

**Arizona Water Protection Fund
FY 2014 Grant Application Review**

Application # WPF0412 Applicant: Southwestern Arid
Grassland Ecology, Inc (SAGE)

Title of Project: Josephine Canyon Riparian
Restoration 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, 2nd Floor, Phoenix). The additional materials available are the following:

- Maps
- Photographs
- Disk
- Other

WPF0412
Arizona Water Protection Fund
Application Cover Page
FY 2014

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Title of Project: Josephine Canyon Riparian Restoration											
Type of Project: <input checked="" type="checkbox"/> Capital or Other <input type="checkbox"/> Water Conservation <input type="checkbox"/> Research	Stream Type: <input type="checkbox"/> Perennial <input checked="" type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral										
Your level of commitment to maintenance of project benefits and capital improvements: <input type="checkbox"/> < 5 years <input type="checkbox"/> 5-10 years <input type="checkbox"/> 11-15 years <input checked="" type="checkbox"/> 16-20 years											
Applicant Information: Name/Organization: Southwestern Arid Grassland Ecology, Inc. (SAGE) Address 1: PO Box 370 Address 2: City: Tumacacori State: Arizona ZIP Code: 85640 Phone: 520 604-1541 Fax: Tax ID No.: XXXXXXXXXX											
Inside an AMA: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If yes, which AMA: <input type="checkbox"/> Phoenix <input type="checkbox"/> Tucson <input type="checkbox"/> Prescott <input type="checkbox"/> Pinal <input checked="" type="checkbox"/> Santa Cruz											
Type of Application: <input checked="" type="checkbox"/> New <input type="checkbox"/> Continuation											
Contact Person: Name: Forrest Sherman Title: Director Phone: 520 604-1541 Fax: e-mail: sherman144@gmail.com											
Any Previous AWPf Grants: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, please provide Grant #(s):											
Arizona Water Protection Fund Grant Amount Requested: \$76,885.00 If the application is funded, will the Grantee intend to request an advance: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Matching Funds Obtained and Secured: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Applicant/Agency/Organization:</u></th> <th style="text-align: right;"><u>Amount (\$):</u></th> </tr> </thead> <tbody> <tr> <td>1. Applicant</td> <td style="text-align: right;">18,196.00</td> </tr> <tr> <td>2.</td> <td></td> </tr> <tr> <td>3.</td> <td></td> </tr> <tr> <td colspan="2" style="text-align: right;">Total: 18,196.00</td> </tr> </tbody> </table>	<u>Applicant/Agency/Organization:</u>	<u>Amount (\$):</u>	1. Applicant	18,196.00	2.		3.		Total: 18,196.00	
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1. Applicant	18,196.00										
2.											
3.											
Total: 18,196.00											
Has your legal counsel or contracting authority reviewed and accepted the Grant Award Contract General Provisions? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A											
Signature of the undersigned certifies understanding and compliance with all terms, conditions and specifications in the attached application. Additionally, signature certifies that all information provided by the applicant is true and accurate. The undersigned acknowledges that intentional presentation of any false or fraudulent information, or knowingly concealing a material fact regarding this application is subject to criminal penalties as provided in A.R.S. Title 13. The Arizona Water Protection Fund Commission may approve Grant Awards with modifications to scope items, methodology, schedule, final products and/or budget.											
Typed Name of Applicant or Applicant's Authorized Representative	Title and Telephone Number OWNER 520 604-1541										
<i>Forrest Sherman</i>	8/26/2013										
Signature	Date Signed										

EXECUTIVE SUMMARY

This grant request is made by Forrest Sherman, the landowner, through the auspices of Southwestern Arid Grassland Ecology, Inc (SAGE), an Arizona non-profit corporation. Mr. Sherman is the director and principal actor for SAGE. SAGE will be the official grant requester in order to maintain a functional and financial separation between the project's activities and the landowner. SAGE and various volunteers and consultants will carry out the project if the grant is awarded.

This grant request is for riparian area restoration, enhancement and maintenance. The plan is to increase groundwater levels and storage capacity in an approximately five hectare area of Josephine Canyon, which has been drained by anthropogenic geomorphologic changes. The project will also address upland areas, which have been essentially denuded of grassland vegetation from extensive cattle grazing. This will be combined with ecologically planned re-vegetation of the riparian area and the surrounding uplands, for a total intervention area of 41 acres. These changes will recreate a habitat which will support a wide variety of plant and animal activity (permanent and migratory). The reestablishment of the riparian area and upland re-vegetation will reduce downstream pollutant loads; this will benefit an impaired reach of the Santa Cruz River. Monitoring of the results and public outreach are integral to the project.

The project will start upon availability of funds and permits and will continue for five years of implementation, intense maintenance, and monitoring, and an additional 15 years of maintenance.

The project location 17 Nada Way, is a 41-acre parcel of land (Lot 104, section III Tubac Foothills Ranch) which straddles Josephine Canyon. Josephine Canyon is located in Santa Cruz County, Arizona and drains the westerly slope of the Santa Rita Mountains. It connects at its upper reach with Madera Canyon and shares that canyon's migratory flyway and diversity of species. Josephine Canyon connects directly with the Santa Cruz River near Tumacacori National Park.

The restoration will be accomplished by a series of events: 1) baseline data collection and planning, 2) design of implementations, 3) interventions, 4) monitoring and then 5) modifications of interventions based upon monitoring results. Interventions will include; removal of invasive species, planting of appropriate native plants, stream bed and upland modifications to increase water infiltration and the construction of a Subsurface Groundwater Containment System (SGRS). A SGRS is an impermeable barrier which is placed below ground level and extends down to an impermeable ground layer and extends across the valley channel. It creates an underground groundwater storage area on its upstream side and can raise the water table. Interpretive signage, open to the public, will be built to explain the SGRS and the features of the enriched ecological landscape. The landowner will perform the majority of the work with the assistance of consultants, volunteers and student clubs from the University of Arizona and other local organizations.

PROJECT OVERVIEW

BACKGROUND: This project is designed to restore, enhance and maintain a riparian habitat which has been degraded by very heavy grazing management practices, and geomorphic changes due to downstream road construction. The targeted riparian area consists of approximately 5 hectares of former wetland located within Josephine Canyon, a major tributary of the Santa Cruz River. Historically, the canyon was a perennial, spatially interrupted stream (areas of the stream were interrupted by sections which flowed under the fluvial deposits). The targeted section encompasses approximately 750 meters of streambed and its floodplain. The upstream watershed is about 30 square kilometers, reaching the saddle between Mts. Wrightson and Hopkins, which is also the upper extent of Madera Canyon. The project is located at 4000 feet and is characterized by significant biodiversity. It is part of the major migratory route of wildlife, for which Madera Canyon is famous.

GOALS:

- 1) To rehabilitate a functioning geomorphology which supports a wetland, but which is rapidly deteriorating.
- 2) To have that wetland be ecologically robust, with sufficient biodiversity for system continuance. Principles of ecological landscape design will be used in the choices of interventions.
- 3) To create an environmental system that reduces pollution loads to downstream waters, the Santa Cruz River.
- 4) To demonstrate an inexpensive and simple rehabilitation intervention, a Subsurface Groundwater Retention System (SGRS) successfully used in other semiarid environments, but not yet commonly used in Arizona.
- 5) To provide restored and continued migratory habitat
- 6) To scientifically document effects of these interventions.
- 7) To provide public outreach in terms of cooperative work with other nonprofit organizations and formal/informal talks and presentations of the values of riparian restoration in the Santa Cruz valley to various groups both community and scientific.
- 8) To create a recreation area which serves to inform the public about the riparian area and the interventions which have been accomplished.

Objectives: Objectives will be adaptive in nature in response to information gathered during the project.

- 1) The targeted area has experienced significant head cutting from road development leading to a drop in the water table effectively draining the wetland. Objectives for goal one are:
 - a) Reconnect the water table with the soil surface area as measured by monitoring wells and water flow data.
 - b) Establish grade control structures, especially in areas directly affected by the head cutting.
 - c) Change stream flow patterns, from a small tributary, to allow for more deposition of silt sized particles.
 - d) Increase meandering within the area to allow for a longer flow length in the area with consequent greater potential for water infiltration
- 2) Ecological functioning will be enhanced by the establishment of a diverse plant and animal community which will allow for the systems continuance under conditions of internal and external stress. Goal two is predicated upon goal one.

- a) To establish a target plant list which will provide for system functioning along several dimensions:
 - i) Plant types: grasses, forbs, shrubs, trees.
 - ii) Winter versus Monsoon growing periods
 - iii) Normal growth habit; low, medium, tall, shrubby, soil fixing
 - iv) Phylo-genetic diversity
 - v) Invasive species will be targeted for extreme stress, hopefully leading to eradication.
 - b) To conduct an inventory of the existing plants, this information, coupled with the target plant list, to be used in selecting most useful plantings.
 - c) Animals are present in the general location and there is sufficient connectivity to expect that there will be migration into the area by other wildlife when habitat is improved.
 - d) The area will be fenced to exclude cattle for at least two years. After that period, a range management plan will be developed, which allows for grazing within the capacity of the system.
- 3) With the reestablishment of a thriving environmental community there will be a reduction of pollutants at the downstream end of the project area.
- a) Turbidity measurements will document reductions on sediment transfer.
 - b) *E. Coli* measurements will document the effectiveness of the ecological filter.
 - c) *Bacteroides* analysis will provide a measurement of human waste products. The upstream area of Josephine Canyon experiences considerable human traffic from Mexico into the United States.
- 4) Integral to the wetland restoration will be the construction of an underground structure called variously a Subsurface Groundwater Retention System (SGRS) or "underground dam." A SGRS is a waterproof barrier placed totally beneath the existing soil surface. Construction involves trenching down to an impermeable layer and refilling this trench with a water barrier (clay, plastic, masonry, compacted silt). As a result, surface water continues unimpeded flow but there is an increase in groundwater storage. There are several geomorphic attributes of the project area which are favorable for this type of structure:
- a) The fluvial deposits are underlain with relatively water impermeable layers ranging from 2 to 5 meters in depth. These layers extend up the sidewalls of the canyon, thus it is feasible to create a tight barrier impeding groundwater downstream migration.
 - b) The area is about 100 meters wide allowing for reasonably sized structures.
 - c) Soils with high clay content are readily available locally.
 - d) The upper and lower sections of the project area are limited by narrow slot canyons.
 - e) Well monitoring data will confirm the storage capacity of the system.
 - f) The SGRS will be available as a demonstration site as part of a planned interpretive trail.
- 5) Migratory habitat will be provided by:
- a) Increase in vegetation growth along several dimensions:
 - i) Canopy cover
 - ii) Canopy height
 - iii) Reduction in Mesquite (*Prosopis juliflora* and *Prosopis velutina*) density allowing for other plant species to grow

- iv) The upland areas around the wetland will be treated with a form of contour ripping and then planted to provide grass cover for birds, especially sparrow populations commonly found next to the area but absent at present from the project area due to the lack of cover.
 - b) Wildlife water supply from pools in the stream bed and a water supply augmented wildlife watering hole.
- 6) The following will be used to monitor and document the project. (see also the Monitoring Plans found later in this application):
- a) Constructed flumes will measure water flow into and out of the system
 - b) Water table levels will be monitored by up to ten monitoring wells with data loggers in place to record the water levels.
 - c) Canopy cover will be measured (repeated measurement design) using Doubenmire transects; point intercept surveys and structured photographic surveys.
 - d) The vegetation structure (height distribution) will be documented by photographs using marked targets to show plant height and density.
 - e) Ecological robustness will be measured by the above listed sampling techniques and by type-frequency distribution counts.

