Arizona Water Protection Fund
FY 2014 Grant Application Review

Application # WPF0416 **Applicant:** Sky Island Alliance

Title of Project: Capacity-Building for Arizona Springs Restoration & Monitoring

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

_____**Maps**
_____**Photographs**
___✓___**Disk**
_____**Other**

WPF0416

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Water Protection Fund

Arizona Water Protection Fund
Application Cover Page
FY 2014

Title of Project:

Type of Project:
- [x] Capital or Other
- [ ] Water Conservation
- [ ] Research

Stream Type:
- [x] Perennial
- [ ] Intermittent
- [ ] Ephemeral

Your level of commitment to maintenance of project benefits and capital improvements:
[ ] < 5 years [x] 5-10 years [ ] 11-15 years [ ] 16-20 years

Applicant Information:

Name/Organization:	Sky Island Alliance
Address 1:	300 East University Boulevard
Address 2:	Suite 270
City:	Tucson
State:	AZ
ZIP Code:	85705
Phone:	(520) 624-7080
Fax:	(520) 791-7709
Tax ID No.:	[redacted]

Inside an AMA: Yes [ ] No [x]

If yes, which AMA:
- [ ] Phoenix
- [ ] Tucson
- [ ] Prescott
- [ ] Pinal
- [ ] Santa Cruz

Type of Application:
- [x] New
- [ ] Continuation

Contact Person:

Name:	Acasia Berry
Title:	Associate Director
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Any Previous AWPF Grants:
[ ] Yes [x] No

If yes, please provide Grant #(s):

Arizona Water Protection Fund Grant Amount Requested:

$0.00 $165,236.00

If the application is funded, will the Grantee intend to request an advance:
[ ] **Yes** [x] **No**

Matching Funds Obtained and Secured:

Applicant/Agency/Organization:	Amount ($):
1. Applicant	8,700.00
2. Desert LCC and WCS	26,552.00
3. Nina Mason Pulliam Charitable Trust	33,000.00
Total:	68,254.00

Has your legal counsel or contracting authority reviewed and accepted the Grant Award Contract General Provisions?
[x] Yes [ ] No [ ] 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.

Acasia Berry	Interim Executive Director 520-624-7080
Typed Name of Applicant or Applicant's Authorized Representative	**Title and Telephone Number**
Acasia Berry	8/27/13
Signature	**Date Signed**

SKY ISLAND ALLIANCE

Protecting our Mountain Islands and Desert Seas

Capacity-Building for Arizona Springs Restoration& Monitoring

A Proposal for the Arizona Water Protection Fund

Capital Projects

28 August 2013

Executive Summary

Sky Island Alliance (SIA) is pleased to submit this proposal for a Capital Improvement Project to the Arizona Water Protection Fund Commission for Funding in the FY2014 Grant Cycle. Our proposal builds on the work that we have been doing in the Sky Island Region around springs conservation, restoration, and developing tools for managers to address climate change adaptation strategies. The three major components of the project are:

- **Ash Spring Restoration Phase 2:** Ash Spring is a perennial spring located within the Chiricahua Mountains, Coronado National Forest, Douglas District. SIA is currently working to implement the Ash Spring Restoration Project Phase 1 in the spring of 2014. Phase 2 of the project addresses the serious erosion impacts related to the Horseshoe 2 Fire of 2011 that is occurring in a streambed adjacent to the Phase 1 Project, and threatening the sustainability of the project. SIA will work closely with Van Clothier of Stream Dynamics, Inc. to design the Phase 2 restoration plan; low-tech in-stream structures will be installed to aggrade the stream and curtail further damage.

- **Develop an Arizona Springs Restoration Handbook:** SIA will work with the Springs Stewardship Institute and resource managers and experts from across the State of Arizona to develop an Arizona Springs Restoration Handbook to inform project planning and implementation statewide. This handbook will be widely available and will walk practitioners through considerations and a process for planning and implementing springs restoration, including how to effectively consider climate change and fire effects.

- **"Adopt-A-Spring" Monitoring Program:** SIA staff will work with trained volunteers and managers to plan springs assessments across multiple seasons, collecting information to start tracking temporal changes - a long-standing need articulated by spring stewards in the region. Monitoring will capture key data to inform management decisions and planning, (e.g. Forest Plan and Allotment Plan implementation, BLM Resource Management Plan revision) – flow data through seasonal change, recording of plants/animals present and major changes in habitat type.

The overarching goal of this proposed project is to continue to deepen our inquiry into one-the-ground implementation and adaptation strategies to lessen climate change impacts to valuable spring ecosystems – and to amplify our findings from southeastern Arizona into products that will have wide applicability for land managers across the state of Arizona.

2.0 Project Overview

2.1 Background

Sky Island Alliance (SIA) has been working closely with Dr. Larry Stevens and Jeri Ledbetter at the Springs Stewardship Institute (SSI), an initiative of the Northern Arizona Museum in Flagstaff, over the past three of years to increase our understanding of, and document the condition of springs throughout southeastern Arizona. We have worked together to modify SSI springs assessment protocols to be both implementable with trained volunteers and compatible with the comprehensive Springs Inventory Database, while still maintaining scientific vigor. We conducted 3 springs assessment trainings, resulting in the emergence of over 90 trained volunteers.[1] This diverse set of volunteers includes students at the University of Arizona, private landowners, environmental consultants, and natural resource professionals from a variety of local (Pima County Regional Flood Control District; Pima County Natural Resources, Parks, and Recreation), and federal agencies (Bureau of Land Management, US Forest Service). With this corps of trained citizen scientist volunteers, natural resource professionals, and SIA staff, we have assessed over 60 springs in southern Arizona. The data collected at springs includes key attributes such as flow, ecological condition, species supported and threats to spring sustainability. By collecting and assessing this data at a regional level we are able to identify springs sites that are high priority for protection and/or restoration. Numerous springs emerged as sites with restoration potential, and SIA is currently working to restore 9 springs in southern Arizona.[2] One of the restoration sites, Ash Spring (located in the Chiricahua Mountains) presents an excellent opportunity to provide high-quality habitat for the federally endangered Chiricahua leopard frog (*Lithobates chiricahuensis*) as well as valuable water resources for a diverse suite of bat species. SIA is working closely with the Coronado National Forest, Bat Conservation International (BCI), and wetland restoration expert Tom Biebighauser to complete Phase 1 of this project in the spring of 2014. Work will include the excavation of shallow ponds, invasive species removal, and native plant installation.[3]

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[1] Funding provided by the Desert Landscape Conservation Cooperative and Wildlife Conservation Society.
[2] Funding provided by the Wildlife Conservation Society and USFWS Partners.
[3] Funding provided by the Wildlife Conservation Society.

SIA's interest and involvement in the conservation and restoration of springs emerged from a series of regional Climate Change Adaptation Workshops that we developed and convened for land and resource managers in the region over the past three years.[4] Workshop participants utilized data on regional climate change and its effects on ecology to collaboratively identify climate change threats to their management targets, vulnerabilities, and adaptation strategies to reduce vulnerabilities. Increasing aridity and scarcity of available water repeatedly emerged as the most pressing threat in the region. At the first two workshops (2010 and 2011), participants identified a lack of critical data on the ecological condition, management status, restoration needs and/or potential of the majority of springs in the region as a serious concern for implementing meaningful climate change-adaptive land management. Managers identified the following on-the-ground adaptation strategies: inventorying spring locations, conditions and characteristics, species presence and management status; coordinating data sharing across jurisdictions to understand springs in a regional context; prioritizing springs for restoration and protective management; and coordinating management across jurisdictions to implement protection and restoration of spring ecosystems. At the most recent workshop in May of 2013, managers stated that in addition to developing baseline data on springs, they were highly concerned about how fire and pre-fire treatments may be affecting springs ecosystems, and are interested in working with SIA and trained citizen scientist volunteers to develop climate-sensitive monitoring data on high priority springs. They were also interested in evaluating current management in light of climate science and applying new information to develop management options to protect and restore springs. There is a regional trend of increased size of high-severity wildland fires, and an earlier onset of fire season, both of which will likely lead to negative impacts on springs, particularly rheocrene-type springs that are located in channels and are often the source of perennial water and riparian habitat. Changes in fire behavior and impacts could also lead to an increased importance of springs as functioning sources of perennial water and species refugia following fire events.

SIA has demonstrated that we are a committed leader in climate adaptation science and practice discussions, and we have established strong working relationships with a strong and diverse group of partners (see box at right). Our collaborative working model has successfully advanced regional discussions on climate change responses to affecting changes in policies and active implementation of climate change adaptation strategies. Our work at the nexus of springs conservation and climate change has been gaining momentum

SIA Partners in Springs Conservation

Federal Agencies

US Fish and Wildlife Service

US Geological Survey

USDA Forest Service

Bureau of Land Management

National Park Service

State Entities

AZ Game & Fish Department

UA Water Resources Research Center

Local Entities

Pima County

Pima Association of Governments

Conservation Organizations

Springs Stewardship Institute

Bat Conservation International

The Nature Conservancy

The Sonoran Institute

Malpais Borderlands Group

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[4] Funding provided by the Nina Mason Pulliam Charitable Trust and the Kresge Foundation.

and is increasingly urgent to protect scarce natural water sources. Interest in the project from natural resource management partners, conservation partners, and private landowners is growing rapidly and there continues to be a high level of demand for springs data where no such information exists. We have had very positive response to the previous project work, and support for its continuation by several already-committed sources of matching funding from a variety of sources.

This proposal to the Arizona Water Protection Fund will allow SIA to take "the next step" – amplifying resources to restoration practitioners for statewide conservation and restoration of vulnerable springs ecosystems.

2.2 Goals

The overarching goal of this proposed project is to continue to implement and assess efficacy of on-the-ground adaptation strategies to lessen climate change impacts to valuable spring ecosystems – and to utilize our findings from southeastern Arizona to create products that will have wide applicability for land managers across the state. We have identified the following specific goals:

1. Develop and test strategies to reduce the vulnerability of springs to climate change and non-climate stressors.
2. Increase state-wide understanding of restoration approaches and techniques for springs that build resilience to climate change impacts, including increased extent of high-intensity fire and drought.
3. Build and enhance technical capacity to collect and understand critical baseline information on unstudied springs and to monitor them long-term.
4. Help managers adapt management of springs to climate change and promote climate change adaptation practices at the landscape scale.
5. Improve future management and enhance stewardship of springs.

2.3 Objectives

We have developed three main objectives to meet our above-stated goals: 1) planning and implementation of Phase 2 of restoration at Ash Spring in the Chiricahua Mountains, 2) creation of a springs restoration handbook for Arizona practitioners, and 3) continued development of an Adopt-A-Spring Monitoring Program. These objectives translate directly to the tasks described in the scope of work in Section 5.0 of this proposal. We will implement Phase 2 of the Ash Spring Restoration Project, which will be designed to address serious fire-related erosion issues that threaten to undermine the sustainability of the restoration actions that are being implemented in Phase 1 during Spring of 2014. We will provide guidance to inform springs restoration through collaborative development and publication of an Arizona Springs Restoration Handbook that explicitly addresses climate change impacts, including a case study of Ash Spring Phases 1 and 2 as well as many other restoration projects. Finally, we will develop methodologies and implementation strategies for climate-savvy monitoring by trained citizen scientists at a select set of high-priority springs ecosystems identified in collaboration with managers.

