

**Springs and Seeps Inventory, Assessment
and Management Planning Project**

A Proposal to the Desert Landscape Conservation Cooperative WaterSMART

Applied Science Grants

FOA No. R11SF81307

August 4, 2011



Sycamore Springs, Huachuca Mountains, Arizona



**SKY
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ALLIANCE

Protecting our Mountain Islands
and Desert Seas

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Executive summary

The Springs and Seeps Inventory project described in this proposal will develop new information regarding the current biological and management status of springs and seeps in the Sky Island region of southeastern Arizona which is at the heart of the Desert Landscape Conservation Cooperative (LCC) region. These waters are crucial resources for wildlife and plants including a variety of sensitive, threatened and endangered water dependent species, and for traditional human uses of the land. Aquatic, semi-aquatic and riparian habitats occupy less than 1% of the state of Arizona's land base and 2% of the arid southwest while 60-75% percent of resident wildlife species depend on these habitats to sustain their populations. Newly collected assessment information will be combined with existing data on spring and seep resources in the region previously collected by entities such as Pima County, Santa Cruz County, the USDA Forest Service (USFS), the National Park Service (NPS), the US Geological Survey (USGS), the Bureau of Land Management (BLM), US Fish and Wildlife Service (USFWS), and the Arizona Game and Fish Department (AZGF), through an online database. This database will be a central repository for inventory information that transcends jurisdictional boundaries providing information about water availability, its relationship to groundwater basins and its importance to wildlife, plants and humans. The database and new assessment information will include information about current management and will serve as a decision support tool to guide managers in on-the-ground decisions related to management of these waters in the face of climate change. This is a two year project which fulfills Task Areas B and C of the funding opportunity with a total project cost of \$248,028 with \$101,618 requested from the Bureau of Reclamation and \$146,410 of non-federal match.

Technical project description

Goals of the Project

The proposed project directly addresses Task Area B and Task Area C *-projecting changes in the distribution of rare resources, assessing how these projected changes may impact the management of natural resources, and developing methodologies and decision support tools to assess and evaluate current or existing resource management practices and the abilities to learn and adapt to the effects of climate change.* The project will enhance the management of spring and seep resources in the Desert LCC by developing new information on the spatial location, temporal attributes, and the biological, hydrological and geomorphological status of springs and seeps at site-specific and landscape scales and applying this information to management through adaptation planning. New information will be developed through inventory and assessment of the spatial location and status of springs and seeps in the Sky Island region of the Desert LCC. The project will develop a regional database for housing and serving historic data from the various cooperating agencies (Pima County, Santa Cruz County, USFS, NPS, USGS, USFWS, BLM, and AZGF) along with new data that is generated through this project. This database will provide a landscape level context for making decisions about management of these crucial resources that has previously been unavailable due to data being stored by individual agencies in different formats. We will employ a combination of citizen science inventories and expert assessments to collect critical baseline information on known spring and seep resources in areas of interest and priority in the region. We will be applying various methodologies for citizen scientist monitoring of spring and seep resources in an arid setting in habitats that are similar to others found across the Desert LCC. This type of

assessment has long been desired by many land and resource managers in the region but has been unattainable by a single entity due to the resource intensive nature of visiting many springs across the region and the cross-jurisdictional nature of the resource itself. Development of a volunteer monitoring program will provide a model for monitoring climate sensitive resources with limited resources.

The need for this type of spring and seep inventory and assessment was raised at two regional climate change adaptation workshops convened and organized by Sky Island Alliance in collaboration with a variety of partners including federal and state land and wildlife management agencies. The second of the two workshops (April, 2011) was focused on developing adaptation strategies for specific ecosystems within the Sky Island region. Developing a better and more in-depth knowledge base and understanding of spring and seep resources in the region and developing restoration and protection measures to best enhance those resources emerged as a recurring theme in workshop discussions. Spring and seeps habitats were repeatedly cited as critical resources for aquatic and riparian species and for other species that depend on these resources for drinking water or food.

This project will demonstrate inventory and assessment techniques and management planning implemented at site-specific and landscape scales to assist adaptation of rare resources to climate change. It will demonstrate applied management responses for adaptation including active measures to enhance resilience of climate-impacted ecosystems, and wildlife and plant habitats.

Specific goals include:

- Work collaboratively with land and resource managers to identify priority watersheds for spring and seep assessments
- Conduct spring and seep inventories and assessments using trained volunteers, professional staff and partner personnel (principally biologists and hydrologists)
- Develop a regional database for housing and serving historic data from cooperating agencies along with new data generated through this project
- Utilize assessments of current spring and seep management in conjunction with land managers and experts to develop climate change adaptation strategies, decision-support tools and recommendations for management of priority areas

Dr. Jonathan Overpeck, Co-Director of The University of Arizona's Institute of the Environment, has observed that the southwestern United States is among the fastest warming regions of the world. In the Sky Island region of the arid southwest, water resources are critical. While aquatic, semi-aquatic and riparian habitats occupy less than 1% of the state of Arizona's land base, 60-75% percent of resident wildlife species depend on these habitats to sustain their populations. These sites can harbor 100-500 times more species than the surrounding arid landscape. These rare resources are of high biological value as a source of water for wildlife, providing rare habitats, and may provide thermal refuge in a harsh environment in the face of a warming climate.

Collaboration around inventory and assessment of spring and seep resources was initiated through the two regional climate change adaptation workshops described above. At these workshops participants identified the need for developing a better understanding of the status and value of these resources. Sky Island Alliance followed the adaptation workshop up with directed outreach to land and wildlife managers that were interested in further inventory and assessment of these resources on their land. We convened a meeting of organizations in July of 2011 focused on working with interested organizations to understand their current needs surrounding management of spring and seep resources. The meeting was well attended with representatives from Arizona Game and Fish Department, Pima County, Sonoran Institute, Pima Association of Governments, the US Fish and Wildlife Service, and the National Park Service including the Sonoran Desert Network. Representatives from the Coronado National Forest and the Bureau of Land

Management communicated their support and interest when they were not able to make the meeting (see letters of support, BLM pending).

Springs are scattered over all the landscapes in the arid southwest, and they often capture our imagination as oases in the arid regions of North America. Archaeologists have shown how 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. In spite of these recognitions, springs have been largely neglected as important cultural, scientific, and economic resources and most have been altered by human activities and non-native ungulates. As a consequence, few springs resemble their natural character and their fauna have experienced some of the highest extinction rates known in North America as identified in *Aridland Springs in North America: Ecology and Conservation*. Edited by Lawrence E. Stevens; Vicky J. Meretsky, 2008, University of Arizona Press.