Statement of Problems/Causes:

Josephine Riparian restoration is needed because of the following problems:

Local head cutting is a hydraulic process in which a change in stream bed grade becomes exaggerated leading to vertical erosion and bed scouring. Niagara Falls is a famous example, but head cuts are common in arid streams. For the project area, the head cutting started (in the early 1990s) with the construction of a housing development access road downstream of the then-existing wetland. To date, it has extended upstream about 180 meters and has dropped the water table up to two meters. In addition, it has exposed the wetland to a significantly wider drainage exposure by disconnecting it from a narrow slot canyon which had served to limit the downstream movement of the water.

The intrusion of the head cut into the riparian area has:

- 1) Dried out the total wetland for significant parts of the year (*See photos 2-6*)
- 2) It left the stream channel bed of stripped soil
- 3) It shortened the available groundwater temporal pulse for riparian plant species.
- 4) It decreased the water storage capacity of the area by as much as ten-acre feet.

Several large trees, Ash and Oak, are dying and smaller wetland brushes and trees are showing signs of stress. Mesquite is thriving.

Without hydraulic intervention, this ecosystem will shift to one better described as upland.

Grazing management has led to a loss of vegetation cover over a wide area. While most ranchers have recognized that a healthy forage crop is the backbone of cattle ranching, the rancher who has the grazing leases which impact the project area operates on a different management style. Photo 1 shows a boundary fence along one side of the project area. The left side of the photograph is the project area while the right side is managed by a different rancher. Hiking in the vicinity one will often come upon dead cattle. Cattle or horses are always on the range and there is no evidence of the range areas being given a fallow period. While not necessarily relevant as the land is privately owned and leased, as best as can be determined, stocking rates are above that allowed by Arizona State Land Trust regulations.

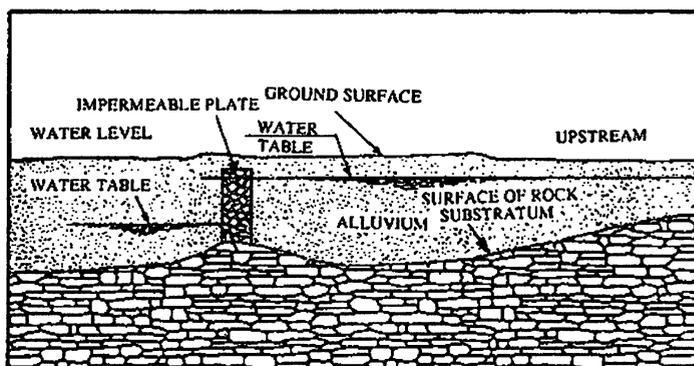
The depletion of water and the heavy grazing have resulted in:

- 1) Degradation of refugia for local species and migratory birds. Josephine Canyon connects the Santa Cruz riparian area with Madera Canyon and is therefore, important for ecological connectivity.
- 2) Increased soil erosion and sediment load for the downstream areas
 - a) This impedes soil formation.
 - b) It reduces seed germination.
 - c) Leading to a positive feedback loop resulting in more naked soil
 - d) Increases fecal contamination in the stream during rain events
- 3) Disturbance regulation is the result of the loss of the dense vegetation cover and the scouring of the stream channel. The system is stressed by the lack of water and the reduction in the number and health of the plant population. As a consequence flash floods often close the road immediately downstream of the project area, there is a high sediment load in the non flood flow, and there is little ability for the system to survive drought years.
- 4) Erosion and sediment control: The erosion problems have been described above. However, the upland areas also need to be addressed. The upland areas drain directly into the riparian area. As they are degraded and consist of very clayey loam, there is massive soil runoff during heavy rain events.
- 5) Waste Treatment does not exist at present. The heavy uninterrupted flows simply sweep any fecal material downstream.

Solutions: The proposed solutions to the situation are in order:

- 1) Preliminary surveys
 - a) Geomorphologic surveying, including RTK level GPS survey of the area. This will be accompanied by GIS mapping. This level of detail is needed to address grade levels and planning of infiltration plowing on the upland areas.
 - b) Long profile and Cross Sections of the stream beds will be developed to analyze the hydraulics of the water flow patterns.
 - c) Ecological surveys will focus upon density, frequency and variation of plant types. While Doubenmire, Line point intercept, and photographic documentations are planned actual implementation of the surveys will lead to modification of procedures as needed. The BLM Technical Reference 1734-4 "SAMPLING VEGETATION ATTRIBUTES" will be used as the primary procedural manual for the surveys.
 - d) Ecological landscape design principles will be used to determine the structures of plant communities, which will provide for a robust riparian and upland community. The establishment and or protection of two to three plant species which fill each ecologic function will be the desired outcome. Examples of ecological function will include:
 - i) C3 and C4 grasses
 - ii) Multiple growth habits
 - iii) Nitrogen-fixing properties
 - iv) Resistance to drought
 - v) Open versus closed canopy
 - vi) Flowering height above the ground
 - vii) Annular time of maximum growth
 - viii) Forage value

- ix) Others as suggested by a landscape design consultant.
- e) Test pits will be dug to determine the depth to impermeable base structure for planning of the SGRS(s) and for conducting soil profiles.
- 2) Fencing of the property to control cattle grazing. Fencing which will form a barrier to cattle crossing will be installed.
- 3) Geomorphic interventions will focus upon increasing groundwater storage capacity, aggrading the stream bed level and lengthening the temporal pulse of water flow.
 - a) The Subsurface Groundwater Containment System SGRS will be central to the restoration to the riparian water table. It can be thought of as an underground dam, but we choose to use SGRS to reduce confusion. As may be seen from the figure the structure serves to impede



groundwater movement by the emplacement of a water barrier under the ground level.

References for this technique are listed in an appendix. Based upon USGS reports of the alluvial deposits of the upper Santa Cruz River the fluvial deposits in the target area have a porosity of 21%. Given an increase in ground water level of five feet at the lower CGRS and 10 feet at the upper CGRS a total storage capacity of 15 acre feet of water can be expected to be stored at any one time. For most of the past years the stream has had above ground flow for four to seven months. The groundwater thus stored should allow for significant development of a robust riparian habitat.

- b) Stream bed induced meandering will be used to increase the length of flow within the system, dropping the effective grade of the stream and leading to increased infiltration of the water.
- c) One Rock Dams (ORD) are simple rock structures, which span the stream bed from flood plain to flood plain and are only one rock high. They will be placed at channel cross over points and riffle areas and serve to increase the grade of stream bed on their upstream side. This will lead to the stream bed having a more heterogeneous structure and greater likelihood of plant growth.
- d) Below the SGRS, Rock Run Downs and ORDs will be used to protect the stream bed from the changes in grade.
- 4) Upland treatment will be based upon selective thinning of Mesquite and initiation of Key Line Plowing or equivalent.
 - a) At present, the upland can best be described as grassland changing from grassland to thorn-scrub bush type system. The mesquites have proliferated at the expense of grass and other forbs. There is a high proportion of cholla.
 - b) Key Line Plowing is a procedure developed in Australia where it has been used since the 1950s. The basic procedure is to use a special ripping plow, which has a thin shank so that there is very

little surface disturbance. At some depth from the surface 30-100 cm, the plow lifts the soil about 2-3 cm. This opens the soil structure and allows rain water penetration to the depth of the plow. The Yeomans Plow pictured here is not the only implement which can be used, but it has significant advantages. The plowing pattern is similar to contour plowing with some careful changes to grade to prevent lateral water flow along the plow line causing gully formation.



- 5) Ecological landscape interventions will be designed to create habitats which show robustness along several ecologic dimensions:
 - a) Resistance to drought
 - b) Resistance to cold and heat
 - c) Resistance to animal grazing
 - d) Time of the year for normal growth
 - e) Type of plant, grass, forb, bush, vine, tree, etc.
 - f) Height of growth
 - g) Riparian versus upland tolerance
- 6) Based upon the preliminary ecologic survey, plants will be chosen to supplement the existing variety. After the fencing and geomorphic changes have been established selective plantings will be made. Invasive and overly competitive plants will be treated to reduce their impact upon the plantings.

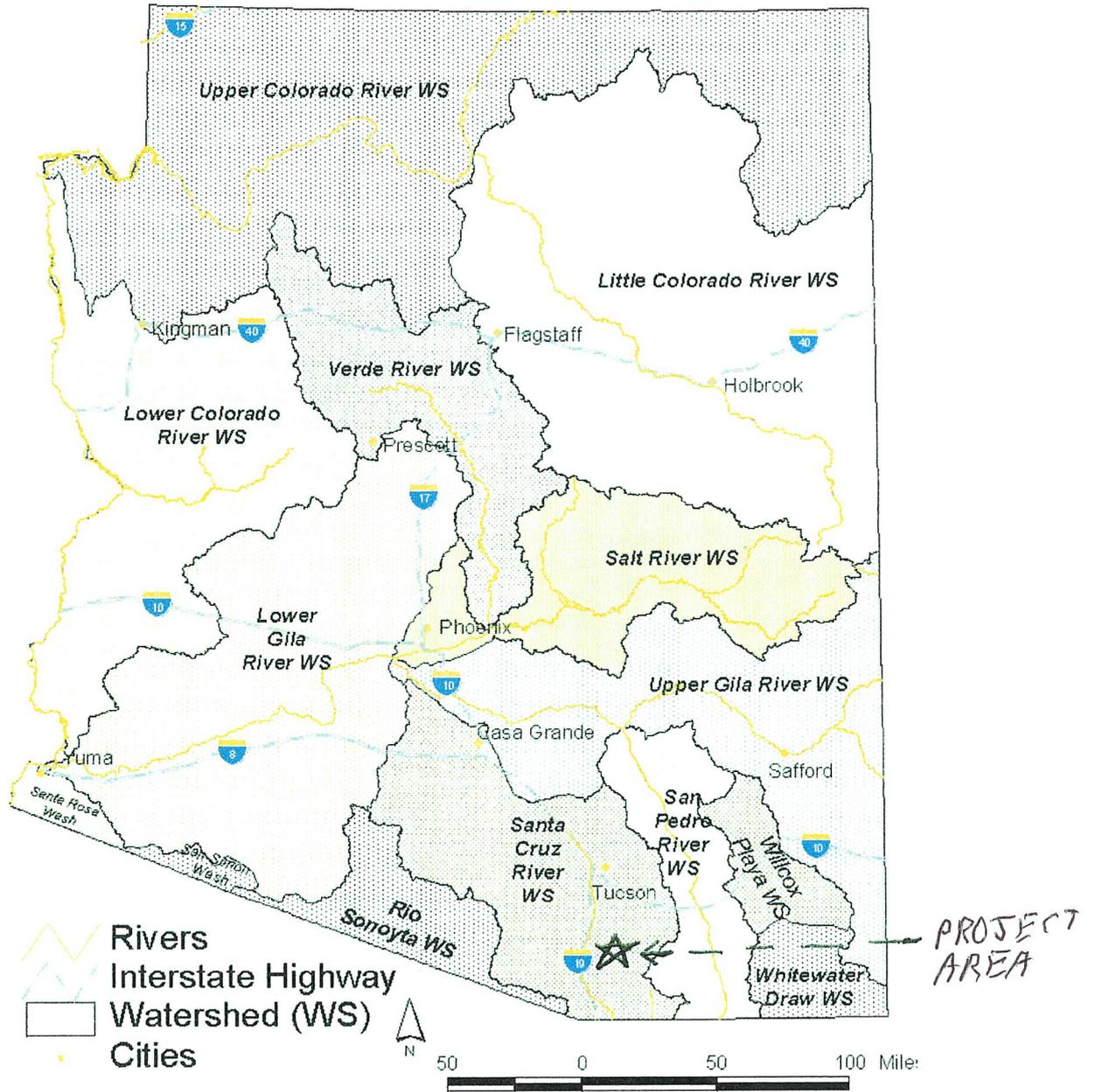
Project Years of benefit:

This project should have a benefit life of at least twenty years. The SGRS should exceed 20 years of life. The grazing management changes will be reflected in any deed changes and require 20 years of maintenance. Fencing, with maintenance will last 20 years and the increase in eco-diversity should extend beyond 20 years.