2.3.1 Ash Spring Restoration Phase 2

Ash Spring is a perennial water source located within the Chiricahua Mountains (CNF, Douglas District). SIA is working with the Coronado National Forest, Bat Conservation International, and restoration expert Tom Biebighauser to implement the Ash Spring Restoration Project Phase 1 in the spring of 2014.Phase 2 of the project addresses the serious erosion impacts related to the Horseshoe 2 Fire of 2011 that is occurring in a streambed adjacent to the Phase 1 Project, and threatening the sustainability of the project. SIA will work closely with Van Clothier of Stream Dynamics, Inc. to design the Phase 2 restoration plan; low-tech in-stream structures will be installed to aggrade the stream and curtail further damage. Restoration at Ash Spring will be an excellent opportunity to engage SIA volunteers, and both phases of the Ash Spring Restoration Project will serve as case studies in the Arizona Springs Restoration Handbook.

2.3.2 Develop an Arizona Springs Restoration Handbook

We will work with the Springs Stewardship Institute and resource managers and experts from across the State of Arizona to conduct a series of workshops to develop an Arizona Springs Restoration Handbook to inform project planning and implementation statewide. This handbook will be widely available and will walk practitioners through considerations and a process for planning and implementing springs restoration, including how to effectively consider climate change and fire effects.

Across Arizona, springs have been largely ignored by management policy and are heavily impacted by human use. Common human-caused threats to spring ecosystems include: local flow diversion, construction of facilities over springs, interruption of disturbance regimes, grazing impacts, exotic plant and animal invasions and groundwater extraction and/or contamination (Sada and Pohlmann 2006). However, springs have significant potential to recover and support landscape resilience when key stressors are removed. Springs can be sustainably used for water services while providing natural ecological function if properly restored. The art and science of spring ecosystem restoration is a young practice and only a few spring restoration projects have been published and reviewed for success (Stacey et al. 2011), but there is a growing interest in, and collaboration around, the restoration of springs in Arizona. A handbook will advance the science of restoring spring ecosystems and provide a consistent approach for managers and conservation organizations. Workshops will focus on defining desired conditions and goals, inventorying, assessing and planning, restoration options, management strategies, legal and regulatory issues, implementing, monitoring, and evaluating success.

2.3.3 "Adopt-A-Spring" Monitoring Program

An Adopt-a-Spring program will be developed and implemented to galvanize trained volunteer participation and will be modeled after SIA's volunteer wildlife tracking program that has been successfully monitoring wildlife corridors for over 10 years.[5] SIA has already developed a core group of volunteers that are trained in the springs assessment protocols – the Adopt-a-Spring program will be a natural extension of those relationships and investments. SIA staff will work with trained volunteers and managers to plan assessments across multiple seasons, collecting information to start tracking temporal

[5] Matching funding provided by the Desert Landscape Conservation Cooperative.

changes - a long-standing need articulated by spring stewards in the region. Monitoring will capture key data to inform management decisions and planning, (e.g. Forest Plan and Allotment Plan implementation, BLM Resource Management Plan revision) – flow data through seasonal change, recording of plants/animals present and major changes in habitat type. Five initial priority springs sites will be selected based on previous springs assessment findings, location of restoration projects, our understanding of managers' priorities, and representativeness within springs cluster (similar elevation, habitat and proximity). By setting up monitoring on at least one spring site before it has restoration work initiated, and continuing monitoring post-restoration we will be establishing a baseline to assess how the applied adaptation strategy of restoring springs is functioning. We will install data logging rain gauges near monitoring sites to capture fine scale data on precipitation, temperature, and relative humidity which will be correlated with seasonal conditions at springs including flow rates. The protocols and volunteer commitment established through this project will be used to monitor springs beyond this project's time horizon, providing data on climatic influences on flow rates and species compositions. Longer-term assessments will provide richer species data and further document ecosystem stressors.

2.4 Statement of Problems

It is well documented that springs in arid ecosystems occupy a small fraction of the landscape yet support disproportionately high levels of productivity, endemism and biodiversity. Springs function as keystone ecosystems, having enormous effects on surrounding landscapes, biota, and economies (Stevens and Meretsky 2008), and play a crucial role in providing climate refugia for migratory birds, reptiles, amphibians and fish (Sada et al. 2001). Archaeologists have shown springs were the focus of many Native American activities, hydrologists understand them as windows into ground water systems, ecologists see them as biodiversity hotspots, ranchers often rely on them as their only water sources, and conservationists recognize that they are important riparian and aquatic systems critical to the survival of many obligatory spring-dwelling animals and plants and to animals that rely on these water sources at a landscape scale. To Native Americans, springs have been important spiritual and cultural sites for millennia. Springs are places of spiritual power and have figured prominently in many Southwest cultures' creation myths. Today, springs remain important locations for Tohono O'odham religious ceremonies, and are no less important to other southwest peoples who have been stewarding springs since well before European colonization (Rea 2008).

Lower Rustler Park Spring in the Chiricahuas – what are the impacts of severe fire on aquatic resources such as this? Without baseline information and monitoring, it may be difficult to know.

Despite the rarity and profound ecological importance of arid land springs, these sites are little-studied, neglected as important cultural, scientific and economic resources, and have a history of overuse and mismanagement. Common human-caused threats to spring ecosystems include: water diversion,

infestation of invasive plant and animal species, overgrazing, pollution, and groundwater extraction and or contamination (Sada et al. 2006). All of these threats are compounded in the face of climate change and long-term drought conditions. Despite these threats, springs also represent likely areas of climate refugia—desert aquifers can hold great volumes of water that feed spring discharges over long periods of time; if these aquifers remain intact, spring fed ecosystems may buffer the effects of climate change induced drought. Human-impacted spring systems are known to recover once the primary disturbance is removed or modified. Springs in good health are constant environments, minimally affected by temperature variation and drought, making them valuable climate refugia as aridity increases (Sada et al. 2006).

At Ash Spring in the Chiricahua Mountains, a project is underway to enhance ecological function through the excavation of shallow ponds for wildlife benefit. This work is threatened by an adjacent incised creek, in which erosional gullying has intensified after the Horseshoe 2 Fire in 2011. If left untreated, this erosion is poised to undermine the ecological integrity of the restoration project through head cutting and potentially draining the wetted areas. For long-term efficacy and self-sustaining restoration outcomes, it is necessary to address the ecological functioning of the landscape surrounding the immediate spring habitat. This site provides an important case-study for post-fire restoration efforts to support hydrologic functioning and ecosystem health. The art and science of spring restoration is a young practice and only a few spring restoration projects have been published and/or reviewed for success (Stacey et al. 2011). Springs also vary widely in their condition and characteristics across the landscape and each will have different historic and baseline condition and characteristics, and potential future trajectories.

2.5 Statement of Solutions

The SIA team of ecologists, restoration experts, and volunteers are assessing this spring-fed meadow at West Hospital Flat in the Pinaleño Mountains.

This project will address three key resource challenges that hinder effective springs conservation: 1) a need to complete restoration work with increasingly limited resources; 2) a lack of springs restoration guidelines, techniques, and strategies that increase site resilience in the face of climate change; and 3) a lack of critical baseline information and monitoring protocols to track spring conditions post-restoration and in response to climate-related impacts.

Arizona has the highest abundance and density of springs in the western U.S. (Stevens and Meretsky 2008). It is crucial that springs conservation be addressed at the landscape level, which requires understanding the contribution of individual springs to regional ecology and ensuring stewardship across jurisdictional boundaries. The first step toward improving management of these waters is documenting their current status, including

current management, human or natural alterations, flora and fauna supported, water production, status of underlying groundwater basin, and contribution to the watershed where they are located. For springs in particular, ecological understanding and effective management requires convening a diversity of disciplines and expertise, a task that has proven difficult without cooperative frameworks and non-federal support (Misztal et al. 2010). The second crucial step is to identify restoration options and implement restoration at key sites to support landscape-level resilience. The Arizona Springs Restoration Handbook will fill a critical need to guide managers in site selection and restoration implementation.

Data and guidance developed through this project will inform management decisions regarding restoration and protection measures that can ensure the resilience of spring resources, and develop relevant information about the relative contribution of springs as a resource for species at the landscape scale. These products have been requested through collaborative efforts with regional land managers and resource experts, ensuring validity and usefulness of this work. Through this proposed project, we will directly support management strategies and address information needs that were identified over the past three years through a series of regional climate change adaptation workshops and springs inventory and assessments conducted by SIA in the Sky Island region.

Project outputs will provide critical examples of progression from adaptation planning to implementation and assessment of efficacy. We will analyze and publicize effectiveness of our restoration treatments in southwestern ecosystems, spring restoration and assessment methodologies and results of post-restoration assessments to provide sorely needed guidance on these efforts in arid systems.

2.6 Statement of Project Years of Benefit

The activities described in this proposal will likely have many years of ecological benefits at Ash Spring; but more importantly, the inclusion of a statewide springs restoration manual and a pilot monitoring program will extend the benefits to managers across the state, with substantial potential for the extension of benefits through time. The work proposed for this project will serve as an important case study for restoration approaches that extend to the landscape surrounding springs ecosystems and, importantly will serve as a model for climate change adaptation implementation. Lessons learned and conservation outcomes will inform the larger community of practitioners in the region working to protect and restore scare water resources. Our corps of skilled volunteers will also come away with skills in restoration implementation and monitoring that may be applicable for them in other places. In an age of decreasing budgets and resources, it is critical for land and resource management agencies to engage in new and innovative means for accomplishing resource stewardship and monitoring. This project will provide both a model for this type engagement and will build a community of local people with skills and appreciation for spring stewardship. Finally, this proposal will add to the currently, very limited body of knowledge on springs restoration providing managers with more concrete information and guidance. This proposal represents a good investment in regional conservation and restoration of critical natural water resources throughout the state.