How the project will enhance the management of natural resources

Temperatures in the southwest have risen 1.5 °F in the last 55 years, and are projected to increase 2–5 °F by 2030 and 4–10 °F by 2090. The combination of warming temperatures and drought conditions have already led to springs in the region drying up, thereby suggesting their vulnerability to long-term climate change. Sky Island Alliance has conducted two regionally-focused climate change adaptation planning workshops for natural resource managers in the last year. Outcomes of workshops show clear and consistent agreement on the need for cross-jurisdictional management of shared resources, and on the importance of protecting water and climate refugia in the region which are both provided by spring and seep habitat. Precipitation projections for the Sky Island region are most robust for the winter and spring seasons and show a projected decrease of 5% in winter precipitation and 24% in spring precipitation. The general consensus of climate scientists is that this region will experience increasing aridity as the climate continues to change and some consider the possibility of a mega-drought. Because spring and seep resources are highly affected by precipitation, effective management will require a sound understanding of resources status and understanding the contribution of the resource to management goals at a landscape level.

Spring and seep resources in the Sky Island region exist in a variety of states ranging from undeveloped and relatively intact to fully altered through installation of structures such as spring boxes or earthen stock tanks being built on top of them. In many instances across public and private lands in the region, these waters were once altered for humans but are no longer being used for the purpose for which they were originally altered, or have been modified far beyond what is necessary for their current use. Many opportunities currently exist for fully or partially restoring springs and seeps to a more natural state that will enhance their value as habitat, water for wildlife and climate refugia. Additionally, due to limited resources for management in the face of increasing threats to resource integrity, opportunities exist to prioritize where and how to focus management activities to generate the best outcomes possible for water and wildlife.

The first step toward achieving enhancement of these waters in the region involves identifying the current status of springs and seeps in areas of interest including current management, human or natural alterations, flora and fauna supported, water production, status of underlying groundwater basin, and contribution of these waters to the watershed where they are located. Agencies in the region currently have scattered and incomplete information about these resources in their stewardship. In some cases they know the location of springs but have no information regarding the flow rate, species supported or potential alterations of the habitat. In many cases managers do not have access to information about spring and seep resources on neighboring lands or across watersheds limiting their ability to respond in a landscape and watershed context. In much of the region lands managed by the USFS abut lands managed

by BLM and Counties with watersheds and groundwater basins overlapping these jurisdictional boundaries. By developing information that allows managers to understand how their spring and seep resources contribute at the watershed and landscape scale we will be supporting planning and decisions that address resource protection at the regional level. By collecting more in-depth biological and hydrological information for sites that resource managers already know the location of, we will be providing a basis for understanding how environmental impacts, especially climate, are affecting these resources and for changing management to better conserve these resources.

This project will enhance long-term management and monitoring of spring and seep resources through application of methodologies for conducting inventory and assessments that train volunteers in assessment protocols and engages them for the long run. These methodologies and trained citizens will lay the groundwork for expansion of this project and for on-going collection of data at established sites.

Activities and stages of the proposed project

This project will develop critical baseline information on spring, seep and shallow groundwater resources in the Sky Island region of the Desert LCC through inventory and assessment of spring and seep resources, development of a regional database to house historic and newly collected information, and implementation of methodologies for a citizen science volunteer effort to inventory, assess, and monitor these waters. The project will demonstrate application of seep and spring assessment data in developing management responses for adaptation planning and management including active measures to enhance resilience of climate-impacted ecosystems, and wildlife and plant habitats.

The proposed project will focus on the Sky Island region of southeastern Arizona with a more intense focus on a region known as the Greater Huachuca Grasslands Complex. The study area includes a diversity of habitats and spring and seep resources on land managed by a variety of different entities including the USFS, BLM, NPS, Pima County, The Nature Conservancy (TNC), and private landowners. Activities include:

1. Conduct managers and experts workshops to identify priority watersheds for spring and seep assessments
2. Develop a regional database for housing and serving historic data from cooperating agencies along with new data generated through this project
3. Conduct spring and seep inventories and assessments using trained volunteers and professional staff and partner personnel (principally biologists and hydrologists) and institute a citizen scientist monitoring framework
4. Conduct spatial and temporal analysis of newly gathered assessment data in combination with historical data to identify seep, spring and shallow groundwater of highest conservation value
5. Utilize assessments of current spring and seep management in conjunction with land managers and experts to develop climate change adaptation strategies and recommendations for priority areas

Conduct managers and experts workshops with USFS, BLM, USFWS, USGS, TNC, NPS, AZGF, Santa Cruz and Pima Counties, Pima Association of Governments, private landowners and others managing land and resources in the study area to prioritize important springs/seeps/shallow groundwater areas for active assessment based on current management of the resource, water rights, location of the resource in relation to other water resources, context of the watershed and groundwater basin the resource is located, any known human and wildlife use of the resource or surrounding areas, and proximity of the resources to other priority management areas. Work with the agencies to identify key spring and seep data needed to inform management decisions and resource allocation. Work with these agencies to identify, utilize, and procure existing spatial and qualitative data for springs, seeps and shallow groundwater resources for prioritization purposes and to inform the structure of a regional database. **Timeline:** months 2-6 of project. **Outcomes:** The information collected will be used to prioritize locations for performing

assessments and to populate a springs database for use in the management and decision support analysis. This will provide a baseline dataset that will be augmented through the proposed inventory and assessment work.

Develop a regional springs, seeps and shallow groundwater spatial database to centralize information from multiple agencies working in the project area. The database will be searchable and accessible through an online interface and will include an interface for entering data. Focal attributes will include location, flow rate, water quality, hydroperiod, associated vegetation and/or species, built structures, current use, current management, associated water rights, and associated groundwater basin information among others. Work with the agencies listed above to procure existing spatial and qualitative data for springs, seeps and shallow groundwater resources and include this data in the database. **Timeline:** months 2-24 of project. **Outcomes:** A database with names, locations, management responsibility, ownership, water rights, ecological and morphological data and other data as needed.