Project Location & Environmental Contaminant Information FY 2014

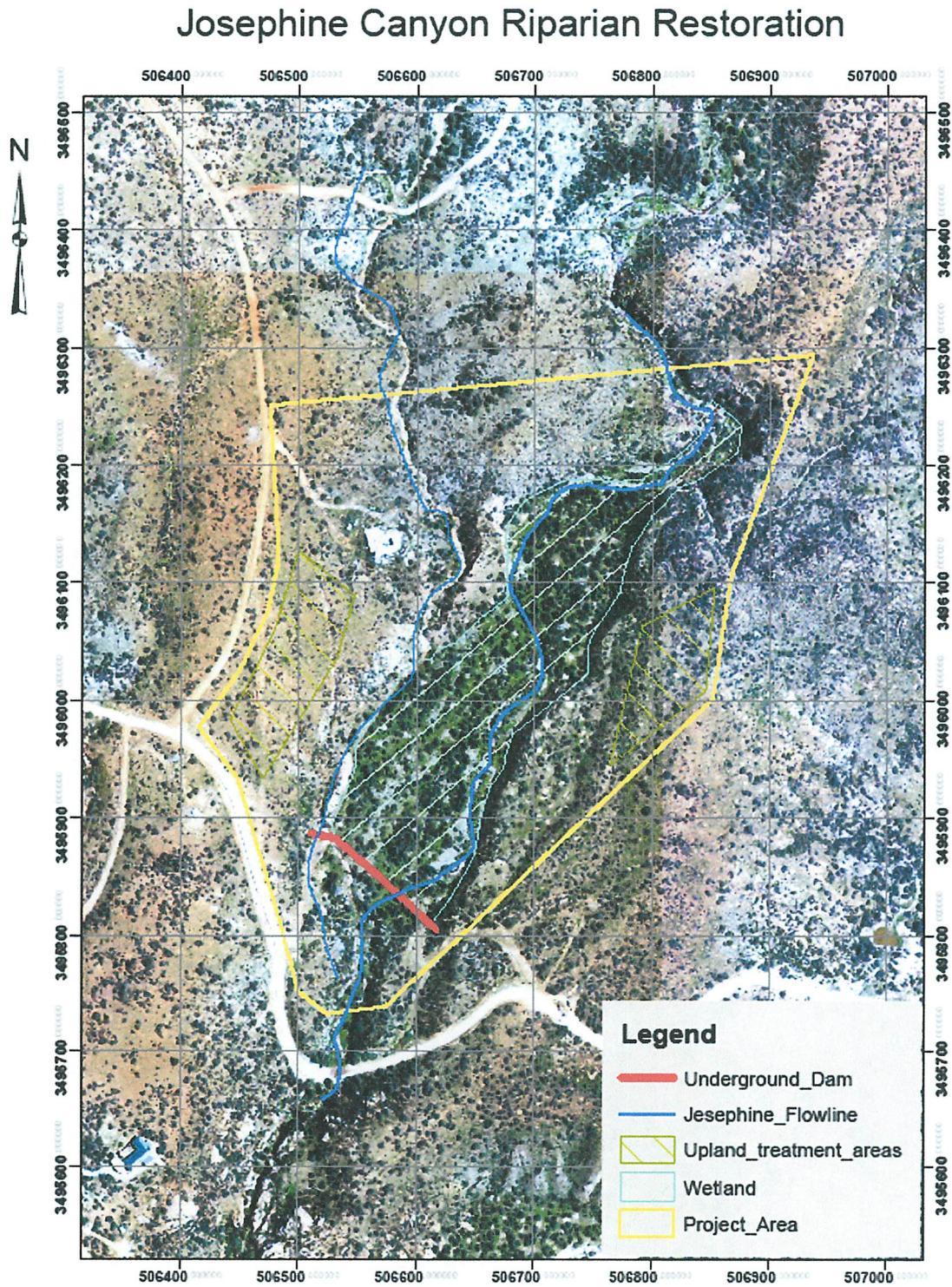
Project Location Information			
1. County: Santa Cruz	2. Section: 17	3. Township: 21S	4. Range: 14E
<p>5. Watershed: Santa Cruz River, Josephine Canyon</p> <p>6. 8 or 10 Digit Hydrologic Unit Code (HUC): 150503010506</p> <p>7. Name of USGS Topographic Map where project area is located: San Cayetano</p> <p>8. State Legislative District: 2 (Information available at: http://azredistricting.org/districtlocator/)</p> <p>9. Land ownership of project area: Private</p> <p>10. Current land use of project area: Leased for cattle grazing</p> <p>11. Size of project area (in acres): 41</p> <p>12. Stream Name: Joosephine Canyon</p> <p>13. Length of stream through project area: 2500 ft</p> <p>14. Miles of stream benefited: 2+ <u>miles</u></p> <p>15. Acres of riparian habitat: 15 <u>acres</u> will be:</p> <div style="margin-left: 350px;"> <input type="checkbox"/> Enhanced <input type="checkbox"/> Maintained <input checked="" type="checkbox"/> Restored <input type="checkbox"/> Created </div>			
<p>16. Provide directions to the project site from the nearest city or town. List any special access requirements: <i>See page 11 of 29</i></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 checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p>			

Arizona Watershed Map FY 2014



Title of Project: Josephine Canyon Riparian Restoration

This figure shows the project area. The Yellow outline is the Lot boundary owned by Forrest Sherman and is the limit of the treated area. The white line snaking across the bottom is Camino Josephina.



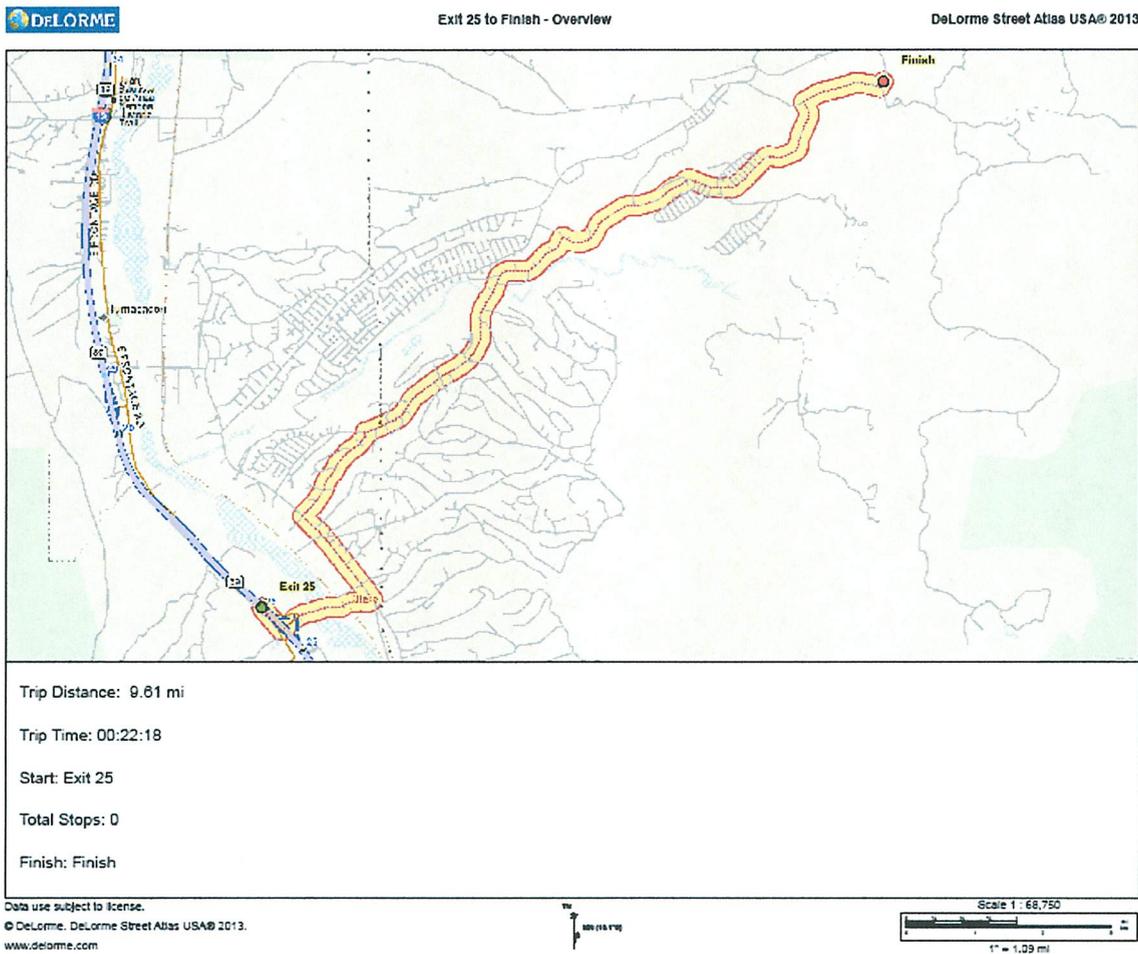
Map of the general area showing State and Federal Lands and NHDFlowline.

Josephine Canyon Riparian Restoration



DIRECTIONS TO THE PROJECT

From Tucson take I-19 south to Exit 25 South
Exit 25 South onto Palo Parado Rd, turn Left
Cross Bridge come to Pendleton Dr. Turn Left.
North on Pendleton Dr to Camino Josephna, Turn Right
Follow Camino Josephina (turns to gravel stay to right) until Nada Way is on Left, Turn.
First Driveway on Right



The general principle of a sub-surface dam is shown in Figure 1.1. An aquifer consisting of permeable alluvial sediments in a small valley supplies water to a village by means of a shallow dug well. The area has a monsoon climate, and due to consumption and the natural groundwater flow, the aquifer used to be drained out during the dry season and consequently the well dried up. To prevent this, a trench has been dug across the valley, reaching down to bedrock. An impervious wall has been constructed in the trench, which has then been refilled with the excavated material. The reservoir will be recharged during the monsoon period and the stored water can be used during the dry season. Excess groundwater will flow above the dam crest and recharge downstream aquifers.

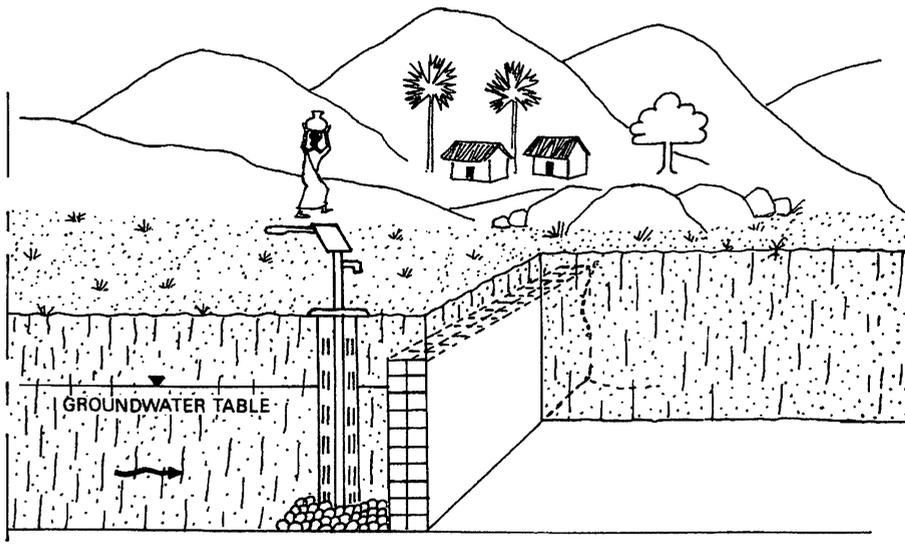


Figure 1.1. General principle of a sub-surface dam.