3.0 Project Location and Environmental Contaminant Information

Project Location & Environmental Contaminant Information
FY 2014

Project Location Information

1. County: Cochise	2. Section: 14	3. Township: 27 South	4. Range: 30 East

5. Watershed: San Simone
6. 8 or 10 Digit Hydrologic Unit Code (HUC): 15040006
7. Name of USGS Topographic Map where project area is located: Portal Peak
8. State Legislative District: 14
   (Information available at: http://azredistricting.org/districtlocator/
9. Land ownership of project area: USDA Forest Service
10. Current land use of project area: Recreation/Watershed Managment
11. Size of project area (in acres): .82
12. Stream Name: Cima Creek
13. Length of stream through project area: 250ft
14. Miles of stream benefited: .64 miles
15. Acres of riparian habitat: .82 acres will be:
    - ☐ Enhanced
    - ☐ Maintained
    - ☒ Restored
    - ☒ Created

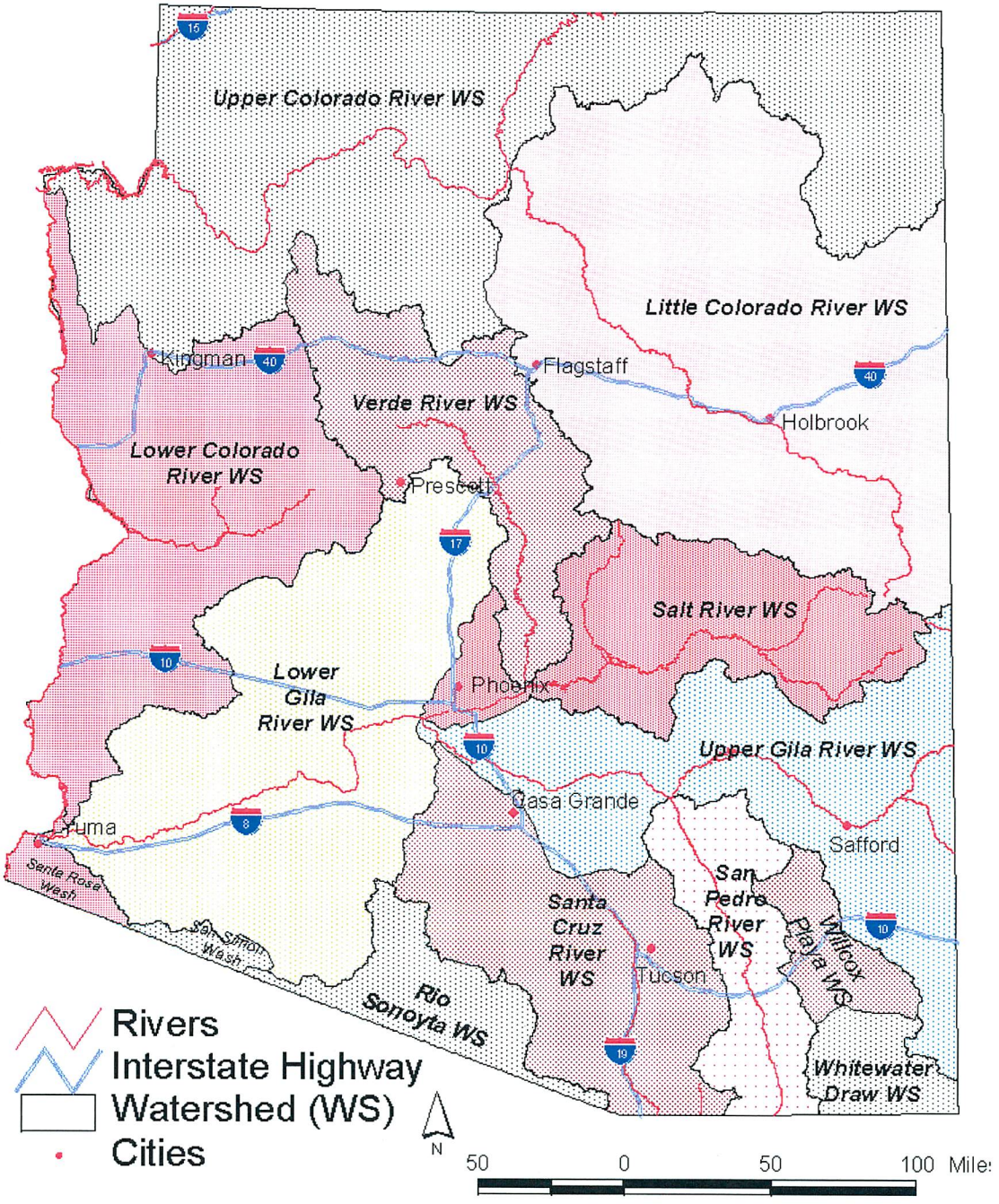
16. Provide directions to the project site from the nearest city or town. List any special access requirements:

The site can be accessed from Portal, Arizona by driving to the end of Forest Road 42A, parking, and following an unmaintained roadbed .8 km west to the spring. There are no special access requirements.

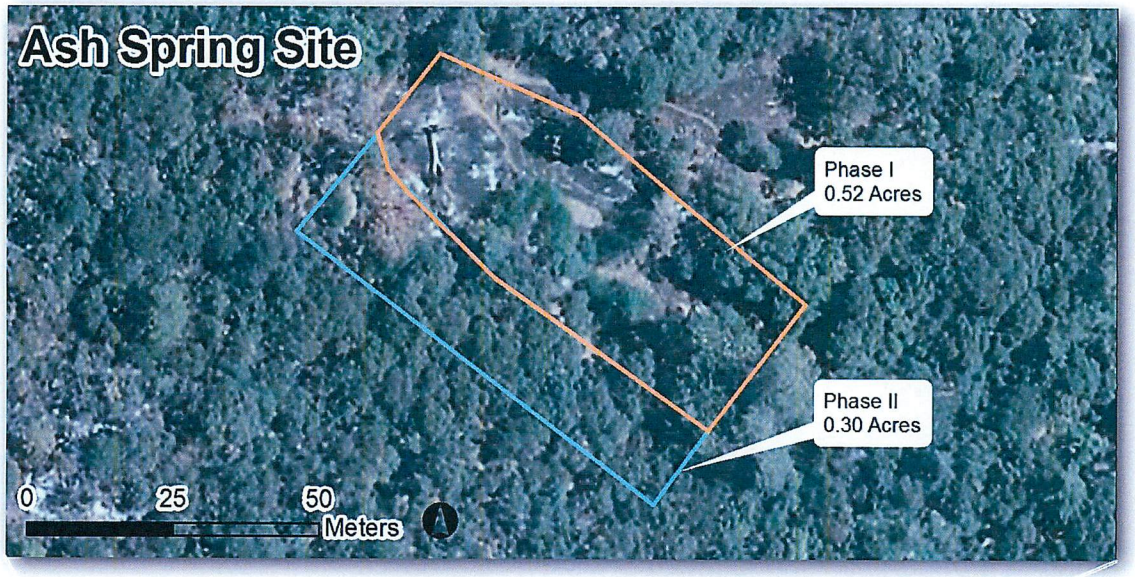
Environmental Contaminant Location Information

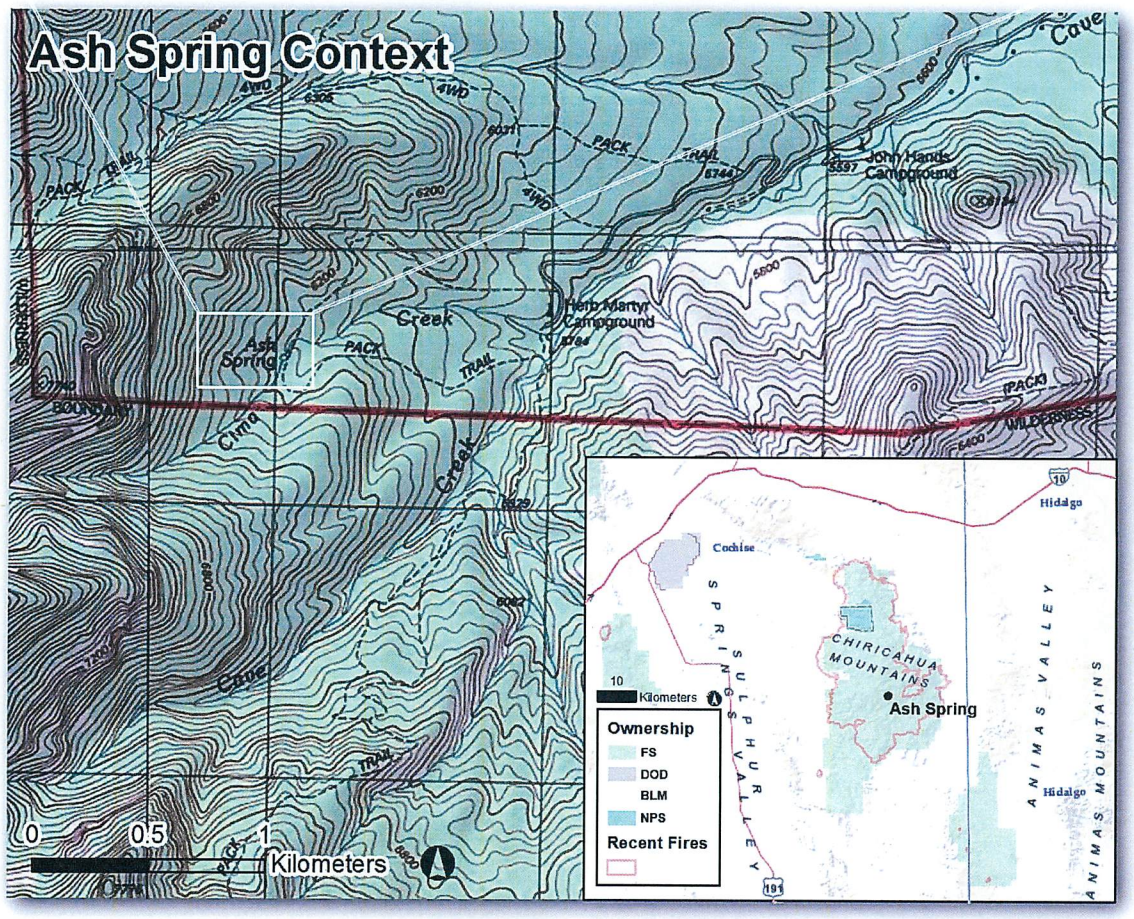
1. Does your project site contain known environmental contaminants? ☐ YES ☒ NO If yes, please identify the contaminant(s) and enclose data about the location and levels of contaminants:
2. Are there known environmental contaminants in the project vicinity? ☐ YES ☒ NO If yes, please identify the contaminant(s) and enclose data about the location and levels of contaminants:
3. Are you asking for Arizona Water Protection Fund monies to identify whether or not environmental contaminants are present? ☐ YES ☒ NO

4.0 Project Maps and Schematics



Project Title: Ash Spring Phase 2 Restoration Located Within the Whitewater Draw Watershed


Ash Spring Site
Phase I
0.52 Acres
Phase II
0.30 Acres
0
25
50
Meters

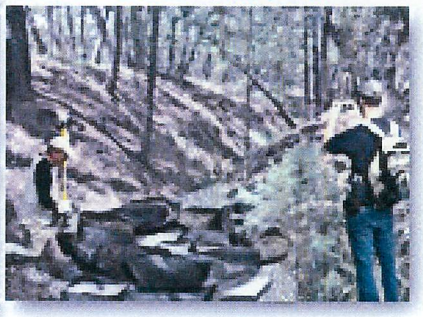

Ash Spring Context
Ash Spring
Herb Martyr Campground
John Hands Campground
Cave
Creek
Cima
PACK
TRAIL
4WD
BOUNDARY
WILDERNESS
0
0.5
1
Kilometers
Cochise
Hidalgo
SULPHUR SPRINGS VALLEY
CHIRICAHUA MOUNTAINS
ANIMAS VALLEY
ANIMAS MOUNTAINS
Ash Spring
10
Kilometers
Ownership
FS
DOD
BLM
NPS
Recent Fires

PROPOSED ASH SPRING RESTORATION DESIGN

Grade Control: One Rock Dam[1]

Wetland Restoration*

Grade Control: Zuni Bowl[1]



* Note: final design may have fewer ponds

1 Note: specific types and locations of grade control structures will be determined by Stream Dynamics, Inc. and USFS hydrologists

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5.0 Scope of Work

This project is comprised of three distinct action areas: 1) planning and implementation of Phase 2 of restoration at Ash Spring in the Chiricahua Mountains, 2) creation of a springs restoration handbook for Arizona practitioners, and 3) continued development of an Adopt-A-Spring Monitoring Program. These actions work in concert with and build upon other SIA projects and initiatives, all with the coordinated goals of increasing accessible ecological data on springs, identifying and acting upon restoration opportunities, and sharing information with managers across the state and in the region.

