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**Erosion Control to Stabilize Soils and
Restore Historic Grasslands in the
Upper Verde River Watershed**

Submitted by:

Upper Verde River Watershed Protection Coalition

**Contact: John Munderloh
Town of Prescott Valley Water Resources Manager
928-759-3105; jmunderloh@pvaz.net**

Date: October 14, 2016

**Arizona Water Protection Fund
Application Cover Page
FY 2017**

Title of Project: Erosion Control to Stabilize Soils and Restore Historic Grasslands in the Upper Verde River Water Shed												
Type of Project: <input checked="" type="checkbox"/> Capital or Other <input type="checkbox"/> Water Conservation <input type="checkbox"/> Research	Stream Type: <input checked="" type="checkbox"/> Perennial <input 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: Upper Verde River Watershed Protection Coalition. Town of Prescott Valley fiscal agent Address 1: 7501 E. Civic Circle Address 2: City: Prescott Valley State: AZ ZIP Code: 86314 Phone: 928-759-3105 Fax: 928-759-3125 Tax ID No.: 86-0356435		Inside an AMA: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, which AMA: <input type="checkbox"/> Phoenix <input type="checkbox"/> Tucson <input type="checkbox"/> Prescott <input type="checkbox"/> Pinal <input type="checkbox"/> Santa Cruz										
Contact Person: Name: John Munderloh Title: Water Resources Manager, Town of Prescott Valley Phone: 928-759-3105 Fax: 928-759-3125 e-mail: jmunderloh@pvaz.net		Type of Application: <input checked="" type="checkbox"/> New <input type="checkbox"/> Continuation Any Previous AWPFF Grants: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, please provide Grant #(s):										
Arizona Water Protection Fund Grant Amount Requested: \$ 138,183 If the application is funded, will the Grantee intend to request an advance: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Matching Funds Obtained and Secured: <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Applicant/Agency/Organization:</th> <th style="text-align: right; border-bottom: 1px solid black;">Amount (\$):</th> </tr> </thead> <tbody> <tr> <td>1. Applicant</td> <td style="text-align: right;">\$98,693</td> </tr> <tr> <td>2. NRCS/EQIP</td> <td style="text-align: right;">\$48,000</td> </tr> <tr> <td>3.</td> <td></td> </tr> <tr> <td align="right">Total:</td> <td></td> </tr> </tbody> </table>		Applicant/Agency/Organization:	Amount (\$):	1. Applicant	\$98,693	2. NRCS/EQIP	\$48,000	3.		Total:	
Applicant/Agency/Organization:	Amount (\$):											
1. Applicant	\$98,693											
2. NRCS/EQIP	\$48,000											
3.												
Total:												
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 John Munderloh	Title and Telephone Number Water Resources Manager 928-759-3105											
Signature 	Date Signed 10/11/16											

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Erosion Control to Stabilize Soils and Restore Historic Grasslands in the Upper Verde River Watershed

Executive Summary

Arizona has 13 million acres of woodlands overgrown with juniper and chaparral species resulting in reduced herbaceous production. According to a feedstock study completed in 2016, Yavapai County has 962,101 acres of Pinyon-Juniper (PJ) woodlands in need of treatment.

Located in the Upper Verde River Watershed in Yavapai County, project implementation will demonstrate how landscape management can stabilize soils and restore historic grasslands through a combination of vegetation treatment and erosion control including 240-acres of PJ (hand) thinning with byproducts used to engineer and build silt dams in eroded areas on private and leased state trust lands.

Historically, thinning projects have resulted in the cut PJ material left in-situ to decompose or burned on site. The proposed unique approach utilizes thinned low-value woody biomass as the basis for erosion control structures to stabilize degraded soils in gullies and upland areas. In addition to reduced soil degradation, upland project benefits include decreased erosion; and improved water quality, grazing conditions and wildlife habitat. The downstream beneficiary is Williamson Valley Wash, one of only a handful of perennial streams in the Big Chino Sub-basin of the Upper Verde River Watershed. Other benefits include increased aquifer recharge, finding a productive use for low-value woody biomass further supporting forest restoration activities, and the project's potential for transferability to other areas of the county, state and west also plagued by PJ overgrowth.

The project area encompasses the 1,940 acres (3 square miles) of the York-Kenson Ranch 13 miles west of Paulden. Juniper silt dams, engineered to meet site-specific needs, will be installed on the 240 thinned acres within the project area that are characterized by severe erosion. Over a two-year project period, the Upper Verde River Watershed Protection Coalition (UVRWPC) and its partners will build four variations of silt dams at 10 locations in the project area. Cut PJ will be used as a key component in the rock and grade control structures in-channel; PJ and T-posts in headcuts; and PJ and rock "geotextile" in the upland approaches to the headcuts. Silt dams will be designed to retain, not detain water, withstand a 100-year storm, and be appropriately sized to avoid rerouting flows onto unaffected lands.

Additional project activities prior to ground disturbance include permitting, landowner access agreement, SHPO clearance, engineering, remote sensing, remote sensing contour/flow channel mapping and photographic monitoring. In conjunction with NRCS, Arizona Department of Forestry and Fire Management (ADFFM), and Arizona State Land Department (ASLD), the UVRWPC will develop a step-by-step guide and conduct outreach to landowners.

Project development was accomplished in partnership with NRCS, ASLD, ADFFM and the

landowner. All have submitted letters of support for the project. A resolution from the UVRWPC is attached and includes a match guarantee and commitment to manage and maintain the project. Total project cost is \$284,876 with \$135,183 requested from the Water Protection Fund and \$146,693 offered as match.

Project Overview

According to a feedstock study completed in 2016, Yavapai county has 962,101 acres of PJ woodlands. PJ encroachment is a resource issue throughout the west exacerbated by the low-value of and limited uses for woody biomass generated from PJ treatment. In the Upper Verde River Watershed, at issue is an ecosystem degraded due to human caused activities, such as fire suppression.

The purpose of the two-year project is to use an innovative and unique erosion control approach to stabilize soils and restore historic grasslands through a combination of PJ thinning; and design and installation of juniper silt dams on 240 acres within 3 square miles of privately owned and leased state trust agricultural land. Project implementation will occur in central Yavapai County in the Big Chino Sub-basin 13 miles west of the community of Paulden on the Kenson-York ranch.

An idea to use material that harmed the land to heal the land arose during a month long pilot PJ thinning project sponsored by the UVRWPC and ADFFM in March 2016. Using cut material in gullies to stem erosion is not a new concept, but the approach to engineer Juniper silt dams specific to a site is innovative and greatly increases the opportunity for success.

John Munderloh who will serve as project manager is the Water Resources Manager for the Town of Prescott Valley and chairs the UVRWPC Technical Advisory Committee.

Representatives from the UVRWPC, ADFFM, NRCS and ASLD met regularly to formalize the project concept, conduct onsite investigation, develop the preliminary Juniper silt dam designs, and complete project and budget planning. Throughout the project period Mr. Munderloh will provide monthly progress reports to the UVRWPC Technical Advisory Committee and Executive Board. He will seek input and technical advice from members of the watershed taskforce who meet on a quarterly basis.

Resource management issues of concern directly related to the proposed project include severe erosion, soil degradation and conversion of historic grasslands to woodlands all due to PJ encroachment and overgrowth. Residual issues are decreased aquifer recharge, increased risk of wildfire, degraded wildlife habitat, risks to water quality, reduced ground cover, and decreased ability of the watershed to respond to climatic factors, specifically long-term drought.

The resource management solution is to implement, planned, coordinated activities with an All Hands, All Lands approach to yield positive results for watershed and forest health.

Upland project benefits include improved soil conditions, decreased erosion; and improved water quality, grazing conditions and wildlife habitat. The downstream beneficiary is Williamson Valley Wash, one of only a handful of perennial streams in the Big Chino Sub-basin of the Upper Verde River Watershed. Other benefits are increased aquifer recharge, finding a productive use for low-value woody biomass further supporting forest restoration activities, and the potential for transferability to other areas of the west also plagued by PJ overgrowth.

Project Goals

1. Use a woody species that harmed the land to heal the land.
2. Improve soil conditions; increase opportunity for aquifer recharge; support grassland restoration; decrease erosion
3. Use NRCS, ASLD and ADFM *Best Management Practices* for project design and implementation.
4. Provide ranchers and resource managers with a tool to control erosion; improve soil health.
5. Develop a use for low-value woody biomass generated from forest thinning.
6. Outreach to resource managers, landowners throughout the west
7. Improve public awareness

Project Objectives

1. Treat 240 acres of PJ; use thinned PJ to build silt dams at 10 sites.
2. Develop detailed (2' contour) topographic maps, flow channel mapping and runoff analysis.
3. Engineer, install silt dams. Incorporate tablet technology.
4. Repeat photography, monitor changes in vegetation, erosion and flow.
5. Write landowner outreach plan, outcome's report and silt dam installation guide
6. Complete project on time and on budget; submit grant reports by deadlines
7. Transfer results and installation guide through implementation of outreach plan continuing for at least one year after project conclusion.
8. Disseminate project information and results to the public via partner websites, traditional media outlets, partner publications, and social media.

Project Outcomes

1. Well-managed partnership with a system in place to monitor, track and document results
2. A use for low-value woody biomass resulting from woodland thinning activities
3. Sufficient number of project sites allows for effective analysis and meaningful results
4. Improved watershed/forest health ; a more balanced ecosystem increasing resilience to respond to drought and other climatic factors
5. A replicable process that can be used by resource managers/landowners across the west
6. Leverages and complements ongoing forest restoration activities in the watershed
7. Improved public knowledge
8. Increased landowner engagement, particularly expanded partnerships with Natural Resource Conservation Districts in the Upper Verde River Watershed

The UVRWPC was established in 2006 as a partnership between the City of Prescott, Towns of Prescott Valley and Chino Valley, Yavapai County and Yavapai-Prescott Indian Tribe. Its affiliated multi-stakeholder Watershed Taskforce, formed in 2011, finalized the Watershed Management Project Plan in 2014. Vegetation management and forest health rose to the top as a project priority. Estimated years of project benefit are 16-20.

**Project Location & Environmental Contaminant Information
FY 2017**

Project Location Information			
1. County: <u>Yavapai</u>	2. Section: <u>15, 16, 17</u>	3. Township: <u>17N</u>	4. Range: <u>04W</u>
<p>5. Watershed: <u>Verde</u></p> <p>6. 8 or 10 Digit Hydrologic Unit Code (HUC): <u>HUC12 150602010710, HUC10 1506020107, HUC8 15060201</u></p> <p>7. Name of USGS Topographic Map where project area is located: <u>Simmons</u></p> <p>8. State Legislative District: <u>#1</u></p> <p>(Information available at: http://azredistricting.org/districtlocator/)</p> <p>9. Land ownership of project area: <u>Bill Kenson Sections 15 & 17, ASLD Section 16</u></p> <p>10. Current land use of project area: <u>Grazing</u></p> <p>11. Size of project area (in acres): <u>240 DIRECT</u></p> <p>12. Stream Name: <u>Unnamed tributary to Williamson Valley Wash</u></p> <p>13. Length of stream through project area: <u>3.1 miles</u></p> <p>14. Miles of stream benefited: <u>5.7 miles ephemeral stream plus 1.2 miles of perennial portion of Williamson Valley Wash</u></p> <p>15. Acres of riparian habitat: <u>200 acres</u> will be:</p> <p style="margin-left: 400px;"> <input checked="" type="checkbox"/> Enhanced <input type="checkbox"/> Maintained <input type="checkbox"/> Restored <input type="checkbox"/> Created </p>			
<p>16. General description and/or delineation for the area of impact of the project within the watershed.</p> <p>The project area is located 13 miles west of Paulden, AZ in the Big Chino Sub-basin of the Verde River Watershed. The project will improve grassland health and wildlife habitat, reduce soil erosion, improve water quality and increase recharge in an unnamed tributary to a perennial portion of Williamson Valley Wash, tributary to the Big Chino Wash and the Upper Verde River.</p> <p>17. Provide directions to the project site from the nearest city or town. List any special access requirements:</p> <p>The project area is accessible from Williamson Valley Road, 2.5 miles north from the end of pavement through a locked gate to the west. Travel 0.8 miles to the southwest on the ranch road to the project site. Permission to access the property is through the landowner, Bill Kenson (letter attached).</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>			

Scope of Work – Two-Year Project Period

Year One

Task 1: Finalize authorizations

Task Description: Complete landowner access agreement, SHPO clearance, and state land department permitting.

Task Purpose: Must be completed and submitted to Project Manager to continue with project implementation.

Deliverable Description: Landowner access agreement, SHPO clearance area, copy of state land permit

Responsible Personnel: John Munderloh, UVRWPC project manager

Deliverable Due Date: Within 90 days of finalization of grant agreement with the Water Protection Fund.

Reimbursable Cost: \$0 – Part of annual project management match

Task 2: Monitoring plans

Task Description: Complete photo and conditions' monitoring plans

Task Purpose: To assure monitoring results in effective tracking of project progress; assure monitoring is conducted according to Best Management Practices provided by the NRCS and Water Protection Fund

Deliverable Description: Monitoring plans

Responsible Personnel: John Munderloh; and NRCS District Conservationist Marques Munis

Deliverable Due Date: Within 90 days of finalization of grant agreement with the Water Protection Fund; concurrently with Task #1

Reimbursable Cost: \$0 - Part of annual project management match

Task 3: Landowner; public outreach plans; initial outreach to public, landowners

Task Description: Complete landowner and public outreach plans

Task Purpose: To guide effective communication with the public and agricultural producers; expand outreach to Chino Winds and Triangle Resource Conservation Districts; improve public awareness

Deliverable Description: Landowner and public outreach plans; copies of communication materials

Responsible Personnel: Sage Consulting

Deliverable Due Date: Within 120 days of finalization of grant agreement with the Water Protection Fund.

Reimbursable Cost: \$0 - \$3,000 offered as part of the applicant match

Task 4: Monitoring of existing conditions; monitor conditions throughout the year

Task Description: Gain knowledge and document conditions prior to commencement of work

Task Purpose: To provide a baseline from which to compare project results; gage project results

Deliverable Description: Report of baseline conditions; monitoring results and analysis

Responsible Personnel: John Munderloh

Deliverable Due Date: Baseline conditions within 30 days of completion of Task #1, finalization of authorizations; monitoring throughout the year

Reimbursable Cost: \$0 - \$7,500 offered as part of the applicant match

Task 5: Site analysis

Task Description: Remote sensing, contour/flow channel mapping, runoff analysis

Task Purpose: Essential to fully understand hydrologic functions and site conditions

Deliverable Description: Copy of reports/documentation

Responsible Personnel: Contract civil engineer; John Munderloh; Marques Munis

Deliverable Due Date: Finalized within 60 days of completion of Task #1; concurrently with Task #4

Reimbursable Cost: \$27,500

Task 6: Final engineering

Task Description: Site specific engineering of Juniper silt dams

Task Purpose: To design silt dams that can withstand 100-year storm event, require little maintenance, and have a life of 16 to 20 years.

Deliverable Description: Copy of final engineering documents

Responsible Personnel: Civiltec, Inc; John Munderloh

Deliverable Due Date: Finalized within 60 days of completion of Task #1; concurrently with Task #s 4 and 5.

Reimbursable Cost:\$25,000

Task 7: PJ treatment

Task Description: Hand-thinning of 240 acres of PJ

Task Purpose: Reduce PJ overgrowth; use thinning byproducts as a major component of Juniper silt dams

Deliverable Description: Site photos, silviculture prescription

Responsible Personnel: John Munderloh; Marques Munis Chris Lowman; Russ Shumate

Deliverable Due Date: 90 days from completion of Task #1

Reimbursable Cost; \$0 - \$48,000 for treatment offered as applicant match

Task 8: Build site-specific Juniper silt dams

Task Description: Install juniper silt dams at 10 sites on the Kenson-York Ranch.

Task Purpose: Control erosion, stabilize soils, and support grassland recovery

Deliverable Description; Site photos, final designs

Responsible Personnel: Civiltec, Inc; John Munderloh; Russ Shumate; Chris Lowman; Marques Munis

Deliverable Due Date: Three months from completion of Pj thinning

Reimbursable Cost: \$85,683

Task 9: Project management

Task Description: Oversee and monitor project progress

Task Purpose: Ensure adherence to timeline, budget, project plan and best management practices.

Deliverable Description: Required grant project reports

Responsible Personnel: John Munderloh, Marques Munis

Deliverable Due Date: Throughout the project period by established Arizona Water Protection Fund reporting deadlines

Reimbursable Cost: \$0 - \$21,568 (John Munderloh); \$5,829 (Marques Munis) – Total \$27,397 offered as applicant match

Year Two

Task 1: Monitoring

Task Description: Channel flow analysis; technical reporting; site condition monitoring

Task Purpose: Track project results; provide information for data collection and reporting

Deliverable Description: Technical analysis and reporting; grant progress reports; site photos

Responsible Personnel: John Munderloh, Civiltec, Inc.

Deliverable Due Date: Throughout the project period by established Arizona Water Protection Fund reporting deadlines.

Reimbursable Cost: \$0 - \$15,000 offered as applicant match

Task #2: Project management

Task Description: Oversee and monitor project progress

Task Purpose: Ensure adherence to timeline, budget, project plan and best management practices.

Deliverable Description: Required grant project reports

Responsible Personnel: John Munderloh, Marques Munis

Deliverable Due Date: Throughout the project period by established Arizona Water Protection Fund reporting deadlines

Reimbursable Cost: \$0 - \$21,568 (John Munderloh); \$5,829 (Marques Munis) – Total \$27,397 offered as applicant match

Task #3: Communication/outreach

Task Description: Communicate with landowners/public according to previously developed outreach plans

Task Purpose: Provide project results to landowners; public

Deliverable Description: Print and electronic communication materials

Responsible Personnel: Sage Consulting

Deliverable Due Date: Throughout the project period by established Arizona Water Protection Fund reporting deadlines.

Reimbursable Cost: \$0 - \$3,000 offered as applicant match

Task #4 Step-by-step instruction guide

Task Description: Write how to instruction guide, including cost tables

Task Purpose: Dissemination of project information to landowners/resource managers supporting transferability of project to other areas in the county, state and west.