Using the Spring Ecosystem Inventory and Assessment Protocols developed for use in arid land ecosystems, trained volunteers working with SIA staff and partners conduct Level 1 Assessments of up to 50 springs, seeps and shallow groundwater areas of high resource priority. Adapt protocols as needed to the unique arid Sky Island ecosystems. We will conduct up to 5 volunteer trainings with both didactic and field exercises. The assessment collects the following information:

Channel morphology: Visual surveys assign categorical visual estimates of spring and spring-run disturbance, and particle-size distribution as appropriate. Length, width, and depth measurements are conducted on springs and spring runs.

Riparian and wetland vegetation: Visual surveys assign categorical visual estimates of spring and spring-run cover and species composition.

Water quality: A handheld, multiparameter water quality instrument is employed to collect discrete data on core water quality parameters.

Aquatic macroinvertebrates: Visual surveys assign categorical visual estimates of spring and spring-run macroinvertebrate communities and abundance.

Wildlife: Visually assess wildlife use of spring and spring-runs through documentation of animal sign

Timeline: months 2-18 of project. **Outcomes:** Level 1 Assessment for 50 springs and data entered in the database. Model and protocol for trained volunteer assessment of springs in arid land ecosystems.

Conduct spatial and temporal analysis of newly gathered assessment data in combination with historical data to identify seep, spring and shallow groundwater of highest conservation value, highest restoration potential, and resources that will be crucial water sources for wildlife adaptation in the region. Current management of springs and seeps in the study area will be included in the database and subsequent analysis in order to identify key areas for additional management activities. Work closely with agencies identified above through expert workshops to conduct climate change adaptation planning assessing their priorities and management options in light of the new information. This will include discussion and analysis on management prescriptions that can be used by land and wildlife managers to minimize and mitigate non-climate stressors, protective and restorative actions that can be implemented on the ground to enhance resilience of these resources, and necessary social and institutional strategies to promote spring conservation. **Timeline:** months 13-22 of project. **Outcomes:** map and analysis of priority resources. Data will be accessible through the shared database. Cross-jurisdictional adaptation plans for priority resources.

Report on spring and seep assessment, management analysis, and climate change adaptation strategies. Report will highlight methodologies developed and tested through the project, findings of the expert workshops and key areas for additional management activities to restore, protect or enhance current resources. In addition we will develop decision support tools for spring and seeps management and climate change adaptation that will include a springs management network to promote and resource

spring conservation activities; the database and associated spatial data that can be used in management planning; a evaluation of inventory and assessment methods, and recommendations for prioritization of methods and focal areas; and a tool box of protection, restoration and management methods. **Timeline:** months 16-24 of project. **Outcomes:** report and map of prioritized springs; methodology of adaptation and management assessment project, management recommendations, decision support tools, and future needs and next steps.

Table 1

Proposed Timeline								
	Q1 2012	Q2 2012	Q3 2012	Q4 2012	Q1 2013	Q2 2013	Q3 2013	Q4 2013
Tasks								
1								
2								
3								
4								
5								

Discussion of the any anticipated problems or major difficulties

The only possible challenge we can anticipate in accomplishing our proposed project is gaining access to high priority and/or important spring sites, whether because of access through private property, remoteness, or area closures due to wildfire. Through our workshops with experts and subsequent database work we will be able to identify springs on or accessed by private property and be able to reach out to the landowner for help with access issues, we have twenty years of experience accessing these areas and foresee no real problems with this. Using volunteers allows us to access remote areas at a low cost and we foresee no real issues with gaining access. Areas closed due to wildfires may be deemed high-priority for inventories and assessments and we will work with the USFS and others to ensure that we can assess sites impacted by fire as this is an important natural process in the Sky Islands and the larger Desert LCC region.

Prior studies that relate to the project or that will inform the project.

This proposal is supported by ecological studies and conservation work on springs, seeps and shallow groundwater areas conducted by Pima County, the Sonoran Desert Network of the National Park Service, the Grand Canyon Wildlands Council and Dr. Larry Stevens on the Southern Colorado Plateau, the Arizona Water Resources Research Center on the Arizona Environmental Water Needs Assessment. There is information available from springs research and inventory and assessment work in the Mohave, Chihuahuan and Great Basin Deserts. In the study area Sky Island Alliance is involved in multiple projects including an erosion control project in upland tributaries of Ciénega Creek, a Chiricahua leopard frog conservation project in the Sonoita Valley, a climate change adaptation case study for Las Ciénegas National Conservation Area, and a watershed health assessment project in the Huachuca Mountains and Las Nutrias Headwaters Watershed. In addition the United States Geological Survey’s Tucson Science Center monitors springs throughout the region.

Sources and support for non-Federal funding

Sources and support for non-Federal funding include The Kresge Foundation, the Nina Mason Pulliam Charitable Trust, the recipient (Sky Island Alliance) and in-kind volunteer effort as project income (see Project Budget Proposal for details).

Ability to Accomplish Project Scope

Sky Island Alliance is a grassroots non-profit organization dedicated to the protection and restoration of the rich natural heritage of native species and habitats in the Sky Island Region of the southwestern United States and northwestern Mexico. Since 1991, we have engaged a wide range of partners, creating alliances and collaborating with scientists, landowners, agency personnel, planners, conservation organizations, volunteers, decision makers and foundations. We understand the Sky Islands from a biological perspective, where species and habitats do not recognize political boundaries, reinforcing the importance of ecoregional conservation. Due to this vision of the region, we engage in an integrated approach to conservation: we protect and restore native species, healthy and diverse ecosystems, and natural evolutionary processes; safeguard and improve wildlife movement across the landscape (connectivity) and reduce barriers to wildlife migration (landscape permeability); increase public understanding and appreciation of the Sky Island Region and importance for sustainable human activities; guide land planning processes to ensure conservation based land management; and promote Wilderness, National Conservation Area, and other protective designations by federal, state, and local governments. For almost 20 years, Sky Island Alliance has been working with numerous partners to build resilience in the region through protection and restoration of cores and corridors, and through the reduction of what are now termed “non-climate stressors.” We have a successful track record of implementing citizen science programs to collect high quality on-the-ground data and observations that are used to inform conservation planning and restoration efforts throughout the region. Sky Island Alliance has a breadth of experience working on assessment and conservation of riparian and aquatic habitats and associated species in the region. We seek to further this critical work and increase resilience in the landscape, as well as ensure climate smart adaptive land management.