Copied from "Groundwater Dams for Small-Scale Water Supply" A Nilsson 1988

SCOPE OF WORK

Task #1 Permits, Authorizations, Clearances and Agreements

Task Description: The grantee must submit to the Project manager all permits, authorizations, clearances and agreements, and perform any consultations necessary to complete the tasks listed in this Scope of Work. These may include but are not limited to:

- State Historic Preservation Office (SHPO) clearance
- Clean Water Act Section 404 permit from the Army Corps of Engineers
- Clean Water Act Section 401 Certification from Arizona Department of Environmental Quality
- Endangered Species Act Section 7 consultation with US Fish & Wildlife or Arizona Department of Fish and Game
- National Environmental Policy Act (NEPA) compliance

Task purpose: To comply with all local, state and federal permit requirements and laws.

Deliverable Description: Copies of all approved permits, authorizations, clearances and agreements.

Deliverable Due Date: Prior to any ground disturbing activities.

Reimbursable Cost: \$0 to \$4,200 depending on SHPO possibly requiring archeological review.

Task #2 Planning

Task #2A

Task Description: The area will be surveyed and mapped.

- Surveying will be done by RTK GPS, which allows for 1-3 centimeter accuracy.
- Except for Mesquite, all trees in the riparian area will be mapped. Mesquite tree densities will be calculated from ArcGis 1/3 meter orthographic maps.
- Long profile and multiple cross sections will be developed for the water channels.
- Less than 30cm elevation contours will be developed.

Task purpose: To provide the basis of intervention planning. The process of gathering the field data and creating the maps will provide for detailed ecological and geomorphic knowledge.

Deliverable Description: The Grantee will provide copies to the maps to the Project manager.

Deliverable Due Date: March 30, 2014

Reimbursable Cost: \$15,492

Task #2B Ecological assessment of the project area

Task Description: To establish baseline plant and animal communities in the project area with a focus open:

- Riparian associated plants, especially perennial plants due to the high variability of annuals.
- Evidence of animals, scat, bird transects, game camera data
- Soil types
- Invasive or unusually dominant native species

Task purpose: This task will be the basis of planned ecological interventions and the baseline for ongoing monitoring.

Deliverable Description: A report listing species found, observations as to their situation, photographs, etc. will be provided to the Project Manager.

Deliverable Due Date: Prior to task #2C

Reimbursable Cost: \$2,249

Task #2C Establishment of an ecologically based landscape plan

Task Description: The grantee will, with the aid of consultants, create a horticultural plan which describes:

- Types of plants
- Location of plants
- Ground preparation, if needed.
- Schedule of planting

Task purpose: The plants and their planting interrelationships will develop a robust ecological system appropriate to the potential biome for the project area.

Deliverable Description: The grantee will deliver a copy of the plan to the Program Coordinator.

Deliverable Due Date: Prior to any active planting of plants

Reimbursable Cost: \$2,573

Task #3 Fencing of project boundaries

Task Description: Construction of cattle fencing around the parameter of the project area

Task purpose: Fencing will allow for the initiation of the grazing management program. The grazing management program will be developed after one years experience with the recovery of the project area.

Deliverable Description: Photographs of installed fencing combined with a narrative report of the fencing.

Deliverable Due Date: July 30, 2014

Reimbursable Cost: \$8,490

Task #4 Construction of Subsurface Groundwater Retention System (SGRS)

Task Description: A barrier to subsurface movement of groundwater will be placed across the stream channel. This will be placed such that surface water patterns are minimally affected. Erosion control will be obtained by having the construction performed during the dry season and by appropriate sediment barriers temporarily placed and by rock rip rap as needed.

Task purpose: This will serve to increase the groundwater levels in the riparian area to levels approximating those which existed before the lower reach of the channel was eroded. By reestablishing the water table water, the groundwater to surface connectivity will be reestablished. In addition, significant water storage capacity will be recreated.

Deliverable Description: A report with photographs of the construction process will be provided to the Project manager.

Deliverable Due Date: Prior to implementation of any plantings in the riparian area. Target date is May 30, 2014

Reimbursable Cost: \$12,732

Task #5 Induced meandering and grade control structures.

Task Description: Placement of hand and machine built structures designed to increase meandering of the channels and to reduce down cutting of the channels. The structures will lead to deposition of sand and silt in the channel reaches allowing for vegetation growth.

Task purpose: The increased meandering and subsequent drop in overall stream grade will allow for more infiltration of water into the soil.

Deliverable Description: A report which describes the work accomplished and photographic documentation of the structures will be provided to the Program Manager.

Deliverable Due Date: May 30, 2014

Reimbursable Cost: \$2,489

Task #6 Upland treatments

Task Description: To change the current upland plant community to one with a higher percentage of native grasses.

- Reduction on density mesquite growth by grubbing and pruning
- Contour ripping of the compacted clay soil to allow for water infiltration and loosening of the soil structure
- Seeding before rain events as appropriate

Task purpose: To reestablish a plant community more representative of the historical grasslands of the area. This will provide habitat for several species of sparrows and other grassland animals. The recreation of the increased cover will reduce sheet water runoff and its consequence of soil erosion and flow of fecal material into the stream. In addition, there will be the opportunity for soil development.

Deliverable Description: Narrative report and photographic documentation will be provided to the Project Manager.

Deliverable Due Date: Task will be started before Monsoon, but not all seeding will be performed until the start of the winter rainy season. Planting will continue throughout the project as the area responds to the various interventions.

Reimbursable Cost: \$1,773

Task #7 Planting in the riparian area

Task Description: Based upon the plans developed in Task #2C plants will be introduced to the project area.

Task purpose: To establish a community of plants, this can support a variety of plant and animal life across multiple ecological dimensions.

Deliverable Description: The grantee will provide a report which includes the plans and photographic evidence of the planting program.

Deliverable Due Date: As determined by the plan developed in Task #2C. This task is anticipated to continue throughout the project. There will be multiple submissions providing evidence of progress.

Reimbursable Cost: \$3,014

Task #8 Interpretive signage

Task Description: This task involves planning and emplacing a series with signs showing the SGRS, rock structures, plant labels, soil types and other features of the hydrology and ecology of the site.

Task purpose: To provide a means of public outreach and recreation that is educational in nature.

Deliverable Description: Photographic documentation of the completed trail will be provided to the Project manager coupled with a narrative report.

Deliverable Due Date: December 30, 2014

Reimbursable Cost: \$3,226

Task #9 Monitoring of interventions

Task Description: Interventions will be repeatedly monitored along several dimensions:

- Repeated vegetation transects
- Hydrodynamic measurements (flow, volume)
- Water table levels and their relationship to precipitation
- Turbidity measurements
- Bacterial contamination measurements
- Geomorphic changes
- Changes in plant ecological structure (Canopy heights and densities, variety of plant types, development of ecological niches which birds and animals can inhabit)
- Development of organic levels in soil profiles
- Structured photographic monitoring will document gross and detailed changes in the area.

Task purpose: Monitoring will document any changes in the project area and will provide information for adaptive management of the project.

Deliverable Description: Detailed monitoring plans and methods will be delivered to the Project Manager. Periodic copies of monitoring information will be provided to the Project Manager.

Deliverable Due Date: Detailed monitoring plans and procedures will be delivered within 60 days of the awarding of the grant. Thereafter, annual monitoring reports will be submitted for five years, due at the end of the calendar year.

Reimbursable Cost: \$17,648 this budget item will be spread out over five years. \$11,448 is requested for the first year to cover the capital expense of the data recording equipment and the increased labor to set up the field protocols, while the remaining \$6,200 covers the next four years (\$1,550 per annum)

Task #10 Final report of the project

Task purpose: The report will summarize the plans, interventions and result of those interventions.

Deliverable Description: A written report will be submitted to the Project Manager.

Deliverable Due Date: February 15, 2019

Reimbursable Cost: \$3,000

Detailed Budget is attached

State Historic Preservation Office Review Form is attached

Key Personnel

Forrest Sherman, PsyD, Project Coordinator

Work history:

- 1971-1992 United States Navy, Psychologist, worked in a variety of settings from providing clinical services, managing teams of people, managing complex research projects, and program development.
- 1992-1995 Chief Psychologist Maine State Prison System.
- 1995-2009 Owned and operated a working farm in Maine.
- 1995-2009 Owned a construction business specializing in pond and drainage development and general construction.
- 2009-present Retired but active in various non-profit activities. Most relevant has been starting a non-profit Southwestern Arid Grassland Ecology, Inc. (SAGE)

Southwestern Arid Grassland Ecology, Inc. (SAGE)

Experience and capabilities

Business:

Cooperating participants with SAGE have successfully and profitably operated private companies for many years.

Consultants are available for specific technical issues.

Scientific:

Staff members are familiar with scientific methodology.

Statistical analysis

Instrumentation

Environmental monitoring

Management of large, published research projects

While not formally trained in Ecology the project manager has a strong textbook and working knowledge of ecology, stream hydrology and land-use issues.

Environmental projects:

SAGE has partnered with the Altar Valley Conservation Alliance for the past two years in two major projects.

1. A demonstration project of grade and erosion control structures.

Constructing over 500 structures

SAGE has developed and implemented the monitoring of this project, which includes:

Vegetation monitoring

Geomorphic

Photographic

Mapping

SAGE provided heavy equipment operation and training of volunteers for the project.

2. Erosion control planning and mapping for a large (250 sq kilometers) prescribed burn project

SAGE has started a multiyear rehabilitation of a perennial stream which was channelized by severe flooding from a cattle tank failure. This project required:

- Surveying
- Installation of channel grade control structures
- Induced meandering structures
- Establishment of monitoring protocols

SAGE has started a cooperative partnership with a private rancher addressing erosion control and abandoned cotton field reclamation, which involves:

- Surveying
- Project planning
- Vegetation evaluation and planting choice
- Increasing rainwater infiltration
- Restoring channelized streams to proper hydraulic functioning

Educational

SAGE can provide public speakers

SAGE will form cooperative partnerships with other non-profits to provide outreach opportunities for this project.

The following have agreed to serve as consultants for this project:

Margaret Livingston, PhD University of Arizona, College of Architecture, Planning and Landscape Architecture

Margaret Livingston is a Professor in the School of Landscape Architecture and Planning. She teaches a range of courses related to ecological and environmental issues in arid environments and has locally and internationally conducted lectures and workshops that focus on water conservation, wildlife habitat, and use of native plants in urban areas. As an urban ecologist, her work emphasizes the importance of evaluating and maintaining natural and semi-natural ecosystems within and surrounding urban areas. In her role as a designer, Margaret focuses on the use of native plants and design of urban wildlife spaces.

Thomas Meixner, PhD Professor, Hydrology and Water Resources (HWR); Associate Department Head, HWR; Director of Graduate Studies, HWR

My research interest lies at the intersection of hydrology and biogeochemistry. In particular, I am interested in how hydrologic processes play a fundamental role in controlling biogeochemical processes and fluxes at the catchment scale. My research group spans from field investigations designed to understand these controls at a mechanistic and process level to modeling studies focused on forecasting biogeochemical and water quality conditions at the catchment to basin scale. In particular, on the modeling side my group works on developing model calibration and uncertainty techniques that can coexist with the both multi-dimensional and yet sparse data that are typically available for water quality modeling at the basin to catchment scale. My work has spanned environments as diverse as desert scrub and alpine ecosystems and from scales of single soil profiles to 10,000 square kilometer catchments.

Shannah Rock, PhD

Dr Rock will provide the water quality sampling service for the project.

She is Assistant Water Quality Specialist at the University of Arizona and director of the Water-Quality Group received her MS and PhD degrees in Civil and Environmental Engineering from the Ira A. Fulton School of Engineering at Arizona State University. The focus of the Water-Quality group at Maricopa Agricultural Center is to provide knowledge and technical information on a broad range of topics related to water quality. Research aspects of the program include evaluation of agricultural practices, industrial operations, municipal water systems and environmental quality relating to impaired waters. Extension activities focus on the interaction between the research and the public to promote greater understanding of the issues that affect water quality here in the Southwest.