Deliverable Description: Copy of instruction guide and contact list

Responsible Personnel: John Munderloh, Marques Munis, Chris Lowman, Russ Shumate, Sage Consulting

Deliverable Due Date: No later than 60 days after project conclusion

Reimbursable Cost: \$0 - \$10,000 offered as applicant match

Task #5 Final report to the Water Protection Fund

Task Description: Complete final documentation for the AWFPP grant funded project

Task Purpose: To comply with AWFPP rules and regulations for grant reporting

Deliverable Description: Final report

Responsible Personnel: John Munderloh; Marques Munis

Deliverable Due Date: Within 45 days of project completion

Reimbursable Cost: \$0 – Part of project management

Note: *All deliverables to be provided throughout the project period will also be included in the final report to the Arizona Water Protection Fund.*

Table 1: Detailed Budget Breakdown

TASK	Total Cost	Project Year(s)	Category
*Remote Sensing, Contour/Flow Channel Mapping Runoff Analysis	\$ 27,500.00	1	Outside Services
*Final Engineering	\$ 25,000.00	1	Outside Services
*Juniper Silt Dam Construction	\$ 85,683.00	1	Outside Services
TOTAL AWPf REQUEST	\$138,183.00	1	Outside Services

*Itemized cost estimates are included in the Appendix.

Table 2: Detailed Matching Funds Breakdown

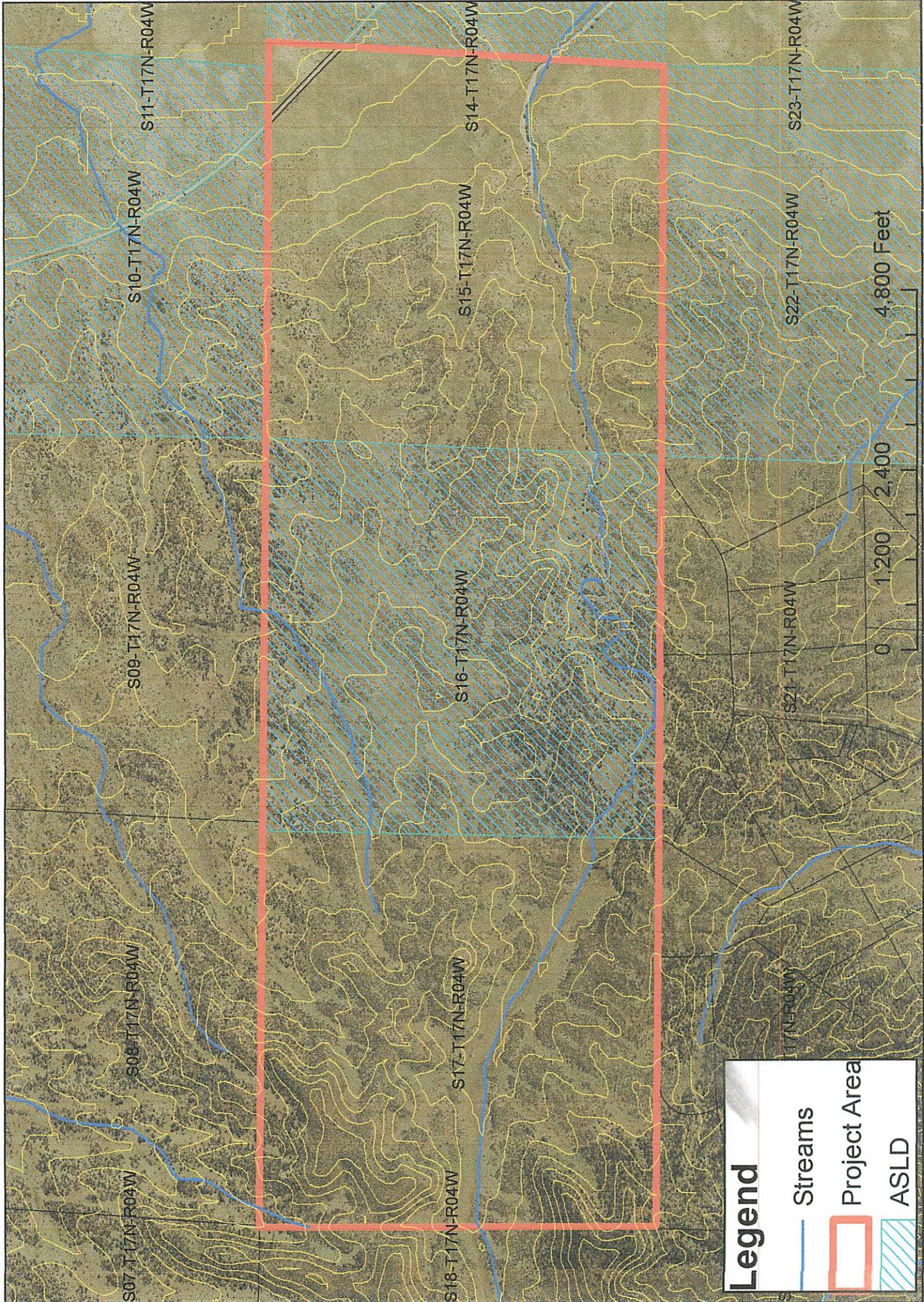
TASK	Total Cost	Project Year(s)	Category
Project Management	\$ 54,793.00	1, 2	Direct Labor
Landowner/Public Outreach	\$ 6,000.00	1,2	Outside Services
Project Monitoring	\$ 22,500.00	1,2	Outside Services
Thinning of 240 acres of PJ	\$ 48,000.00	1	Direct Labor
Write Step-by-Step Instruction Guide	\$ 10,000.00	2	Outside Services
TOTAL APPLICANT MATCH	\$141,293.00	1,2	Outside Services Direct Labor

**PROJECT LOCATION MAP(S)
AND SCHEMATICS**

ARIZONA WATERSHED MAP - 2016



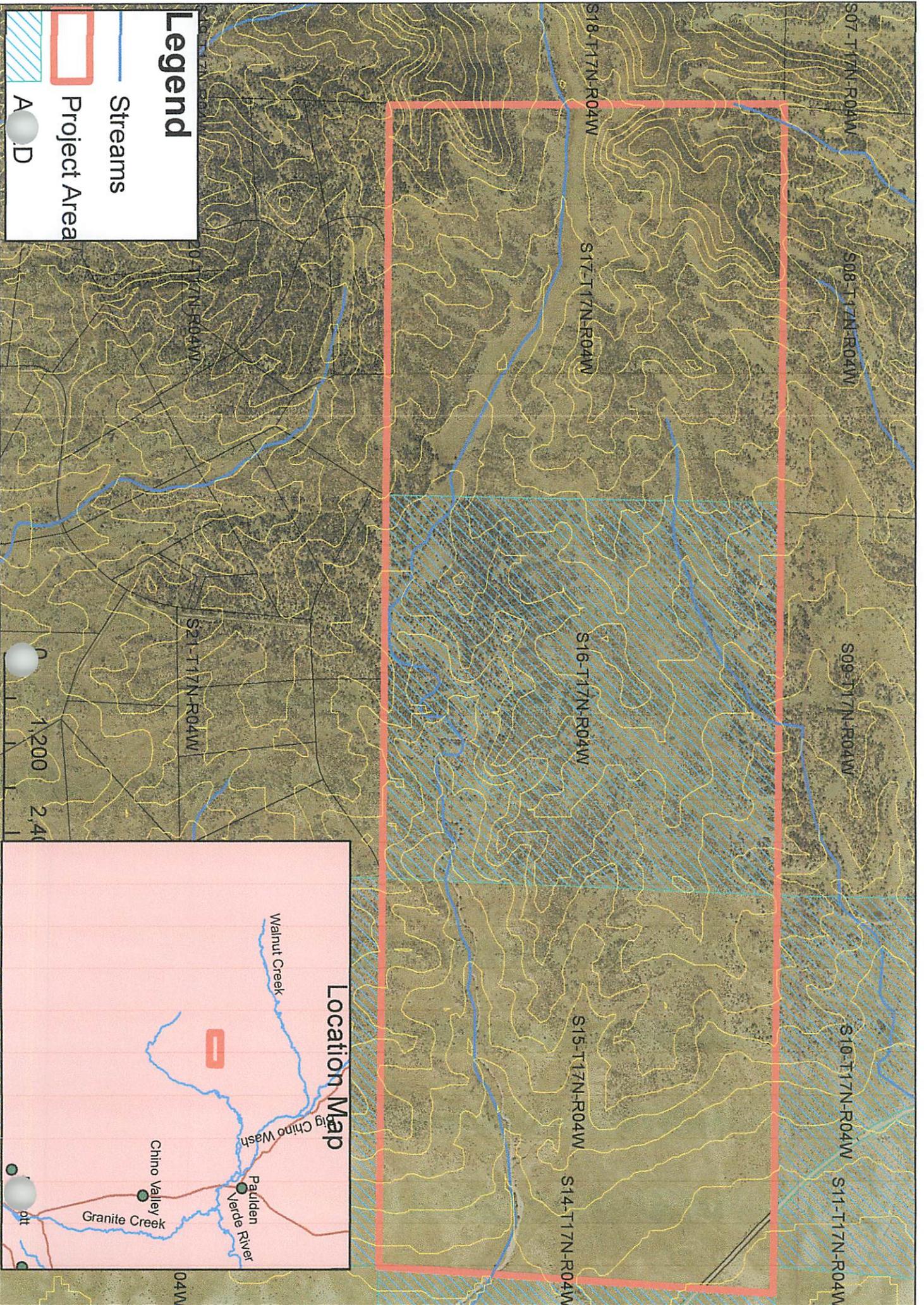
Project Area - Brush Erosion Control Structures, Kenson/York Ranch

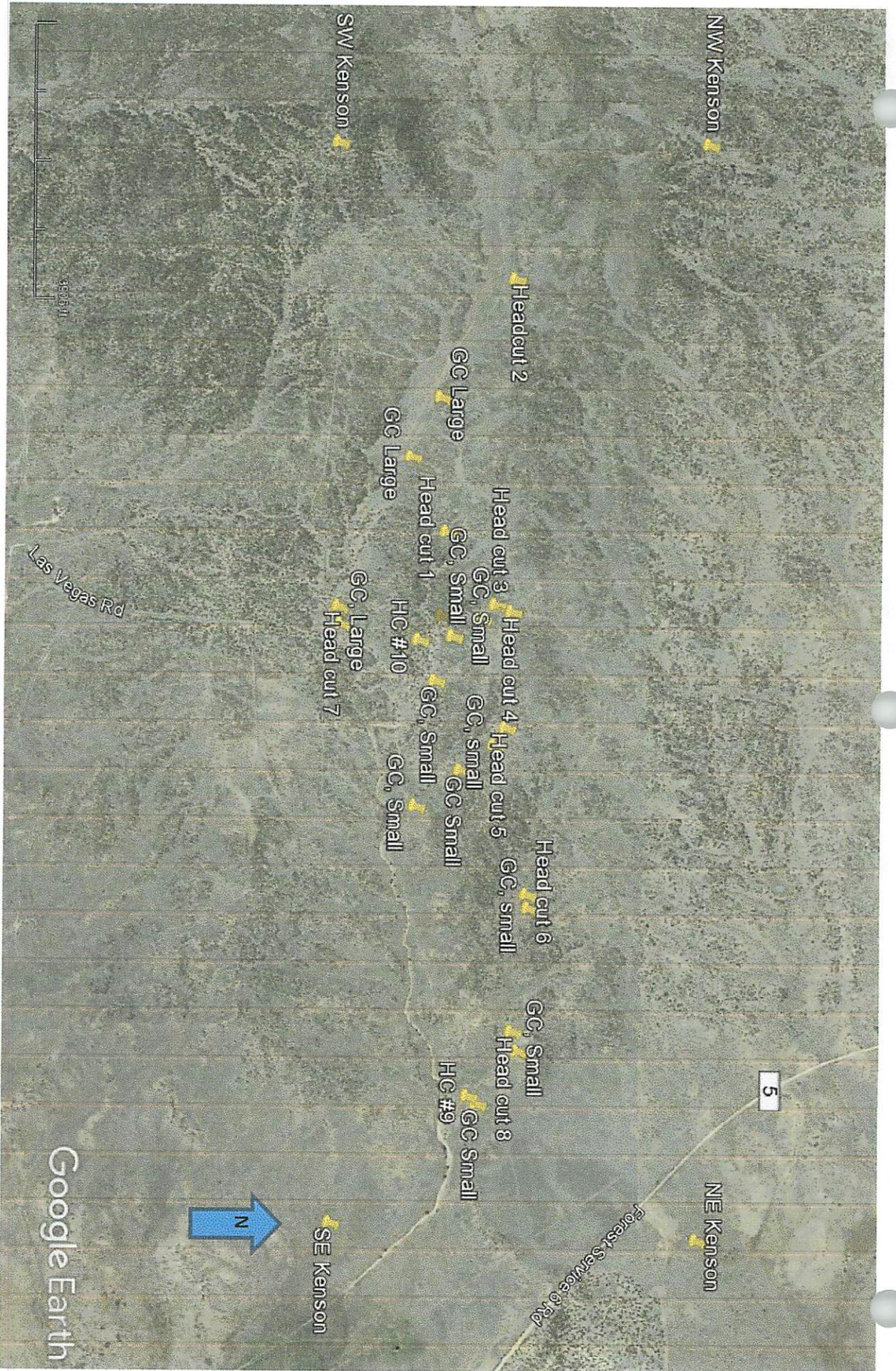


Legend

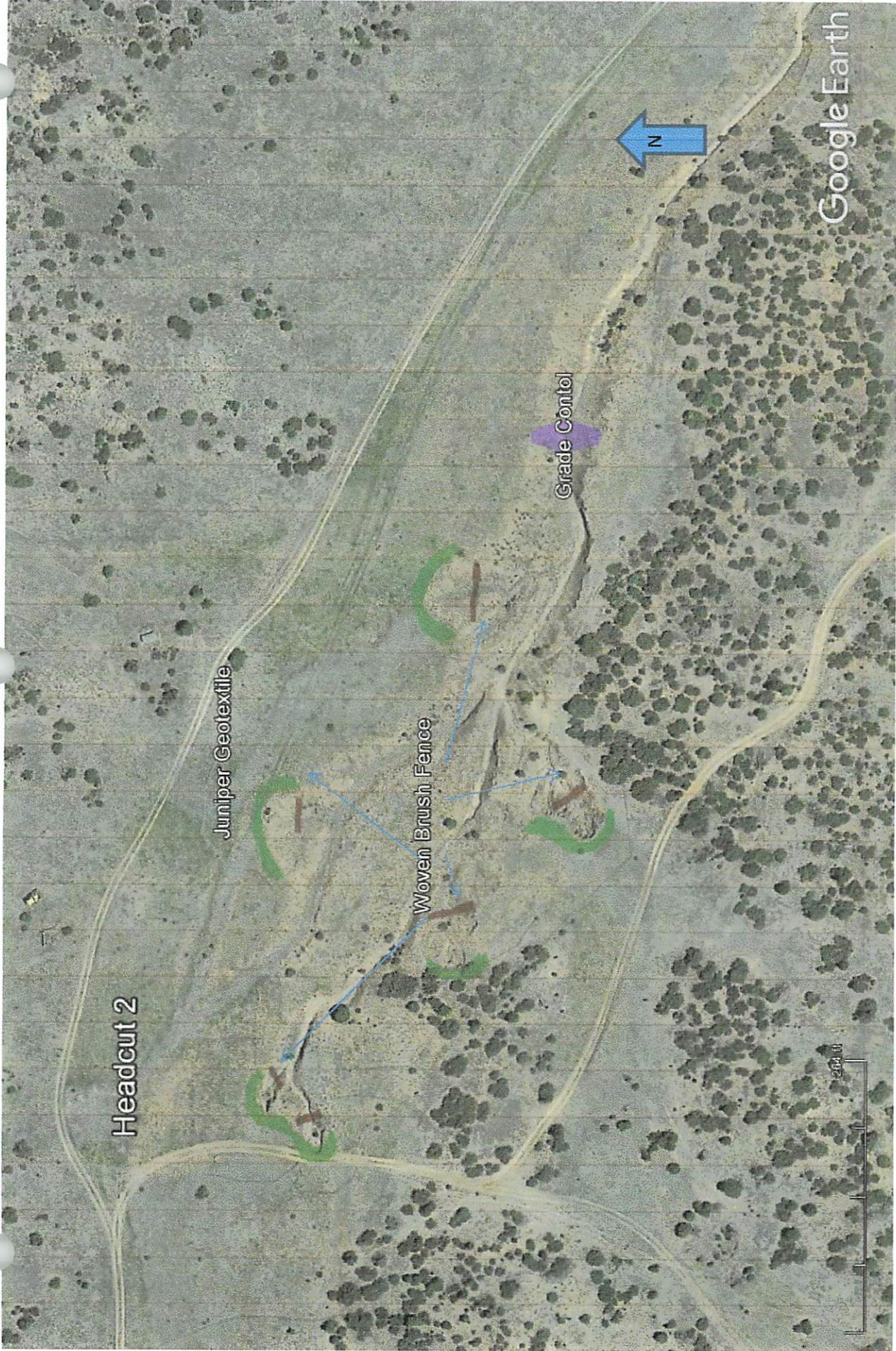
- Streams
- Project Area
- ASLD

Project Area - Brush Erosion Control Structures, Kenson/York Ranch





Project Layout Showing Location of Head Cuts and Grade Control Structures



Representative Treatments at Head Cut #2 Area

SUPPLEMENTAL INFORMATION

Supplemental Information Narrative

State Historic Preservation Office (SHPO) – The SHPO review form is attached. Task 1 in the Scope of Work includes the SHPO clearance, within 120 days of start of grant period. Planned PJ treatment will be accomplished through an existing Natural Resource Conservation Service Environmental Quality Incentive Program (EQIP) contract with the landowner. It has been cleared for hand treatment, and no additional archaeological (cultural) survey is required.