Trevor Hare is the Landscape Restoration Program Manager at Sky Island Alliance. As the lead of the restoration program, Trevor has eight years of extensive experience in riparian and upland restoration project development and management, and implementing methods and assessment techniques learned at multiple trainings given by regional watershed restoration experts and federal land management agencies. Through the trainings and implementation of several large projects including the restoration of the largest ciénega in New Mexico and a comprehensive arroyo restoration plan for Las Ciénegas National Conservation Area, he has learned project planning and implementation from some of the leading private and public restoration practitioners and institutions in the western United States.

Trevor currently serves as the Science Advisor for the Coalition for Sonoran Desert Protection, in addition to being a member of Pima County's Conservation Acquisition Commission. He also sits on the board of the Ciénega Watershed Partnership and serves on the Chiricahua Leopard Frog Recovery Team and the Sonora Salamander Participation Team. Trevor graduated from The University of Arizona in 1991 with a degree in Ecology and Evolutionary Biology with a focus on botany. He worked on a long-term project with the Arizona Poison and Drug Information Center studying the impacts of urban and rural development on rattlesnakes. Trevor also has worked as an endangered species biologist doing inventory and monitoring of Mexican spotted owls, cactus ferruginous pygmy-owls, goshawks, southwest willow flycatchers, native fish, and cacti.

Trevor will be the Project Manager and will be responsible for project management across the tasks outlined above and will be involved in all facets of the project including the workshops and data acquisition, the database development, the inventories and assessments, the data analyses and develop climate change adaptation strategies, decision-support tools and recommendations for management. Trevor has accomplished projects similar in scope to this proposed project in the past both as Principal Investigator and as a team member.

Louise Misztal is the Conservation Policy Program Coordinator and GIS Specialist at Sky Island Alliance. Louise holds Bachelors degrees in Microbiology and Ecology and Evolutionary Biology from

The University of Arizona. Over the past seven 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. At Sky Island Alliance, Louise performs spatial analyses to inform conservation planning and implementation of upland and riparian restoration work, and works with a variety of federal, state and county agencies, NGOs and research scientists on natural resource management issues. Louise sits on the steering committee for the Desert LCC and on the advisory team for a USGS-Northern Arizona University study, *Forecasting effects of climate change on federal and state managed wildlife within ecosystems of the arid Southwest*. Louise currently spearheads Sky Island Alliance's climate change adaptation initiative and is leading the development and convening of a series of climate change adaptation workshops for natural resource management in the Sky Island region. Her work focuses on developing and implementing collaborative, cross-jurisdictional strategies for responding to climate change impacts and on building a network of professionals that are sharing knowledge, developing research that is responsive to managers needs and working across jurisdictional boundaries to build resilience at the regional level.

Louise will be the Project Co-manager and will also be responsible for project management across the tasks outlined above and will be involved in all facets of the project including the all GIS work and mapping, workshops and data acquisition, the database development, the inventories and assessments, the data analyses and develop climate change adaptation strategies, decision-support tools and recommendations for management. Louise has accomplished projects similar in scope to this proposed project in the past both as Principal Investigator and as a team member.

The budget is approximately allocated across tasks as follows (with both staff and contractor):

Task 1. 15% to conduct managers and experts workshops to identify priority watersheds for spring and seep assessments.

Task 2. 15% to develop a regional database for housing and serving historic data from cooperating agencies along with new data generated through this project.

Task 3. 40% to conduct spring and seep inventories and assessments using trained volunteers and professional staff and partner personnel.

Task 4. 15% to conduct spatial and temporal analysis of newly gathered assessment data in combination with historical data to identify seep, spring and shallow groundwater of highest conservation value

Task 5. 15% to apply assessments of current spring and seep management in conjunction with land managers and experts to develop climate change adaptation strategies and recommendations for priority areas.

Relevance of the Project to the LCC

Geographic Scope

The proposed project will focus on the Arizona portion of the Sky Island region of the Desert LCC. The full extent of the Sky Island region includes southeastern Arizona, southwestern New Mexico, and northeastern Sonora, and northwestern Chihuahua. This region is located at the heart of the Desert LCC and encompasses a diversity of habitats including low-lying desert and grassland habitat, mid-elevation oak woodlands and high-elevation pine and mixed conifer habitat. The proposed project area is the southeastern Arizona portion of the Sky Island region within the Santa Cruz and San Pedro River watersheds. Watersheds are widely recognized as a functional unit for landscape scale assessment of resources and health and resource planning and conservation.

For this project spring, seep and shallow groundwater inventory and assessment efforts are expected to be conducted in the following watersheds based on the outcomes from the prioritization expert workshop: Upper and Lower Santa Cruz River, Rio Asuncion, Upper and Lower San Pedro River, Pantano Wash - Rillito River, Brawley Wash - Los Robles Wash, Whitewater Draw - Rio Agua Prieta, Willcox Playa,

San Bernardino Valley, and San Simon River. Due to identification of an area of the region known as the Greater Huachuca Grasslands Complex as a high conservation priority by TNC in their Apache Highlands Conservation Priorities report, and due to existing conservation efforts there, we expect a strong project focus on Upper and Lower Santa Cruz River, Upper and Lower San Pedro River and Pantano Wash – Rillito River watersheds. Most of the watersheds within the project area encompass portions of USFS, BLM, State, NPS, and in some cases private, county, and USFWS managed lands.

Relevance of the Project to a Broader Geographic Scope

The grassland valleys and mountain islands of southern Arizona that comprise the Sky Islands support a huge slice of our nation's natural heritage including many native species found nowhere else. The Sky Island region is located at the meeting point of several desert and forest biological provinces with influences from the Sonoran and Chihuahuan desert and Rocky Mountains and Sierra Madre. Sky Island mountain ranges in the region rise to 9,000 plus feet of elevation above the surrounding desert and grassland that start as low as 2,500 feet of elevation. This creates great topographical and biological diversity in a relatively small surface area such that traveling from the base of a mountain to the top can take you from desert scrub habitat up to mixed conifer in a matter of miles. Surface and groundwater resources are of great interest and importance to land and wildlife managers not only in the Sky Island region, but in the greater arid southwest and throughout the Desert LCC. Although wetlands and riparian habitat, ranging from high forest to low desert, constitute less than 2% of the arid western U.S. landscape, these habitats harbor a disproportionate amount of biological diversity. Precipitation is critical to spring and seep resources. Climate change is expected to alter the timing and intensity of precipitation and thus change surface water quantity as well as seasonal patterns of flooding and drought.

The database and methodology (training and utilizing volunteers for long-range monitoring of water resources) will prove to be broadly applicable across the entire Desert LCC region, leveraging the support for this individual project to benefit agencies, communities and most critically conservation efforts across the entire region.

