses that are not included anywhere else on this form. This is an expense to the Forest Service.
- (d) **Cooperator Contribution:** Cooperator employee salaries, travel, equipment, supplies, etc., provided toward completion of the project. Total Cooperator indirect cost (overhead) is also included in this column. All the costs listed here are an expense to the Cooperator.
- (e) **Value of Cooperator In-Kind Contribution:** Cooperator non-cash contributions provided toward completion of the project for which the Cooperator has incurred no expense. These contributions can be made from the Cooperator or through the Cooperator by other entities and include such items as volunteer labor, donated materials, equipment, supplies, etc. These values are not reimbursable and can only be used to satisfy the Cooperator's matching requirement.
- (f) **Cash Contribution to the Forest Service:** Cooperator cash contribution provided to the Forest Service for use in completing the project. This is an expense to the Cooperator. Display by Cost Element where these funds will be expended. Be sure to site a collection authority in the Agreement if this column is used.
- (g) **Third Party Cash Contribution Non-Federal:** Cash contribution provided to the Cooperator from Non-Federal organization(s) for use in the project. Display these contributions by Cost Element expenditures.
- (h) **Third Party Cash Contribution Federal:** Cash contributions provided to the Cooperator from Federal agency(ies) for use in the project. Display these contributions by Cost Element expenditures.
- (i) **Gross Total Project Value:** The sum of all the values provided toward the project. This figure reflects the true estimated cost of the project.
- (j) **Estimated Program Income:** The gross income estimated to be generated under the project between the effective date of award and completion of the project, such as conference or workshop fees received, rental fees earned from renting real property or equipment acquired with agreement funds, or the sale of commodities or items developed under the project.
- (k) **Net Total Project Value:** The sum of all the values provided toward the project with Estimated Program Income taken into consideration. This figure reflects the true estimated cost of the project.

USFS Agreement No.	06-PA-11030420-766
ASP Tax ID No.	866004791 X
ASP Agreement No.	PR06-301
Issued:	6/14/06

PARTICIPATING AGREEMENT
between
USDA, FOREST SERVICE, COCONINO NATIONAL FOREST
and
ARIZONA STATE PARKS

This PARTICIPATING AGREEMENT is hereby entered into by the USDA Forest Service, Coconino National Forest, hereinafter referred to as the Forest Service and Arizona State Parks, hereinafter referred to as ASP.

The Forest Service is authorized to enter into this agreement by (1) the Cooperative Funds and Deposits Act of December 12, 1975, Pub. L. 94-148, 16 U.S.C. 565a1 - a3; the Granger-Thye Act of April 24, 1950; and the Watershed Restoration & Enhancement Authority under the 1999 Department of the Interior and Related Agencies Appropriations Act (a.k.a. "The Wyden Amendment).

Arizona State Parks may enter into agreements with Federal agencies under Arizona Revised Statute Section 41-511.05(2), and has the authority to manage lands it owns under Arizona Revised Statutes Sections 41-511.04 (A)(2).

A. PURPOSE:

The parties to this agreement recognize that certain undesirable plants pose a threat to the environmental and economic health of ASP by the displacement of native plant species, and the degradation of wildlife habitat and recreational values.

This agreement will facilitate a cost-effective, coordinated effort for the treatment of undesirable plants for a 5 year period across jurisdictional boundaries at Dead Horse Ranch State Park and the Verde River Greenway State Natural Area and the adjacent Forest lands, with the objective of achieving healthy and productive natural and agricultural ecosystems. This agreement defines the roles and responsibilities of the Forest Service and ASP in this effort

Projects will include treatment of priority weed species and recording their locations and treatment using the North American Weed Management Association mapping standards. Data will be submitted for the treated populations into the USGS SouthWest Exotics Mapping Project (SWEMP) database.

Priority weed populations are based on the presence of small populations that are feasible to eradicate. The current priority species are as follows:

<i>Arundo donax</i>	<i>Elaeagnus angustifolia</i>
<i>Centaurea melitensis</i>	<i>Linaria dalmatica</i>
<i>Cortaderia selloana</i>	<i>Pennisetum setaceum</i>

USFS Agreement No. 06-PA-1104320 766
ASP Tax ID No. 86604791 X
ASP Agreement No. PR06 301
Issued 6 14, 06

Other high priority targets include those that would require more resources and coordination than is currently available, but could be available in the future. These additional high priority species are as follows:

Acroptilon ropens *Tamarix spp* *Ailanthus altissima*

The Forest Service and ASP project managers listed below (D, 14, Principal Contacts) will work together to identify the target species for specific project periods.