5.1 Ash Spring Restoration Phase 2

Ash Spring Restoration Phase 1 (excavation of shallow pools for native frogs and bats) will be completed in spring of 2014[6]. Ash Spring Restoration Phase 2, included in this proposal, will include actions to protect the previous work from fire-related erosion, road-related erosion, and livestock trespass. Proposed activities and timelines for the Arizona Water Protection Fund Grant are presented below:

Task 5.1.1: Permits, Authorizations, Clearances, and Agreements

Task Description: SIA will work with the CNF to obtain and submit to the Project Manager all permits, authorizations, clearances, and agreements, and perform any consultations necessary to complete the tasks listed in this Scope of Work. This task will begin with a formal project site visit with USFS hydrology personnel from the Coronado National Forest and Van Clothier of Stream Dynamics, Inc. to assess erosional hazards and to discuss potential restoration strategies and necessary compliance issues. Potential compliance triggers may include, but are not limited to, the following:

- State Historic Preservation Office (SHPO) clearance
- National Environmental Policy Act (NEPA) compliance
- Endangered Species Act (ESA) Section 7 consultation with US Fish and Wildlife Service
- Access agreement(s) between SIA and USFS
- Clean Water Act Section 401 Certification from Arizona Department of Environmental Quality
- Clean Water Act Section 404 Certification from the US Army Corps of Engineers
- Data collection permit(s)
- Water right permits if necessary[7]
- Arizona Pollutant Discharge Elimination System (AZPDES) permit
- Arizona Department of Environmental Quality Pesticide General Permit and filing of Notice of Intent

USFS anticipates that this project will require an Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) of 1972, as amended. SIA will ensure that USFS has all necessary project proposal information to be able to accurately and efficiently assess environmental impacts. Ash Spring Restoration Phase 1 environmental compliance is in process now, and will consist of a Categorical

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[6] Funding match from the Wildlife Conservation Society.

[7] Water right permitting is not anticipated at this time, as no water would be necessary to complete the restoration portion (Phase 2) of this project

Exclusion. SIA has had initial discussions with CNF regarding an upcoming Programmatic Environmental Assessment for small watershed protection projects in the Douglas District, planned for FY 2014, which could include this project.

Task Purpose: To comply with all local, state, and federal permit requirements, environmental laws and regulations, and to obtain legal access to project areas.

Deliverable(s): Copies of all approved permits, authorizations, clearances, and agreements will be submitted to the Project Manager.

Deliverable(s) Date: Submittal will occur prior to any ground disturbing activities (YR 2, 2015).

Reimbursable Cost: $7,370

Task 5.1.2: Ash Spring Phase 2 Restoration Plan

Task Description: SIA and Van Clothier will prepare a restoration plan to guide the project, which will include a detailed description of all proposed actions, maps/graphics, materials lists, and all other information necessary to implement the Ash Spring Phase 2 project. Likely restoration actions include: low-tech in-stream structures appropriate for steep streams that will be designed to prevent additional head-cutting and aggrade the base of the stream with sediment. The plan will also include protective measures such as fencing to prevent livestock trespass and decommissioning of the access road which is exacerbating erosion issues.

Task Purpose: To provide a detailed project description for environmental compliance, and to guide restoration implementation.

Deliverable(s): Draft and Final Plans will be submitted to the Project Manager and Coronado National Forest for comments and approval.

Deliverable(s) Date: Draft plan within 90 days of contract award (YR 1, 2014); Final plan within 180 days of award (YR 1, 2014).

Reimbursable Cost: $9,409

Task 5.1.3: Ash Spring Phase 2 Implementation

Task Description: SIA will coordinate with Van Clothier to schedule project implementation, which will take place over the course of a number of volunteer work weekends. SIA's dedicated corps of volunteers has reached over 450 individuals; of these, nearly 150 have been active so far in the 2013 calendar year, ensuring adequate turn-out to accomplish restoration tasks as described in the restoration plan. Work is likely to include: movement of soil and rocks within the stream channel to construct restoration structures; installation and repair of fencing; and decompaction, erosion control, and seeding of the access road.

Task Purpose: To protect the Ash Spring Phase 1 Project from fire-related erosion impacts.

Deliverable(s): Completion of restoration tasks.

Deliverable(s) Dates: YR 2, 2015 – YR 3, 2016. Implementation timing will be dependent upon completion of all compliance and permitting, as well as seasonal and fire restrictions, but is anticipated to occur in the second and/or third year of the project contract.

Reimbursable Cost: $30,944

Task 5.1.4: Ash Spring Phase 2 Final Restoration Report

Task Description: SIA will draft a report to summarize implementation efforts and monitoring results.
Task Purpose: To share information about the project and its performance through time.
Deliverable(s): Final restoration report.
Deliverable(s) Dates: YR 5, 2018.
Reimbursable Cost: $3,009

5.2 Arizona Springs Restoration Handbook

The Arizona Springs Restoration Handbook is envisioned as a resource that will be useful for public land managers and private landowners across Arizona and the southwest region. SIA will work closely with the SSI to craft this handbook. Larry Stevens and Jeri Ledbetter are widely regarded throughout the region as experts on springs conservation and restoration. Their highly relevant body of work includes: the development of a methodology to inventory and assess the ecological health and functionality of arid land springs; development of a relational Springs Inventory Database[8] which is currently being brought online; and working with the Nevada Springs Restoration Committee to develop a restoration guide for Nevada, Great Basin, and Mojave/Sonoran Desert springs. SIA has worked extensively with SSI to bring their talents to the southeastern Arizona, where we have collaborated to develop assessment protocols that implementable with trained citizen scientist volunteers and compatible with the comprehensive SSI database, while still maintaining scientific rigor.

This task will begin with the "Rehabilitation and Restoration of Arizona Springs Handbook Development Workshop", which is being held at the 12th Biennial Conference of Science and Management on the Colorado Plateau in Flagstaff, Arizona on September 16, 2013[9] and will be followed by at least two more handbook development workshops. Workshop participants (some specifically invited) will include natural resource managers, agency personnel, tribal personnel and environmental professionals from across the region. The Workshop format will include introductory presentations followed by interactive discussions and small group work to elucidate information for the Handbook, including:

- Defining Desired Conditions and Goals,
- Inventorying, Assessing, and Planning,
- Restoration Options,
- Management Strategies,
- Legal and Regulatory Issues,
- Implementation,

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[8]From the SSI website: *A comprehensive evaluation requires a survey of geomorphology, soils, geology, solar radiation, flora, fauna, water quality, flow, georeferencing, and cultural resources, as well as a thorough assessment of the site's condition and risks to the ecosystem. The information we collect in each category is complex, and many of the data are interrelated. For example, water quality is linked to flow, geology, geomorphology, soils, flora, and fauna. We have designed a relational database that provides a framework to compile this information, and to analyze biological, physical, and cultural relationships, many of which are poorly understood.* http://www.springstewardship.org/database.html

[9] Funding match from the Nina Mason Pulliam Charitable Trust..

- Monitoring,
- Incorporating Feedback, and
- Evaluating Success.

Workshop outcomes will include development of best management practices and guidance on springs restoration through the engagement of experts and practitioners in the shared development of a draft handbook.

Proposed activities and timelines for the Arizona Water Protection Fund Grant are presented below.

Task 5.2.1: Development of Species-Specific Guidelines for Restoration Plant Materials

Task Description: SIA will compile information regarding appropriate restoration plant species and present the information in a tabular format that is searchable and usable for the restoration practitioner. Information will include: synonyms; common name(s); elevation and distribution; habitat preferences (including spring type, if applicable); method of propagation; and wildlife benefits. This will include an extensive literature search as well as interviews with species experts.
Task Purpose: This resource is intended to assist Arizona restoration practitioners in assembling appropriate and informed plant palettes for springs restoration projects.
Deliverable(s): This deliverable will be presented as an Appendix to the Arizona Springs Restoration Handbook.
Deliverable(s) Date: YR 3, 2016.
Reimbursable Cost: $6,557

Task 5.2.2: Development of Guidelines for Rare Plant Species

Task Description: SIA will compile information regarding rare plant species that are known or expected to occur at Arizona springs. Species addressed will include federally threatened and endangered species as well as rare plants identified by federal and state land management agencies, and the information will be presented in a tabular format that is searchable and usable for the restoration practitioner. Information will include: synonyms; common name(s); conservation status and threats; elevation and distribution; habitat preferences (including spring type, if applicable); and wildlife benefits. This will include an extensive literature search as well as interviews with species experts.
Task Purpose: This resource is intended to assist Arizona restoration practitioners in proactively addressing rare plant conservation in springs restoration projects.
Deliverable(s): This deliverable will be presented as an Appendix to the Arizona Springs Restoration Handbook.
Deliverable(s) Date: YR 3, 2016.
Reimbursable Cost: $6,557

Task 5.2.3: Publish Draft Springs Restoration Handbook and Distribute Widely

Task Description: The Draft Arizona Springs Restoration Handbook will be made available on the websites of SIA, SSI, the Desert Landscape Conservation Cooperative, the Climate Adaptation Knowledge Exchange and a digital PDF copy will be distributed widely.