Complementing Existing Efforts Within the LCC

This proposed project is the direct output of findings from two climate change adaptation workshops, convened by Sky Island Alliance in collaboration with a variety of partners including federal and state land and wildlife management agencies in September 2010 and April 2011. The workshops focused on the arid southwest and the Sky Island region respectively. Professionally facilitated through the US Institute for Environmental Conflict Resolution and EcoAdapt, each workshop drew approximately 80 participants representing more than 30 organizations working in the focal regions including federal and state agencies, counties, local governments, conservation organizations, academic researchers, tribes and private landowners. The September 2010 workshop was convened in cooperation with a Desert LCC outreach meeting and was structured to address Sky Island Alliance's goal of developing cross-jurisdiction collaborative adaptation strategies and the LCC's goal of identifying science needs and priorities. The workshops were structured to develop preliminary adaptation plans for habitat types by 1) identifying a specific management effort for adaptation planning; 2) determining specific climate change vulnerabilities based on projected changes potential ecological effects; 3) identifying a suite of potential adaptation responses; and 4) creating a set of adaptation actions and determining next steps. Through the course of these two workshops, spring and seep resources were repeatedly identified as a critical natural resources that support aquatic and terrestrial species in the region, particularly sensitive, threatened or endangered species and as a resource that harbors a high density of biological diversity. These resources were identified as being poorly understood and under-studied and yet were also identified as high priority for conservation in the face of climate change (workshop report available at www.skyislandalliance.org/adaptationworkshop2010.htm).

The proposed project will build on work that has been completed and work that is ongoing by variety of entities in the focus area. The Arizona Water Resources Research Center has developed the Arizona Environmental Water Needs Assessment which will inform this project and which will focus in part on environmental waters of the Sky Island region where there are existing management partnerships such as the Cienega Watershed Partnership. The Arizona Department of Water Resources developed the Arizona Water Atlas with the purpose of supporting water planning and development efforts by providing water-related information on a local, regional and statewide level. Data and syntheses collected through this effort will provide a wealth of contextual information that we will combine with our spring and seep inventory and assessment information for the prioritization and adaptation planning portions of the project. The Sonoran Desert Network of the NPS and particularly Saguaro National Park has an extensive spatial inventory of springs on lands they manage and is working to develop ways to assess potential impacts of climate change on high elevation springs that have a low contributing area. Pima County is working to implement the Sonoran Desert Conservation Plan in which surface water and associated groundwater resources were identified as the most important conservation target in a planning effort that included biological and cultural resources targets. The County needs more information to adequately protect these resources. The Coronado National Forest has completed a locational inventory of range developments, many of which are associated with springs, along with developing spatial data depicting the location of spring resources on the Forest. The Arizona Game and Fish Department has a variety of locational inventory information on springs that resides in various formats ranging from paper data sheets to databases that are no longer updated. This data will be made useful to land managers throughout the region through proposed project outcomes.

Benefits to LCC Partners

The proposed project will provide decision support to managers implementing a variety of established programs in the region including the FireScape program spearheaded by the Coronado National Forest and The University of Arizona, adaptive management planning on the Las Cienegas National Conservation Area, implementation of the Sonoran Desert Conservation Plan, the revision of the Coronado National Forest 15 year Land and Resource Management Plan and designation of a legal system of roads and trails, management of wildlife waters by AZGF and the management of water resources on private land that borders public lands. The greatest benefit they will see however is the watershed and landscape scale of the project which will inform downstream land managers of what is happening upstream and vice-a-versa.

The proposed project will directly benefit the management of spring, seep and shallow groundwater resources within the Desert LCC region. These resources are important as habitat for aquatic species, as sources of water and food for wildlife and, in many areas have cultural significance or support traditional human uses of the land. In addition to directly benefiting these waters, the project will benefit plants and wildlife in the region and will assist organizations such as the Arizona Game and Fish Department in making management decisions related to supporting wildlife in adaptation to climate change. Managers, planners and decision makers currently lack a landscape level understanding of the location and status spring and seep resources they steward which would allow them to make better decisions. This project will develop the information necessary to assess management of spring and seep resources at a landscape level thus supporting management that can be responsive to climate change at a scale that goes beyond individual management units. The project will demonstrate methods for inventorying and assessing sensitive water resources in arid regions through alternative means (trained volunteers), and will build a corps of trained volunteers within the Sky Island region that have the skills necessary to complete further inventory and assessment and long-term monitoring as needed.

Informing Management Actions in the LCC

The outcomes of this project will include cross-jurisdiction inventory and assessment information for spring and seep resources immediately available to resource managers in the region in a format that is

useful for informing decisions, particularly for prioritizing the conservation resources and determining needed management changes. Knowing the location and status of water resources was identified by collaborating organizations as being important for a variety of ongoing efforts including the management of threatened and endangered aquatic species, the management of invasive aquatic species particularly in the context of protecting and reintroducing native species, deciding how to spend restoration and conservation monies, managing wide-ranging wildlife that rely on open water for drinking, understanding how these resources contribute to larger habitat downstream, and providing a baseline of information that can be compared with other climatic and hydrologic factors to understand how these resources are changing. Through this project we will work directly with collaborating agencies to develop climate change adaptation strategies specific to spring and seep resources within the context of watersheds. Where appropriate, these strategies will be cross-jurisdictional and we will focus on developing strategies that are immediately implementable based on current project activities and ongoing collaboration with Sky Island Alliance or other project and LCC collaborators.

This project will also develop a framework and methodology for engaging volunteers as citizen scientists in the inventory and assessment of these resources. Many of the agencies we will be cooperating with maintain their own corps of regular volunteers in addition to the volunteers associated with Sky Island Alliance. Development of a successful program to utilize volunteer efforts to develop new and longitudinal information about these resources is of great interest to these agencies as they look for strategies to monitor sensitive resources and to respond to climate changes while faced with diminished agency resources.

Project Support

Collaboration around inventory and assessment of spring and seep resources was initiated through the two regional climate change adaptation workshops described above. At these workshops participants identified the need for developing a better understanding of the status and value of these resources. Sky Island Alliance followed the adaptation workshop up with directed outreach to land and wildlife managers that were interested in further inventory and assessment of these resources on their land. We convened a meeting of organizations in July of 2011 focused on working with interested organizations to understand their current needs surrounding management of spring and seep resources. The meeting was well attended with representatives from Arizona Game and Fish Department, Pima County, Sonoran Institute, Pima Association of Governments, the US Fish and Wildlife Service, and the National Park Service including the Sonoran Desert Network. Representatives from the Coronado National Forest and the Bureau of Land Management communicated their support and interest when they were not able to make the meeting (see letters of support).