The initial project under this agreement will focus on control of small, manageable populations of *Arundo donax*, *Centaurea melitensis*, *Cortaderia selloana*, *Elaeagnus angustifolia*, *Linaria dalmatica*, *Pennisetum setaceum*, and mapping the project area and entering the location and date of control effort into the SWEMP database.

B. STATEMENT OF MUTUAL BENEFIT AND INTERESTS:

The Forest Service and ASP both have the responsibility for controlling undesirable plants on lands under their jurisdiction. Since undesirable plants originate from both private and public lands, and since infestations often occur on adjacent jurisdictions, it is in the interest of both parties to this agreement to work together in a cost effective manner to locate and treat infestations and prevent their spread.

C. THE FOREST SERVICE SHALL:

1. Treat *Arundo donax*, *Centaurea melitensis*, *Cortaderia selloana*, *Elaeagnus angustifolia*, *Linaria dalmatica*, and *Pennisetum setaceum* populations within Dead Horse Ranch State Park and the Verde River Greenway State Natural Area near the Forest boundary. Treatment will consist of cutting and spraying plants with a non-restricted aquatic herbicide. The herbicide will be applied under the supervision of Forest Service and Arizona State Parks personnel with a Certified Applicators license.
2. Map all the populations controlled under this agreement and enter the information into the Southwest Exotic Mapping Program (SWEMP) database.

D. ASP SHALL:

1. Provide documentation of any non-federally funded work hours or volunteer hours, as available. The Forest Service will use this information toward the Forest Service match for funding received from the University of Arizona Forest Health Program.

E. IT IS MUTUALLY UNDERSTOOD AND AGREED BY AND BETWEEN THE PARTIES THAT:

1. SUPERVISION. Neither party to this agreement will directly supervise employees of the other party to this agreement. Qualified supervisors shall be on site with employees of their organization during performance of activities under this agreement.

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Issued:	6/14/06

2. **FUNDING.** For both parties, obligations hereunder are contingent upon the availability of appropriate funds. No legal liability on the part of any party shall arise until funds have been appropriated by Congress or the State Legislature and provided for in the Annual Operating and Financial Plan or otherwise allocated for the purposes of this agreement.
3. **FUNDING EQUIPMENT AND SUPPLIES.** Federal funding under this instrument is not available for reimbursement of ASP purchase of equipment or supplies.
4. **FREEDOM OF INFORMATION ACT (FOIA).** Any information furnished to the Forest Service under this instrument is subject to the Freedom of Information Act (5 U.S.C. 552).
5. **RETENTION AND ACCESS REQUIREMENTS FOR RECORDS.** The Forest Service, Inspector General, or Comptroller General, through any authorized representative, shall have access to and the right to examine all records related to this instrument. As used in this provision, "records" includes books, documents, accounting procedures and practices, and other data regardless of type and regardless of whether such items are in written form, in the form of computer data, or in any other form. The US Forest Service shall provide ASP with a copy of all records pertaining to this agreement. All records pertinent to this agreement shall be retained by the Forest Service for a period of 3 years and by the ASP for a period of 5 years.
6. **MODIFICATION.** Modifications within the scope of the instrument shall be made by mutual consent of the parties, by the issuance of a written modification, signed and dated by all parties, prior to any changes being performed. The Forest Service is not obligated to fund any changes not properly approved in advance.
7. **NON-DISCRIMINATION.** In carrying out the terms of this Agreement, the Parties agree to comply with Executive Order 99-4 and all other applicable federal and state laws, rules, and regulations, including the Americans with Disabilities Act, prohibiting discrimination in employment, the provisions of which are incorporated herein by reference.
8. **LEGAL AUTHORITY.** ASP has the legal authority to enter into this instrument, and the institutional, managerial and financial capability (including funds sufficient to pay nonfederal share of project costs) to ensure proper planning, management, and completion of the project. Nothing in this provision shall require ASP to spend funds in excess of those allocated and appropriated for the purposes of this agreement.
9. **PARTICIPATION IN SIMILAR ACTIVITIES.** This instrument in no way restricts the Forest Service or ASP from participating in similar activities with other public or private agencies, organizations, and individuals.