Task Purpose: To make information regarding springs restoration processes and techniques proven to be successful available to resource managers to improve springs conservation across the state of Arizona.
Deliverable(s): Draft Arizona Springs Restoration Handbook.
Deliverable(s) Date: YR 4, 2017.
Reimbursable Cost: $2,744

Task 5.2.4: Follow-up Workshop at the 13th Biennial Conference of Science and Management on the Colorado Plateau in Flagstaff, Arizona in 2015

Task Description: The Arizona Springs Restoration Handbook is envisioned as a living document that will be periodically updated with the best available science. SIA will distribute the Handbook to a wide variety of restoration practitioners, including the participants of the 2013 meeting. SIA will convene another workshop at the 13th Biennial Conference of Science and Management on the Colorado Plateau in Flagstaff, Arizona in 2015 (or equivalent) to solicit feedback and make improvements to the document.
Task Purpose: To distribute the Draft Arizona Springs Restoration Handbook to managers invested in its creation and to solicit feedback.
Deliverable(s): Attendance of conference.
Deliverable(s) Date: YR 4, 2017.
Reimbursable Cost: $17,549

5.3 "Adopt-A-Spring" Monitoring Program

An Adopt-a-Spring Monitoring program will be instituted to galvanize trained volunteer participation and will be modeled after SIA's volunteer wildlife tracking program that has been successfully monitoring wildlife corridors throughout the region for over 10 years. SIA staff will work with trained volunteers and managers to plan assessments across multiple seasons, collecting information to start tracking temporal changes relevant to climate changes- a long-standing need articulated by spring stewards in the region. Monitoring will capture key data to inform management decisions and planning, (e.g. Forest Plan and Allotment Plan implementation, BLM Resource Management Plan revision) – flow data through seasonal change, recording of plants/animals present and major changes in habitat type. Five initial springs sites will be selected based on previous springs assessment findings, location of restoration projects, our understanding of managers' priorities, and representativeness within springs cluster (similar elevation, habitat and proximity). By setting up monitoring on at least one spring site before it has restoration work initiated, and continuing monitoring post-restoration we will be establishing a baseline to assess how the applied adaptation strategy of restoring springs is functioning. We will install data logging rain gauges near monitoring sites to capture fine scale data on precipitation, temperature, and relative humidity which will be correlated with seasonal conditions at springs including flow rates. The protocols and volunteer commitment established through this project will be used to monitor springs beyond this project's time horizon, providing data on climatic influences on flow rates and species compositions. Longer-term assessments will provide richer species data and further document ecosystem stressors.

The launch of this program is currently funded by the Desert Landscape Conservation Cooperative through the second quarter of 2015.Proposed activities and timelines for the Arizona Water Protection Fund Grant are presented below.

Task 5.3.1: Continuation of Adopt-A-Spring Program

Task Description: SIA will continue administering the Adopt-A-Spring Program after current funding (through 2015) is exhausted. Activities will include volunteer training and coordination, as well as data entry and analysis. SIA staff will make a presentation at a regional conference about the development of this program, including initial outcomes and lessons learned.
Task Purpose: The purpose of this task is to continue the Adopt-A-Spring program once current funding expires, and to share the project with other managers.
Deliverable(s): Presentation at regional conference.
Deliverable(s) Date: YRs3 - 5, 2016 - 2018.
Reimbursable Cost: $53,318

5.4 Reporting

SIA will submit annual reports as well as a final report to the Arizona Water Protection Fund Program Manager.

Task 5.4.1: Annual Reporting

Task Description: SIA will submit annual reports to include discussion of all activities undertaken in the subject year, outcomes, and work plan for subsequent year.
Task Purpose: The purpose of this task is to report on project progress.
Deliverable(s): Annual report.
Deliverable(s) Date: Annual reports will be submitted by the end of the first quarter of the subsequent year. YRs 1 - 5, 2014 - 2018.
Reimbursable Cost: $15,275

Task 5.4.2: Final Reporting

Task Description: SIA will submit a final report to the Arizona Water Protection Commission. Previous annual reports will be included as attachments.
Task Purpose: The purpose of this task is to report on final project outcomes.
Deliverable(s): Final report will be submitted by the end of the first quarter of 2019.
Deliverable(s) Date: YRs 3 - 5, 2016 - 2018.
Reimbursable Cost: $6,585

6.0 Economic Benefits for Arizona

SIA has crafted this proposal with an eye toward both ecological and economic benefits for the state of Arizona. SIA's office is located in Tucson, Arizona, and all employees are residents of the state of Arizona. In addition, the Springs Stewardship Institute is a project of the Museum of Northern Arizona in Flagstaff, Arizona. SIA will prioritize the use of materials and supplies that generate income for Arizona businesses and communities for all aspects of this project.

7.0 Literature Cited

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2008 Aridland Springs in North America: Ecology and Conservation. University of Arizona Press.

7.0 Detailed Budget Breakdown

SUMMARY HOURS							
	TASK	Carianne Campbell	Christopher Morris	Louise Misztal	Acasia Berry	Maggie Trinkle	Total
1	Ash Spring Restoration Phase 2	500	200	250	40	40	1030
2	AZ Springs Restoration Handbook	560		160	40	40	800
3	Adopt-A-Spring	240	635	635	60	30	1600
4	Reporting	300		300	60	60	720
	Subtotal SIA Labor Hours	**1600**	**835**	**1345**	**200**	**170**	**4150**
DIRECT LABOR COSTS (incl. wages and fringe benefits)							
	rates	*$31*	*$27*	*$28*	*$39*	*$31*	**Total**
1	Ash Spring Restoration Phase 2	15,415	5,374	7,000	1,564	1,242	$30,596
2	AZ Springs Restoration Handbook	17,265	0	4,480	1,564	1,242	$24,552
3	Adopt-A-Spring	7,399	17,062	17,780	2,347	932	$45,520
4	Reporting	9,249	0	8,400	2,347	1,864	$21,859
	Subtotal SIA Labor	**$49,328**	**$22,436**	**$37,660**	**$7,822**	**$5,280**	**$122,527**
OUTSIDE SERVICES							
		Springs Stewardship Institute	Stream Dynamics, Inc.				Total
1	Ash Spring Restoration Phase 2		$8,100				$8,100
2	AZ Springs Restoration Handbook	$7,500					$7,500
3	Adopt-A-Spring						$0
4	Reporting						$0
	Subtotal Subcontractor	**$7,500**	**$8,100**				**$15,600**
OTHER DIRECT COSTS, CAPITAL OUTLAY, & EQUIPMENT COSTS							
		Per diem	mileage	Lodging	conference registrations	supplies & equipment rental	Total
1	Ash Spring Restoration Phase 2	$495	$1,450			$6,400	**$8,345**
2	AZ Springs Restoration Handbook	$525	$348	$625	$600	$500	**$2,598**
3	Adopt-A-Spring	$885	$2,088	$750	$600	$3,975	**$8,298**
4	Reporting	$0	$0	$0	$0	$0	**$0**
	Subtotal Expenses	**$1,905**	**$3,886**	**$1,375**	**$1,200**	**$10,875**	**$19,241**
					Subtotal		**$157,368**
					5% Admin		**$7,868.38**
					Total		**$165,236**

8.0 Detailed Matching Funds Breakdown

TASK	Direct Labor Costs	Outside Services	Other Direct Costs	SUBTOTAL
Sky Island Alliance				
Task 1: 300 volunteer hours	$2,175	$0	$0	**$2,175**
Task 3: 900 volunteer hours	$6,525	$0	$0	**$6,525**
Desert LCC				
Task 3: Launch of Adopt-A-Spring Program	$2,248	$13,560	$5,630	**$21,438**
Wildlife Conservation Society				
Task 1: Ash Spring Phase 1 Restoration	$1,916		$3,200	**$5,116**
Nina Mason Pulliam Charitable Trust				
Task 2: AZ Springs Restoration Handbook	$20,000	$13,000	$0	**$33,000**
SUBTOTAL	**$32,864**	**$26,560**	**$8,830**	**$68,254**

Supplemental Information (Appendices)

A: State Historic Preservation Office (SHPO) Review Form

B: Key Personnel

C: Project Site Photographs

D: Description of Monitoring/Sampling Plans

D1: SSI General Springs Restoration Plan Outline

E: Description of Revegetation Plans or Research Designs

F: Existing Plans, Reports, Information Relevant to the Project

F1: Ash Spring Phase 1 Restoration Proposal

G: Letters of Support

H: Evidence of Control and Tenure of Land

I: Evidence of Physical and Legal Availability of Water (not necessary – no water will be used)

Appendix A: SHPO Review Form

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 - Capital Improvement Project

2. Project Title: Capacity-Building for Arizona Springs Restoration & Monitoring

3. Applicant Name and Address: Sky Island Alliance; 300 E. University Blvd. Suite 270, Tucson, AZ 85705

4. Current Land Owner/Manager(s): USDA Forest Service

5. Project Location, including Township, Range, Section: T27S R30E S14

6. Total Project Area in Acres (or total miles if trail): .82

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: Work is likely to include: movement of soil and rocks within the stream channel to construct restoration structures; installation and repair of fencing; and decompaction, erosion control, and seeding of the access road.

9. Describe the condition of the current ground surface within the entire project boundary area (for example, is the ground in a natural undisturbed condition, or has it been bladed, paved, graded, etc.). Estimate horizontal and vertical extent of existing disturbance. Also, attach photographs of project area to document condition: The current ground surface is in natural undisturbed condition.

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

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

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

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

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

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

If YES, name of the district:

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

Ariane Campbell / 27 Aug 2013 / Ariane Campbell

Applicant Signature /Date Applicant Printed Name

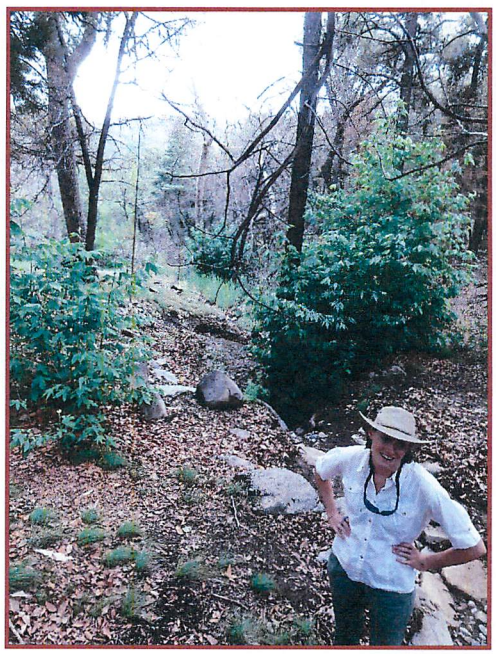
FOR SHPO USE ONLY
SHPO Finding: ☐ Funding this project will not affect historic properties. ☐ Survey necessary – further GRANTS/SHPO consultation required (*grant funds will not be released until consultation has been completed*) ☐ Cultural resources present – further GRANTS/SHPO consultation required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

Appendix B: Key Personnel

SIA has assembled a diverse team for this project, with extensive experience in restoration and springs conservation. Our team includes SIA professional staff, as well as uniquely-qualified consultants for appropriate tasks. The Springs Stewardship Institute (Larry Stevens) provides unparalleled expertise and experience in the study of springs, management of springs data and stewardship approaches. Stream Dynamics, Inc. (Van Clothier) is regionally-known as expert at designing and implementing low-tech stream restoration projects.

Carianne Campbell is the Landscape Restoration Program Manager at Sky Island Alliance and will serve as the Project Manager for this project. Carianne has accomplished projects similar in scope to this proposed project in the past both as Principal Investigator and as a team member.

Carianne Campbell brings over 15 years of experience in documenting natural resources, and specializes in developing vegetation ecology methodologies and designing habitat restoration projects that incorporate novel and low-tech approaches to restoration to achieve conservation goals. She has extensive experience surveying and documenting plant and wildlife species and communities in the southwestern US and northwestern Mexico. She makes appropriate native plant landscaping recommendations, prepares invasive species management plans, and designs maintenance and monitoring plans. Campbell holds a BA in Botany, and serves as the President of the Tucson Chapter of the Arizona Native Plant Society and on the Mayor-appointed City of Tucson Landscape Advisory Committee.