Key Personnel – Key personnel include John Munderloh, Town of Prescott Valley Water Resources Manager and Chair of the UVRWPC Technical Advisory Committee; Rich Shroads, civil engineer and principal with Civiltec, Inc.; Rush Shumate, regional forester for the Arizona Department of Forestry and Fire Management; Willie Sommers, range specialist and grants' manager for the Arizona Department of Forestry and Fire Management; Marques Munis, district conservationist for the Natural Resource Conservation Service, and Chris Lowman, range resource specialist for the Arizona State Land Department. All key personnel were involved in project planning. Their resumes are attached after this narrative.

Munderloh, with more than 25 years of professional experience in agricultural engineering, and water resources management and hydrology; will serve as project manager. Rick Shroads, PE, and president of Civiltec, Inc., has more than three decades of civil engineering specifically with erosion issues, most recently after the Schultz fire in northern Arizona. He works designing engineering solutions for in-channel issues and currently is the lead engineer for the Slaughterhouse Gulch Restoration Project on Yavapai-Prescott Indian Tribal land, a project funded by the Arizona Department of Environmental Quality in early 2016.

Marques Munis is the Natural Resource Conservation Service District Conservationist for the region. He has experience in all managers of rangeland management, ecosystem restoration, and outreach to land owners. Russ Shumate, is the ADFM Regional Forester for the northern district, has more than two decades of experience as a firefighter and forester. His education and experience are in forestry and fire science. Chris Lowman has been the range resource area manager in northern Arizona for the Arizona State Land Department since 2007. He earned his undergraduate degree in rangeland ecology and management from the University of Iowa.

Existing Plans/Reports/Information – Existing plans and reports that serve as justification for the proposed project include: (1) Upper Verde River Watershed Protection Coalition Watershed Restoration and Management Project Plan, pages 1, and 19-28; (2) Arizona Department of Forestry and Fire Management, Arizona Fire Resource Strategy, pages 28, 34, and 55. Pertinent pages are included in the Appendix of this proposal.

The UVRWPC Watershed Restoration and Management Project Plan was completed in 2014 after an extensive two-year planning process among multiply public and private stakeholders serving on the coalition's watershed taskforce. It is the guiding document for all UVRWPC work in the Upper Verde River Watershed. Forest (woodlands) health and vegetation management rose to the top as a project priority.

Under the guidance of ADFFM and U.S. Forest Service, the Arizona Forest Resource Strategy was completed in 2010 by the multi-disciplinary Arizona Forests Resource Task Group. It is a statewide forest resource assessment, mandated by the Farm Bill, to identify priority forest landscape areas.

Project Site Photos – Site photos illustrating erosion issues in the project area are attached immediately after this narrative.

Community Support – A resolution of support and match guarantee from the UVRWPC Executive Board is included, as well as support letters from State Senator Steven Pierce, Bill Kinson, rancher/landowner; Natural Resource Conservation Service; Arizona Department of Forestry and Fire Management, and Arizona State Land Department.

Evidence of Site Control – Bill Kinson, landowner/lessee has submitted a letter of support. A final land access agreement is included under Task 1 of the Scope of Work and will require not more than 30 days from start of grant period.

Evidence of Physical and Legal Availability of Water – A Water Availability Letter from John Munderloh, Town of Prescott Valley Water Resources Manager and Chair of the UVRWPC Technical Advisory Committee, is attached immediately after this narrative.

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**
2. Project Title: **Erosion Control to Stabilize Soils and Restore Grasslands in the Upper Verde River Watershed**
3. Applicant Name and Address: **Upper Verde River Watershed Protection Coalition, Town of Prescott Valley fiscal agent 7501 E. Civic Circle Prescott Valley, AZ 86314**
4. Current Land Owner/Manager(s): **Fred Kinson**
5. Project Location, including Township, Range, Section: **Central, Yavapai County Township 17, Range 04W, Section 15, 16, 17**
6. Total Project Area in Acres (or total miles if trail): **3 square miles**
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: **Project implementation will demonstrate how landscape management can stabilize soils and restore historic grasslands through a combination of vegetation treatment and erosion control including 240 acres of Pinyon-Juniper (PJ) thinning with thinning byproducts used to engineer and build silt dams in eroded areas on private and leased state trust lands. The 240-acres have been cleared and are slated for hand treatment. Partners will build four variations of silt dams at 10 locations in the project area. Cut PJ will be used as a key component in the rock and grade control structures in-channel; PJ and T-posts in headcuts; and PJ and rock "geotextile" in the upland approaches to the headcuts. Silt dams will be designed to retain, not detain water, withstand a 100-year storm, and appropriately sized to avoid rerouting flows onto unaffected lands.**

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 ground is undisturbed by human activity. Disturbance has occurred in the form of long and deep gullies that are the result of erosion caused by PJ encroachment and overgrowth

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

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

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

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

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

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

If YES, name of the district:

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

John Munderlow /Date 10/11/16

JOHN MUNDERLOW
Applicant Printed Name

FOR SHPO USE ONLY	
SHPO Finding: <input type="checkbox"/> Funding this project will not affect historic properties. <input type="checkbox"/> Survey necessary – further GRANTS/SHPO consultation required (<i>grant funds will not be released until consultation has been completed</i>) <input type="checkbox"/> Cultural resources present – further GRANTS/SHPO consultation required (<i>grant funds will not be released until consultation has been completed</i>)	
SHPO Comments	
For State Historic Preservation Office:	Date:

RESUMES of KEY PERSONNEL

John M. Munderloh

EXPERIENCE:

Water Resources Manager

3/05 to Present

Town of Prescott Valley (Town)

- Developed Town's reclaimed water into a useable drinking water supply
- Developed 1st ever effluent auction – received world-wide attention and “Water Deal of the Year” award on international stage
- Carries out directives of Town Council related to securing long-term water supplies
- Manages Water Conservation Programs
- Meets regulatory requirements for Town groundwater and effluent resources
- Manages Town's effluent recharge operations
- Developed recharge facilities
- Represents the Town on Big Chino Water Ranch importation project in concert with the City of Prescott
- Responsible for developing effluent recovery sites
- Participates on numerous local, regional and state water resource boards, commissions and committees

Coordinator, Yavapai County Water Advisory Committee

9/00 to 3/05

Yavapai County

- As sole staff person, carried out directives of 14-member water committee, several subcommittees, and Board of Supervisors.
- Acted as water resource advisor to County Supervisors
- Prepared technical analysis of several water-related issues in the Yavapai County region, including water impact, water budget and water right analysis
- Acted as project manager on joint contract between Yavapai County and U.S. Geologic Survey for hydrologic analysis of Verde River watershed, with a specific focus on the Big Chino Sub basin
- Developed comprehensive relational database on water resources and water rights in Yavapai County
- Provided updates and analysis of federal and state legislative bills regarding water resources
- Presented water related information in written and oral form to professionals and public

Engineering Project Manager

Town of Chino Valley

11/99 to 8/00

- Created first alternative water supply portfolio for Town of Chino Valley
- Established right for Town to provide utility services through a public referendum
- Participated in negotiations for water service between Town and Yavapai College and Town and City of Prescott
- Completed design and construction management of first portion of Town municipal water system
- Completed design and construction management of public baseball field irrigation system
- Assisted in community planning committees
- Participated in regional and Yavapai County water management committees

Associate Engineer

Bookman-Edmonston Engineering

4/97 to 10/99

- Conducted Beardsley Canal Capacity analysis and analyzed wheeling arrangements for conveyance of CAP water to WestCAPS cities
- Determined development potential of unused CAP allocations in New Mexico
- Developed a recovery plan for banked CAP water in Pinal County, Arizona

WORK EXPERIENCE (continued):

- Completed a water development plan for private development in the City of Tolleson, AZ
- Assisted in design and permitting of a groundwater recharge project
- Conducted well impact analysis for permitting large irrigation wells

Program Manager – Adjudications Section

Arizona Department of Water Resources

6/96 to 4/97

- Acted as technical advisor to Maricopa County and Apache County Superior Court regarding the Arizona General Stream Adjudication
- Advised Chief Legal Counsel on water rights impact related to the Yavapai-Prescott and City of Prescott settlement agreement
- Supervised 11 to 18 professional and technical staff
- Prepared technical reports on water rights and made determinations of water use and water supply
- Analyzed relevant issues regarding adjudication policy procedures, case history and legal issues as they may impact technical determinations
- Consulted with Judges, Special Master, legal and technical consultants and claimants over issues regarding water rights
- Coordinated policy changes for the Arizona Department of water resources adjudication proceedings and Indian water right settlement proceedings
- Managed budget of special adjudications accounts
- Completed Gila River Indian Community Hydrographic Survey Report
- Oversaw maintenance of large water rights database, managed reporting and notification requirements for the adjudication process

Water Resources Supervisor – Investigations Unit

Arizona Department of Water Resources

11/91 to 6/96

- Supervised professional and technical staff for water use and rights studies in the Upper Verde River watershed and other Arizona watersheds
- Completed Preliminary Upper Salt River Hydrographic Survey Report
- Completed Technical Assessment of Interlocutory Appeal Issue No. 2
- Completed significant portions of the Little Colorado River System Inventory of Uses
- Completed unpublished internal documents such as Technical Principles of Water Rights Adjudication and the Adjudications Section Investigations Manual

Water Resources Specialist I/II/III – Water Resources and Investigations Units

Arizona Department of Water Resources

3/89 to 11/91

- Developed a procedure for quantifying water uses and created hydrologic impact models
- Developed a comprehensive method to quantify irrigation water uses for the adjudication process
- Investigated and compiled reports on water rights and water claims
- Conducted field investigations of surface water diversions and conveyance systems
- Compiled portions of the San Pedro River Hydrographic Survey Report

Agricultural Energy Specialist – Engineering Division

Sulphur Springs Valley Electrical Co-op

5/87 to 11/88

- Conducted pump and well tests to determine pumping plant inefficiencies
- Established a criteria for pumping plant repairs
- Completed technical reports to the Arizona Energy Office
- Prepared Irrigation Power Requirements report for the Rural Electrification Association
- Predicted monthly power requirements for an electric load shaving program

EDUCATION: **B.S.-Agricultural Engineering – University of Arizona, Tucson**

CURRENT COMMITTEE ASSIGNMENTS:

- **Statewide Water Advisory Committee - Member**
- **Arizona Water Protection Fund - Commissioner**
- **Northern Arizona University Watershed Research and Education Program – Board Member**
- **Yavapai County Water Advisory Committee – Technical Committee Member**
- **Northern Arizona Municipal Water Users Association – Technical Committee Chair**
- **Upper Verde River Watershed Protection Coalition – Technical Committee Member, Safe Yield Subcommittee Member**

SELECTED PUBLICATIONS:

- **Historic and Current Water Uses and Water Use Projections for the Big Chino Subbasin, 2003**
- **Verde Valley Water Budget Analysis, 2002**
- **Recovery Assessment of Banked Water – Central Arizona and Maricopa Stanfield Irrigation and Drainage Districts, 1997**
- **Beardsley Canal Hydraulic Capacity Analysis, 1999, Phases I and II.**
- **Review of Wheeling Arrangements and Policies by Selected Agencies, 1999**
- **Hydrographic Survey Report for the Gila River Indian Reservation, Preliminary, 1997**
- **Technical Principles of Water Rights Adjudications in Arizona, 1995**
- **Briefing Report, Joint Select Committee on Arizona General Stream Adjudications, 1994**
- **Little Colorado River System Inventory of Water Uses, 1994**
- **Technical Assessment of the Arizona Supreme Court Interlocutory Appeal Issue No. 2 Opinion, 1993**
- **Hydrographic Survey Report for the Upper Salt River Watershed, Preliminary, 1993**
- **Hydrographic Survey Report for the San Pedro River Watershed, Final, 1991**
- **Technical Assessment of Interlocutory Appeal Issue No. 2, 1993**
- **Irrigation Power Requirements Study, U.S. Department of Agriculture, Rural Electrification Association, Sulphur Springs Valley Electrical Cooperative, 1988**



PROFESSIONAL REGISTRATION

Professional Engineer
Arizona, No. 24601
Professional Engineer
California, No. 35447
Professional Surveyor
Arizona, No. 26405
Professional Surveyor
California, No. 5640

EDUCATION

B.S. Civil Engineering,
Cal Poly Pomona

PROFESSIONAL AFFILIATIONS

American Society of
Civil Engineers
American Consulting Engineers
Council
American Public Works
Association
Arizona Association of
County Engineers
Arizona Professional Land
Surveyors Association
California Land Surveyors
Association
Arizona Floodplain
Management Association

EXPERTISE

- Civil Engineering
- Water Engineering
- Drainage Engineering
- Transportation Engineering
- Wastewater Engineering
- Survey
- Construction Management

SUMMARY

Mr. Shroads is a Professional Engineer and Professional Land Surveyor practicing in Arizona and California. Mr. Shroads has been involved in the civil engineering arena since 1976. In 1986, Mr. Shroads founded **Civiltec Engineering** and served as Corporate President for 28 years. Mr. Shroads has 39 years of experience in the project management and design of roadways, water supply and distribution systems, sewer systems, hydrology and drainage systems, airport specialty design, and site development plans. He has performed and prepared boundary analysis and establishment surveys, geodetic surveys, cadastral surveys, A.L.T.A surveys, topographic surveys, aerial control surveys, mapping, platting, title research and analysis, land title discrepancy resolution, legal assistance, and hundreds of construction survey projects.

Recently, Mr. Shroads has served as interim County Engineer for Coconino County. He has been instrumental in preparation and implementation of in-house engineering procedures for delivering capital improvement projects associated with pavement reconstruction and preservation projects as well as flood control projects county wide. He has also managed flood and debris mitigation projects associated with the aftermath of the Schultz fire and Slide fire disasters.

PROJECT EXPERIENCE

Project Principal – Iron Springs Road Reconstruction Project

Civiltec has recently completed design plans, specifications, estimates and construction administration for 5.4 miles of Iron Springs Road in Yavapai County. The project consists of full roadway reconstruction and widening, superelevation, drainage, signage and striping, and barrier design. Seismic testing for additional slope stability analysis was needed due to steep ascending slopes on the project. Mr. Shroads managed all aspects of the project design and assisted County Staff in Construction Management.

Project Principal – Koch Field Road Pavement Preservation Project

This project encompassed the design, surveying, easement acquisition and construction management of a 1.2 mile long segment of Koch Field Road in Coconino County from Townsend Winona Road to Silver Saddle Road. The project initially began as a mill and overlay project, however, with insight from Civiltec engineers, it was modified to be a more financially efficient pavement preservation project utilizing a rubberized chip-fiber micro seal project. The cost savings associated with this pavement preservation approach made a significant amount of project funding available for drainage improvements along the entire roadway corridor including flood control channels and installation of over 50 roadway and driveway culverts. Fiberglass fiber was added to the micro-seal surfacing for additional tensile strength and pavement life enhancement.

PROJECT EXPERIENCE (CONTINUED)

Project Principal – District Engineering for Inscription Canyon Ranch Water User's Association

This project includes continued on-call services for the Inscription Canyon Ranch Water User's Association in Prescott. Engineering tasks provided include hydraulic modeling, system supply analysis, system distribution analysis and recommendations, pump station design, as well as providing plan review services for water system plans submitted by outside engineering firms. We also provide inspection services for all new construction in the Associations area of CCN.

Project Principal – Center Street, Road 4 South, Peavine Trail Improvements

This project included 30% level design plans for the extension of Road 4 South from the Sun Edison Plant to Peavine Trail (approximately 5,900 LF) through State Land, 30% design level plans for a new road in the existing Peavine Trail ROW from Road 4 South to Center Street (approximately 12,000 LF), and 30%, 60%, 90%, 100% plan, specification, and cost estimate preparation for the reconstruction of Center Street from Road 1 East to the Peavine Trail (6,300 LF). Civiltec's scope of services included design survey, boundary establishment, document preparation for State Land acquisition, drainage studies, hydraulic calculations for drainage structures, utility coordination, and plan, specification, and cost estimate development. The project also included the preparation of a CLOMR at Santa Cruz Wash for channelization and a new 6 barrel 10' x 8' box culvert structure at Center Street. The CLOMR was approved after addressing 2 minor comments from FEMA on the original CLOMR submittal.

Project Principal – I-10 Deck Park Tunnel Drainage Improvements

This project is located in the City of Phoenix on I-10 between 3rd Avenue and 3rd Street. The project improvement area includes the I-10 Deck Park Tunnel, Japanese Friendship Garden and the Margret T. Hance Park located above the Deck Park Tunnel. The project work included re-design of the subsurface drainage improvements including drainage board, perforated pipe underdrain systems on the bridge deck edges, mitigating leaking tunnel deck joints all which were severely leaking and affecting the traveling public during tunnel use.

Project Principal – Ernest A. Love Airport Runway 3R-21L RSA Improvements

This project included the construction of a 400-ft runway shift for a federally-funded runway safety project which essentially moved runway 3R-21L away from a busy traffic corridor (resulting in safer operations for the airfield and the travelling public). It also entailed the widening of parallel taxiways, pavement replacement, detention basin construction, and over 8,000 linear feet of new 36" to 78" diameter storm drain pipe and associated inlets. *Civiltec* provided all of the survey control and design survey for the lengthening of the runway. The survey included approximately 49,000 field observations in addition to ground control services for both high and low-altitude aerial imagery. *Civiltec* also provided airspace analysis data per FAA guidelines, base map preparation for the project, and AGIS processing.

Project Principal – 360° Tactical Police Shooting Range

Civiltec was responsible for design and construction management of this tactical pistol range utilized by law enforcement agencies throughout the state. The facility was designed for tactical practice maneuvers accommodating firing patterns from any direction within the range. The design of this project included the development of plans, specifications, and a construction cost estimate for the outdoor shooting range on an approximate three-acre site. Civiltec also provided construction administration services and construction staking for this project.

Professional Profile

Professional firefighter and forester with AZ State Forestry, currently serving as District Manager for Northwest District in Chino Valley AZ

- I have worked 21 fire seasons in AZ, and throughout the western US and Canada.
- I served as Phx Dist AFMO, and held this position for approx. 11 years.
- I currently serve as District Manager/FMO for Northwest Dist and have since December 2015
- I have a deep and comprehensive understanding of the workings and operations of the AZ Department of Forestry and Fire Management.