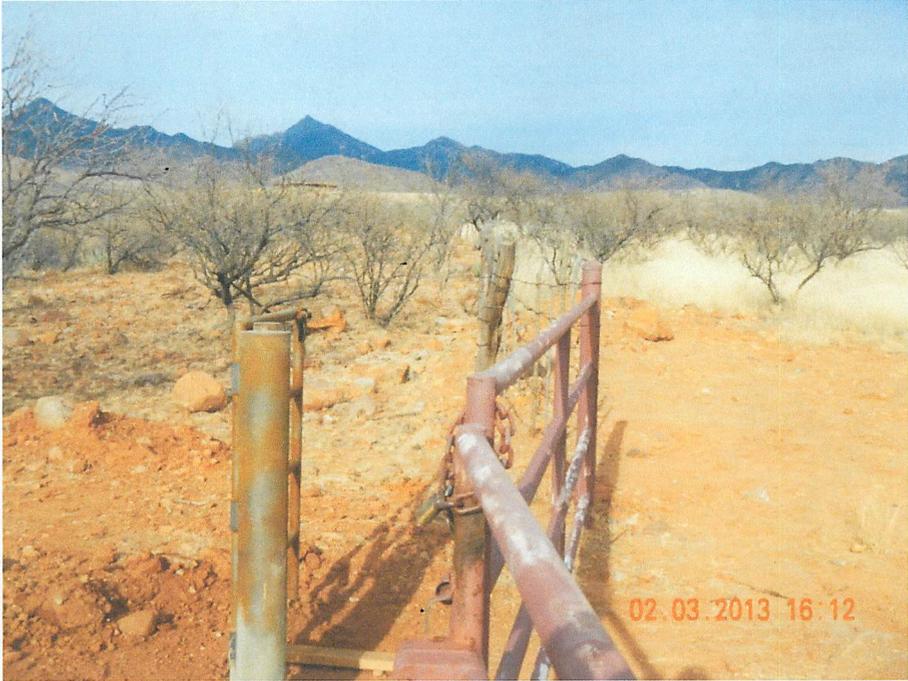


Figure 1

Figure 1 shows the boundary fence with overgrazed side on the left



Figure 2

Figure 2 shows canyon looking from the west



Figure 3

Figure 3 shows canyon from south to north



Figure 4

Figure 4 shows canyon looking NE towards Mts. Hopkins and Wrightson. Saddle between then is entrance to Madrea Canyon.



Figure 5

Figure 5 shows how grazed the ground is.



Figure 6

Figure 6 shows stream bed within the canyon. Stream bed is about 3 meters wide.



Figure 7

Figure 7 shows small stand of Deer Grass.

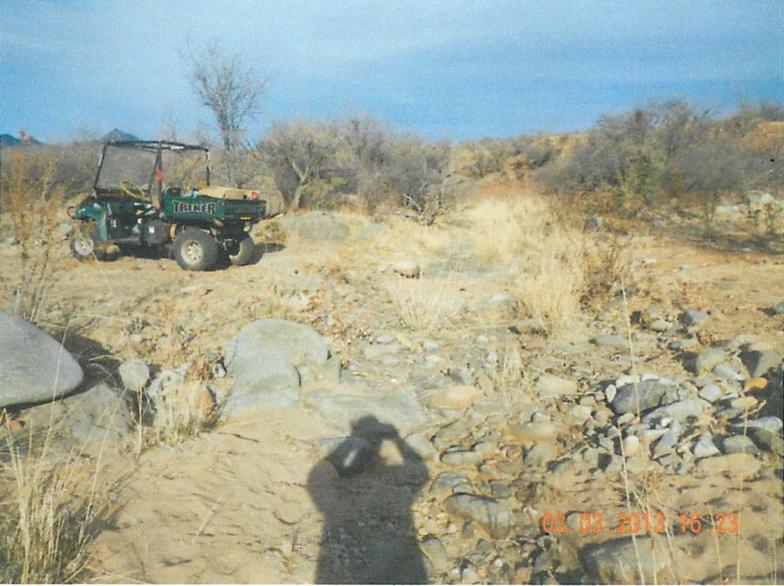


Figure 8

Figure 8 shows stream bed



Figure 9

Figure 9 shows Ash and Hackberry in the canyon bottom.



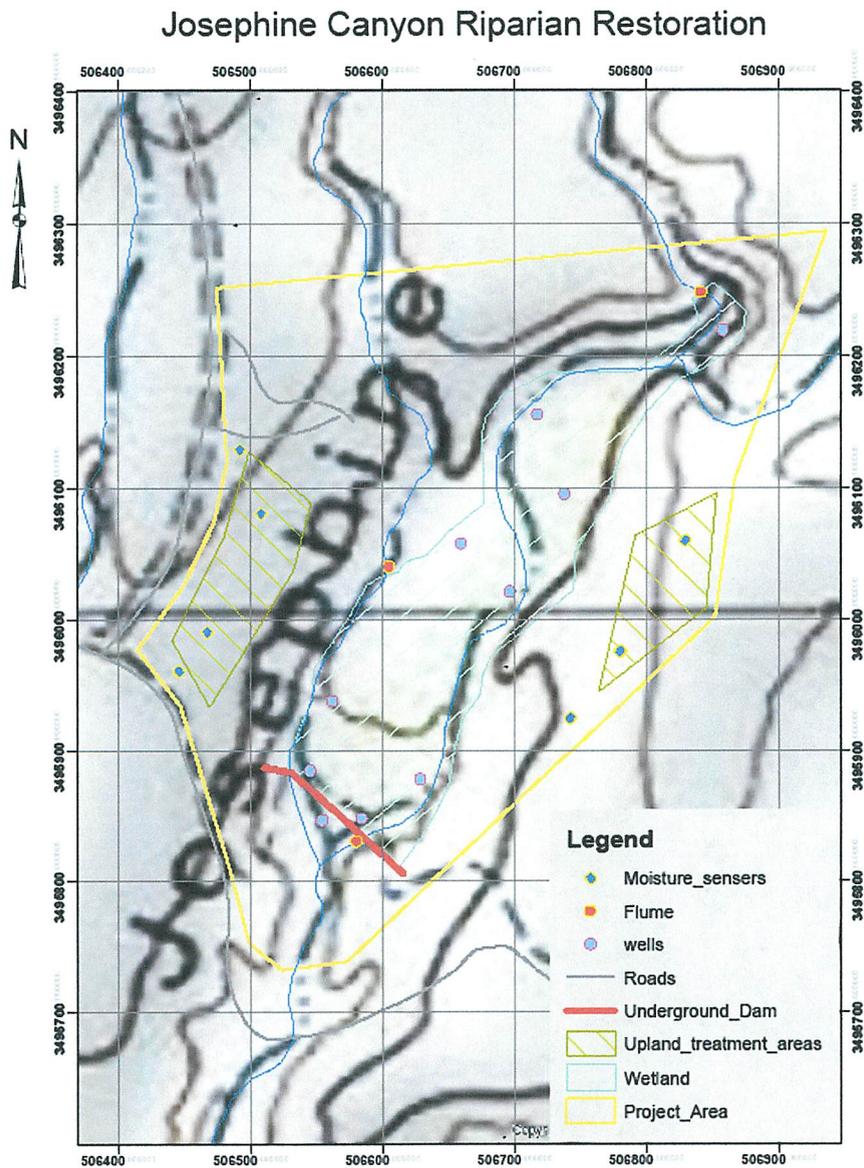
Figure 10

Figure 10 shows area where SGRS will be placed, from the camera across the canyon through the small mesquites to right of buggy.

Basic Monitoring Plan

1. Background and Monitoring objectives
 - a. Pollutants of concern are E. Coli and turbidity.
 - b. Monitoring should show a decrease in both pollutants between where two streams enter the wetland basin and the single stream outflow (I1, I2 and O1)
 - c. The general method of data analysis will compare the mean differences in data gathered at the three sampling sites (upstream and downstream)
 - i. Analysis of Variance will be used to establish the significance of the mean differences.
2. Parameters and measurements will include direct measurements of pollutants of concern and documentation of the ecological changes if the targeted wetland.
 - a. *E-coli* and *Bacteroides* will be measured using the services of the University of Arizona department of Soil, Water, and Environmental Science laboratory. *Bacteroides* analysis will allow for a determination of any human associated E. coli in the water.
 - b. Turbidity will be measured using LaMotte's 2020we Turbidity Meter or equivalent.
 - c. Vegetative changes will be monitored by:
 - i. Daubenmire transects
 - ii. Repeated benchmarked and scale controlled photography.
 1. Photographic analysis will be based upon the methods found in Photo Point Monitoring Handbook USDA General Technical Report PNW-GTR-526 March 2002.
 - d. Maps will be developed using a combination of GIS, RTK GPS, field surveys of Long Profiles and Cross sections, and LIDAR data provided by Santa Cruz County.
 - e. Soil profiles will be obtained at the beginning and end of the project to determine any changes in the distribution of particle size from the modifications of flow patterns.
 - f. These parameters have been chosen for the following reasons:
 - i. *E. Coli* is a specified pollutant of concern in the Santa Cruz River.
 1. It may reflect the cattle grazing overuse in the area of the project site.
 2. It is an accepted indicator of fecal contamination within a watershed.
 3. The re-establishment of a viable riparian area would serve to reduce the pass through of surface faecal contamination with a concomitant reduction in faecal load.
 - ii. *Bacteroides* measurements can indirectly show the presence of human fecal contamination. *Bacteroides* analysis for human contamination is based upon the large upstream watershed and the number of persons who travel through and camp there.
 - iii. Turbidity is of concern due to the large range area which has been denuded of vegetative cover and has been disturbed by cattle. This has caused significant soil transport when sheet flow occurs. Again, the reestablishment of a riparian area would help to mitigate this erosion.
 - iv. Vegetative changes will be monitored as they are a principal aspect of a riparian area.
 - v. Mapping will show any increase in sinuosity and geomorphology as a result of the physical interventions within the wetland area.
 - vi. Soil particle changes are a strong indicator of geomorphologic changes.
3. The proposed site has been selected because:

- a. It includes a discrete historical and potential wetland area due to the underlying geological profile and recent anthropogenic changes in the surface profile.
 - i. At present, there are some riparian obligate species remaining but less coverage as on a similar nearby reach.
- b. It is of amenable size for Southwestern Arid Grasslands Ecology, Inc. to manage.
- c. It is owned by one landowner who has agreed to the project.
- d. Physical access is convenient.
- e. The stream is listed as intermittent by Arizona NEMO Watershed-Based Plan Santa Cruz Watershed and has significant flow throughout Monsoon and during winter rain periods.
- f. Map of sample sites



4. The monitoring schedule will be based upon significant rainfall events starting at the beginning of the project, continuing through each rainfall season and at the close of the project.

a. Specific monitoring times activities are related to the following events;

Event	E. Coli	Bacteroides	Vegetation transects	Turbidity	Survey, Photo,
Start of project	X	X	X	X	ALL
First rain runoff event	X			X	
Post second rain	X			X	
After Monsoon	X				PHOTO
<i>Second and third year</i>					
During first winter rain	X			X	
After second rain	X			X	
During first Monsoon runoff	X			X	
After second monsoon rain	X			X	
After Monsoon	X	X	X	X	PHOTO
<i>Third through fifth year</i>					
After first winter rain	X			X	
During monsoon rain	X			X	
After Monsoon	X		X		PHOTO
Close of project	X	X		X	ALL

b. Water quality improvement is expected after the emergence of new plant growth coupled with increased sediment deposition. This will potentially occur during and after the second monsoon.

c. The pollutant load from cattle is not likely to change during the project period, and if current range management practices continue, it will have a year-round impact.