USFS Agreement No.	06-PA-11030420-766
ASP Tax ID No.	866004791 X
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Issued:	6/14/06

10. **EXTENSION OF PERFORMANCE PERIOD.** The Forest Service, by written modification, may extend the performance period of this instrument for a total duration not to exceed 5 years from its original date of execution.
11. **TERMINATION.** Any of the parties, in writing, may terminate the instrument in whole, or in part, at any time before the date of expiration. No parties shall incur any new obligations for the terminated portion of the instrument after the effective date and shall cancel as many obligations as possible. Full credit shall be allowed for each Party's expenses and all non-cancelable obligations properly incurred up to the effective date of termination.
12. **TERMINATION FOR CONFLICT OF INTEREST.** This Agreement is subject to termination pursuant to A.R.S. Section 38-511.
13. **COMPLIANCE WITH FEDERAL AND STATE REGULATIONS.** The parties agree to comply with all Federal and State rules and regulations.
14. **PRINCIPAL CONTACTS.** The principal contacts for this instrument are:

Forest Service Project Contact
 Laura Moser, Invasive Species Coord.
 Coconino National Forest
 1824 S. Thompson Street
 Flagstaff, AZ 86001
 Phone: 928.527.3423
 FAX: 928.527.3620
 E-Mail: lmoser@fs.fed.us

ASP Project Contact
 Max Castillo, Manager
 Verde River Greenway Area
 2011-b Kestrel Road
 Cottonwood, AZ 86356
 Phone: 928.639.0312
 FAX: 928.639.0342
 E-Mail: mcastillo@pr.state.az.us

Forest Service Administrative Contact
 Elizabeth Vensel, G&A Specialist
 Coconino National Forest
 1824 S. Thompson Street
 Flagstaff, AZ 86001
 Phone: 928.527.3561
 FAX: 928.527.3680
 E-Mail: evensel@fs.fed.us

ASP Administrative Contact
 Margaret Fernandez, Contract Officer
 ASP, Procurement Office
 1300 W. Washington St. Rm 220
 Phoenix, AZ 85007
 Phone: 602.542.6937
 FAX: 602.542.6949
 E-Mail: mfernandez@pr.state.az.us

15. **AVAILABILITY OF FUNDS.** Forest Service funds in the amount of \$9,800.00 are currently available for performance of this instrument through June 30, 2007 (see Annual Operating & Financial Plan). The Forest Service's obligation for performance of this instrument beyond this date is contingent upon the availability of appropriated funds from which payment can be made. No legal liability on the part of the Forest Service for any payment may arise for performance under this instrument beyond June 30, 2007 until funds are made available to the Forest Service for

USFS Agreement No.	06-PA-11030420-766
ASP Tax ID No.	866004791 X
ASP Agreement No.	PR06-301
Issued:	6/14/06

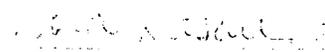
performance and until ASP receives notice of availability to be confirmed in a written modification by the Forest Service.

16. **ENDORSEMENT.** Any ASP contributions made under this instrument do not by direct reference or implication convey Forest Service endorsement of ASP's product or activities.
17. **FOREST SERVICE LIABILITY.** The United States federal government does not have the authority to indemnify and hold harmless the State of Arizona from any and all claims, liabilities, losses, damages, charges, etc. The State of Arizona does not have the authority to indemnify and hold harmless the United States federal government from any and all claims, liabilities, losses, damages, charges, etc. The State of Arizona will be responsible for errors, omissions and negligence of its employees. The United States federal government will be responsible for errors, omissions and negligence of its employees to the extent provided by Congress under the Federal Tort Claims Act (28 U.S.C. 1346(b), 2401(b), 2671-2680, as amended by P.L. 89-506, 80-Stat.306).
18. **ILLEGAL IMMIGRATION.** The parties agree to comply with Executive Order 2005-30, "Ensuring Compliance with Federal Immigration Laws by State Employers and Contractors," the provisions of which are hereby incorporated by reference.
19. **ALTERNATIVE DISPUTE RESOLUTION.** The parties agree to engage in any alternative dispute resolution procedures authorized by their statutes, regulations, and court rules, including but not limited to 5 U.S.C. 575 and A.R.S. Section 12-1518.
20. **FINANCIAL PLAN.** The attached financial plan in hereby incorporated and becomes a part of this agreement.
21. **COMMENCEMENT/EXPIRATION DATE.** This instrument is executed as of the date of last signature and is effective through June 30, 2007 at which time it will expire unless extended.
22. **AUTHORIZED REPRESENTATIVES.** By signature below, ASP certifies that the individuals listed in this document as representatives of ASP are authorized to act in their respective areas for matters related to this agreement.