Work History

NW Dist Manager	AZ Dept of Forestry and Fire Mngt	12/15- Present
Acting Phx Dist FMO	AZ State Forestry Division	04/15- 12/15
Phx Dist AFMO	AZ State Forestry Division	03-1/11, 10/11-04/15
Phx Dist Fire Mngt Assistant	AZ State Forestry Division	1997-2003
Conductor	BNSF Winslow, AZ	01/11-10/11
Forestry Tech	Prescott NF (seasonal)	1995-1997

Education

BS Forest Management	NAU Flagstaff, AZ	1995
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► Christopher B. Lowman

965 W. Damian Loop, Chino Valley AZ 86323

Phone: 928-273-8594

E-mail: c4lowman@hotmail.com

Summary of Qualifications

Through my education and work experience I have applied principles and practices of rangeland, watershed and riparian area management and natural resource conservation to the management of Arizona State Trust lands. I have significant field experience conducting rangeland monitoring for impacts to vegetation or cultural and natural resources due to grazing leases and management. I prepare reports and documentation for meetings and recommendations. I have the ability and competence to perform any action or duty requested in any environment, from adverse field conditions to contentious public meetings. I have established and maintained effective working relationships with natural resource professionals in various levels of government as well as with the public on whose land I am enforcing the leases.

Education

B.S. Rangeland Ecology and Management, University of Idaho (2001)

Experience

Range Resource Area Manager, (April 2007 –Current)

Arizona State Land Department (1133 West Road 3 North, Chino Valley, AZ 86323)

In my current position, I am responsible for reviewing range improvement and land treatment applications by conducting field inspections and writing correspondence including supplemental conditions to minimize impacts to State Trust land resources. I conduct cultural resource surveys and rangeland monitoring in coordination with Natural Resources Conservation Service staff, along with lease compliance and livestock grazing trespass investigations as part of my regular duties. I participate in Habitat Partnership Committee and NRCS District meetings. I am involved in all aspects of lease compliance on State Trust lands including conducting surveys for range improvement, vegetation treatment and wildlife improvement projects; conduct lease compliance investigations, prepare and update grazing lease files and ranch maps, and participate in lease default settlement conferences. I spend a significant time collecting, interpreting, analyzing and evaluating field data to make decisions and help inform judgments.

Senior Lands Resource Specialist (2002 - 2007)

Idaho Department of Lands (3563 Ririe Highway, Idaho Falls, ID 83401)

In this position I was responsible for administering state grazing, cropland and miscellaneous leases. I would develop and write allotment management plans, and conduct field inspections and monitoring on State Trust land. I would also inventory and evaluate rangeland and wildlife habitat for overall health, condition and tread, and suitability.

Skills and Certifications

- ▶ Experienced in handling and working around livestock.
- ▶ Skilled in working with MS Word, Excel, PowerPoint, along with extensive experience using Arcview and other GIS software.
- ▶ Extensive experience in operating off-road/ATV vehicles, forklifts, tractors, various fire engines from light engines to tactical water tenders, horseback riding and vehicle maintenance.
- ▶ Certified as a Squad Boss and Class A Faller for wildland fire suppression duties.
- ▶ Completed 4 classes in supervision training between 2006 and 2007

References:

Erik Swanson, President, Hague Creek Companies: 602-402-5446

Emmett Sturgill, Mohave Livestock Association: 928-279-3007

Russ Shumate, Arizona State Forestry Division: 928-460-3039

Marques Daniel Munis
 1150 Paar Dr
 Prescott, AZ 86305 US
 Day Phone: (928) 830-4895 - Ext: NA
 Email: marques.munis@az.usda.gov

Availability:

Job Type: Permanent
Work Schedule: Full-Time

Work Experience:**Natural Resources Conservation Service**

8841 Florentine Rd., Ste. C
 Prescott Valley, AZ 86314 United States
 05/2016 - Present

Hours per week: 40

Series: 0457 **Pay Plan:** GS **Grade:** 11

District Conservationist (This is a federal job)

Duties, Accomplishments and Related Skills:

Duties:

- 1) Provide financial and technical assistance to agricultural producers.
- 2) Work with the Central Arizona Land Trust and the NRCS State Office programs lead for conservation easements to discuss application and ACEP program requirements with interested participants.
- 3) Review and approve contract payments.
- 4) Represent the NRCS field office in numerous working group meetings including; the Central Arizona Grasslands Partnership, the Upper Verde River Watershed Protection Coalition, the Triangle Conservation District, the Chino Winds Conservation District and the Arizona Association of Conservation Districts. Meetings required communication and coordination with multiple local, state and federal agencies.
- 5) Manage field office programs workload for CTA, EQIP, RCPP, WLFW and the Two Chiefs Initiative
- 6) Responsible federal official for environmental evaluation completed as part of the NEPA process
- 7) Assist the Area Conservationist in hiring new field office staff.

Accomplishments:

As acting and official District Conservationist in the Prescott Valley Field Office I have worked with a variety of customers that culminated in obligation of over 1.2 million dollars to conservation in FY 2016. When I first arrived in the Prescott Valley Field Office our total contract obligation was approximately \$300,000. Thus, by working with partners Arizona State Land Department, the United States Forest Service, Arizona State Forestry and the Arizona Game and Fish Department we have been able to double the number of active contracts targeting conservation and triple the number of dollars available to local land owners to implement projects. We have also been able to broaden the types of operations we have reached from rangeland operations to private forestland and irrigated pasture.

Skills:

- 1) Project Management
- 2) Field Office Management
- 3) Field Office Outreach
- 4) Coordination with partner agencies to accomplish agency mission
- 5) Programs Knowledge including EQIP, CSP and ACEP
- 6) Contract Review, Approval and General Administration
- 7) Program Eligibility including control of land that required a deed or lease

Supervisor: Kendal Hicks (928-214-0421)

Okay to contact this Supervisor: Contact me first

Natural Resources Conservation Service

8841 E Florentine Rd
 Prescott Valley, AZ 86314 United States
 09/2015 - 05/2016

Hours per week: 40

Series: 0454 **Pay Plan:** GS **Grade:** 09

This is a time-limited appointment or temporary promotion

District Conservationist (Acting) (This is a federal job)

Duties, Accomplishments and Related Skills:

In addition to the information described below please see duties, accomplishments and related skills described under Rangeland Management Specialist October, 2013 to May, 2016. I continued to fulfill the duties of a Rangeland Management Specialist while acting as District Conservationist in Kingman, AZ and Prescott Valley, AZ.

Additional Duties:

- 1) Supervised one Rangeland Management Specialist while acting in Kingman, AZ.
- 2) Responsible federal official for environmental evaluation completed as part of the NEPA process.
- 3) Reviewed and approved contract payments.
- 4) Represented the NRCS field office in numerous working group meetings including; the Central Arizona Grasslands Partnership, the Upper Verde River Watershed Protection Coalition, the Triangle Conservation District, the Chino Winds Conservation District and the Arizona Association of Conservation Districts. Meetings required communication and coordination with multiple local, state and federal agencies.
- 5) Managed field office programs workload for CTA, EQIP, RCPP, WLFW, ACEP (Easements) and the Two Chiefs Initiative.
- 6) Worked with the Central Arizona Land Trust and the NRCS State Office programs lead for conservation easements to discuss application and program requirements with interested participants.

Additional Accomplishments:

- 1) I received a letter of commendable performance for work completed in Kingman, AZ.
- 2) I received a temporary promotion for time acting as District Conservationist in Prescott Valley, AZ.
- 3) I received a spot award for superior performance during my time acting as District Conservationist in Prescott Valley from January, 2015 to May, 2015.

Additional Skills:

- 1) Management of field office workload
- 2) Employee supervision

Supervisor: Robert McBride (701-628-2151)

Okay to contact this Supervisor: Yes

Natural Resources Conservation Service

8841 E. Florentine Rd., Ste C
 Prescott Valley, AZ 86314 United States
 10/2013 - 05/2016

Hours per week: 40

Series: 0454 **Pay Plan:** GS **Grade:** 09

Rangeland Management Specialist (This is a federal job)

Duties, Accomplishments and Related Skills:

Duties:

- 1) Maintain status as a Certified Conservation Planner.
- 2) Prepare and facilitate implementation of ranch conservation plans that solve natural resource problems such as; undesirable plant community health, soil erosion and inadequate water for livestock and wildlife.
- 3) Conduct rangeland inventories including; rangeland health, ecological site assessment (uplands), stream visual assessment protocol (riparian), forage utilization and forage/livestock balance.

- 4) Utilize ArcGIS to develop conservation planning maps.
- 5) Participate in coordinated resource management with other agencies including United States Forest Service, Bureau of Land Management, Arizona State Land Department and Arizona Game and Fish Department.
- 6) Prepare and submit environmental evaluations to the responsible federal official in compliance with NEPA and other environmental laws.
- 7) Develop engineering designs for livestock water wells, pipelines, drinkers and storage facilities. Complete a construction review on installed designs to evaluate compliance with NRCS standards and specifications.
- 8) Develop conservation practice designs for prescribed grazing systems, brush management projects, herbaceous weed management practices, and fencing practices. Complete a field review to evaluate compliance with NRCS standards and specifications.
- 9) Prepare preliminary cultural resource reports and conduct field surveys on all linear practices and area type practices up to 100 acres. Coordinate all efforts through the area office cultural resource staff.
- 10) Develop and administer contracts under the Farm Bill. Contract development includes the creation of an annual schedule of operations and a budget for the life of the contract. Perform annual contract reviews and address compliance issues according to agency policy.

Accomplishments:

- 1) I received a superior rating on all past performance reviews (2012, 2013, 2014, 2015).
- 2) I have completed conservation plans on more than 30 mixed ownership ranches (USFS, BLM, ASLD and Private) ranging in size from 5,000 to more than 100,000 acres.
- 3) I have written and administered contracts that have funded over \$2,000,000 in conservation projects to improve the health of private, state and public lands.
- 4) Completed one conservation plan for a ranch with a conservation easement. Funded multiple practices through an EQIP contract to improve the health and sustainability of the land under the conservation easement.

Skills:

- 1) Project management
- 2) Preparation of environmental compliance documents
- 3) Preparation of cultural resource compliance documents
- 4) Plant identification and vegetation inventory
- 5) Soil and ecological site inventory
- 6) Geographic Information Systems (ArcGIS)
- 7) Contract administration software (ProTracts)
- 8) Conservation/range planning software (Customer Service Toolkit)
- 9) Engineering and environmental analysis models (Pipe Design, WinPST, RUSLE, etc.)
- 10) Strong technical writing skills
- 11) Strong oral communication skills

Supervisor: Kresta Faaborg (701-225-5113)

Okay to contact this Supervisor: Yes

Natural Resources Conservation Service

8841 E. Florentine Rd. Ste C
Prescott Valley, AZ 86314 United States

01/2015 - 05/2015

Hours per week: 40

Series: 0454 **Pay Plan:** GS **Grade:** 9

This is a time-limited appointment or temporary promotion

District Conservationist (Acting) (This is a federal job)

Duties, Accomplishments and Related Skills:

Please see duties, accomplishments and related skills described under District Conservationist (Acting) September, 2015 to May, 2016.

Supervisor: Kresta Faaborg (701-225-5113)

Okay to contact this Supervisor: Yes

Natural Resources Conservation Service

8841 E. Florentine Road, Suite C
Prescott Valley, AZ 86314 United States

04/2014 - 05/2014

Hours per week: 40

Series: 0454 **Pay Plan:** GS **Grade:** 11

This is a time-limited appointment or temporary promotion

District Conservationist (Acting) (This is a federal job)

Duties, Accomplishments and Related Skills:

Please see duties, accomplishments and related skills described under District Conservationist (Acting) September, 2015 to May, 2016.

Supervisor: Ray Dotson (775-857-8500)

Okay to contact this Supervisor: Yes

Natural Resources Conservation Service

6940 N. Air Terminal Blvd
Douglas, AZ 85607 United States

10/2011 - 10/2013

Hours per week: 40

Series: 0454 **Pay Plan:** GS **Grade:** 09

Rangeland Management Specialist (This is a federal job)

Duties, Accomplishments and Related Skills:

Please see duties, accomplishments and related skills described under Rangeland Management Specialist October, 2013 to May, 2016.

Supervisor: Gerry Gonzalez (520-255-4865)

Okay to contact this Supervisor: Yes

Natural Resources Conservation Service

1608 N. Stockton Hill Road
Suite 103
Kingman, AZ 86401 United States

06/2013 - 08/2013

Hours per week: 40

Series: 0454 **Pay Plan:** GS **Grade:** 9

This is a time-limited appointment or temporary promotion

District Conservationist (Acting) (This is a federal job)

Duties, Accomplishments and Related Skills:

Please see duties, accomplishments and related skills described under District Conservationist (Acting) September, 2015 to May, 2016.

Supervisor: Ray Dotson (775-857-8500)
Okay to contact this Supervisor: Yes

Colorado State University
 Campus Delivery
 Colorado State University
 Fort Collins, CO 80523 United States
08/2007 - 10/2011

Hours per week: 30

Research Fellow (Rocky Mountain Cheatgrass Management Project)

Duties, Accomplishments and Related Skills:

As a graduate research fellow I helped shape and manage a challenging and rewarding research project on developing management protocols for controlling one of the most ubiquitous invasive weeds of the western United States, cheatgrass. A significant fieldwork component in combination with an equally daunting mathematical computer modeling component allowed me to develop a unique technical skill set. This skill set along with extensive time in the field with land managers enabled me to act as a key communicator between an interdisciplinary team of economists, ecologists, weed scientists and extension specialists.

Duties:

- 1) Project management (Permitting, budgeting, logistics, etc.)
- 2) Grant writing
- 3) Experimental design
- 4) Laboratory and field protocol development
- 5) Data analysis and interpretation
- 6) Communication of research findings through reports, scholarly articles and verbally at professional meetings, stakeholder meetings, project meetings and workshops.

Accomplishments:

- 1) Collaborated with an interdisciplinary research team to establish the Rocky Mountain Cheatgrass Management Project.
- 2) Collaborated on a grant that funded two additional graduate students and brought together scientists from two states to form a working group consisting of ranchers, public land managers and extension agents.
- 3) I was awarded a third place poster presentation at the 2011 Institute for Livestock and Environment Conference in Fort Collins, Colorado for research relating nitrogen turnover rates to the persistence of an invasive weed (cheatgrass) on rangelands in the southern Rocky Mountains.

Skills:

- 1) Data Analysis (Microsoft Excel, R and SAS)
- 2) GIS and Mapping (ArcGIS, Grass and Quantum)
- 3) Computer Programming (Python, VBA, Fortran)
- 4) Vegetation Sampling (Cover, Biomass, Total Carbon and Nitrogen Composition)
- 5) Soil Sampling (Texture, Bulk Density, Carbon and Nitrogen Composition)
- 6) Literature review
- 7) Technical writing
- 8) Oral presentations

Supervisor: Cynthia Brown (970-491-1949)

Okay to contact this Supervisor: Yes

Colorado State University
 Campus Delivery
 Colorado State University
 Fort Collins, CO 80523 United States
08/2010 - 12/2010

Hours per week: 20

Graduate Teaching Assistant (Ecology and Management of Weeds)

Duties, Accomplishments and Related Skills:

Duties:

- 1) Taught one three hour lab class per week
- 2) Lectured when the professor was not available
- 3) Graded assignments and tests
- 4) Met independently with students as needed

Accomplishments:

- 1) Created a web based noxious weed jeopardy game to increase student involvement in class.
- 2) Increased student involvement and understanding of concepts being demonstrated in labs by involving students in the data visualization process using Microsoft Excel.

Skills:

- 1) Greenhouse plant care and maintenance
- 2) Herbicide safety and application procedures
- 3) Statistical analysis and visualization in Microsoft Excel
- 4) Microsoft Word and Power Point
- 5) Plant identification
- 6) Oral Presentations and instruction

Colorado State University
 Campus Delivery
 Colorado State University
 Fort Collins, CO 80523 United States
08/2009 - 12/2009

Hours per week: 20

Graduate Teaching Assistant (Ecology and Management of Weeds)

Duties, Accomplishments and Related Skills:

Duties:

- 1) Taught two three hour lab classes per week
- 2) Lectured when the professor was not available
- 3) Graded assignments and tests
- 4) Independently met with students as needed
- 5) Supervised and assisted students with greenhouse projects

Accomplishments:

- 1) Developed a teaching assistant handbook for the newly structured class
- 2) Established laboratory protocols

Skills:

- 1) Plant growth and care in greenhouse
- 2) Herbicide safety and application procedures
- 3) Statistical analysis and visualization in Microsoft Excel
- 4) Microsoft Word and PowerPoint
- 5) Plant identification
- 6) Oral presentations and instruction

Supervisor: Cynthia Brown (970-491-1949)

Okay to contact this Supervisor: Yes

Laramie Rivers Conservation District

5015 Stone Road (CR 22)
Laramie, WY 82072 United States
05/2007 - 08/2007

Hours per week: 40

Conservation Technician**Duties, Accomplishments and Related Skills:****Duties:**

- 1) Assisted in the construction of living snow fences
- 2) Assisted in the construction of spring water developments for livestock and wildlife
- 3) Developed and implemented a pilot study on cheatgrass invasion to determine the effectiveness of previously applied management actions

Accomplishments:

- 1) Completed the pilot study and presented to the conservation district board.