5. Protocols, Equipment and Training

a. Protocols

- i. E. Coli testing protocol will follow the instructions provided by the testing laboratory. Samples will be drawn from the running stream, or lacking running water, from water holes near the sample sites. The monitoring times chosen should result in running water for each data-gathering period.
- ii. *Bacteroides* monitoring will involve similar water sampling into sterile bottles provided by the testing laboratory and shipping the sample to them for testing.
- iii. Turbidity testing will use an 'open bottle' water gathering system due to the shallow nature of the streams. In past years there has been apparent homogenous mixing of the water in the streams. Adequate sampling of the stream cross section should not be a significant problem. The samples will be tested using the instructions provided with the equipment. The LaMotte 2020we Turbidity Meter is a nephelometric instrument which measures the light scattered at 90% from a beam of light going through the water sample.
- iv. Vegetation monitoring will use the Daubenmire method. This uses a frame (20cm.X50cm.) in which various plant cover classes are recorded. Typically, each transect will use 30 frame placements. This will allow for sufficient data to perform

- appropriate Analysis of Variances upon the data gathered over the course of the project. A specific protocol similar to that found in <http://www.cbrestoration.noaa.gov/documents/cb-mon1m.pdf> will be used.
- v. Profiles of stream channels and cross sections will be surveyed using the basic methods described in *“Let the Water do the Work: Induced Meandering and Evolving Method for Restoring Incised Channels, Zeedyk and Clothier 2009.”* This will provide profiles of the stream channels and allow for design of structures to restore the connections between the stream channels and the local potential aquifer.
 - vi. Several monitoring wells will be placed to record the water table changes throughout the project. These are shown on the above map as “X’s”
 - vii. Photographic analysis will be based upon the methods found in Photo Point Monitoring Handbook USDA General Technical Report PNW-GTR-526 March 2002.
 - viii. Mapping will be based upon ESRI’s program ARCMAP 10.2 using readily available orthographic imagery, and upon the field data gathered by the detailed GPS survey.
 - ix. Soil analysis will be performed using both the ‘feel’ method and sieving the soil through a series of progressively small screens allowing for a percentage breakdown of the sand and silt sizes
- b. Equipment and resources
- i. Needed to be acquired
 1. E. Coli and Bacteroides testing materials
 2. Turbidity meter
 3. RTK GPS
 - ii. On hand
 1. Surveying equipment
 2. ARCGis software
 3. Daubenmire frames and associated equipment
 4. Materials for well casings
 5. Photographic equipment
 6. Project manager is experienced in monitoring large projects and is familiar with the required techniques.

Re-vegetation/Restoration Plans

Details of re-vegetation and restoration plans will be developed as part of the grant process. However, in general, the purpose behind the project is to restore a degraded hydrological system, specifically to restore it’s ground water storage capacity. This will allow the reintroduction of native riparian obligate and facilitated plant species with the subsequent development of the whole biome usually found in a riparian area.

Appendix

Nilsson, A., "Groundwater Dams for Small-Scale Water Supply", *Intermediate Technology Publications Ltd, London, UK*

<http://www.rainwaterharvesting.org/methods/modern/gwdams.htm>

<http://www.oas.org/dsd/publications/Unit/oea59e/ch34.htm>

www.ewra.net/ew/pdf/EW_2005_11-12_05.pdf

Biebighauser, Thomas R., "*Wetland Restoration & Construction, A Technical Guide*", Upper Susquehanna Coalition.

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, FY 2014
2. Project Title: Wetland Restoration in Josephine Canyon
3. Applicant Name and Address: Southwestern Arid Grassland Ecology, Inc. (SAGE)
4. Current Land Owner/Manager(s): Forrest Sherman
5. Project Location, including Township, Range, Section: Tubac Foothills Ranch Unit III, Lot 104 Luis Maria Baca Grant (Float No. 3) 31.6N 110.93W
6. Total Project Area in Acres (or total miles if trail): 41
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: The area will be fenced to reduce the grazing load from cattle. In addition, a 400 ft trench about 5 feet deep will be dug across the fluvial deposits in the bottom of the canyon and refilled with compacted clay or silt.

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 majority of the area is in an undisturbed state. There is one house, built since 2005 and an old roadbed.

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.

F. Sherman

Applicant Signature

18/26/2013

/Date

Forrest Sherman

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:

Land ownership documentation

12 11238104

AUTO

NOTICE OF VALUE

FELIPE A. FUENTES JR.
SANTA CRUZ COUNTY ASSESSOR
PO BOX 1150
2150 N CONGRESS DR
NOGALES, AZ 85628
(520) 375-8030

THIS IS NOT A TAX BILL

RETURN SERVICE REQUESTED

PRESORTED
FIRST CLASS
U.S. POSTAGE
PAID
PHOENIX, ARIZONA
PERMIT NO. 338

See reverse side for definitions and instructions

Your Appeal Deadline is April 29, 2013

Property located in: SANTA CRUZ COUNTY	Tax Year 2014	Parcel ID 12	BK 11238104	MP 11238104	Parcel	Notice Date 02/28/2013
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	LEGAL CLASS	2013 VALUATION			2014 VALUATION			
		Value	ASST. RATIO	ASSESSED VALUE	LEGAL CLASS	VALUE	ASST. RATIO	ASSESSED VALUE
LAND FCV	M	13229	10.3	1367	M	13229	10.3	1367
IMPR FCV	3	213132	10.0	21313	3	210911	10.0	21091
TOTAL FCV	M	226361	10.0	22680	M	224140	10.0	22458
LIMITED VALUE	M	226361	10.0	22680	M	224140	10.0	22458

SECTION: 17 TOWNSHIP: 21S RANGE: 14E ACRES: 41.45

LEGAL DESCRIPTION SUB TUBAC FOOTHILLS RANCH UNIT NO.3 LOT 104

SHERMAN FORREST
P O BOX 370
TUMACACORI AZ 85640





Return Mail Operations
PO Box 14411
Des Moines, IA 50306-3411

Statement date 07/07/13
Loan number 0096705124
Property address
**17 CAMINO SEPULVEDA
TUMACACORI AZ 85640**

Land Ownership documentation

Customer Service Online
wellsfargo.com
 Fax 1-866-278-1179
 Telephone 1-866-234-8271
Correspondence PO Box 10335
Des Moines IA 50306
Des Moines, IA 50306
Hours of operation
Mon - Fri 6 a.m. - 10 p.m.
Mon - Fri 6 a.m. - 10 p.m.
Sat 8 a.m. - 2 p.m. CT
 Payments PO Box 30427
Los Angeles CA 90030
Purchase or refinance
1-866-867-3026



1MB 04610/004610/004610 0011 1ACQG0Y708

**FORREST SHERMAN
PO BOX 370
TUMACACORI, AZ 85640-0370**

We accept telecommunications relay service calls.

Important messages

This is not a bill, our records indicate your payments are scheduled to withdraw automatically. All funds are applied when sufficient funds have accumulated to make a full monthly payment as outlined in your mortgage note. If you are paying off your loan, please contact us at least five (5) days prior to your next withdrawal date.

Reduce your home energy bills
Consider a programmable thermostat to help reduce energy costs. According to ENERGY STAR, changing settings while away from home can save you about \$180 every year in energy costs.

Summary

Payment (principal and/or interest, escrow)	\$2,135.92	Unpaid principal balance	\$27,100.21
Optional product(s) ²	\$40.33	(Contact Customer Service for your payoff balance)	
		Interest rate	5.25%
Total payment	\$2,176.25	Interest paid year-to-date	\$0,212.45
		Taxes paid year-to-date	\$0,136.66
		Escrow balance	\$1,600.63

Activity since your last statement

Date	Description	Total	Principal	Interest	Escrow	Other
07/07	Payment	\$2,176.25	\$1,000.00	\$1,000.00	\$1,000.00	Opt product \$40.33
06/06	Payment	\$2,176.25	\$1,000.00	\$1,000.00	\$1,000.00	Opt product \$40.33
05/06	Payment	\$2,176.25	\$1,000.00	\$1,000.00	\$1,000.00	Opt product \$40.33
04/24	County tax payment				\$0,136.66	SANTA CRUZ COUNTY (W)

²Home Warranty \$40.33

004610004610 ACQG0Y 31-ET-41-C001



Loan number 0096705124

Monthly payment x pmt amt A \$

Additional principal B \$

Late charges C \$

Other charges D \$

Additional escrow E \$

Check here and see reverse for address correction.

FORREST SHERMAN
04610/004610/004610 0011 1ACQG0Y708

Please specify additional funds



WELLS FARGO HOME MORTGAGE
PO BOX 30427
LOS ANGELES CA 90030-0427

Total amount enclosed (Please do not send cash) F \$

This is not a bill, but for your information only.

708 0096705124 5 10000217395022692402173950000000 000000011417691275 1

THOMAS M. DANIEL
288 Grosvenor Road
Rio Rico, AZ 85648
(203)246-7715

August 25, 2013

To Whom it may concern:

As a resident of the abutting Salero Ranch which also shares riparian rights to Josephine Wash and Canyon, I Thomas Daniel fully support the restoration efforts of Forrest Sherman and SAGE.

Sincerely,

Thomas M Daniel

Thomas M. Daniel

232 Bond Canyon Road
Tumacacori, AZ 85640

August 26, 2013

Dear Sir or Madam:

This letter is to support enthusiastically the grant proposal of Forrest Sherman, who is a neighbor and one with whom I have worked closely on the rehabilitation of my stream bed on Bond Canyon Creek. A year ago Mr. Sherman made a presentation to my wife and me showing dramatically the results of his work in rehabilitating a series of washes in the Altar Valley. Those pictures convinced us of the feasibility of restoring our stream bed to its earlier state, and we already are seeing clear results of his efforts. We could not be more enthusiastic about the work he has done here.

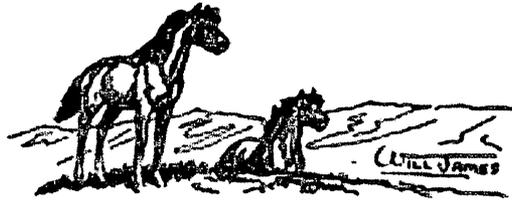
I have known Forrest for approximately 7 or 8 years and have gotten to know him very well. I've always been impressed by his "can do" attitude and in the outcomes of his work, a substantial amount of which has been on my own property. He is a man who has an inquiring mind, and is always exploring new challenges and putting his newly gained knowledge into practice. He seeks out new knowledge and follows up with professionals to help him build his own knowledge base and then to put that knowledge into practice.

My wife and I do hope that you will be able to support his proposed work, which will be of great benefit to our local area and beyond.

Sincerely,

Larry L. Leslie
Professor Emeritus, University of Arizona

Distinguished Visiting Professor
and Senior Research Associate
University



ELKHORN RANCH

27000 WEST ELKHORN RANCH ROAD ... TUCSON, ARIZONA 85736

520.822.1040 ... WWW.ELKHORN RANCH.COM

August 26, 2013

Letter of Reference for Forrest Sherman, Southwestern Arid Grassland Ecology (SAGE)

To Whom It May Concern:

I have worked with Mr. Forrest Sherman from two different perspectives – as a landowner who has benefited from his project work and as a board member for the Altar Valley Conservation Alliance. Forrest is a committed jack-of-all trades conservationist, dedicated to doing good work for the land and contributing to ongoing practical and scientific knowledge.

Forrest appeared in the Altar Valley where we live and ranch in January 2012, as a volunteer for an ambitious watershed restoration project known as the Elkhorn/Las Delicias Demonstration Project. The project involved extensive hand and machine work to stabilize highly eroded drainages, as well as rehabilitation of a ranch road that was causing much of the watershed trouble. The work also involved set up and implementation of an extensive photo and vegetation monitoring protocol. Forrest quickly became an integral member of the team due to his energy, intelligence, and can-do attitude. He utilized all manner of skills ranging from running survey equipment, to working with volunteers to place rocks, to running the dump truck. When unexpected project personnel changes occurred, Forrest agreed to take over the monitoring of the project as (an expenses paid) volunteer, a job that continues to this day.