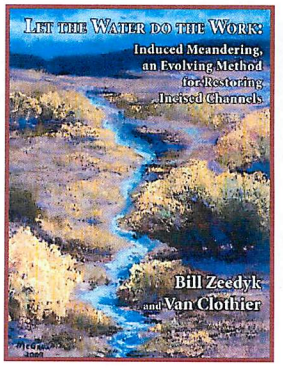
Louise Misztal is the Conservation Policy Program Coordinator and GIS Specialist at Sky Island Alliance. Louise works with land management agencies (federal, tribal, state and local), academic institutions, conservation organizations, and private landowners to ensure conservation-based adaptive land management. Over the past nine years. Louise has worked as a conservation biologist in southern Arizona on a variety of research and monitoring projects including monitoring threatened and endangered species' reproduction and habitat, assessing current and potential habitat for species of concern, and implementing and monitoring riparian restoration projects. Over the past three years she has convened and led a regional climate change adaptation workshop series available to land and resource managers to advance understanding of climate change impacts on Sky Island ecosystems and to develop on-the-ground adaptation actions that can be implemented.

Her more recent work has focused on implementing collaborative, cross-jurisdictional strategies for responding to climate change impacts and on maintaining a network of professionals that is sharing knowledge, developing research that is responsive to managers needs and working across jurisdictional boundaries to build resilience at the regional level.In addition to experience as a field biologist, Louise has formal training and experience in spatial information gathering and management, analysis, and in both technical and lay map production. Louise holds Bachelor's

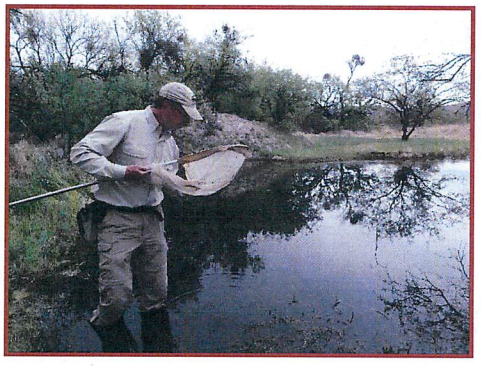
degrees in Ecology and Evolutionary Biology and Microbiology and a Master of Science in Geographic Information Systems from The University of Arizona. Louise is a member of the Desert Landscape Conservation Cooperative steering committee and sits on the Advisory Team for a USGS study to assess climate impacts to wildlife in the southwest.

Christopher Morris is the Landscape Restoration Program Conservation Associate at Sky Island Alliance. Christopher will be responsible for project tasks that relate to training and managing Sky Island Alliance volunteers, overseeing proper implementation of assessment protocols and field data collection, and will be involved in design of springs monitoring protocols and implementation of restoration to ensure accessibility to volunteers.

Previous to SIA, Christopher served as a wilderness instructor, as a ranger at Roxborough State Park, and worked on resource protection, wildlife management, and volunteer restoration projects at a private park increasing volunteer engagement by 600% in 5 years, all in Colorado. Christopher has served as a wilderness ranger at Yosemite National Park, CA, in the summer seasons and as a ranger at Saguaro National Park, AZ, in the corresponding winters. He is trained in ArcGIS satellite mapping and is also a Master Educator in Leave No Trace outdoor ethics. Additionally, Christopher has been formally trained in the spring assessment protocols that SIA intends to utilize for this project. Christopher holds a Bachelor of Arts in Anthropology (with a concentration in Archaeology) as well as a Bachelor of Arts in Spanish, both from Minnesota State University – Moorhead.

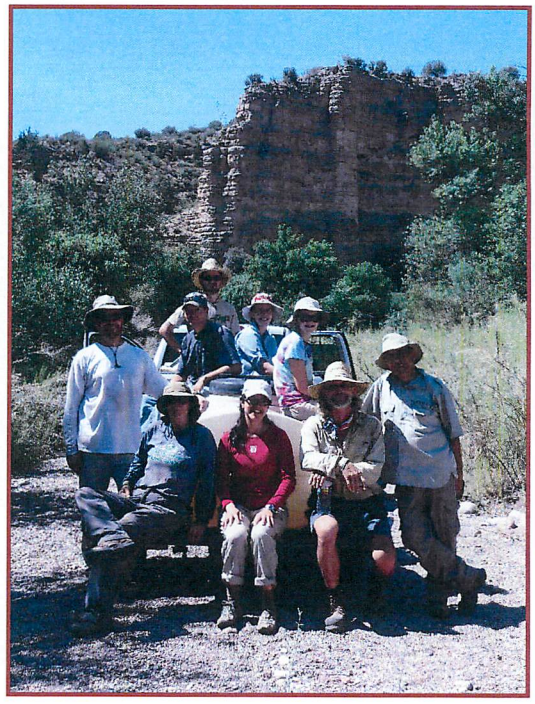


Van Clothier, Stream Dynamics, Inc. Van will be assisting Sky Islands Alliance with the restoration design and implementation of the Ash Spring Phase 2 portion of this project. Van has worked extensively in Arizona and New Mexico on a variety of restoration projects with regional drylands stream restoration and water harvesting experts. He is the co-author, with Bill Zeedyk, of *Let the Water Do the Work: Induced Meandering, an Evolving Method for Restoring Incised Channels*. Stream Dynamics uses a holistic and intuitive approach to stream restoration and erosion control, to achieve the most cost-effective, efficient, and sustainable results. Van will be the field supervisor and equipment operator for the implementation of the Ash Spring Phase 2 restoration.



Larry Stevens, PhD, Springs Stewardship Institute will be responsible for consulting services to develop the Arizona Springs Restoration Handbook, to contribute to writing the Handbook, to implement spring monitoring protocols, develop long-term monitoring protocols, and delivering training on the use of the Spring Inventory Database and technical expertise on management options for springs.Dr. Stevens is the Curator of Ecology at the Museum of Northern Arizona, and conducts research on biogeography and springs ecology. Dr. Stevens brings over 25 years of experience and his educational credentials include a PhD in Zoology and an MS in Biology, both from Northern Arizona University. He is extensively published and is regarded as a regional expert in springs ecology, and is an author of *Aridland Springs in North America: Ecology and Conservation* (Arizona-Sonora Desert Museum Studies in Natural History); in addition, he has been involved in development of a springs restoration handbook for the state of Nevada.

SIA volunteers. Over the past 20 years, SIA has developed a corps of volunteers that are dedicated to on-the-ground actions to protect the natural resources of the Sky Island Region. SIA's dedicated corps of volunteers has reached over 450 individuals; of these, nearly 150 have been active so far in the 2013 calendar year, ensuring adequate turn-out to accomplish restoration tasks as described in the restoration plan. SIA has over 90 volunteers already trained in the ecological assessment of springs, and these volunteers will be an integral part of completing restoration at Ash Spring as well as staffing the Adopt-A-Spring monitoring program. This diverse set of volunteers includes students at the University of Arizona, private landowners, environmental consultants, and natural resource professionals.



Appendix B: Project Site Photographs

Photograph 1. Ash Spring is a perennial spring that originates on a hillslope and is modified with a spring box.

Photograph 2. Spring water flows into a wet meadow, where pools will be excavated for aquatic and bat wildlife benefit as part of the Ash Spring Restoration Project, Phase 1. Note flagging at proposed pond locations.

Photograph 3. Ash Spring meadow, looking toward the incised stream channel gully.

Photograph 4. Stream channel gully forming just below the trail crossing.

Photograph 5. Downstream portion of incised channel.

Appendix D: Description of Monitoring/Sampling Plans

GENERAL SPRINGS RESTORATION PLAN OUTLINE:[10]

Draft 28 November 2012

Northern Arizona University Ecohydrology Class (GLG 670)

Instructors: Abe Springer and Larry Stevens

I. ADMINISTRATIVE CONTEXT

A. General administrative approach

1)Relate springs site restoration to mission and vision

2)Develop specific goals for restoration

- o Restore the site to as nearly natural and ecologically functioning a condition as possible *OR* restore specific resources, characteristics or populations as desired by the manager *OR* restore other desired future condition of the site
- o Consider: Minimizing maintenance costs and activities
- o Optional: Provide outreach about springs to the community, schools, and springs stewards

3)Identify and engage stakeholders – develop a small but effective steering committee

4)Clarify water rights

5)Identify and develop funding

- o Governmental sources
- o Local landowners and stakeholders
- o Local NGOs or other donors

II. BACKGROUND INFORMATION AND ASSESSMENT

A. Sources of Existing Information

1)Locate historic oblique and aerial photographs, and historical reports

- o Libraries
- o City, County, State, Federal sources of information

2)Consultation with elders (local and Tribal communities)

3)Locate private well data?

B. Information Needs and Syntheses

1)Develop a groundwater model

2)Conduct a springs ecosystem assessment (SSI SEAP)

3)Comparison with nearby similar springs

4)Compile/evaluate flow trends over time

5)Compile/evaluate water quality and trends over time

6)Develop soils and stratigraphic maps

7)Occurrence of native and non-native vegetation, invertebrates, vertebrates

8)Develop a detailed site topographic map

9)Dendrochronological analysis?

III. PLANNING

A. Draft Proposed Plan Development

1)Steering Committee refines goals and plan preparation

- o Hold regular stakeholder meetings

2)Develop budget and schedule

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[10] This document was prepared by Springs Stewardship Institute and is included here with permission as a preliminary outline of potential contents of the Arizona Springs Restoration Handbook

3)Plan components
- o Evaluate pre-treatment ecosystem assessment analysis
- o Identify features to preserve in *situ*
- o Identify features to remove – old pipes, concrete, fencing, roads/trails, etc.
  - ▪ How to accomplish with the least impact?
- o Recontour channel to maximize wet meadow area
- o Developing footpath(s) to prevent further erosion
- o Eliminate non-native species
- o Revegetation with native species
  - ▪ Determine irrigation needs and costs, and irrigation schedule and maintenance
- o Develop a monitoring plan and implementation schedule
- o Develop an outreach plan on-site and virtual
  - ▪ Public relations – newspaper and radio
  - ▪ Local exhibit(s)
  - ▪ Remember to repeatedly thank contributors and volunteers

4)Identify permitting requirements
- o USACE – Section 404 permit required?
  - ▪ Need concise project description and wetland delineation
- o ADEQ – SWPPP (if needed)
- o ADOT – ROW (width of ROW, work space environmental protection)
- o Fish and Wildlife Service – Endangered Species Act compliance