Skills:

- 1) Vegetation Monitoring and plant identification
- 2) Planting of native and introduced forbs, shrubs and trees
- 3) Weed control management practices
- 4) Operation of trucks, trailers, ATVs and tractors in remote areas
- 5) General construction and labor practices

Colorado State University

Campus Delivery
Colorado State University
Fort Collins, CO 80523 United States
01/2007 - 05/2007

Hours per week: 20

Graduate Teaching Assistant (Ecology)**Duties, Accomplishments and Related Skills:****Duties:**

- 1) Graded Assignments and Tests
- 2) Held office hours and independently met with students as needed

Skills:

- 1) Oral and Written Communication Skills

United States Forest Service

220 E Market St
Meeker, CO 81641 United States
05/2006 - 08/2006

Hours per week: 40

Series: 0454 Pay Plan: GS Grade: 05

Range Technician (This is a federal job)**Duties, Accomplishments and Related Skills:****Duties:**

- 1) Crew lead 2005 and 2006
- 2) Identified and controlled weeds through appropriate chemical and biological methods
- 3) Identified and notified supervisor of any new weed infestations
- 4) Vegetation monitoring

Accomplishments:

- 1) Treated more than 1,000 acres of weeds in 2005 as crew leader.
- 2) Obtained my qualified supervisors license for herbicide application on rangeland, industrial and right of way areas.

Skills:

- 1) Stockmanship
- 2) Equipment maintenance and operation (argos, atvs, tanks, pumps, sprayers etc.)
- 3) Truck and trailer driving on hazardous mountain roads
- 4) Herbicide handling and safety
- 5) Herbicide documentation
- 6) Saddle-light sprayer operation, maintenance and assembly
- 7) Livestock packing
- 8) Plant identification
- 9) Written and verbal communication

Supervisor: Hal Pearce (970-878-6008)

Okay to contact this Supervisor: Yes

Triple O Outfitters

P.O. Box 99 - 448 County Road #41
Hamilton, CO 81638 United States
10/2005 - 11/2005

Hours per week: 60

Outfitter/Hunting Guide**Duties, Accomplishments and Related Skills:****Duties:**

- 1) Established and supplied drop camps
- 2) Packed wild game, equipment and supplies on horseback
- 3) Fed and cared for horses

Accomplishments:

- 1) Most clients filled their hunting tags

Skills:

- 1) Stockmanship
- 2) Packing equipment, supplies and game on horseback
- 3) Field game processing
- 4) Wilderness orienteering and survival
- 5) Operation of trucks and trailers on hazardous mountain roads
- 6) Client communication and service

United States Forest Service

220 E Market St
Meeker, CO 81641 United States
05/2005 - 10/2005

Hours per week: 40

Series: 0454 Pay Plan: GS Grade: 05
Range Technician (This is a federal job)
Duties, Accomplishments and Related Skills:
 Please see duties, accomplishments and related skills described under Rangeland Technician 2006
 Supervisor: Hal Pearce (970-878-6008)
 Okay to contact this Supervisor: Yes

United States Forest Service
 220 E Market St.
 Meeker, CO 81641 United States
 05/2004 - 10/2004
 Hours per week: 40
 Series: 0454 Pay Plan: GS Grade: 05
Range Technician (This is a federal job)
Duties, Accomplishments and Related Skills:
 Please see duties, accomplishments and related skills described under Rangeland Technician 2006
 Supervisor: Hal Pearce (970-878-6008)
 Okay to contact this Supervisor: Yes

United States Forest Service
 220 E Market St.
 Meeker, CO 81641 United States
 06/2003 - 08/2003
 Hours per week: 40
 Series: 0454 Pay Plan: GS Grade: 4
Range Technician (This is a federal job)
Duties, Accomplishments and Related Skills:
 Please see duties, accomplishments and related skills described under Rangeland Technician 2006
 Supervisor: Hal Pearce (970-878-6008)
 Okay to contact this Supervisor: Yes

Schou Ranch (Family Operated)
 2145 S. Main St.
 Lone Pine, CA 93545 United States
 01/1990 - 08/2000
 Hours per week: 10
Ranch Hand
Duties, Accomplishments and Related Skills:
 I was raised on a small family operated ranch at the base of the Sierra Nevada mountains where I first became interested in agriculture and natural resource management.
Duties:
 1) Winter feeding of cows, bulls and heifers.
 2) Produced a steer each year for 4-H.
 3) Assisted at stock shows.
 4) Assisted in pasture and ranch maintenance and weed control.
Accomplishments:
 1) Successfully marketed and sold ten steers through the 4-H program.
Skills:
 1) Stockmanship
 3) Animal husbandry (Beef Cattle)
 4) Tractor operation
 5) Irrigation management
 6) Fencing
 7) Care and maintenance of equipment

Education:

Colorado State University Fort Collins, CO United States
 Some College Coursework Completed 10/2011
 GPA: 3.76 of a maximum 4.0
 Major: Rangeland Ecosystem Science
Relevant Coursework, Licenses and Certifications:
Agriculture Courses
 1) Decision Making and Management Skills
 2) Understanding and Managing the Land Resource
 3) Understanding and Managing the Animal Resource
 4) Analyzing and Managing the Business
 5) Understanding Policy
Biology Courses
 1) Invasive Plants & Weeds
Botany Courses
 1) Plant Identification
Natural Resources Courses
 1) Geospatial Applications in Natural Resources
 2) Remote Sensing of Natural Resources
 3) Concepts in GIS
 4) Systems Ecology
 5) Design of Geographic Information Systems
 6) Biogeochemical Cycling in Ecosystems
 7) Supervised College Teaching
Rangeland Courses
 1) Range Animal-Habitat Interactions
 2) World Grassland Ecogeography
 3) Ecology of Disturbed Lands
 4) Riparian Ecology and Management
 5) Rangeland Research
Soils Courses
 1) Pedology
Statistics Courses
 1) Design and Data Analysis for Researchers I
 2) Design and Data Analysis for Researchers II

Western State College Gunnison, CO United States
 Bachelor's Degree 08/2004
 GPA: 3.44 of a maximum 4.0
 Major: Environmental Studies and Economics
 Relevant Coursework, Licenses and Certifications:
 Economics Courses
 1) Environmental Economics
 2) Macroeconomics
 3) Microeconomics
 4) Intermediate Microeconomics
 5) Money Banking and Financial Markets
 6) Econometrics
 7) Economic Development and Sustainability
 8) International Economics and Globalization
 9) Economics and Public Policy
 10) Local Economic Development Analysis
 11) Income, Distribution, Poverty, Wealth
 Environmental Studies Courses
 1) Introduction to Environmental Studies
 2) Environmental Policy
 3) Science, Technology and the Environment
 4) Public Lands Management
 5) Environmental Applications
 6) Field Experience
 Geology Courses
 1) Physical Geology
 Biology Courses
 1) Environmental Biology
 Chemistry Courses
 1) Introduction to Chemistry

Job Related Training:

USDA-NRCS Snow Survey. January 10-15, 2016
 USDA-NRCS Soil Health and Sustainability for Field Staff. August 27-29, 2013
 USDA-NRCS Economics of Conservation Planning. Albuquerque, NM. March 26-28, 2013
 USDA-NRCS Conservation Boot camp. Tucson, AZ. March 5-21, 2013
 USDA-NRCS Orientation for New Employees. June 11-15, 2012
 Arizona NRCS Cultural Resources Training. July 26-27, 2012
 USDA-NRCS Managing for Excellence. Durham, NC. May 15-17, 2012
 Arizona NRCS Conservation Planning. Tucson, AZ. March 5-9, 2012
 Biological Assessment Training. Phoenix, AZ. January 24-26, 2012
 The Shipley Group- Reviewing NEPA Documents. Boise, ID. September 7-9, 2011
 Holistic Resource Management and Advanced Holistic Resource Management
 Pueblo, CO. February 14-19, 2011
 Sustainable Rangelands Roundtable Workshop. Billings, MT. February 12, 2011

Affiliations:

Wildlands Restoration Volunteers - Member, Project Leader, Crew Leader
 Society for Rangeland Management - Member/AZ Chapter
 Newsletter Editor

Professional Publications:

Marques D Munis, Cynthia S. Brown, Roy Roath, Mike Coughenour. Imazapic herbicide: A Process-based tool for post-fire Restoration of Bromus tectorum infested plant communities? In: Institute for Livestock and the Environment: 2010; Fort Collins, CO.
 Cynthia S. Brown, Val J. Anderson, Victor P. Claassen, Mark E. Stannard, Linda M. Wilson, Cheryl Y. Atkinson, James E. Bromberg, Thomas A. Grant III, and Marques D. Munis. 2008. Restoration Ecology and Invasive Plants in The West. Invasive Plant Science and Management, 1(4):399-413
 Marques D Munis, Cynthia S. Brown, Roy Roath, Mike Coughenour. Landscape scale constraints on conversion of a sagebrush Steppe ecosystem to an annual grass dominated stable state in southeastern Wyoming. In: Institute for Livestock and the Environment Annual Meeting: 2009; Fort Collins, CO.
 Marques D Munis, Cynthia S. Brown, Roy Roath, Mike Coughenour. Landscape scale constraints on conversion of a sagebrush Steppe ecosystem to an annual grass dominated stable state in southeastern Wyoming. In: Ecological Society of America Annual Meeting: 2009; Pittsburg, PA.
 Marques D Munis, Cynthia S. Brown, Roy Roath, Mike Coughenour. Southern Rocky Mountain Cheatgrass Management Project: An Application of the SAVANNA Ecosystem Model. In: GIS Day: 2009; Fort Collins CO.
 Marques D Munis, Cynthia S. Brown, Roy Roath, Mike Coughenour. Landscape scale constraints on conversion of a sagebrush Steppe ecosystem to an annual grass dominated stable state in southeastern Wyoming. In: Society for Range Management Annual Meeting: 2009; Albuquerque, NM.
 Marques D Munis, Cynthia S. Brown, Roy Roath, Mike Coughenour. Process-based modeling of ecological thresholds: A tool for management of Bromus tectorum invaded communities. In: Colorado Chapter of the Society for Range Management: 2007; Fort Collins, CO.

References:**Additional Information:**

References available upon request
 2012, 2013, 2014 and 2015 USDA-NRCS (Superior Performance Award)
 Aug 2007 - May 2011 Agricultural Experiment Station (Graduate fellowship)
 December 2010 Institute for Livestock and the Environment (3rd place poster winner)
 Jan 2007 Colorado Weed Management Association (Scholarship Outstanding Invasive Plant Management Project)
 2007 - 2008 C Wayne Cooke Scholarship (Outstanding Graduate Student Majoring in Rangeland Ecosystem Science)
 2003 - 2006 United States Forest Service (Safety Award)

Kenson-York Ranch Site Photos illustrating erosion







PROJECT SUPPORT LETTERS
UVRWPC RESOLUTION OF SUPPORT/MATCH

SENATOR STEVE PIERCE

1700 WEST WASHINGTON, SUITE S
PHOENIX, ARIZONA 85007-2844
CAPITOL PHONE: (602) 926-5584
CAPITOL FAX: (602) 417-3101
TOLL FREE: 1-800-352-8404
spierce@azleg.gov

DISTRICT 1



Arizona State Senate

SENATE PRESIDENT 2012

COMMITTEES

NATURAL RESOURCES
CHAIRMAN

TRANSPORTATION

JUDICIARY

October 5, 2016

Arizona Water Protection Fund Commission
3550 North Central Avenue, Suite 200
Phoenix, Arizona 85012

Dear Commission Members:

I am writing this letter to express my complete support of the Upper Verde River Watershed Protection Fund (UVRWPC) application requesting funding to address severe erosion issues on agricultural land.

As a large land owner, I am acutely aware of the problems that result from Pinyon-Juniper (PJ) encroachment. Erosion, flooding, degraded soil conditions, impaired water quality, unhealthy habitat for wildlife, damage to riparian areas, decreased groundwater recharge and increased risk of catastrophic wildfire are all negative impacts.

The engineering and installation of silt dams developed with biomass from thinning activities is a landscape-scale approach that has potential for broad transferability to benefit public and private lands not only in the State of Arizona, but throughout the west. We have done this for years on Las Vegas ranch. Where ever possible we have worked on the PJ on our ranch for the past 50 years. We were recognized by the Society of Range management for our efforts. We need to encourage this practice.

There are millions of acres of PJ in need of treatment in this state. It is critical that we develop uses woody biomass generated to allow us to effectively restore and manage our woodlands and watersheds. If we don't, nature will do it with fires and ruin a valuable natural resource.

I want to thank in advance for your support. If you have any questions, please do not hesitate to contact me at 602-926-5584.

Sincerely,

Senator Stephen Pierce
Legislative District 1
Arizona State Senate



Douglas A. Ducey
Governor

Office of the State Forester

Arizona Department of Forestry and Fire Management



Jeffery C. Whitney
State Forester

October 12, 2016

Arizona Water Protection Fund Commission
3550 North Central Avenue, Suite 200
Phoenix, AZ 85012

Re: Juniper Silt Dam Project

Dear Committee Members:

The Upper Verde River Watershed Protection Coalition (UVRWPC) is tackling serious issues facing the watershed. Since 2013, the Arizona Department of Forestry and Fire Management (DFFM) has been a member of the UVRWPC Watershed Taskforce and collaborating partner working to address identified critical resource concerns.

We are highly supportive of the Juniper silt dam project proposed with this application. Not only is it a unique solution to curb erosion, it also provides match funding for a federal Western Forest Leadership Council grant applied for by DFFM in September of this year.

DFFM, formerly Arizona State Forestry, received new direction from the Arizona Governor Doug Ducey in March of 2013. Our personnel are responsible for suppression of wildfire on 22 million acres of state and unincorporated private land in Arizona, as well as services and leadership in the areas of fire prevention, urban and community forestry, forest stewardship, watershed and forest health, and utilization and marketing.

Juniper encroachment and the subsequent increased erosion continue to be a problem for our landowners. It negatively impacts our forests and watersheds and damages dependent ecosystems. The proposed uplands project directly benefits the perennial Williamson Valley Wash, checks degradation to soils and wildlife habitat, and reduces the risk of catastrophic wildfire through thinning, provides a use for low-value woody biomass, and slows water allowing more time for aquifer recharge. It is a landscape-scale proposal that has potential for broad transferability throughout the state and west.

DFFM and UVRWPC are committed to the project. Both have dedicated significant resources to project planning, as well as cash and in-kind match funding to bring this project from the design phase to on-the-ground implementation.

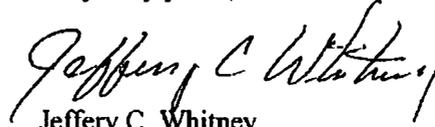
Duty ♦ Respect ♦ Integrity

1110 West Washington Street, Suite 100 ♦ Phoenix, Arizona 85007 ♦ Main: (602) 771-1400 ♦ Fax: (602) 771-1421

October 12, 2016
Page 2

Thank you for your time and consideration. We look forward to our future partnership with the water protection fund. I can be reached at 602-771-1400 or jeffwhitney@forestryandfire.az.gov if you have further questions.

Very truly yours,

A handwritten signature in black ink, appearing to read "Jeffery C. Whitney". The signature is written in a cursive style with a large initial "J".

Jeffery C. Whitney
Arizona State Forester

BARNEY YORK RANCH
3845 W. Little Granite Lane
Prescott, AZ 86305

October 5, 2016

Arizona Water Protection Fund Commission
3550 North Central Avenue, Suite 200
Phoenix, AZ 85012

Dear Commission Members:

Severe erosion issues are negatively impacting ranchlands that I manage on the Barney York Ranch, located about 20 miles Northwest of Prescott, Arizona. Encroaching Juniper has degraded the native grasslands and has increased erosion on this property, including creating deep gullies and head cuts. Left unchecked, this erosion will continue to degrade soils and grasslands.

Working with the Natural Resource Conservation Service (NRCS) and Upper Verde River Watershed Protection Coalition (UVRWPC), I will begin to thin the encroaching Juniper and plan to address erosion with a uniquely designed solution. Under current Juniper thinning practices, the cut material is left on the land or burned onsite. This proposed project will use the juniper byproducts for engineered and strategically placed silt dams designed to retard erosion – in essence, using the material that harmed the land, to heal the land.

Benefits of this project go beyond erosion control. Silt dams will slow runoff and optimize groundwater recharge. Upland grasslands, water quality, wildlife habitat and grazing conditions will improve and soil erosion will be reduced. We predict that the perennial portion of Williamson Valley Wash, one of only a handful of perennial streams in the Big Chino Sub-basin, will benefit from improved water quality and water supplies.

I urge you to fund this project. Not only will it have positive benefits in the project area, the project concept is designed to be transferrable to other locations. Juniper silt dams can be replicated in any area experiencing erosion issues due to overgrowth. Secondly, it also provides a use for low-value woody biomass.

Thank you for your time and consideration of this proposal. If you have any questions, please do not hesitate to call me at 928-308-0660.

Sincerely,


W. A. (Bill) Kenson

Arizona Water Protection Fund Commission
3550 Northe Central Avenue, Suite 200
Phoenix, AZ 85012

October 10, 2016

Dear Committee Members:

The United States Department of Agriculture Natural Resource Conservation Service (NRCS) field office located in Prescott Valley has been a member of the Upper Verde River Watershed Protection Coalition (UVRWPC) Watershed Taskforce since 2012. NRCS personnel with the Prescott Valley Office work closely with other taskforce members and the coalition to identify natural resource challenges and design solutions.

Juniper encroachment throughout the watershed brings with it a host of resource concerns including severe erosion, flooding, loss of soil integrity, degradation of grasslands and wildlife habitat, decreased water quality and impaired hydrologic cycle. During the summer months of 2016, taskforce members representing the Arizona Department of Forestry and Fire Management, Arizona State Land Department, NRCS and the UVRWPC collaborated to design a unique application for the byproducts of forest thinning activities.

For decades, it has been common practice among landowners to place stems of thinned and downed trees in ditches to stem the progression of erosion. This has met with varied levels of success. However, properly engineered Juniper silt dams specific to the site could increase the level of success.

Grade control structures and other erosion control structures, such as the proposed project will benefit the watershed and its associated riparian areas including an unnamed wash in the project area, and the Williamson Valley Wash. It also complements the current five-year brush management project funded through a grant from the USDA Regional Conservation Partnership Program (RCPP). The RCPP program is a partnership between the UVRWPC, NRCS Prescott Valley Office, and Arizona Game & Fish Department.

Personnel with the Prescott Valley NRCS Office will collaborate with and provide technical advice to the landowner and UVRWPC on project implementation. They will also assist the UVRWPC with outreach the local Chino Winds and Triangle Natural Resource Conservation Districts. Another benefit to this project is its potential for transferability to other areas of the state and west that are also struggling with Juniper encroachment onto historic grasslands.