These organizations have expressed a great need for developing a better understanding of spring and seep resources, including their location, hydroperiod and species supported, for both resources on the lands they manage and for these resources throughout the region. These organizations expressed the importance of understanding how spring and seeps they are making management decisions about directly fit into the landscape-level picture of water resources and conservation of species that depend on them.

Letters of Project Support

Please find attached letters of support from Pima County, Santa Cruz County, Pima Association of Governments, the Coronado National Forest and the Tucson office of the Bureau of Land Management.

Dissemination of Results

We will disseminate the results of this project through multiple means including presenting at two regional scientific conferences; through outreach to land and wildlife managers; and, providing access to the seeps and springs database, spatial analyses, and decision-support tools. The spring and seep database created through the project will be accessible through an internet interface that allows people to download

data. Spatial information will be associated with all quantitative and qualitative attributes so that data downloaded from the database will be easily integrated into a Geographic Information Systems (GIS). All shapefiles and other GIS specific data generated through the project will be publically available for download through the Sky Island Alliance website and through partner website to include but not limited to the Climate Adaptation Knowledge Exchange (CAKE) and DataBasin. We will work directly with land and wildlife management agencies to explore the possibility of having the database linked through their website and having spatial data and analyses available through their website. We look forward to make all data, GIS products, analyses and reports available on the Desert LCC website or data hosting portal as it is developed. In the case of sensitive information related to threatened or endangered species, or other sensitive resources we will only make data available as appropriate to project partners.

Methodologies, findings and lessons learned will be published in a white paper that will be available through the Sky Island website and disseminated broadly through the Southwest Climate Change Network managed by the University of Arizona Institute of the Environment, the Arizona Climate Change Network managed by Sky Island Alliance, CAKE and the third and workshop in the regional climate change adaptation workshop series that Sky Island Alliance has been hosting expected to be held in 2013. The third workshop in the series is expected to draw 80 participants from across the Sky Island region representing federal and state agencies, counties, local governments, conservation organizations, research institutions and private landowners. In addition we will publish our findings and a case study in the peer-reviewed literature. Because Sky Island Alliance is involved in a variety of collaborative planning and restoration efforts in the region, we will integrate project results and products into all of our work with land and resource managers in the region. This will include outreach to groups like the Ciénega Watershed Planning Partnership, and the Coronado Planning Partnership. It will also include direct outreach to local land and resource managers that we expect to use the project results and to contribute historic data to the project. We will present initial results of the project at the Madrean Archipelago conference to be held in Tucson in the summer of 2012. We plan to present project results at the Society for Ecological Restoration International Conference to be held in the fall of 2013.

Connection to Reclamation Project Activities

The proposed work will develop new knowledge and information about aquatic, wetland and riparian habitat that support fish and wildlife populations in the Desert LCC and will enhance the management of these areas as key resources for wildlife adaptation to climate change. The project will also develop a better understanding of the status of surface water at springs and seeps as it relates to groundwater basins and watersheds in the region. Within the study area groundwater, and the connection between groundwater and surface water, is a crucial resource for wildlife and plant species, and humans. New and synthesized information developed through the project will contribute to the management of sensitive and endangered aquatic species in the region such as the Gila topminnow and Chiricahua leopard frog and aquatic invasive species such as bullfrogs -- all expected to be affected by climate change.

The study area for this project is located in the Lower Colorado River Basin. The Bureau of Reclamation (BOR) maintains climate research and development activities throughout the Colorado River Basin including projects to improve the understanding of surface water, groundwater, and land cover interactions, and looking at potential impacts from climate change as they relate to groundwater and surface water sustainability. The study area for this project falls within the boundaries of Lower Colorado River Basin Multi-species Conservation Program that is focused on the conservation of habitat for riparian, aquatic and terrestrial species. The knowledge and management benefits derived from this project will contribute to the conservation of surface and groundwater, and habitat for native species within a portion of the Lower Colorado River Basin program area. Within the Lower Colorado River Basin, the project area encompasses the Santa Cruz River watershed where the BOR is working on developing water storage and the San Pedro River watershed where the BOR is involved in developing a watershed-wide plan to protect water resources for humans and the environment. Information developed

through the proposed project will contribute to a understanding of the availability of surface water resources for the environment and to decision-making by managers in the region. Sky Island Alliance does not receive Reclamation project water and the project activities will not involve reclamation project lands of reclamation facilities.

Post-project benefits (performance measures)

We will measure the benefits accrued during this project through multiple means including the cooperation with our project partners; the development and use of the database; the recruitment of volunteers and their effectiveness in collecting inventory and assessment data; and, the development and implementation of the analyses and decision-support tools that will include a springs management network to promote and resource spring conservation activities; the database and associated spatial data that can be used in management planning; a evaluation of inventory and assessment methods, and recommendations for prioritization of methods and focal areas; and a tool box of protection, restoration and management methods. During our preliminary discussion with land, water and wildlife managers of the region in preparation for this project they stressed the importance of our proposed approach to collect in one place all the information already known about our springs, seeps, and shallow groundwater areas and to prioritize inventory and assessment work around knowledge gaps. These partners, USFS, BLM, USFWS, NPS, AZGF, Pima County and Pima Association of Governments, also indicated that they do not know what spring resources exist on neighboring lands nor do they know what management is occurring upstream and downstream from the lands they manage. Through this project we will develop the information and methods these land and wildlife managers need to make informed cross-jurisdictional decisions around the management of these rare resources and disseminate it through multiple means including the climate adaptation workshops, conferences, white papers and technical paper published in the peer-reviewed literature.

Potential environmental impacts

We foresee no negative environmental impacts occurring because of activities proposed in this project. There are no ground-disturbing activities proposed. There is the potential for short-duration animal disturbance and perhaps small amounts of vegetation trampling associated with the inventories and assessments. Because of the nature of the proposed project we will encounter wetlands, endangered and threatened species and cultural resources. We will address these issues in our methodologies and will reduce impacts to plants and animals.

Required permits and approvals

None

Funding plan and letters of commitment

Sky Island Alliance is in the process of securing letters of commitment from project funders. If the project is selected for funding, the letters will be submitted to the Bureau of Reclamation prior to the commitment of funding to the project as required.