5)Define project success metrics

6)Refine plan , budget, and schedule

IV. IMPLEMENTATION

A.Initiate compliance activities

B.Site Preparation

1)Site survey

2)Hazmat protection

3)Remove non-native and undesired species

4)Accounting

B. Construction

1)Remove concrete box, old barbed wire

2)Recontour channel to maximize wet meadow area

3)Develop a footpath to prevent further erosion

4)Accounting and reporting

C. Post-construction

1)Restore site from construction impacts

2)Establish irrigation, if needed

3)Replant desired species

4)Reintroduce or translocate desired faunal species

5)Accounting and reporting

D. Implement Outreach Program

1)Report to MNA Board

2)Write-ups in scientific, popular, and news venues

3)Accounting and reporting

V. MONITORING, FEEDBACK, PROJECT WRAP-UP

A. Evaluate project success

1)Conduct a post-treatment SEAP analysis

2) Integrate findings in relation to plan

B. Evaluate Outreach Success

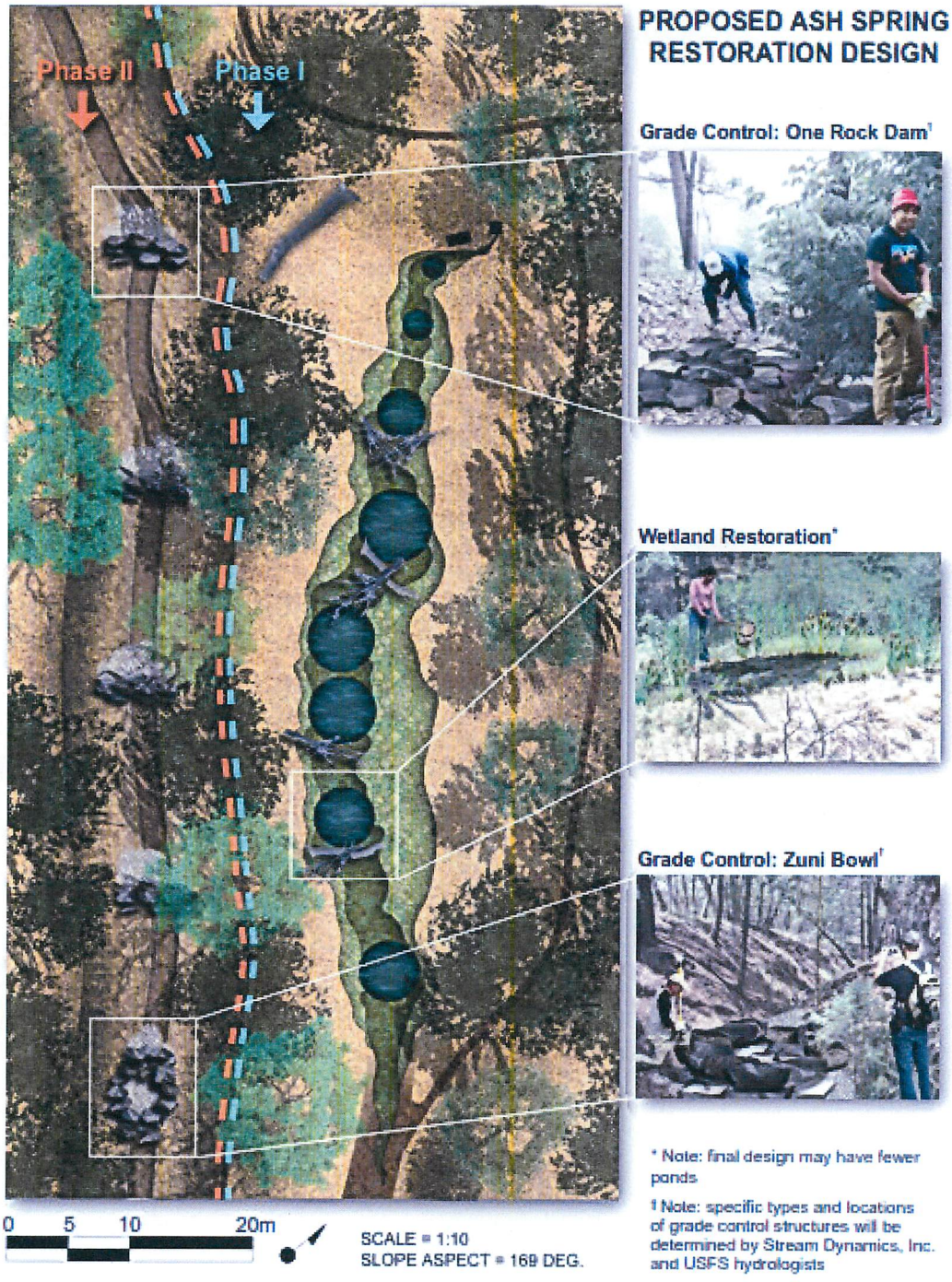
C. Publicize project importance, approach, results and success

1)Report to stakeholders

2)Write-ups in scientific, popular, and new venues

D. Continue periodic monitoring and feedback

Appendix E: Description of Revegetation Plans or Research Designs



Appendix F: Existing Plans, Reports, Information Relevant to the Project

Date: 7/12/2013

Ash Spring Restoration Proposal

Introduction

This document describes proposed restoration activities at Ash Spring in the Chiricahua Mountains and is intended to assist Coronado National Forest staff with the permitting of this project and to provide a planning document. Ash Spring has been altered by human activity, impacting the quality of wetland habitat at the site. This proposed project would restore this critical wetland ecosystem to a more natural state to provide habitat for numerous wildlife species, especially the endangered Chiricahua leopard frog (*Lithobates chiricahuensis*), and provide a critical new watering site for many of the 21 bat species that occur in the Chiricahuas--one of the highest bat diversity areas in the United States.[11]

Location and Site Description

Ash Spring is located on the Coronado National Forest in the Chiricahua EMA approximately 1 km to the west of Herb Martyr Campground (Sec 14, Township 27 South, Range 30 East). The site can be accessed by driving to the end of Forest Road 42A, parking, and following an unmaintained roadbed .8 km west to the spring.

The spring emerges from an 18% south southeast facing slope in pine-oak habitat at an elevation of 1,881 meters. Cima Creek, which is deeply incised and ephemeral, is located directly to the west of the spring. The spring source has been concentrated in a concrete spring box measuring 1 meter on a side. From the springbox, water is piped a short distance to a cattle trough fashioned from an old propane tank; water not captured by the spring infrastructure creates a spring run that flows 70 meters to a roadbed southeast of the source. Spring water primarily drains to the roadbed, but a portion also flows to Cima Creek at one point upslope from the roadbed. The spring flow has created some small scale erosion along the roadbed.

The current conditions along the spring run are characterized by hydric soils and the presence of rushes and sedges, indicating that the spring has been recently perennial. Topsoil texture is organic and typically 5-10 cm in depth. The soils are saturated with groundwater; however, no pooled water is available for wildlife at the site.

Other features include a fence that forms a perimeter around the site, adjacent trails, and an old wooden structure. A three strand barbed wire fence forms a 160 meter perimeter around the spring and is in a state of disrepair. TR 247 (Terra Trail) is located directly upslope from the spring source and a social trail connects the old roadbed to TR 247. A dilapidated wooden structure is located within 10 meters of the spring source and was likely associated with the spring infrastructure in the past. See the attached existing conditions map.

History and Impacts

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[11] Personal communication with Bat Conservation International's Dan Taylor

The presence of infrastructure such as pipes, a drinking trough, and a spring box are evidence that that Ash Spring has been altered from its historical condition. The spring flow has been diverted for various purposes and it is difficult to determine what its unaltered state was. However, it is likely that a greater diversity of habitat was present prior to the spring's development. Natural features likely included more extensive wet meadow habitat with a diversity of landforms created by fallen trees and uneven topography. Tip-ups, or small excavations created by the root wads of fallen trees, would have formed small pooled habitat providing open water for wildlife--this "pit and mound" topography, along the gradient of the spring run, would have provided habitat for a wide diversity of wetland dependent organisms.

Project Goals

1. Restore wet meadow and small pooled habitats along course of the existing spring run. Pit and mound topography, resembling holes left by fallen trees, will provide a diversity of habitats and mimic historical conditions at the site.
2. Create open water habitat to benefit endangered Chiricahua leopard frogs (*Lithobates chiricahuensis*) and provide a water sources for numerous bat species including the federally listed lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*).
3. Restore wetland habitat that slows water movement across the site to prevent erosion.
4. Create a monitoring framework to better understand the restoration of spring ecosystems, identify specific project metrics, and provide for adaptive management at the site.

Background

Interest in restoring Ash Spring stemmed from a wetland restoration workshop hosted by Bat Conservation International (BCI) at the Southwest Research Station in January of 2012. The workshop was taught by nationally renowned wetland restoration expert Tom Biebighauser. The initial site analysis and restoration design was created over the course of this training and was later proposed to the Forest Service as a potential project by BCI's Dan Taylor. Following the workshop, permitting was initiated by the Forest Service to implement the project, including an archeological survey and a biological assessment.[12] Following these actions, BCI prioritized funding for other restoration projects due to time constrains; Sky Island Alliance is currently collaborating with BCI and has secured the funding necessary to complete this project. The site was visited again on June 14th, 2013 by Tom Biebighouser, BCI's Dan Taylor, Coronado National Forest's Hydrologist Salek Shafiqullah, Coronado National Forest's Watershed Program Manager Michele Girard, Sierra Vista District Biologist Chad Bell, Arizona Game and Fish's Abigail King, Southwest Research Station's Director Dr. Dawn Wilson, and Sky Island Alliance staff members Louise Misztal and Nick Deyo. This visit allowed key Forest Service staff and other experts to assess the site and determine the value of the proposed project. Also, Tom Biebighouser described his restoration design and flagged proposed wetland habitat areas. This proposal is informed by the June site visit mentioned above and field notes taken during site visits in January of 2012.

Proposed Actions

This restoration plan will be implemented following guidelines established in Biebighouser's book *Wetland Restoration and Construction—a Technical Guide*. Generally, a series of small wetland pools will be dug along the spring run; once excavated, the pools will fill with water due to the high groundwater

level at the site. Eight pools have been flagged at the site and their approximate dimensions and coordinates are illustrated in the restoration design found in this document. Pools will range in diameter from 2 meters to 6 meters and will be approximately 0.5 meters in depth. The largest pool will be dug to a depth of 1 meter to provide ideal habitat for Chiricahua leopard frogs (*Lithobates chiricahuensis*). A small excavator with low-impact rubber treads will be used to construct the pools in coordination with SIA staff and volunteers. Note: a small excavator can access the site using the roadbed that approaches the spring from the southeast. The following is a list of recommended techniques that will be followed during construction. The estimated duration of project implementation is one week, and would ideally occur in the spring or fall.

1. Use an excavator to remove and salvage native plants and topsoil for replanting and placing in and around the completed wetlands.
2. Dig small shallow depressions of various depths within the areas marked by flagging. Randomly place the soil removed in piles of various heights and widths near the pools to resemble fallen tree tip-up mounds.
3. Decompact soil in and around each wetland depression so that groundwater may rise to the surface, interact with surface water, and provide conditions for the establishment of native wetland plants.
4. Decompact soil around each wetland so that groundwater may interact with surface water and provide conditions for the establishment of wetland plants.
5. Construct wide spillways between each pool on a gradual slope to restore wet meadow habitat between pools. Bury large woody debris and rocks in these spillways to prevent erosion.
6. Avoid compaction of the removed soil.
7. Add large woody debris to the restored wetlands and surrounding area.
8. Place the saved vegetation and topsoil in and around the completed wetlands, and on the mounds--do not compact.
9. Install additional native plant materials.