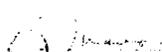
USFS Agreement No. 06-PA-11030420-366
ASP Tax ID No. 866004791 X
ASP Agreement No. PR06-301
Issued 6/14/06

USDA FOREST SERVICE
COCONINO NATIONAL FOREST

ARIZONA STATE PARKS

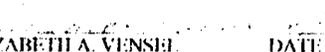

NORA B. RASURE
Forest Supervisor

DATE


KENNETH TRAVOUS
Executive Director

DATE

The authority and format of this instrument has
been reviewed and approved for signature.

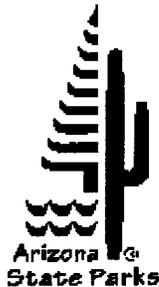

ELIZABETH A. VENSE
Grants and Agreements Specialist

DATE

FOR FOREST SERVICE INTERNAL USE ONLY

Agreement No.	06-PA-11030420-366
Job Order #	ENW11060
Specialty Code for FY06	SP-00000
Budgetary/Account Code	NA
Fellow Frequency	NA
Cooperator Federal Agency ID No.	560001-01-X
USFS Program Manager and phone	Carla Moser 929-277-8122
Expiration Date	June 30, 2007

Letters of community support-



"Managing and conserving natural, cultural, and recreational resources"

Arizona Water Protection Fund Commission
Arizona Department of Water Resources
3550 N. Central Ave.
Phoenix, Arizona 85012

June 6, 2008

Re: Verde River Invasive Species Project

Dear Arizona Water Protection Fund Commissioners:

As the director of Arizona State Parks I would like to express my enthusiastic support for the Verde River Invasive Species Project located throughout the Verde Valley and including the Verde River Greenway State Natural Area that is proposed by the Ecological Monitoring & Assessment (EMA) Program at Northern Arizona University. As a stakeholder, we appreciate the opportunity the project provides to develop a team of community members to restore riparian corridor function and wildlife habitat.

We understand that the purpose of the project is to enhance native plant communities and improve the riparian habitat along the Verde River, decrease the seed dispersal from non-native invasive plant species, and educate the community on the threats of these species, and effective eradication techniques. This project will also provide many benefits to the university community by allowing a student to participate in organization and implementation of the project.

Arizona State Parks recognizes the investment in this project requested of the AWPF and is enthusiastic about the opportunity to provide support and assistance for this project. We are eager to work closely with the grantee to see this project to completion and to help with its success into the future.

If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Ken Travous, Director
Arizona State Parks

Janet Napolitano
Governor

State Parks
Board Members

Chair
William C. Scalzo
Phoenix

Arlon Colton
Tucson

Reese Woodling
Tucson

Tracey Westerhausen
Phoenix

William C. Porter
Kingman

William C. Cordasco
Flagstaff

Mark Winkelman
State Land
Commissioner

Kenneth E. Travous
Executive Director

Arizona State Parks
1300 W. Washington
Phoenix, AZ 85007

Tel & TTY: 602.542.4174
www.azstateparks.com

800.255.3765 from
(50 R 928) area codes

General Fax:
602.542.4180

Director's Office Fax:
602.643.4188



Arizona Water Protection Fund Commission
Arizona Department of Water Resources
3550 N. Central Ave.
Phoenix, Arizona 85012

June 6, 2008

Re: Verde River Invasive Species Project

Dear Arizona Water Protection Fund Commissioners:

As the Unit Manager of The Verde River Greenway State Natural Area, I would like to express my enthusiastic support for the Verde River Invasive Species Project located throughout the Verde Valley and including the Verde River Greenway State Natural Area (VRGSNA) that is being proposed by the Ecological Monitoring & Assessment (EMA) Program at Northern Arizona University. As a stakeholder, we appreciate the opportunity the project provides to develop a team of community members to restore riparian corridor function and wildlife habitat.