This year, the Altar Valley Conservation Alliance and its primary restoration contractor Steve Carson (Rangeland Hands) have again partnered with SAGE to work on a series of restoration projects throughout the Altar Valley. Thus far, Forrest has served a member of the field recon team and has prepared project maps. He is an excellent team member who delivers work as promised. He has many skills, never stops learning, and is committed to doing restoration work. Please contact me at 520-822-1040 if you have further questions.

Regards,

/s/ Mary T. Miller

Elkhorn Ranch, Co-Manager/Owner

Altar Valley Conservation Alliance, Vice-President/Programs



Forrest Sherman <sherman144@gmail.com>

hydrologic alterations and restoration

1 message

Thomas Meixner <thomas.meixner.ua@gmail.com>

Sun, Aug 25, 2013 at 1:39 PM

To: Forrest Sherman <sherman144@gmail.com>

Forrest,

Good to talk to you on Friday. Your project to install a subsurface flow impediment to help restore the riparian area on your land near Josephine canyon seems like a reasonable and worthwhile project. I look forward to seeing it implemented and using the site as an example of hydrologic restoration for the HWR field course.

Thanks,
Tom

—

Professor
Hydrology and Water Resources
University of Arizona
Mail to: Room 122 JW Harshbarger Bldg. #11
Physical Office: Room 202 JWH
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**Josephine Canyon Riparian Restoration
Budget breakdown for Arizona Water Protection Fund Grant Proposal**

			Direct Labor	Outside Services	Other Direct Costs	Capital Outlay & Equipment Costs	Administrative Costs	Total Budget Needed by Task	Matching funding by Task	Amount Requested by Task	Grant % of Total per task
Task#	1	Permits, Authorizations, Clearances and Agreements	\$1,350	\$4,200	\$640	\$0	\$210	\$7,440	\$3,240	\$4,200	56%
Task#	2A	Mapping of project area	\$2,905	\$0	\$208	\$13,266	\$738	\$17,117	\$1,625	\$15,492	91%
Task#	2B	Ecological assessment of the project area	\$850	\$960	\$280	\$190	\$114	\$2,394	\$145	\$2,249	94%
Task#	2C	Establishment of ecologically based landscape plan	\$1,210	\$1,200	\$400	\$0	\$123	\$2,933	\$360	\$2,573	88%
Task#	3	Fencing of project boundaries	\$4,315	\$0	\$1,280	\$4,821	\$404	\$10,820	\$2,330	\$8,490	78%
Task#	4	Construction of Subsurface Groundwater Retention System (SGRS)	\$2,128	\$0	\$330	\$11,110	\$604	\$14,172	\$1,440	\$12,732	90%
Task#	5	Induced meandering and grade control structures	\$1,000	\$500	\$180	\$1,230	\$119	\$2,910	\$480	\$2,489	86%
Task#	6	Upland treatments	\$1,520	\$0	\$750	\$503	\$84	\$2,857	\$1,084	\$1,773	62%
Task#	7	Planting in riparian area	\$1,264	\$400	\$320	\$1,398	\$144	\$3,526	\$512	\$3,014	85%
Task#	8	Interpretive Signage	\$1,982	\$400	\$1,130	\$1,490	\$154	\$5,156	\$1,930	\$3,226	63%
Task#	9	Monitoring of interventions	\$9,750	\$1,800	\$375	\$9,923	\$850	\$22,698	\$5,050	\$17,648	78%
Task#	10	Final report of project								\$3,000	100%
		Sum of administrative costs (this is reflected within each task)					\$3,543				

TOTALS	
GRANT AMOUNT	\$92,022
MATCHING	\$18,196
REQUESTED FROM AWP	\$76,885
Percentage of administrative costs to grant request	4.61%

TASK# 1 **Permits, Authorizations, Clearances and Agreements**

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	Total Needed	In Kind	Grant Request
1	Research and Writing of Grant	54	\$25			1350	\$1,350	\$0
2	ACE 404 Permitting	28	\$25			700	\$700	\$0
3	401 Permitting	22	\$25			550	\$550	\$0
4						0		\$0
5						0		\$0
6						0		\$0
7						0		\$0
	TOTAL	104				2600		\$0
Outside Services								
1	Archeological Review (If needed)			\$4,200	1	4200		\$4,200
2						0		\$0
3						0		\$0
4						0		\$0
						4200		\$4,200
Other Direct Costs								
1	Office Supplies (paper, computer ink etc)			\$120	1	120	\$120	\$0
2	Office use			\$5	104	520	\$520	\$0
3						0		\$0
4						0		\$0
5						0		\$0
						640		\$0
Capital Outlay Costs								
1						0		\$0
2						0		\$0
3						0		\$0
4						0		\$0
5						0		\$0
6						0		\$0
7						0		\$0
						0		\$0
Administrative Costs								
1	5% of grant request							\$210
2						0		\$0
3						0		\$0
4						0		\$0
						0		\$210
					GRAND TOTALS	\$7,440	\$3,240	\$4,410

TASK#2A

Mapping of project area

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	Total Needed	In Kind	Grant Request	
1	Survey field work	65	\$25			1,625	\$1,625	\$0	
2	Survey office work	32	\$25			800	\$0	\$800	
3	Survey Helper	40	\$12			480	\$0	\$480	
4						-	\$0	\$0	
5						-	\$0	\$0	
6						-	\$0	\$0	
7						-	\$0	\$0	
					Sub Total	2,905	\$1,625	\$1,280	
Outside Services									
1						-	\$0	\$0	
2						-	\$0	\$0	
3						-	\$0	\$0	
4						-	\$0	\$0	
					Sub Total	-	\$0	\$0	
Other Direct Costs									
1	Printing (See note)			\$52	4	208	\$0	\$208	
2	Office and Computer use (See note)			\$15	32	480	\$480	\$0	
3						-	\$0	\$0	
4	Printing cost of survey drawing 24"X36"					-	\$0	\$0	
5						-	\$0	\$0	
					Sub Total	688	\$0	\$208	
Capital Outlay Costs									
1	Survey Equipment RTK GPS <i>(see note)</i>			\$13,266	1	13,266	\$0	\$13,266	
2						-		\$0	
3	<i>Hiring a surveyor would be about \$11000 to \$13000. SAGE has capacity to do the surveys needed with this equipment. There will be repeated setups for different parts of the project which increases the cost of hiring a surveyor. Each set up by external surveyor would be an additinal \$2000-\$3000.</i>					-		\$0	
4						-		\$0	
5							-		\$0
6							-		\$0
7							-		\$0
					Sub Total	13,266	\$0	\$13,266	
Administrative Costs									
1	5% of grant request					-		\$738	
2						-	\$0		
3						-	\$0	\$0	
4						-	\$0	\$0	
					Sub Total	-	\$0	\$738	
					TOTAL	16,859	\$1,625	\$15,492	

TASK# 2B

ECOLOGICAL DESCRIPTION OF THE PROJECT AREA

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	TOTAL NEEDED	In Kind	Grant Request
1	Traverse setup	8	\$25			\$200		\$200
2	Plant surveys	12	\$25			\$300		\$300
3	Soil Profiles	6	\$25			\$150		\$150
4	Animal survey	8	\$25			\$200		\$200
5						\$0		\$0
6						\$0		\$0
7						\$0		\$0
					Sub Total		\$0	\$850
Outside Services								
1	Plant consultant	8	\$60			\$480		\$480
2	Animal consultant	8	\$60			\$480		\$480
3						\$0		\$0
4						\$0		\$0
					Sub Total		\$0	\$960
Other Direct Costs								
1	Survey forms			\$1	16	\$16	\$16	\$0
2	T posts for traverse			\$8	10	\$80		\$80
3	SAGE auger equipment	3	\$35			\$105	\$105	\$0
4	Map Printing (24"X36")			\$50	4	\$200		\$200
5	Office expence per hour			\$5	8	\$40	\$40	\$0
					Sub Total		\$145	\$280
Capital Outlay Costs								
1	Munson Soil Color Book			\$190	1	\$190		\$190
2						\$0		\$0
3						\$0		\$0
4						\$0		\$0
5						\$0		\$0
6						\$0		\$0
7						\$0		\$0
					Sub Total		\$0	\$190
Administrative Costs								
1	5% of grant request					\$0		\$114
2						\$0	\$0	
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$114
					TOTAL		\$145	\$2,394

TASK# 2C

Establishment of ecologically based landscape planting

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	TOTAL NEEDED	In Kind	Grant Request
1	Plan Development	30	\$25			\$750	\$0	\$750
2	Map and Drawing Production	12	\$30			\$360	\$180	\$180
3	Surveying for plant layout	4	\$25			\$100	\$100	\$0
4						\$0	\$0	\$0
5						\$0	\$0	\$0
6						\$0	\$0	\$0
7						\$0	\$0	\$0
					Sub Total	\$1,210	\$280	\$930
Outside Services								
1	Landscape Ecologist Consultant	24	\$50			\$1,200	\$0	\$1,200
2						\$0	\$0	\$0
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$1,200	\$0	\$1,200
Other Direct Costs								
1	Map printing (24"X36"maps)			\$50	4	\$200	\$0	\$200
2	Office use per hour			\$5	16	\$80	\$80	\$0
3	Specialized software			\$10	12	\$120	\$0	\$120
4						\$0	\$0	\$0
5						\$0	\$0	\$0
					Sub Total	\$400	\$80	\$320
Capital Outlay Costs								
1						\$0		\$0
2						\$0		\$0
3						\$0		\$0
4						\$0		\$0
5						\$0		\$0
6						\$0		\$0
7						\$0		\$0
					Sub Total	\$0	\$0	\$0
Administrative Costs								
1	5% of grant request					\$0	\$0	\$123
2						\$0	\$0	
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$123
					TOTAL	\$2,810	\$360	\$2,573

TASK# 3

Fencing of Project Boundary

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	Subtotal	In Kind	Grant Request
1	Crew Chief	105	\$20			\$2,100	\$1,000	\$1,100
2	Labor	105	\$15			\$1,575	\$0	\$1,575
3	Layout and brush clearing	32	\$20			\$640	\$0	\$640
4						\$0	\$0	\$0
5						\$0	\$0	\$0
6						\$0	\$0	\$0
7						\$0	\$0	\$0
					Sub Total	\$4,315	\$1,000	\$3,315
Outside Services								
1						\$0	\$0	\$0
2						\$0	\$0	\$0
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$0
Other Direct Costs								
1	Auger equipment (SAGE owned)			35	36	\$1,260	1000	\$260
2	Office expence per hour			5	4	\$20	20	0
3	Map			1	50	\$50		\$50
4						\$0		
5						\$0		
					Sub Total	\$1,330	\$1,020	\$310
Capital Outlay Costs								
1	Barbed wire 1320 ft roll			\$96	16	\$1,536	\$0	\$1,536
2	Barbless wire 1320 ft roll			\$76	5	\$380	\$0	\$380
3	T posts			\$8	175	\$1,400	\$0	\$1,400
4	4 ft gate			\$105	3	\$315	\$0	\$315
5	12 ft gate			\$150	2	\$300	\$0	\$300
6	Wooden Posts			\$18	30	\$540		\$540
7	Intermediate fence wire supports			\$1	350	\$350		\$350
					Sub Total	\$4,821	\$0	\$4,821
Administrative Costs								
1	5% of grant request					\$0		\$422
2						\$0	\$0	
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$422
					TOTAL	\$10,466	\$2,020	\$8,868
						\$0		

TASK# 4

Construction of Subsurface Groundwater Retention System (SGRS)