Thank you for consideration. Do not hesitate to call or e-mail with any questions. I can be reached at 928-759-9301, ext. 109, or marques.munis@az.usda.gov.

Sincerely,



Marques Munis
District Conservationist
USDA NRCS Prescott Valley

Arizona Water Protection Fund Commission
3550 North Central Avenue, Suite 200
Phoenix, Arizona 85012

October 12, 2016

Dear Commission Members:

The Arizona State Land Department in Yavapai County works in partnership with numerous local, state and federal agencies, as well as private businesses and landowners, to address resource issues of concern. Juniper encroachment into the Central Arizona Grasslands and related erosion continue to be a problem at the watershed level.

The Arizona State Land Department is an active member of the Upper Verde River Watershed Protection Coalition (UVRWPC) Watershed Taskforce. Along with the Natural Resource Conservation Service (NRCS) and Arizona Department of Forestry and Fire Management (ADFFM), also members of the watershed taskforce, we work to resolve landscape scale problems in the Upper Verde River Watershed.

Over the last six months, natural resource managers representing the organizations above have worked collaboratively to design a project that addresses the issue of degradation caused by severe erosion due to Juniper encroachment. The resulting project is a different approach than just placing stems in a ditch. Silt dams will be site specifically engineered with specifications communicated via tablet technology to field personnel.

Implementation of this project has the potential to be transferrable across Arizona and the west. I urge you to fund the proposal so we can continue to work as a team to slow the domino effect of resource issues including impaired soil conditions and water quality, flooding, rapid erosion, and degraded wildlife and riparian habitat. This project also supports forest restoration through thinning activities which reduces the risk of catastrophic wildfire.

Sincerely,



Chris Lowman
Range Resource Area Manager
Chino Valley, AZ

Upper Verde River Watershed Protection Coalition
a formal partnership between Yavapai County, City of Prescott,
Towns of Prescott Valley and Chino Valley and Yavapai-Prescott Indian Tribe

**Executive Board Resolution Supporting Submission of a Grant Application
to the Arizona Water Protection Fund for Fiscal Year 2017**

A resolution of the **EXECUTIVE BOARD OF THE UPPER VERDE RIVER WATERSHED PROTECTION COALITION** "Coalition" authorizing submittal of a grant application to the Arizona Water Protection Fund requesting funding to accomplish essential tasks associated with implementation of the Coalition Watershed Management and Restoration Plan and the proposed Juniper silt dam erosion control project.

WHEREAS, THE UPPER VERDE RIVER WATERSHED PROTECTION COALITION, hereinafter known as "The Coalition," is desirous of partnering with the Arizona Water Protection Fund;

WHEREAS, The Coalition is desirous of seeking outside funding sources to support its goals and planned activities;

WHEREAS, The Coalition has the professional expertise and financial ability to successfully implement the grant, including adherence to deadlines and reporting requirements;

WHEREAS, The Coalition understands its financial responsibility and has the resources, as included in the Project Budget, to implement the project.

NOW, THEREFORE, BE IT RESOLVED THAT the EXECUTIVE BOARD OF THE UPPER VERDE RIVER WATERSHED PROTECTION COALITION approves application to the Arizona Water Protection Fund and authorizes Project Director John Munderloh, Chair of the Coalition Technical Advisory Committee, to take all necessary steps to complete and submit said application.

Passed and adopted by the EXECUTIVE BOARD OF THE UPPER VERDE RIVER WATERSHED PROTECTION COALITION this 11TH day of October 2016.

By: 

Lora Lee Nye

Executive Board Chair

Upper Verde River Watershed Protection Coalition

APPENDIX

**Upper Verde River Watershed
Protection Coalition
Watershed Taskforce**

**Watershed Restoration
and Management
Project Plan**

Prepared for:



Prepared by:

**Upper Verde River Watershed Protection Coalition
Watershed Taskforce**

December 2014

Executive Summary

The Upper Verde River Watershed Protection Coalition (UVRWPC or Coalition) is an intergovernmental partnership comprised of representation from the City of Prescott, Towns of Prescott Valley and Chino Valley, Yavapai County and the Yavapai-Prescott Indian Tribe. Established in 2006, the Coalition has a mission to protect the base flows of the Upper Verde River and reach safe yield in the Prescott Active Management Area while balancing the reasonable water needs of residents who live and businesses that operate within watershed boundaries.

In March of 2012, a Watershed Taskforce was established by Coalition leadership with the directive to develop a plan that will guide future watershed restoration and management efforts. The resulting collaboration of natural resource managers, engineers, scientists, planners, business owners and private citizens worked in service of a common goal to ensure the long-term vitality and health of the Upper Verde River Watershed and its supporting ecosystems. A grant from the United States Bureau of Reclamation, awarded in September 2012, augmented this comprehensive project-based planning effort.

Critical watershed issues identified by taskforce members include:

1. Water supply security;
2. Forest health;
3. Increase in catastrophic wildfires; and,
4. Proliferation of invasive species.

Project concepts developed to address critical issues span four areas also took into account historical and desired watershed conditions, as well as goals and objectives of the multi-stakeholder taskforce. Focus areas include:

1. Vegetation Management
2. Recharge Enhancement
3. Capitalization on Urbanization
4. Land Use Management, Water Conservation and Aquifer Protection

Taskforce members methodically analyzed the watershed using Geographic Information Systems (GIS), hydrologic and geologic characteristics, land ownership and field work to select project locations. Project types and locations are illustrated on Map 1 on the next page. Multi-faceted projects, including cost estimates, were designed to achieve maximum benefit to the watershed and associated ecosystems. They have the potential to locally enhance recharge while mitigating the risk of catastrophic wildfire through vegetation thinning; reduce unhealthy sediment loads in bodies of water and improve the water quality of runoff; enhance recharge through installation of retention structures (gabions); and restore riparian and wildlife habitat. Scenario planning was incorporated to further define project parameters, as well as identify the needs for and threats to implementation.

Several themes emerged throughout the process. There is a clear and critical need to engage policy makers, incorporate the private sector as a major partner, and garner public support through increased education and dissemination of information.

9.2. Enhanced Runoff and Recharge

As previously described, approximately two percent out of over 2 million acre-feet per year of the estimated average annual precipitation is recharged into the aquifer; the remainder is lost to evapotranspiration or otherwise leaves the watershed. Even a small increase in the percentage recharged would create a meaningful change in the aquifer. The taskforce explored various ways to increase runoff and recharge rates within the watershed, including constructed improvements, policies, and changes to vegetation. Project plans with the goal of increasing runoff to optimize recharge must take into account the potential for soil erosion from runoff, wildlife needs, aesthetics, existing vegetation, land ownership, and costs. A focus on large storm events and seasonal events (e.g. winter storms) will be important since large winter events tend to be the primary sources of recharge. A project may focus on increasing the length of time water flows in stream beds, which would likely lead to increasing recharge amounts.

9.3. Silvicultural Prescriptions

Silviculture is the art and science of manipulating vegetation to accomplish the objectives of the land owner. The prescriptive use of thinning and burning is unique to each area and is specified accordingly.

9.4. Possible Effects of Juniper Removal on Water Balance

In the previously mentioned study in Texas, junipers have been shown to have a profound effect on hydrology and water balance. Those effects include:

- **Interception of precipitation:** juniper canopies and the leaf litter they produce have been shown to intercept up to 80 percent of the total annual precipitation where it quickly evaporates. Grasslands only intercept about 10 percent of the total annual precipitation.
- **Infiltration and runoff:** juniper leaf litter increases infiltration rates (what amount is not first intercepted in the canopy) under the tree canopy, however, because junipers also diminish the grass cover outside of the canopy, increased runoff and erosion is created in the space outside of the tree's dripline.
- **Herbaceous Production:** Juniper has extensive lateral and deep roots and physiological adaptations that enable it to extract water from very dry soil. It also has a dense mat of fibrous roots at the soil surface. These traits allow juniper to outcompete grass for water and nutrients.
- **Evapotranspiration:** Aside from intercepting and evaporating water before it reaches the soil surface, junipers are evergreens and have the capability to transpire water yearlong, including times when grasses have gone into a temperature or drought-induced dormancy.
- **Runoff:** Juniper leaf litter and the increases to infiltration rate caused by the root system allow the tree to intercept and infiltrate runoff flowing from interspaces between trees. However, when the tree is cut and removed, the modified soil structure remains for many years and improves deep infiltration and reduces runoff.
- **Recharge:** Junipers affect deep drainage on rangelands because of the effects on the water balance including 1) a large percentage of total rainfall never reaching the soil and 2) junipers extract most of the water that does enter the soil to meet its transpiration requirements. Invasion of juniper on areas that were primarily grassland has strong implications for recharge of aquifers.

9.5. Fire Regime and Condition Class

The Big Chino sub basin area is characterized by vegetation types evolved and maintained by fire. The Yavapai Communities Wildfire Protection Plan (YCWPP) area is characterized by vegetation types evolved and maintained by fire. Fire started by lightning and native people was an integral part of the local ecosystems. This ecological setting was likely diverse and productive with a built-in resistance to large scale, devastating fires. Fire regime and condition class are significant because of this history. Fire events are inevitable, but their affect is manageable through prevention; namely, removing and reducing density of vegetation.

The effect fire has on vegetation types within the area is highly variable and complex. Ecological processes, such as intermediate stage development, nutrient cycling, fuel accumulation, and water availability are all influenced by fire, as well as vegetative characteristics such as fuel composition, plant health/vigor, age/size class distribution, and species composition.

Vegetation types may be classified by fire regime. The area includes several natural fire regimes because of the diversity in soil, elevation, aspect, precipitation, and vegetation type. The natural fire regime is the total pattern of fires within the vegetation type that is characteristic of that portion of the area. Factors that make up the natural fire regime include source of ignition, behavior and intensity, size, return interval, and effects. Fire regimes may be described by intensity, effect on vegetation, and frequency.

The Condition Class of a vegetation type for a particular area may be used to define its departure from the natural fire regime. This departure from historical fire frequencies and the level of change from the natural regime are considered along with the likelihood of losing key ecological components to determine the current Condition Class.

- Condition Class 1: Fire regimes are within an historical range and the risk of losing key ecosystem components is low.
- Condition Class 2: Fire regimes have been moderately altered from their historic range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals.
- Condition Class 3: Fire regimes have been significantly altered from their historic range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals.

During the last century natural fire return intervals have been interrupted across most of the PrAMA and Big Chino sub-basin. The current fire environment can be characterized by an overgrown complex fuel profile, moderate to steep terrain, poor ground access, increasing percentage of dead standing and downed trees, increasing percent dead in understory bushes, an extended drought climate and an expanding wildland/urban interface.

The longer the return interval of fire, the more severe and larger the fire event. Also, the more acres burned by fire through time affects the movement towards restoration of the natural fire regime at the landscape level.

Primary vegetation types within the study area are affected by fire, and affect fire behavior in different ways:

Ponderosa Pine. In this vegetation type, Ponderosa pine (*Pinus ponderosa*) is the predominant tree species throughout although other species such as White fir (*Abies concolor*) and Douglas fir (*Pseudotsuga menziesii*) may be found in association at the higher elevations, while Gambel oak (*Quercus gambelii*), pinyon pine (*Pinus*

californiarum var. *fallax*), shaggy bark juniper (*Juniperus osteosperma*), Alligator juniper (*Juniperus deppeana*) and chaparral species are intermixed to varying degrees. Many Ponderosa pine stands are currently stocked at moderately high levels with an age class composition characterized as mostly immature with very little in the young and mature components.

The natural fire regime within this vegetation type was probably typical of other western Ponderosa pine forests. This regime can be described as having frequent light surface fires with return intervals of from one to twenty-five years (Covington, 1992; Dieterich, 1988). These fires maintained open and park-like conditions with a grass and forb understory. Burning released nutrients from accumulated woody debris and leaf and needle litter.

Fire suppression, timber harvesting, and historical grazing practices have disrupted the natural fire regime to the extent that current tree stocking is relatively high and associated forest fuels are more continuous. Understory grass and forb stocking is correspondingly low. The absence of fire has allowed the conversion to shade-tolerant species at the higher elevations. These understory species have become ladder fuels, allowing fire to climb from the surface fuels up into the Ponderosa pine overstory, causing more severe and destructive fires. Some of the Ponderosa pine vegetation type is currently in Condition Class 3 which means that fire frequencies have departed from historical frequencies by multiple return intervals. In these areas, fire regimes have been significantly altered from the natural range and the risk of losing key ecosystem components is high.

Pinyon-Juniper. The species that make up this vegetation type include pinyon pine, and numerous junipers (*Juniperus deppeana*, *J. monosperma*, and *J. osteosperma*). In some cases chaparral may be found intermixed, and in others grasses are interspersed through the vegetation type. Ponderosa pine and riparian vegetation including Arizona walnut and willow may be found in some drainage bottoms as well. Pinyon-juniper and pure juniper stands are represented by a range of stocking levels with general ages being greater than 50 years with many old age trees in the hundreds of years. These woodland stands typically have little understory vegetation and ground cover. They can also be characterized by extensive levels of sheet and gully erosion. Areas previously chained, sheared, or fire wooded with no follow-on prescribed fire are now restocked with moderate to high levels of regeneration by juniper and/or chaparral species. Extensive areas of natural grassland are currently being encroached upon by constantly expanding juniper (*J. osteosperma*). Trees of various ages, including relatively young trees, produce seeds which are carried by water down slope into the grasslands.

The natural fire regime within this vegetation type was likely one characterized by infrequent and severe surface fires with return intervals of more than 25 years (Hollenshead, 2001). However, the natural range was probably more confined than today with much having been grassland with a significantly different fire regime. The natural range was probably more limited to sites that were relatively protected from frequent fire, such as rock outcrops. When these stands burned under this fire regime there were likely sporadic and isolated crown fires that killed many trees but did not replace the stand (Hollenshead, 2001).

Fire suppression combined with certain historical grazing practices has significantly disrupted the natural fire regime of natural grassland areas. Many of these areas are now occupied by the pinyon-juniper vegetation type with correspondingly sparse to nonexistent understory vegetation and surface fuels. This current vegetation and fuels condition will not carry the frequent low-intensity surface fires that occurred naturally. Significant loss of the grassland component on these acres has already occurred, and the current risk of losing key ecosystem components to a fire event is relatively low.

Chaparral. Predominant species include mountain mahogany (*Cercocarpus montanus*), manzanita (*Arctostaphylos pungens*), silk tassel (*Garrya wrightii*), scrub oak (*Q. turbinella*), emory oak (*Q. emoryi*), and Arizona white oak

(*Q. arizonica*). The post-fire resprouting shrubs associated with this vegetation type may include Gambel oak, manzanita, mountain mahogany, scrub oak, and silk tassel. This vegetation type is arranged as large, continuous stands of chaparral in addition to being interspersed with pine and juniper. A range of stocking levels is represented in this vegetation type with an approximate age class composition as mostly mature, some young, and very little immature. Mature chaparral stands tend to have little in the way of understory vegetation and associated ground cover. Extensive levels of sheet and gully erosion of the soils can occur in these stands.

The natural fire regime within this vegetation type was characterized as severe surface fires combined with crown fires. The return interval was approximately 35 to 40 years (Floyd-Hanna, 1997). These fires served as replacement events in mature stands of chaparral and likely resulted in a mosaic of age classes across the landscape.

Fire suppression has moderately altered the natural fire regime in the chaparral vegetation type. Relatively large and continuous stands with little age class or structural diversity now make up much of the chaparral. Most of this type has burned at least once in the last century, which represents a departure by at least one fire return interval. This places much of the chaparral in Condition Class 2. Fire regimes have been moderately altered from their historic range, and the risk of losing key ecosystem components is considered moderate.

Grassland. Grassland in the study area has been altered to varying degrees by overgrazing and invasion of woody species. The natural fire regime within this vegetation type was characterized as low-intensity surface fires with a return interval of from one to twenty-five years (Hollenshead, 2001). Frequency and nature of these fires likely maintained the grass composition and prevented the establishment of woody vegetation.

Fire suppression combined with historical grazing practices has significantly disrupted the natural fire regime on some natural grasslands. Many of these areas have evolved into chaparral stands or woodlands and now may have a completely different fire regime. Existing grasslands have probably not burned as frequently as in the past. However, fire events have occurred and have helped to promote and maintain the grass component. Departure from the natural fire regime is difficult to determine. The risk of losing key ecosystem components may be low. On those portions of the watershed in a vegetation condition class of two or three, the reduction in woody biomass along with the reintroduction of fire is expected to reduce soil erosion, improve soil hydrology, increase grass stocking and enhance tree growth.

9.6. Capitalization on Urbanization

Different development patterns impact the watershed both positively and negatively. Recognizing that development will continue to occur, projects will focus on mitigating impacts from existing development and/or minimize impacts of future development.

Urbanized areas increase the amount of impermeable surfaces (paved areas and rooftops), increasing runoff rates and volumes. Current development codes require that the peak runoff rate not be higher than the runoff rates for the property prior to development. Mitigation measures such as detention basins are common in the commercial areas of the PrAMA. However, the total runoff volume after a rain event is often larger than the pre-development conditions due to the reduction of on-site infiltration into the soil. Because there is an additional volume of water that is created due to urbanization, opportunities exist to utilize the increased runoff to enhance recharge.

The City of Prescott currently has a system in place to take advantage of much of the urbanized runoff. Two reservoirs, Watson and Willow Lakes, are downstream of much of the city's urbanized areas and capture the additional runoff. However, historic water rights owned by the city to the water in the reservoirs remain unchanged. There may be an opportunity to capture the amount of additional runoff due to urbanization, store in reservoirs and put that water to beneficial use.

There are water right issues to be aware of when looking at a system to utilize urban runoff. Downstream, senior water right owners will have a basis of claim for the pre-development water runoff. Proving how much water is "new" water from urbanization will take effort.

9.7. Land Use Management, Conservation and Aquifer Protection

Land use management will involve water providers and residential, commercial, and agricultural land users. In addition to large scale recharge enhancement projects, smaller scale conservation and rainwater harvesting projects were investigated. Land use management and conservation projects and policies address landscape considerations, range management, and reducing consumer water use.