Support from both The Kresge Foundation and the Nina Mason Charitable Trust have already been secured (both are three-year approved projects that are currently underway, providing some match-to-date and also significant match moving forward in 2012 and 2013. The match-to-date (since July, 2010 through September, 2011) is applied from the planning and execution of the climate change conferences, subsequent planning meetings and field work/groundtruthing of riparian areas leading to the development of this proposal. As well, match from that same period was applied to the initial development of a complex natural systems database and a framework for an online portal and data-extractable website. The in-kind volunteer effort, as noted elsewhere, is a conservative estimate of the volunteer time that will be contributed to this project based on Sky Island Alliance's last 10 years of field work utilizing hundreds of

volunteers; volunteer effort annually currently totals around 13,000 hours for the entire organization. Sky Island Alliance will or already has contributed (match-to-date) the funding to support the recipient match. Support from the National Fish & Wildlife Foundation (as additional federal support for this project) has already been secured through a Sky Islands Grasslands Initiative multi-year award.

Table 2: Summary of Non-Federal and Federal Funding Sources

Funding Source	Funding Amount
Non-Federal Entities	
The Kresge Foundation	59,242
Nina Mason Pulliam Charitable Trust	10,000
Sky Island Alliance (recipient)	7,595
In-Kind Volunteer Effort	48,400
Non-Federal Subtotal:	125,237
Other Federal Entities	
National Fish & Wildlife Foundation	21,173
Other Federal Subtotal:	21,173
Requested Reclamation Funding:	101,618
Total Project Funding:	248,028

Official resolution

Sky Island Alliance’s Board of Directors meets next on August 20, 2011. At this meeting an official organizational resolution will be adopted regarding this proposal and will identify the official with legal authority to enter into an agreement (Sky Island Alliance’s Executive Director, Melanie Emerson), verify the SIA governing body that has reviewed and offered support for the application submitted, the capability of SIA to provide the amount of funding and in-kind support specified in the funding plan, and agreement that SIA will work with Reclamation to meet established deadlines for entering into a cooperative agreement. This resolution will be executed on August 20, 2011 and submitted within the 30-day allowance indicated in the Funding Opportunity Announcement (prior to September 3, 2011 – 30 days from the August 4, 2011 proposal deadline).

Project budget proposal

Budget format (see Table 3: Project Budget Format on next page)

Budget Narrative

a) Salaries and Wages

Trevor Hare will be the Project Manager and will be responsible for project management across the tasks outlined above and will be involved in all facets of the project including the workshops and data acquisition, database development, inventories and assessments, data analyses and development of climate change adaptation strategies, decision-support tools and recommendations for management.

Louise Misztal will be the Project Co-manager and will also be responsible for project management across the tasks outlined above and will be involved in all facets of the project including the all GIS work and mapping, workshops and data acquisition, the database development, the inventories and assessments, the data analyses and develop climate change adaptation strategies, decision-support tools and

recommendations for management. Louise has accomplished projects similar in scope to this proposed project in the past both as Principal Investigator and as a team member.

A professional informaticist will be contracted to assist us in database development. In addition Sky Island Alliance staff members will be responsible for tasks as outlined below. The informaticist is a contractor that Sky Island Alliance has already identified and who has already contributed paid and volunteer time to develop a complex database for the organization, on which the next phase of development can be based (and thereby significantly reducing the cost of the overall Task #2). The Contractor's non-profit hourly rate for this kind of database development is \$75/hour.

Table 4: Hours by Task

	Task 1	Task 2	Task 3	Task 4	Task 5	Total
Landscape Restoration Project Manager – PI	208	84	208	166	166	832
Conservation Policy Program Coor. – Co PI	312	312	124	250	290	1288
Conservation Field Assistant	-	83	667	84	-	834
Volunteer & Outreach Coordinator	-	-	208	-	-	208
Wildlife Linkages Program Coordinator	-	-	298	-	-	298
Contractor	-	165	-	-	-	165

Tasks

1. Conduct managers and experts workshops to identify priority watersheds for spring and seep assessments
2. Develop a regional database for housing and serving historic data from cooperating agencies along with new data generated through this project
3. Conduct spring and seep inventories and assessments using trained volunteers and professional staff
4. Conduct spatial and temporal analysis of newly gathered assessment data in combination with historical data to identify seep, spring and shallow groundwater of highest conservation value
5. Utilize assessments of current spring and seep management in conjunction with land managers and experts develop climate change adaptation strategies and recommendations for priority areas

Volunteer In-kind (Project Income)

Six volunteer weekends and 9 volunteer day trips for a total of 21 days. Each day is counted as 10 hours, 2 hours of travel and 8 hours of work. Volunteer hours are valued at \$22/hour based on 2010 valuation at http://www.independentsector.org/volunteer_time. We conservatively estimated 10 volunteers per day. 21 days x 10 hours x 10 volunteers x \$22/hour = \$46,200.

In addition volunteer effort will be utilized for data entry in our office. 10 days of 5 hours each with 2 volunteers combines for a total of \$2,200 value of that effort.

b) Fringe Benefits

Sky Island Alliance provides health, dental and vision insurance to all employees employed at .5 FTE or greater. The average cost of premiums per month is \$322.86. The average premium to be covered per employee for the 24 months of the grant period is \$6374. The Quantity represents the FTE equivalent for this project.

c) Travel

Two scientific conference trips by two SIA staff to present findings of the proposed project in 2012 and 2013. The estimated costs are based on the past cost of the Madrean Conference and its location in

Tucson and the current registration, travel and lodging costs associated with the SERI conference (see: <http://www.ser2011.org/en/>).

Madrean Archipelago Biodiversity Conference, Tucson, Arizona, May, 2012

- Two conference registrations. \$250/each = \$500
- Two conference registrations. \$250/each = \$500 (contributed to project by SIA)

Society for Ecological Restoration International Conference, Location TBD, August, 2013

- Two roundtrip plane tickets. \$1500/each = \$3000
- Two registrations to conferences. \$375/each = \$750
- Ten nights lodging. \$100/each = \$2000
- Ten days of per diem at \$35/each = \$350

Total Travel = \$6100

d) Equipment

The YSI Professional Plus Multiparameter Meter unit is capable of fast and accurate measurements of dissolved oxygen, conductivity, pH, and temperature.