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	Total Needed	In Kind	Grant Request
1	Survey Stake out	8	\$25			\$200	\$0	\$200
2	Survey Grade Control	8	\$25			\$200	\$0	\$200
3	Heavy Equipment operator	48	\$25			\$1,200	\$0	\$1,200
4	Labor	40	\$12			\$480	\$0	\$480
5	Seeding of disturbed soil (see note)	4	\$12			\$48	\$0	\$48
6						\$0	\$0	\$0
7						\$0	\$0	\$0
					Sub Total	\$2,128	\$0	\$2,128
Outside Services								
1						\$0	\$0	\$0
2						\$0	\$0	\$0
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$0
Other Direct Costs								
1	Diesel fuel for heavy equipment			\$4	60	\$240	\$0	\$240
2	Office use per hour			\$5	8	\$40	\$40	\$0
3	Map (detail grade and stakeout)			\$50	1	\$50	\$0	\$50
4						\$0	\$0	\$0
5						\$0	\$0	\$0
					Sub Total	\$330	\$0	\$290
Capital Outlay Costs								
1	Equipment use SAGE owned	36	\$40			\$1,440	\$1,440	\$0
2	Equipment rental (see note)			\$1,800	2	\$3,600		\$3,600
3	Equipment transportation			600	2	\$1,200		\$1,200
4	Clay or other impermeable water barrier			\$4,750	1	\$4,750		\$4,750
5	Seeding of disturbed soil (see note)			\$120	1	\$120		\$120
6						\$0		\$0
7	Native grass seeding on soil disturbed by SGRS construction, \$120 per 5 LB bag.					\$0		\$0
					Sub Total	\$11,110	\$1,440	\$9,670
Administrative Costs								
1	5% of grant request					\$0		\$604
2						\$0	\$0	
3	Rental of Backhoe or excavator for trenching, cost per week. Plus \$1200 dilivery and pickup.					\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$604
					TOTAL	\$13,568	\$1,440	\$12,692

TASK# 5

Induced Meandering & Grade Control

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	Total Needed	In Kind	Grant Request
1	Planning and Stake Out (surveying)	12	\$25			\$300	\$0	\$300
2	Equipment Operation	12	\$25			\$300	\$0	\$300
3	Volunteer training and supervision	16	\$25			\$400	\$0	\$400
4						\$0	\$0	\$0
5						\$0	\$0	\$0
6						\$0	\$0	\$0
7						\$0	\$0	\$0
					Sub Total	\$1,000	\$0	\$1,000
Outside Services								
1	Volunteer Group costs (see note)			\$500	1	\$500	\$0	\$500
2						\$0	\$0	\$0
3	Fee to Sky Island Institute or other non-profit to organize volunteer labor					\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$500	\$0	\$500
Other Direct Costs								
1	Fuel			\$20	1	\$20	\$0	\$20
2	Survey Stakes and flagging (see note)			\$1	50	\$50	\$0	\$50
3	Office use per hour			\$5	12	\$60	\$60	\$0
4	Map (grade detail, LP and Crosssection)			\$50	1	\$50	\$0	\$50
5						\$0	\$0	\$0
					Sub Total	\$180	\$0	\$120
Capital Outlay Costs								
1	SAGE earthmoving equipment	12	\$40			\$480	\$480	\$0
2						\$750		\$750
3						\$0		\$0
4						\$0		\$0
5						\$0		\$0
6						\$0		\$0
7						\$0		\$0
					Sub Total	\$1,230	\$480	\$750
Administrative Costs								
1	5% of grant request					\$0		\$119
2						\$0	\$0	
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$119
					TOTAL	\$2,910	\$480	\$2,489

TASK# 6

Upland Treatments

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	TOTAL NEEDED	In Kind	Grant Request
1	Mesquite removal survey	8	\$25	-	0	\$200	\$0	\$200
2	Mesquite removal Labor	72	\$12	-	0	\$864	\$384	\$480
3	Countour Stake Planning and Stake Out	8	\$25	\$0	0	\$200	\$0	\$200
4	Countour ripping	8	\$20			\$160	\$0	\$160
5	Seeding	8	\$12			\$96	\$0	\$96
6						\$0	\$0	\$0
7						\$0	\$0	\$0
					Sub Total	\$1,520	\$384	\$1,136
Outside Services								
1						\$0	\$0	\$0
2						\$0	\$0	\$0
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$0
Other Direct Costs								
1	SAGE equipment (bulldozer with ripper)	16	\$40	\$0	0	\$640	\$640	\$0
2	Office use per hour			\$5	12	\$60	\$60	\$0
3	Map (grade contril and stake location)			\$50	1	\$50	\$0	\$50
4						\$0	\$0	\$0
5						\$0	\$0	\$0
					Sub Total	\$750	\$700	\$50
Capital Outlay Costs								
1	Fuel (2 gal per hour)			\$4	32	\$128		\$128
2	Seed (5 pound bag) mixed native seed			\$125	3	\$375		\$375
3						\$0		\$0
4						\$0		\$0
5						\$0		\$0
6						\$0		\$0
7						\$0		\$0
					Sub Total	\$503	\$0	\$503
Administrative Costs								
1	5% request funding					\$0	\$0	\$84
2						\$0	\$0	
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$84
					TOTAL	\$2,773	\$1,084	\$1,773

TASK# 7

Planting Riparian Area

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	TOTAL NEEDED	In Kind	Grant Request
1	Planning and stake out of planting areas	12	\$25	-	0	\$300	\$0	\$300
2	Map production	4	\$25	-	0	\$100	\$0	\$100
3	Planting labor	36	\$12	\$0	0	\$432	\$0	\$432
4	Volunteer planting labor	32	\$12			\$384	\$384	\$0
5	Wildlife waterer labor	4	\$12			\$48	\$48	\$0
6						\$0	\$0	\$0
7						\$0	\$0	\$0
					Sub Total	\$1,264	\$432	\$832
Outside Services								
1	Environmental Landscape consultation	8	\$50			\$400	\$0	\$400
2						\$0	\$0	\$0
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$400	\$0	\$400
Other Direct Costs								
1	SAGE feeding volunteers			\$10	4	\$40	\$0	\$40
2	Map printing (24"X36")			\$50	4	\$200	\$0	\$200
3	Office use per hour			\$5	16	\$80	\$80	\$0
4						\$0	\$0	\$0
5						\$0	\$0	\$0
					Sub Total	\$320	\$80	\$240
Capital Outlay Costs								
1	Seed 5 lb bag (mixed native seed)			\$120	4	\$480		\$480
2	Trees and shrubs (see note)			\$50	15	\$750		\$750
3	Rubermaid Stock tank	Wildlife waterer		\$73	1	\$73		\$73
4	Irrigation pipe per foot			\$0	300	\$75		\$75
5	Float valve			\$20	1	\$20		\$20
6						\$0		\$0
7						\$0		\$0
					Sub Total	\$1,398	\$0	\$1,398
Administrative Costs								
1	5% of grant request							\$144
4	Trees and shrubs may be planted after several years of monitoring the response of the valley to the intervention. Any planting will depend upon the suitability of the micro environment for the species.						\$0	\$0
						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$144
					TOTAL	\$3,382	\$512	\$3,014

TASK# 8

Interpretive Signage Development

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	TOTAL NEEDED	In Kind	Grant Request
1	Planning and map development	20	\$25		0	\$500	\$0	\$500
2	Sign installation	20	\$20		0	\$400	\$400	\$0
3	Trail landscaping	36	\$12		0	\$432	\$0	\$432
4	Sign post construction	10	\$15			\$150	\$150	\$0
5	Earthwork	25	\$20			\$500	\$500	\$0
6						\$0	\$0	\$0
7						\$0	\$0	\$0
					Sub Total	\$1,982	\$1,050	\$932
Outside Services								
1	Landscape Design Consultant	8	\$50			\$400	\$0	\$400
2						\$0	\$0	\$0
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$400	\$0	\$400
Other Direct Costs								
1	SAGE earthmoving equipment	20	\$40			\$800	\$800	\$0
2	Maps (24"X36")			\$50	5	\$250	\$0	\$250
3	Office use per hour			\$5	16	\$80	\$80	\$0
4						\$0	\$0	\$0
5						\$0	\$0	\$0
					Sub Total	\$1,130	\$880	\$250
Capital Outlay Costs								
1	Signs			\$31	30	\$930		\$930
2	Posts and backboards			\$22	20	\$440		\$440
3	Seed 5 lb bag			\$120	1	\$120		\$120
4						\$0		\$0
5						\$0		\$0
6						\$0		\$0
7						\$0		\$0
					Sub Total	\$1,490	\$0	\$1,490
Administrative Costs								
1	5% requested funds					\$0		\$154
2						\$0	\$0	
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$154
					TOTAL	\$5,002	\$1,930	\$3,226

TASK# 9

Monitoring

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	TOTAL NEEDED	In Kind	Grant Request
1	First year Vegetation	24	\$25	-		\$600	\$200	\$400
2	First Year Hydrodynamic	16	\$25	-		\$400	\$400	\$0
3	First Year Turbidity	4	\$25			\$100	\$100	\$0
4	First Year Geomorphic	24	\$25			\$600	\$600	\$0
5	First Year ecological structure	24	\$25			\$600	\$0	\$600
6	First Year photographic documentation	24	\$25			\$600	\$200	\$400
7	Continued Vegetation (4 years)	14	\$25	\$350	4	\$1,400	\$800	\$600
8	Continued Hydrodynamic (4 Years)	10	\$25	\$250	4	\$1,000	\$500	\$500
9	Continued Turbidity (4 years)	4	\$25	\$100	4	\$400	\$0	\$400
10	Continued Ecological Structure (4 years)	12	\$25	\$300	4	\$1,200	\$0	\$1,200
11	Continued Photographic (4 years)	8	\$25	\$200	4	\$800	\$400	\$600
12	Weather data collection (1 time per month)			\$20	60	\$1,200	\$1,200	\$0
13	Second and fifth year geomorphic mapping	16	\$25			\$400	\$200	\$200
14	Flume construction	18	\$25			\$450	\$450	\$0
					Sub Total	\$9,750	\$5,050	\$4,900
Outside Services								
1	Bacterial Laboratory analysis			\$25	40	\$1,000	\$0	\$1,000
2	Consultant	16	\$50			\$800	\$0	\$800
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$1,800	\$0	\$1,800
Other Direct Costs								
1	Recording forms, pens, clipboards (see note)			\$25	5	125	\$0	\$125
2	Office use per hour			\$5	50	\$250	\$0	\$250
3	Forms needed to record monitoring results @ \$25 per year for 5 years.					\$0	\$0	\$0
4						\$0	\$0	\$0
5						\$0	\$0	\$0
					Sub Total	\$375	\$0	\$375
Capital Outlay Costs								
1	Turbidity meter			\$775	1	\$775		\$775
2	Data Logggers (moisture)			\$93	7	\$651		\$651
3	Data Logggers (pizimeters)			\$258	12	\$3,096		\$3,096
4	Dynamax Intelimet Mereriological Station with evapotranspiration measurment			\$5,025	1	\$5,025		\$5,025
5								
6	Flume construction Materials, wood plywood			\$32	8	\$256		\$256
7	Flume construction Materials, concrete bags			\$8	15	\$120		\$120
					Sub Total	\$9,923	\$0	\$9,923
Administrative Costs								
1	5% of grant request					\$0		\$850
2						\$0	\$0	\$0
3						\$0	\$0	\$0
4						\$0	\$0	\$0
					Sub Total	\$0	\$0	\$850
					TOTAL	\$21,848	\$5,050	\$17,848

TASK# 10

Final Report

Direct Costs	Description	Hours	Fee per Hour	Item Cost	# of Items	TOTAL NEEDED	In Kind	Grant Request
1	Report writing			-	0	\$0	\$0	\$3,000
					Sub Total	\$0	\$0	\$3,000
					TOTAL			\$3,000