Aquifer protection projects must address growth impacts to the groundwater supplies. Within the PrAMA portion of the watershed, the 1980 Groundwater Management Act and subsequent policies and laws have resulted in a moratorium on new groundwater-supplied irrigated agriculture, prevent new subdivisions to be constructed using existing groundwater supplies, established water rights, require implementation of conservation practices and establish well spacing guidelines.

Within the Big Chino sub-basin portion of the watershed, only the Big Chino Water Ranch property purchased as a water supply by the City of Prescott carries any such protection. Outside of this, there are as many as 500,000 acres of private and State Trust Land within the sub-basin that may be developed. Aquifer protection programs for this sub-basin will require a significant amount of political will to enact. Some of the aquifer protections that have been enacted in other areas that may be replicable in the Big Chino sub-basin include:

- Purchase of development rights (conservation easements)
- Arizona State Trust Land reform
- Low or no-impact developments employing wastewater and rainwater collection and recharge
- Establishment of water rights and prohibition on new uses

Because these are largely policy-related programs, the Watershed Task Force did not create a project. Next steps toward implementation will be through direction from the Coalition Executive Board and other stakeholders.

10.0 Project Evaluation Criteria

Evaluation criteria were established for each project concept, and used to screen potential projects prior to full development.

10.1. Vegetation Management

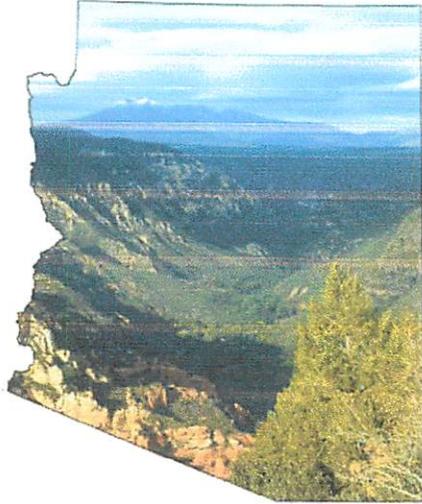
Projects target pinion-juniper and chaparral removal, with the intent of restoring grassland conditions, reducing evapotranspiration and ultimately increasing recharge. They include prescribed burns and removal of exotic vegetation species. Projects will incorporate monitoring to demonstrate the effectiveness of the prescription. Screening criteria are included in Table 4.

Table 4 – Vegetation Restoration Project Criteria	
Evaluation Criteria	Consideration/Required Value
Vegetation type/density	Pinion juniper or chaparral
Slope/aspect/elevation	Site specific
Size	40 acre minimum (control and project site)
Ownership	Cooperative ownership Excludes small private parcels
Soil type/geology	Conducive to runoff and recharge
Recharge/runoff potential	Site specific; proximity to basin boundaries
Measurable conditions	Site specific – instrumentation/ stream levels and other measurement methods acceptable
Close proximity of sites	Prefer adjacent/close
Consistent with management plan(s)	Taskforce Watershed Plan; PNF Plan; PrAMA 4th Management Plan, etc.
Potential Natural Vegetation Type	Consistency with NRCS recommended vegetation Long term viability
Secondary benefits	Habitat; fire control; grazing; water quality; flood control
Accessibility	Must be reasonable treatment and monitoring Must have legal access
Precipitation/weather	Site specific; day-to-day conditions for access and monitoring
Representative of watershed	Must be able to replicate or ability to upscale

10.2. Infiltration Enhancement

Infiltration enhancement projects will typically involve constructing gabions to slow runoff flow during rain events in washes, increasing detention time in the channel, and expanding the wetted perimeter to increase recharge. Gabion design will meet all flood control requirements and will adhere to conventions honoring down-stream appropriative water rights. Screening criteria for infiltration enhancement projects are included in Table 5.

Evaluation Criteria	Consideration/Required Value
Slope/aspect/elevation	Gentle slope
Location	Systems not in place already; proximity to location with recharge potential; proximity to location as alternate source
Size	Large enough to have “control” portion of site
Ownership	Cooperative ownership
Vegetation	Conducive to filtration and water quality
Soil type/geology	Acceptable permeability; transmissivity to recharge aquifer; sheet flow occurring
Measurable conditions	Site specific; baseline data available
Representative of watershed as a whole	Must be able to replicate or upscale
Environmental	Grazing; habitat; flood control; etc. Investigations complete
Accessibility	For treatment and monitoring
	Must be reasonable and legal access
Precipitation/weather	Site specific; day-to-day conditions for access and monitoring



Arizona Forest Resource Strategy

*A comprehensive strategic plan
to address forest-related
conditions, trends, threats, and
opportunities as identified in
the 2010 Arizona Forest
Resource Assessment*

June 18, 2010



Arizona State
Forestry Division



5.2 ECOSYSTEM HEALTH

Critical Issue Description

Evidence of their declining health, function and sustainability is readily apparent throughout the forest ecosystems of Arizona. Dramatic signals of unraveling ecosystems include large, uncharacteristic crown fires; effects of prolonged drought; excessive fuel buildup; vegetative loss from insects and tree pathogens; and widespread decreases in the biodiversity of both plants and animals. Evidence-based ecological research indicates that some Arizona ecosystems are very different from historic conditions. These changes include alterations in nutrient cycling, decreases in understory species diversity, increases in exotic species, and disruption of natural fire regimes. It is essential that we accurately identify the reasons for decline in the health of forest ecosystems and respond appropriately.

Introduction

Ecosystems must be accurately identified to enable science-based strategies to be implemented at an accelerated pace on a landscape scale. Defining and assessing the health of complex ecosystems is not easy. Ecosystem health issues result from human activity, are brought to light because of human concerns, and are addressed through human intervention. Indicators of healthy ecosystems include: 1) biological diversity, 2) biotic integrity and resilience, and 3) supporting human needs and uses. These three indicators accurately reflect the biological, physical, and human dimensions required for sustaining ecosystems.

Indicators used to assess components of ecosystem health:

- Uncharacteristic wildfire
- Forest insects and pathogens
- Ecosystem integrity and resilience
- Increased introduction of invasive/exotic species
- Changes in forest diversity and structure
- Changes in wildlife diversity
- Human needs and uses (i.e., ecosystem services)

Characteristics of a properly restored ecosystem include:

- Reduction of unnatural levels of insect and diseases
- Enhanced native plant and animal diversity
- Maintain habitat essential for the survival and recovery of threatened and endangered species
- Improved watershed function
- Decreased invasive species
- Natural fire regimes maintained
- Significant reduction of unnatural crown fires
- Sustainable forest vegetative structure and ecosystem function
- Provides a wide range of ecosystem services
- Historical disturbance regimes (e.g. fire, wind, insects, disease) return to their natural role within the ecosystem.



5.3 WATER & AIR

Critical Issue Description

Water is arguably Arizona's most precious resource. Because forested watersheds produce a large proportion of the state's water supplies, proper forest management is essential to protect the quantity and quality of water supply for municipal, industrial, and agricultural uses as well as for riparian ecosystems that provide habitat for the broadest diversity of species in Arizona. Natural climate variability and global climate change have resulted in persistent drought for the past decade. Temperature increases have led to earlier spring runoff and loss of water storage. The challenge of forest management going into the future will be the wise use of practices that lessen the impacts of climate change through watershed management strategies that help to ensure adequate, good-quality water supplies for agriculture, industry, people, and the environment.

Clean air, often taken for granted, is another precious resource. Arizona's forest lands play an important role in maintaining and enhancing air quality. Trees modify the atmosphere by absorbing carbon dioxide and producing oxygen; clear the air by filtering dust, ash, pollen, and smoke; intercept wind; provide shade; and moderate air temperature. However, forest management activities and fires can have negative effects on air quality by producing excessive smoke and releasing other particulates into the atmosphere. Careful planning and coordination are needed to improve forest management activities to limit smoke impacts and improve air quality.

Introduction

Compared to most of the nation, water is scarce in Arizona. Average annual precipitation during the past 30 years has ranged from less than 3 inches in the driest deserts to as high as 25-40 inches at higher elevations, with half the state receiving less than 10 inches and ponderosa pine forests receiving between 20 and 30 inches. Not only is average precipitation lower than most other parts of the country, the timing and amount of precipitation received annually is highly variable. In this setting, watershed protection, enhancement, and conservation are extremely important. Forests enhance watershed conditions and, in turn, water quality by stabilizing soils and reducing erosion. Trees bind the soil; absorb or deflect the downward fall of rain, snow, sleet, and hail; filter toxins from water; and reduce runoff, flooding, and sediment deposit after storms. A dependable supply of clean water is imperative for Arizona's agricultural uses as well as for the state's six million citizens and millions of visitors.

Arizona's forests also enhance air quality in several ways. Trees modify the atmosphere by absorbing carbon dioxide (providing a sink for carbon) and producing oxygen, and clear the air by filtering dust, ash, and smoke (especially in urban areas). They also intercept wind, provide shade, and moderate air temperature. Conversely, Arizona's forests contribute to reduced air quality when smoke is produced by wildfires and other management activities, especially prescribed burning.



5.7 CLIMATE CHANGE

Critical Issue Description

Arizona's climate has experienced wide swings in temperature and precipitation for thousands of years. A naturally variable climate has given rise to changes in fire frequency, wide variation in flood and drought severity, and has influenced native population shifts throughout the region. Recent changes in temperature and precipitation over several decades, caused in part by human activity, have increased the severity of forest insect outbreaks and have contributed to some of the largest wildfires in Arizona's history. While climate has always been variable over time, rapid climate change creates cascading effects of tree mortality, increased disturbance frequency and severity, and shifting zones of suitable habitat that could dramatically alter Arizona's forested landscapes.

Introduction

Arizona is characterized by a rich climatological record that scientists have been able to extract from tree rings and river and lake sediments. This high-quality temperature and precipitation timeline extends back almost 1,000 years. This long-term record indicates that precipitation and temperature have varied widely through time, and have influenced vegetation, rivers, and the use of this landscape by humans.

It is now widely accepted that the interior western United States has recently experienced higher temperatures than other parts of North America, and Arizona is consistently warmer than many other areas when comparing the last decades' average temperatures to the past 100-year average. While the global average temperature has risen one degree Fahrenheit over the past 150 years, Arizona and other parts of the Southwest have risen more than 2°F.

The impact of this temperature rise has been documented in several areas important to the structure and function of forested ecosystems. With rising temperatures, wildfires have become more frequent, have started earlier in the spring, have lasted longer, and have become more resistant to control. Also, spring snowmelt has started earlier, with streams running earlier than historic records.



*Civil, Water, Wastewater, Drainage and Transportation Engineering
Construction Management • Surveying
California • Arizona*

August 4, 2016

Mr. John Munderloh
Upper Verde River Watershed Protection Coalition
7501 E. Civic Center Drive
Prescott Valley AZ 86314

via email

Subject: Williamson Valley Area Mapping and Flow Estimates –
Sections 15, 16, and 17, Township 17 North, Range 4 West

Dear Mr. Munderloh:

Thank you for recently contacting Civiltec regarding the subject project. We are pleased to provide you with the following scope of services and fee estimate for such services. They are outlined as follows...

Phase 1 – Aerial Mapping and Control Survey

Task 1 – Survey 18 control panels to be used by photogrammetrist for a baseline control network in order to develop topographic mapping described in Task 2 below. Said control panels will be set utilizing NAD83 horizontal datum, state plane coordinate system, Arizona Central zone. Vertical datum will be NAVD88.

Task 2 – Provide aerial topographic (photogrammetric) mapping at a horizontal scale of 1"=100' with 2-foot contour intervals for approximately 320 acres of the total 1,920 acres comprising the 3 sections of land referenced above. The remainder of the area of land (1,600 acres) will be flown and data collected but not mapped at this time. If in the future, you are in need of topographic mapping of any portion of this remainder area, it can be generated without revisiting the site. We will also provide you with color orthophotography of the entire 1,920 acres (3 sections).

Task 3 – We will calculate flowrates for the large east-west wash and the secondary wash that feeds into it to the east utilizing HEC-1 hydrologic modeling software. These flowrates will be based on a 100 year - 24-hour storm event. We will also provide general estimates of flowrates for the smaller tributaries to the main wash which converge toward the center of the project. Results will be provided via a technical memorandum. A comprehensive hydrology study report is not anticipated to be needed at this time.

Task 4 – Project Management and Meeting Attendance. This includes general internal and external project management, and meeting attendance for up to two meetings.

Fees associated with Tasks 1 through 4 outlined above will be \$21,190.00

Rate Schedule
Professional Services - Effective January 1, 2016

Discipline	Hourly Rate
Project Manager	\$155.00
Project Engineer	\$140.00
Staff Engineer	\$130.00
Designer	\$120.00
Construction Observer	\$105.00
Survey Technician	\$105.00
Field Survey Crew	\$125.00
Administration	\$65.00

<u>Other Charges:</u>	<u>Rate</u>
Copies:	\$0.35/S.F.
Outside services and expenses	Cost+15%

If you are in need of additional services above and beyond the scope of services described above, fees will be based on the hourly rates as shown on the above rate schedule. The rates are subject to an increase in cost on January 1, 2017 and each January thereafter. The increase will be commensurate with our annual rate increase and will not exceed 10% per year. The increase will be applied to the unpaid balance of the contract.

Payment for Services Rendered:

Payment is due within 30 days of invoice date.

If this proposal is acceptable to you, please sign below and return one copy to our office. We will bill you each month for the work performed the previous month. We are looking forward to working with you, and will begin immediately upon receipt of the following items:

1. Signed agreement herein

Thank you for the opportunity to be of helpful service,

CIVILTEC ENGINEERING, INC.



Richard Shroads, P.E., P.L.S., Founder

Accepted By _____

Date _____

TERMS AND CONDITIONS

1. **SERVICES TO BE PROVIDED.** Civiltec Engineering, Inc. (hereinafter Civiltec) is an independent consultant and agrees to provide Client, for its sole benefit and exclusive use, consulting services set forth in our proposal. Civiltec reserves the right to terminate services at any time. Payment for services rendered prior to the time of termination of services shall be due pursuant to the payment terms as described.

2. **PAYMENT TERMS.** Client agrees to pay our invoice upon receipt. If payment is not received within 30 days from the invoice date, Client agrees to pay a service charge on the past due amount at the prevailing legal rate (1 ½ percent monthly), including reasonable attorney's fees if collected by an attorney, and Civiltec reserves the right to suspend all work until payment is received. No deduction shall be made from our invoice on amount of liquidated damages or other sums withheld from payments to Contractor or others. These payment terms may be amended in the Proposal.

Either party may terminate this Agreement without cause upon 30 days written notice. In the event Client requests termination prior to completion of the proposed services, Client agrees to pay Civiltec for all costs incurred plus reasonable charges associated with the termination of the work. In this event, Client also agrees to release Civiltec from all liability for services rendered.

In the event all or any portion of the services or work product prepared or partially prepared by Civiltec be suspended, abandoned, or terminated, Client shall pay Civiltec for all fees, charges, and services provided for the project, not to exceed any contract limit specified herein. Client acknowledges if the project services are suspended and restarted, there will be additional charges due to suspension of the services, which shall be paid for by Client as extra services.

3. **STANDARD OF CARE.** Civiltec will perform its services using that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE OR INTENDED BY OUR PROPOSAL OR BY OUR ORAL OR WRITTEN REPORTS.

4. **INSURANCE.** Civiltec maintains insurance coverage as follows:

- a) Worker's Compensation - Statutory; Employers' Liability \$1,000,000 each accident/disease/policy limit;
- b) Professional Liability - \$1,000,000 per claim, \$2,000,000 aggregate;
- c) Commercial General Liability - \$1,000,000 per occurrence, \$2,000,000 aggregate;
- d) Umbrella Liability - \$5,000,000 per occurrence, \$5,000,000 aggregate;
- e) Automobile Liability Insurance - \$1,000,000 each accident.

5. **PROFESSIONAL LIABILITY.** Client agrees that Civiltec's liability to Client or any third party due to any negligent professional acts, errors or omissions or negligent breach of contract will be limited to an aggregate of \$50,000 or our total fee, whichever is greater. If Client prefers to have higher limits of professional liability, we agree to increase the limit up to a maximum of \$1,000,000 upon Client's written request at the time of accepting our proposal, provided Client agrees to pay an additional consideration of ten percent of our total fee, or \$500, whichever is greater. The additional charge for the higher liability limit is because of the greater risk assumed by us and is not a charge for additional professional liability insurance.

6. **SITE OPERATIONS AND SOIL CONDITIONS.** Client will arrange for right-of-entry to the property for the purpose of performing studies, tests and evaluations pursuant to the agreed services. Client represents that it possesses necessary permits and licenses required for its activities at the site.

Civiltec makes no representations concerning soil conditions and is not responsible for any liability that may arise out of the making or failure to make soil surveys, or sub-surface soil tests, or general soil testing.

If a Contractor (not a subcontractor of Civiltec) is involved in the project, Client agrees, in accordance with generally accepted construction practices, that the contractor will be solely and completely responsible for the working conditions on the job site, including the safety of all persons and property during performance of the work, and compliance with OSHA regulations. These requirements will apply continuously and will not be limited to normal working hours. It is agreed that Civiltec will not be responsible for job or site safety on the project, other than for our employees and subcontractors.

Client acknowledges that Civiltec is not responsible for the performance of work by third parties including, but not limited to, the construction contractor and its subcontractors. Client further agrees to defend, indemnify and hold Civiltec harmless from any and all liability, real or alleged, in connection therewith, excepting liability arising from the negligence of Civiltec.