Monitoring

Sky Island Alliance has worked with the Spring Stewardship Institute to establish protocols for assessing baseline conditions at springs and will use the same protocols to assess post-restoration success and to inform the adaptive management cycle. These protocols have are efficient and consistent in the collection and management of data. In Arizona, land managers have already assessed hundreds of springs using these methods, specifically in the North Kaibab Ranger District, Grand Canyon National Park, and areas of Coconino National Forest and Apache-Sitgreaves National Forest. The following information will be collected at Ash Spring before and at least one growing season after restoration implementation.

1. **General information:** spring locality information, spring classification, and careful georeferencing
2. **Site Map:** a scaled map is drawn to provide data on the geomorphology of springs, area measurements, and show the diversity of spring microhabitats.
3. **Photo Monitoring Points:** photographs of key restoration features taken from benchmarked locations are reproducible and provide data on ecosystem changes over time.
4. **Flora and Fauna:** lists of plant and animal species are generated with careful attention to the presence of sensitive as well as invasive organisms.
5. **Flow:** basic flow measurements are taken at the spring source.
6. **Water Quality:** measurements are taken on pH, conductivity, dissolved oxygen, and temperature.

Sky Island Alliance will also perform a Spring Ecosystem Assessment Protocol (SEAP) at Ash Spring to provide qualitative information regarding the ecological condition of the site. Data collected during initial assessments will be used to create specific performance metrics for this project. All data collected will be accessible to managers through the online Springs Inventory Database that we are currently developing in cooperation with the Spring Stewardship Institute.

Attachments

The following maps were created using measurements taken at the Ash Spring site. They are not survey grade documents, however, they do provide site context and an accurate depiction of this proposed restoration design.

Contact information

Carianne Campbell, Landscape Restoration Program Manager
carianne@skyislandalliance.org
520-624-7080x14

Louise Misztal, Conservation Policy Program Coordinator
louise@skyislandalliance.org
520-624-7080x19

Nick Deyo, Conservation Associate
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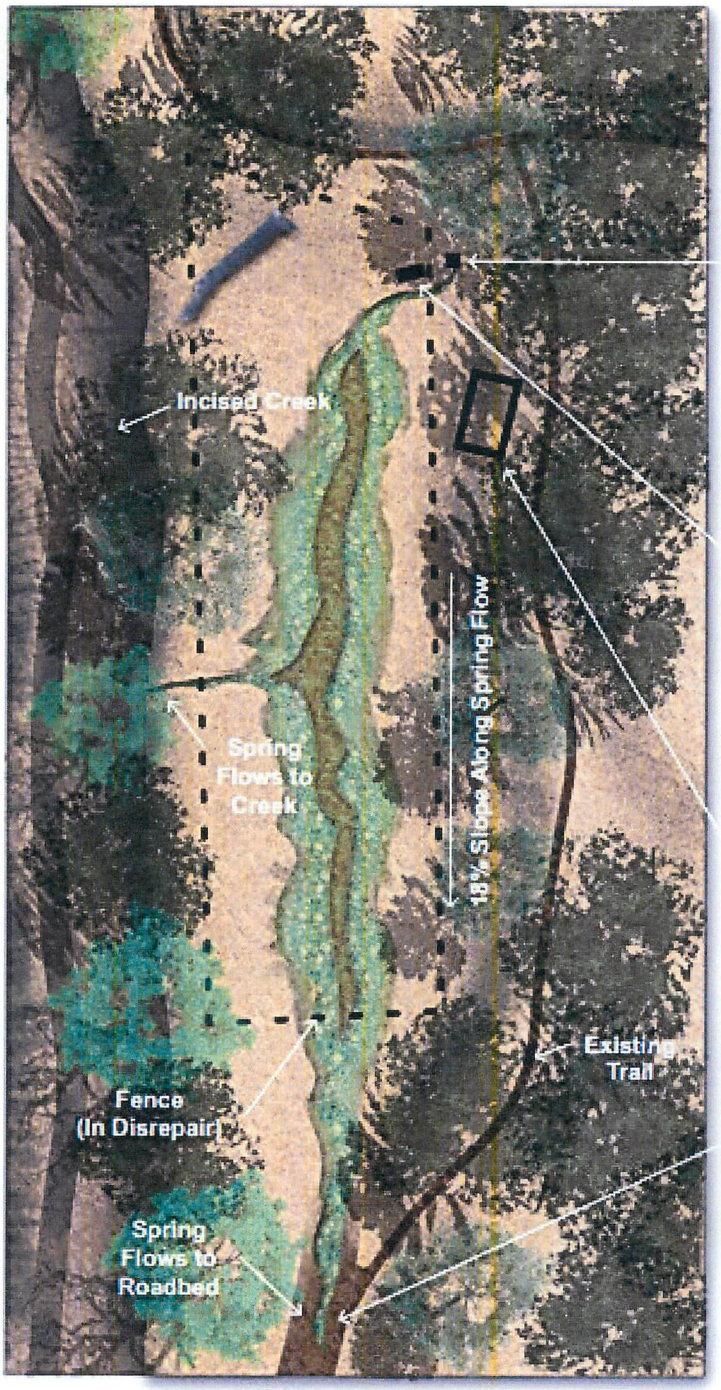
ASH SPRING EXISTING CONDITIONS

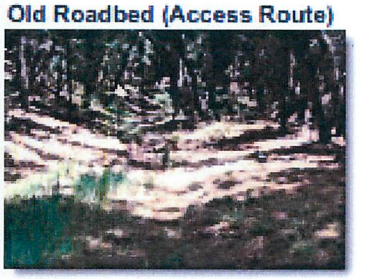


Spring Source

Old Drinker

Structure

Old Roadbed (Access Route)

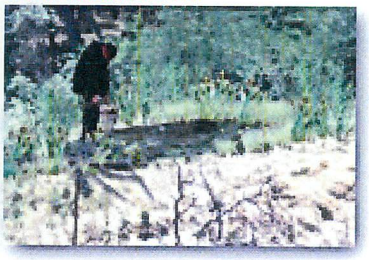


0 5 10 20m

SCALE = 1:10
SLOPE ASPECT = 169 DEG.

ASH SPRING PROPOSED RESTORATION DESIGN

Pond Illustration



0 5 10 20m

SCALE = 1:10
SLOPE ASPECT = 169 DEG.

Appendix G: Letters of Support

United States Department of Agriculture
Forest Service
Coronado National Forest Supervisor's Office
300 W. Congress
Tucson, Arizona 85701
Phone (520) 388-8300
FAX (520) 388-8305
Deaf & Hearing Impaired 711

File Code: 2520
Date: August 27, 2013

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

To Whom It May Concern,

I am writing today to lend support to Sky Island Alliance's (SIA) proposal for a FY 2014, Arizona Water Protection Grant for a Capital Project in the Douglas District of the Coronado National Forest. This project will build upon work that SIA is already doing in the Coronado National Forest (CNF) to inventory and assess springs of the sky island region and will bring restoration implementation and monitoring tools developed here to resource managers across the state.

This project conforms to the Forest Service Watershed Condition Framework (WCF), which establishes a new consistent, comparable, and credible process for improving the health of watersheds on national forests and grasslands. Under the WCF and the National Environmental Policy Act, the CNF will be conducting an environmental analysis of small watershed/wildlife habitat improvement projects throughout the Chiricahua Mountains. The resulting range-wide documentation is expected to be completed in 2014, and will ensure environmental compliance standards for this project will be met. In addition, CNF has applied to Arizona Department of Water Resources (ADWR) for a water right for ash spring for the beneficial use of stockwater and wildlife. The ADWR reference number is 33-096354. The project will occur on National Forest System lands, and SIA has legal and physical access to the land.

The Forest is collaborating with Sky Island Alliance, Bat Conservation International, and Tom Biebighauser on the first phase of restoration at Ash Creek, and we are pleased to support this project which includes the second phase of work, which will protect the investments made at Ash Spring. This project will not only result in on-the-ground resources for wildlife, it will develop much needed information on effects of fire and fire management on springs in priority areas and will engage managers in climate change adaptation planning. We are pleased that the restoration effort at Ash Spring will be used as a case study in the restoration handbook as well as an initial site for the Adopt-A-Spring citizen scientist monitoring program.

We believe that Sky Island Alliance is uniquely qualified to undertake this effort due to its track record of leading regional efforts to bring scientists, practitioners and the public into both dialogue and on-the-ground action. Such regional scale planning and shared management of resources is critical to deal with conservation of our natural resources in the face of climate

change. SIA is also a leader in developing monitoring programs that engaging citizens and land and resource management partners in the collection of important ecological data (e.g., wildlife tracking, springs assessment) that assists in management decisions.

We look forward to working with Sky Island Alliance to restore Ash Spring and to develop regional tools for restoration planning and monitoring.

Sincerely,

for JIM UPCHURCH
Forest Supervisor

batcon.org
BAT CONSERVATION
INTERNATIONAL

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

Dear AWP Fund Commissioners,

August 26, 2013

I am writing to state BCI's strong support for the Sky Island Alliance's proposal for the Phase II erosion abatement effort at the Ash Spring restoration site in the Chiricahua Mountains, and for the development of the related Arizona Spring Restoration Handbook. The Ash Spring gully erosion abatement project will ensure the long-term health of an ecologically vital spring and water source for a multitude of wildlife species. The handbook will use this and additional projects to provide a training template that can increase the scope of these efforts by initiating and guiding similar efforts across the state.

As noted in the proposal, Arizona's springs provide essential riparian and aquatic habitat for bats and many other vertebrate and invertebrate wildlife species and they're especially important in Arizona's arid regions. Almost all of Arizona's 26 bat species have an extremely high demand for water due to their particular physiology. Reproductive individuals, critical to maintaining populations, must have free, pooled water to drink every night. Springs have provided a well-distributed water source across Arizona's landscapes for bats and other wildlife for thousands of years, and their associated riparian vegetation supports an abundance of bat's insect prey, making them critical foraging habitat as well. As primary predators of night-flying insects that cost farmers and foresters billions of dollars annually, bat conservation is extremely important to ecosystems and human economies. Springs have for eons provided an oasis for wildlife, water for settlers, livestock, agriculture, and native cultures. Yet despite their importance, springs remain one of the least studied or conserved habitats, and they are threatened by many stressors. It's hard to believe that broad efforts are just now being proposed to restore and monitor springs across the west, but better late than never.

The Sky Island Alliances proposal is an excellent step towards better restoring, protecting, and managing these vital resources. It is a very well designed proposal with a high probability of success. It will build on the existing information available, collaborate with other landscape-level efforts using comparable methodologies, and provide essential baseline information that could provide a benchmark of overall watershed condition in the face of changing climates. I cannot think of a better use of agency natural resources right now than supporting the type of effort that this proposal represents.

Sincerely,

Daniel A. R. Taylor
Water for Wildlife Program Coordinator
Bat Conservation International

Cc: Carianne Campbell

Appendix H: Evidence of Control and Tenure of Land

The project area is owned by the USDA Forest Service. A letter of support will be submitted under separate cover.