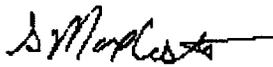
We understand that the purpose of the project is to enhance native plant communities and improve the riparian habitat along the Verde River, decrease the seed dispersal from non-native invasive plant species, and educate the community on the threats of these species, and effective eradication techniques. This project will also provide many benefits to the university community by allowing a student to participate in organization and implementation of the project.

Verde River Greenway State Natural Area is enthusiastic about the opportunity to provide several test plot areas on State Parks property for invasive plant control, as well as support and assistance for this project. I will work with our state office to ensure that permits are obtained for the completion of this project.

We are eager to work closely with the grantee to see this project to completion and to help with its success into the future.

If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,


S. Max Castillo
Unit Manager, VRGSNA
2011-B Kestrel Road
Collanwood, AZ 86326
(928)639-0312

Janet Napolitano
Governor

State Parks
Board Members

Chair
William C. Scalzo
Phoenix

Arian Colton
Tucson

Reesa Woodling
Tucson

Tracey Westerhausen
Phoenix

William C. Porter
Kingman

William C. Cordasco
Flagstaff

Mark Winkelman
State Land
Commissioner

Kenneth E. Travous
Executive Director

Arizona State Parks
1300 W. Washington
Phoenix, AZ 85007

Tel & TTY 602 642 4174
www.azstateparks.com

800.285.3703 (toll free)
(602 & 026) area codes

General Fax:
602 542 4180

Director's Office Fax:
602 542 4188



**Verde
Natural Resource Conservation District**

PO Box 280
Camp Verde, AZ 86322
June 6, 2008

Patty West
The Ecological Monitoring & Assessment (EMA) Program
Northern Arizona University
P.O. Box 5845
Flagstaff, Arizona 86011

The Verde Resource Conservation District (NRCD) would like to express its enthusiastic support for the Verde River Invasive Species Project located throughout the Verde Valley and including the Verde River Greenway State Natural Area that is being proposed by the Ecological Monitoring & Assessment (EMA) Program at Northern Arizona University. We are donating \$1320.00 in matching funds (24 hours of a professional Certified Applicator) toward this project.

Sincerely,

Verde NRCD
Kaki Rowland, Chair
Ryna Rock, Supervisor
Bill Cowan, Supervisor
Jodi Allen, Supervisor

Evidence of control and tenure of land-

Property Info Card

file:///Users/mcastillo/Desktop/406.36.015H.html

Yavapai County, AZ-Parcel summary Printed: 6/6/2008



Parcel ID
406-36-015H

Owner
ARIZONA STATE PARKS BOARD

Mailing Address
1300 W WASHINGTON

City **State** **Zip**
PHOENIX AZ 85007

Secondary owner
N/A

Recorded Last Transfer Date	Doc Docket	Last Transfer Doc Page
N/A		

Physical Address
.....

Incorporated Area
CITY OF COTTONWOOD

DOR Acres	Calculated Acres	Subdivision	Subdivision Type
11.77	12.178		N/A

School District
MINGUS UHS #4

Fire District
N/A

Property Info Card

file:///Users/mcastillo/Desktop/406.04.013F.html

Yavapai County, AZ-Parcel summary Printed: 6/6/2008



Parcel ID
406-04-013F

Owner
STATE PARKS BOARD

Mailing Address
1300 W WASHINGTON

City **State** **Zip**
PHOENIX AZ 85007

Secondary owner
N/A

Recorded Last Transfer Date	Doc Docket	Last Transfer Doc Page
10/14/1992	2544	466

Physical Address
.....

Incorporated Area
N/A

DOR Acres	Calculated Acres	Subdivision	Subdivision Type
14.73	6.894		N/A

School District
MINGUS UHS #4

Fire District
VERDE VALLEY FD

The properties listed as VRGSNA are part of the Verde River Greenway State Natural area and are the proposed sites for the Invasives Project. Permission will be granted for access to these parcels when the permits have been acquired. I am working on obtaining the permits at the same time as the grant is being processed.


S. Max Castillo, Unit Manager VRGSNA
2011-B Kestrel Road, Cottonwood, AZ 86326
(928)639-0312

Evidence of physical and legal availability of water: No water will be used in this project.