7. **UNFORSEEN CONDITIONS OR OCCURRENCES.** It is possible that unforeseen conditions or occurrences may be encountered, which could substantially alter the necessary services or the risks involved in completing our services. If this occurs, we will promptly notify and consult with Client, but will act based on our sole judgment where risk to our personnel is involved. Possible actions could include:

- a) Complete the original Scope of Services in accordance with the procedures originally intended in our Proposal, if practical in our judgment;
- b) Agree with Client to modify the Scope of services and the estimate of charges to include study of the unforeseen conditions or occurrences, with such revision agreed to in writing;

- c) Terminate the services effective on the date specified by us in writing.
8. **CLIENT DISCLOSURE.** Client agrees to advise Civiltec upon execution of this Agreement of any hazardous substance or any condition, known or that reasonably should be known by Client, existing in, on, or near the site that present a potential danger to human health, the environment, or equipment. By virtue of entering into this Agreement or providing services hereunder, we do not assume control of or responsibility for the site or the person in charge of the site, or undertake responsibility for reporting to any federal, state or local public agencies any conditions at the site that may present a potential danger to public health, safety or the environment.
9. **INDEMNITY.** To the fullest extent permitted by law, the Client shall indemnify and hold harmless Civiltec, Civiltec's officers, employees, directors, shareholders, subconsultants, and subcontractors from and against all claims, damages, losses, expenses, and other costs, including costs of defense and attorney's fees resulting from the active, passive, or comparative neglect of the Client. In connection with toxic or hazardous substances or constituents and to the maximum extent permitted by law, Client agrees to defend, hold harmless and indemnify Civiltec from and against any and all claims and liabilities unless caused by our negligence or willful misconduct, resulting from:
- a) Client's violation of any federal, state or local statute, regulation or ordinance relating to the management or disposal of toxic or hazardous substances or constituents;
 - b) Client's undertaking of or arrangement for the handling, removal, treatment, storage, transportation or disposal of toxic or hazardous substances or constituents found or identified at the site;
 - c) Toxic or hazardous substances or constituents introduced at the site by Client or third persons before or after the completion of services herein; and
 - d) Allegations that Civiltec is a handler, generator, operator, treated, storer, transporter, or disposer under the Resource Conservation and Recovery Act of 1976 as amended or any other similar federal, state or local regulation or law due to the services provided under this Agreement.
10. **DOCUMENTS.** Civiltec will furnish to Client the agreed upon number of reports and supporting documents. These instruments of services are furnished for Client's exclusive internal use and reliance in connection with the project or services provided for in this Agreement, not for advertising or other type of distribution or general publication, and are subject to the following:
- a) For any other purposes, all documents generated by Civiltec under this Agreement shall remain the sole property of Civiltec. Upon request and payment of the costs involved, Client is entitled to copies of all papers, documents and drawings provided Client's account is paid current. Client agrees to obtain our written permission for any exception for use not described here. Any unauthorized use or distribution shall be at Client's and recipients' sole risk and without liability of Civiltec;
 - b) Client shall furnish documents or information reasonably within Client's control and deemed necessary by us for proper performance of our services. Civiltec may rely upon Client-provided documents in performing the services required under this Agreement; however, Civiltec assumes no responsibility or liability for their accuracy. Client-provided documents will remain the property of Client.
11. **CLAIMS.** The parties agree to attempt to resolve any dispute without resort to litigation. However, in the event a claim is made that results in litigation, and the claimant does not prevail at trial, then the claimant shall pay all costs incurred in defending the claim, including all reasonable attorney's fees of both parties. The claim will be considered proven if the judgment obtained and retained through any applicable appeal is at least ten percent greater than the sum offered to resolve the matter prior to the commencement of trial.
12. **OPINIONS OF COST.** If requested, Civiltec will use its best efforts and experience on similar projects to provide realistic opinions or estimates of costs for installation of materials, remediation or construction as appropriate based on reasonably available data, our designs or our recommendations. However, such opinions are intended primarily to provide information on the order of magnitude or scale of such costs and are not intended for use in firm budgeting or negotiation unless specifically agreed otherwise in advance, in writing with Civiltec. Client understands actual costs of such work depend heavily on regional economics, local construction practices, material availability, site conditions, weather conditions, Contractor skills, and many other factors beyond our control.
13. **CONFIDENTIALITY.** Civiltec will maintain as confidential any documents or information provided by Client indicated to be confidential and will not release, distribute, or publish to any third party without prior permission from Client, except as compelled by order of a court or regulatory body of competent jurisdiction and then only after notice to Client.
14. **SEVERABILITY.** In the event that any provision of this Agreement is found to be unenforceable, the other provisions shall remain in full force and effect.
15. **SURVIVAL.** All obligations arising prior to the termination of this Agreement and all provisions of this Agreement allocating responsibility or liability between Client and Civiltec shall survive the completion of the services and their termination of this Agreement.
16. **INTEGRATION.** This Agreement, the attached Proposal and documents and those incorporated herein constitute the entire Agreement between the parties and cannot be changed except by a written instrument signed by both parties.
17. **GOVERNING LAW.** This Agreement shall be governed in all respects by the laws of the State of Arizona.
18. **FEES.** Client shall pay the costs of outside checking and inspection fees, zoning and annexation application fees, assessment fees, soils engineering fees, soil testing fees, aerial topography fees, and all other fees, permits, bond premiums, title company charges, blueprint and reproductions.

**Juniper & Rock Silt Dams
Headcut #2
Kenson-York Ranch**

Engineer's Construction Cost Estimate

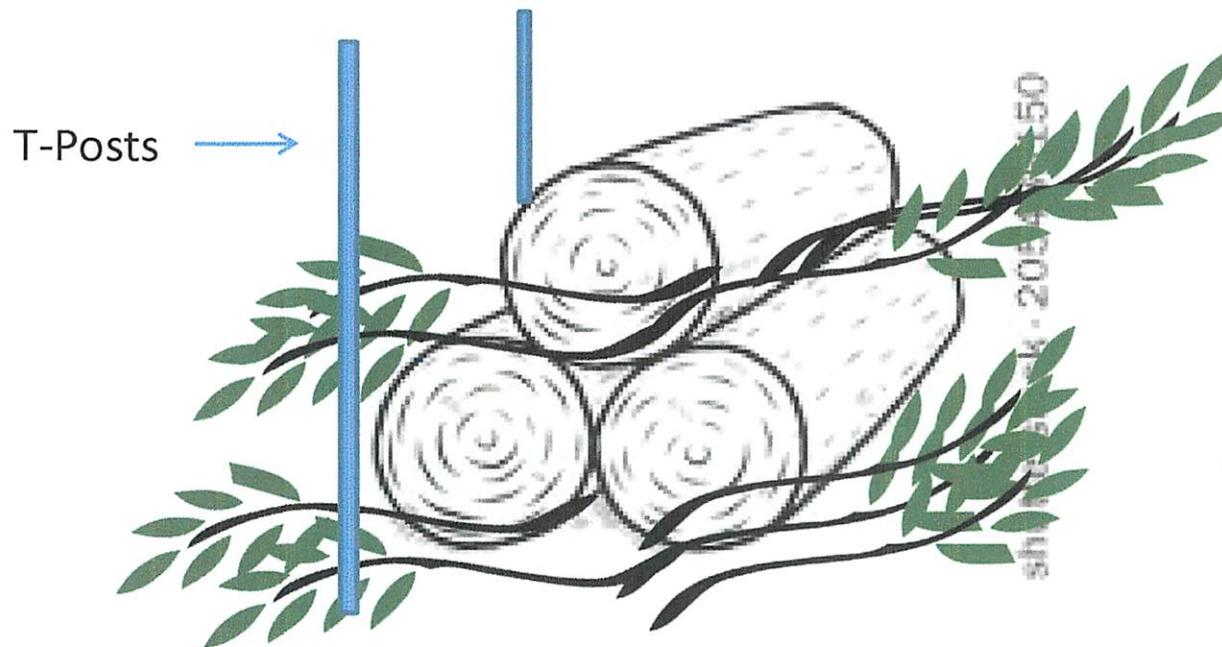
Project Costs					
	Description	Unit	Quantity	Unit Cost	Total Cost
1	Grade Control Structure				
2	Backhoe Travel time	hours	2	\$150.00	\$300.00
3	Excavation of keyways with backhoe	cu. Yds	7	\$15.75	\$109.20
4	6-9" Rock, Delivered	cu. Yds	19	\$40.00	\$775.93
5	Placement of rock with backhoe	hours	4	\$150.00	\$600.00
6	3" PVC Drainage Pipe	ft	30	\$0.62	\$18.60
7	Juniper Stems, 1.5" dia or less, cut from green trees	hours	2	\$15.50	\$31.00
8	Construction according to specs, 10-man crew	hours	8	\$155.00	\$1,240.00
9	Subtotal, Grade Control Structure	Ea	1	\$3,074.73	\$3,074.73
10	Woven Brush Fence				
11	Cut and process 1 large juniper (~16" base) into logs and branches	hours	2	\$15.50	\$31.00
12	Install T-posts to approx. 2 ft. above grade min. or point of refusal	hours	1	\$15.50	\$15.50
13	T-posts	Ea.	6	\$3.50	\$21.00
14	Assemble woven brush fence according to spec.	hours	6	\$15.50	\$93.00
15	Subtotal, Woven Brush Fences	Ea	7	\$160.50	\$1,123.50
16	Juniper Geotextile				
17	Cut and process 2-4 small junipers (~6" base)	hours	2	\$15.50	\$31.00
18	Place branches interwoven around entrance to headcut	hours	2	\$15.50	\$31.00
19	Place 12" rocks on juniper branches about 12" apart	hours	2	\$15.50	\$31.00
20	12" Rocks, delivered	cu. Yds	1	\$30.00	\$30.00
21	Subtotal, Juniper Geotextile	Ea.	6	\$123.00	\$738.00
22	Total, Materials and Construction at headcut #2				\$4,936.23
23	Contingencies	%	10%	\$4,936.23	\$493.62
24	Subtotal, Materials, Construction and Contingencies at headcut #2				\$5,429.86

**Juniper & Rock Silt Dams
Headcut #2
Kenson-York Ranch**

Engineer's Construction Cost Estimate

Project Costs		Units	Quantity	Unit Cost	Total Cost
1	Small Grade Control Structures				
	Excavation of keyways with backhoe	cu Yds	7	\$15.75	\$109.20
	6-8" Rock, Delivered	cu Yds	19	\$40.00	\$775.93
	Placement of rock with backhoe	hours	4	\$150.00	\$600.00
	3" PVC Drainage Pipe	ft	30	\$0.62	\$18.60
	Juniper Stems, 1.5" dia or less, cut from green trees	hours	4	\$15.50	\$62.00
	Construction according to specs, 10-man crew	hours	8	\$155.00	\$1,240.00
	Subtotal, Small Grade Control Structures	Ea	10	\$7,025.73	\$20,057.33
	Large Grade Control Structures				
	Excavation of keyways with backhoe	cu Yds	14	\$15.75	\$220.50
	12-15" Rock, Delivered	cu Yds	40	\$40.00	\$1,600.00
	Placement of rock with backhoe	hours	8	\$150.00	\$1,200.00
	3" PVC Drainage Pipe	ft	30	\$0.62	\$18.60
	Juniper Stems, 1.5" dia or less, cut from green trees	hours	8	\$15.50	\$124.00
	Construction according to specs, 10-man crew	hours	16	\$155.00	\$2,480.00
	Subtotal, Large Grade Control Structures	Ea	4	\$5,043.10	\$27,572.40
	Woven Brush Fence - 1 large Juniper per each (approx 18" base)				
	Cut and process 1 large Juniper (~18" base) into logs and branches	hours	2	\$15.50	\$31.00
	Install T-posts to approx. 2 ft. above existing grade or point of refusal	hours	1	\$15.50	\$15.50
	T-posts	Ea	6	\$3.50	\$21.00
	Assemble woven brush fence according to spec.	hours	12	\$15.50	\$186.00
	Subtotal, Woven Brush Fences	Ea	40	\$253.50	\$10,140.00
	Juniper Geotextile Near Headcut				
	Cut and process 2-4 small Junipers (~8" base)	hours	2	\$15.50	\$31.00
	Place branches interwoven around entrance to headcut	hours	2	\$15.50	\$31.00
	Place 12" rocks on juniper branches about 12" apart	hours	2	\$15.50	\$31.00
	12" Rocks, delivered	cu Yds	1	\$30.00	\$30.00
	Subtotal, Juniper Geotextile	Ea	60	\$123.00	\$7,380.00
	Upland Juniper Geotextile Spreader Structure				
	Cut and process 2-4 small Junipers (~8" base)	hours	2	\$15.50	\$31.00
	Place branches interwoven at specified upland area	hours	2	\$15.50	\$31.00
	Place 12" rocks on juniper branches about 12" apart	hours	2	\$15.50	\$31.00
	12" Rocks, delivered	cu Yds	1	\$30.00	\$30.00
	Subtotal, Upland Juniper Geotextile	Ea	60	\$123.00	\$7,380.00
	Total, Materials and Construction				\$75,529.73
	Contingencies	%	10%	\$75,529.73	\$7,552.97
	Forwarder to transport juniper from cut site to erosion site	hours	60	\$200.00	\$12,000.00
	Backhoe Travel time	hours	4	\$150.00	\$600.00
	Subtotal, Materials, Construction and Contingencies				\$99,692.71

Woven Juniper Log and Brush Silt Fence Concept



Juniper Branches

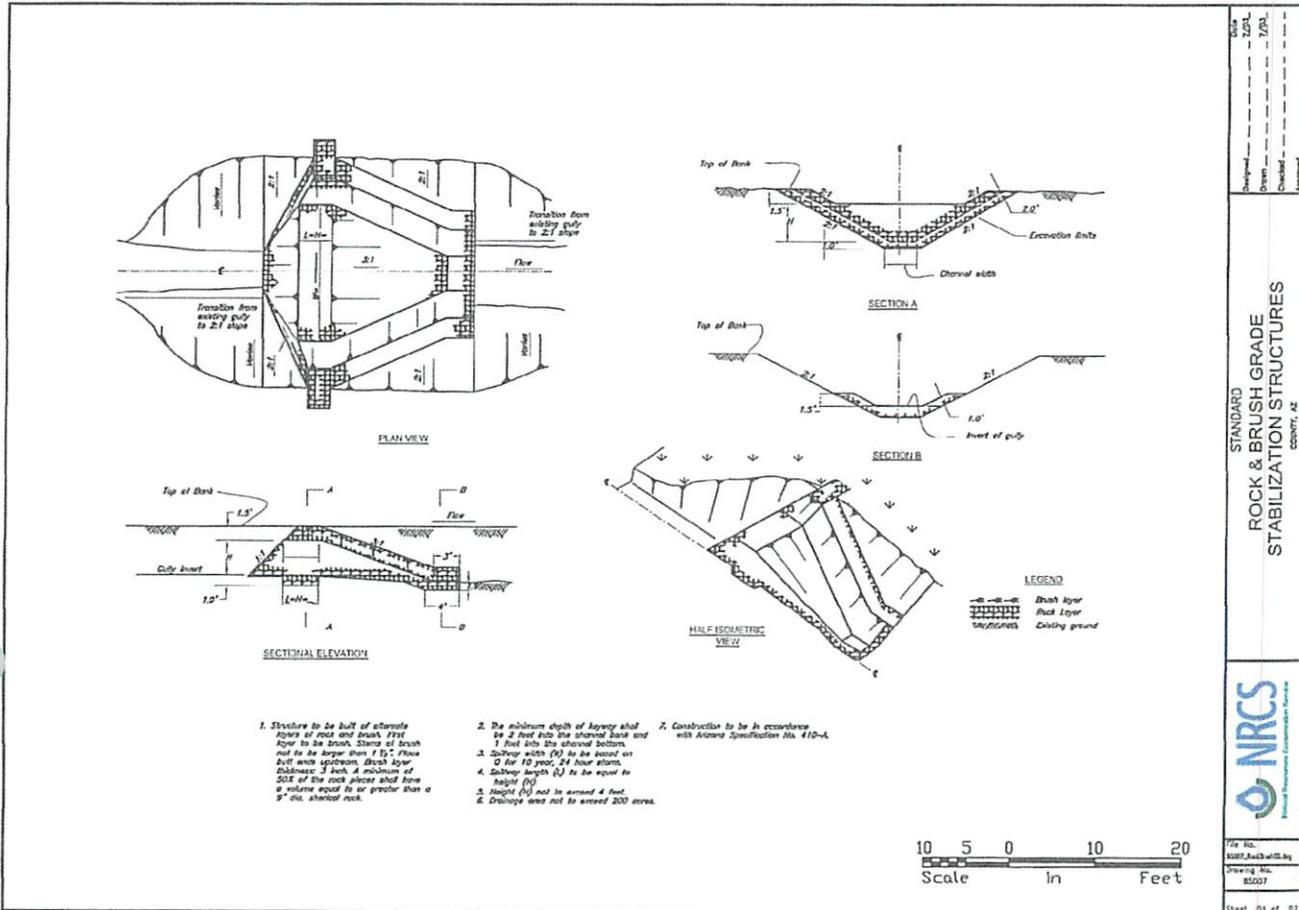
- Place parallel to flow direction
- Place main stem under logs
- Leafy end alternating upstream and downstream

Juniper Logs

- 3-log structure
- Place perpendicular to direction of flow
- Minimum 6" diameter
- Wire to T posts to prevent floating during storm flow
- Interlace logs so joints don't overlap



Figure TS14P-26 Detail for rock and brush grade stabilization



STANDARD
**ROCK & BRUSH GRADE
 STABILIZATION STRUCTURES**
 COUNTY NO.

File No.
 Staff Assigned
 Drawing No.
 85037
 Sheet 01 of 01



October 11, 2016

Arizona Water Protection Fund Commission
3550 North Central Avenue, Suite 200
Phoenix, Arizona 85012

RE: Evidence of Physical and Legal Availability of Water:

Dear Commission Members:

The proposed project will not consume or impound surface water or use any other source of water. The project will involve construction of "silt dams" as grade control structures within ephemeral channels but these structures are engineered to not retain or impound water. The grade control structures within the channels will be loosely woven rock and brush structures that are designed to capture silt but allow the passage of water. To ensure that water is not impounded behind the structures, an additional 3" flexible pipe will be installed at grade level to pass any water that may be impounded.

Sincerely,

John Munderloh
Water Resources Manager, Town of Prescott Valley
Chair, Upper Verde River Watershed Protection Coalition Technical Advisory
Committee