The meter is \$1075

The dissolved oxygen and conductivity probe is \$595

The Temperature and pH probe is \$295

Three units at \$1965/each plus shipping = \$6000

Priced based on web search at the time of this proposal. http://www.instrumart.com/products/31356/ysi-professional-plus-multiparameter-meter?s_kwcid=TC|23075|YSI%20professional%20plus||Sp|6896303764&gclid=CLjT5J-csaoCFRNjgwodkFFe8Q

The Magellan MobileMapper 6 Handheld GPS/GIS Receiver with ArcPad software will allow us to take sub-meter locations and measurements of spring attributes.

One unit at \$1,640 plus shipping.

50% is match from NFWF so funding request in the amount of \$875

Priced based on web search at the time of this proposal.

http://www.quantumgear.com/catalog/index.php?manufacturers_id=20&page=1&sort=4d

Nikon Coolpix L110 12.1 MP Digital Camera, 15 x optical zoom, pop-up flash, 14.3 ounce, 28mm wide-angle coverage and macro shooting capability.

Four at \$220 plus shipping = \$950

Priced based on web search at the time of this proposal.

http://www.google.com/products/catalog?oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&q=Nikon+Coolpix+L110&um=1&ie=UTF-8&tbm=shop&cid=14262035304449426114&sa=X&ei=1kE4Tra2Je_YiAKfqfTtDg&ved=0CHsQ8wIwAQ

Total Equipment = \$7,825

e) Materials and Supplies

Field supplies, such as field forms, clipboards, tape measures, etc, to collect in data.

5 reams of recycled paper at \$10/each = \$50

5 clipboards at \$5/each = \$25

2 tape 50 meter tape measures at \$50/each = \$100

5 invertebrate identification guides at \$30/each = \$150
Miscellaneous \$200

Total field supplies = \$525

f) Contractual

We will contract with an expert to help us with our database needs. Database programmer, 165 hours and \$75/each = \$12,500 of which Sky Island Alliance has identified already invested \$5000 into the project since July, 2010 and is included in the budget as recipient match.

g) Environmental and Regulatory Compliance - Not Applicable

h) Reporting

40 hours of project Co-PI Louise Misztal have been allocated along with volunteer in-kind hours to compile field data, complete necessary analyses and write financial and program performance reports as identified in the FOA.

i) Other

Assessment Travel

Twenty field trips will be undertaken including weekend volunteer outings, single day field trips with staff, volunteers and agency personnel, and out-of-town meetings.

Nine single day. 200 miles roundtrip at \$.50/mile = \$900

Six weekend. 300 miles roundtrip at \$.50/mile = \$900

Five out-of-town meetings. 200 miles roundtrip at \$.50/mile = \$500

35 per diems at \$15/each = \$525

Total travel = \$2825

Joint Costs – rate \$9,000 per 1 FTE

Sky Island Alliance pools joint costs and treats as direct cost, allocating shares to each cost center as stated in OMB circular A-122. This includes rental cost of office space, phone and internet connections, office supplies maintained for general use (such as toner for printers, paper, pens), depreciation and insurance. The rate of \$9,000 per 1 FTE for budget purposes is derived from trends in expenses in each of these categories over the past 3 years. The actual joint costs expensed to each cost center is determined by distributing all expenses that meet the criteria of a joint cost, in that they are necessary expenses for each cost center but due to the nature of the expense a method of distribution is necessary. Sky Island Alliance distributes these based on percentage of effort expended in each programmatic cost center as well as fundraising and administration. The effort expended is determined by timesheets submitted by all staff.

j) Indirect Costs - 11%

Sky Island Alliance will initiate negotiation of Indirect Cost Rate with the Federal Government with approval of application. For budgeting purposes the Indirect Rate of 11% represents the percentage of administrative costs in our 2009 990 IRS filing.

k) Contingency Costs - Not Applicable

l) Total Cost

The total cost of this two-year project, which fulfills Task Areas B and C of the FOA is \$248,028 with \$101,618 requested from the Bureau of Reclamation, \$125,237 of non-federal match and \$21, 173 match from the National Fish and Wildlife Foundation (federal).

TABLE 3

Springs and Seeps Inventory, Assessment and Management Planning Project BUDGET

A Sky Island Alliance Proposal to the Desert Landscape Conservation Cooperative WaterSMART Applied Science Grants
FOA No. R11SF81307
August 4, 2011

BUDGET ITEM DESCRIPTION	Unit and Unit Quantity	COMPUTATION	FTE	FUNDING			TOTAL COST (24 months)
				RECIPIENT FUNDING	FROM OTHER PARTNERS	BOR FUNDING	
SALARIES AND WAGES							
Trevor Hare, Landscape R		Annualized	51299	0.20	12,565	20,520	33,085
Louise Miztal, Conservat			48628	0.30	48,393	29,177	77,569
Conservation Field Assis			34762	0.20	13,691		13,691
Volunteer & Outreach Coor			41668	0.05		3,476	3,476
Wildlife Linkages Program			41668	0.07	5,970		5,970
*Volunteer Effort: Field (2)			22	2100.00			
*Volunteer Effort: Data Mgr			22	100.00			
FRINGE BENEFITS							
Full-time & part-time employees							
Average Hra			3874	0.82		6,374	6,374
TRAVEL							
Madrean Archipelago Biodi			250	4.00		500	1,000
Society for Ecological Rest			375	2.00		750	750
Travel			1500	2.00		3,000	3,000
Per Diem			35	10.00		350	350
Lodging			200	5.00		1,000	1,000
EQUIPMENT							
YSI Professional Plus Multi			1995	3.00		5,985	5,985
Magellan MobileMapper 6 I			1675	1.00	838	838	1,675
Nikon Coolpix L110 12.1 M			250	6.00		1,000	1,500
SUPPLIES/MATERIALS							
Office Supplies						350	350
Field Supplies (clipboards, tape measures, etc.)						500	500
CONTRACTUAL							
Database Programming (Ei			165	75.00		7,500	12,500
REPORTING							
Louise Miztal, Conservat			48628	0.02		935	935
OTHER							
Assessment Travel							
Mileage to as			4600	0.50		2,300	2,300
Per Diem			15	35.00		525	525
Joint Costs, \$9,000 per 1 F			9000	0.82		7,403	7,403
TOTAL DIRECT COSTS							
						55,335	81,455
						91,548	228,338
INDIRECT COSTS							
				0.11		660	10,070
						8,960	19,690
TOTAL PROJECT COSTS							
						55,995	90,415
						101,618	248,028



Partnering • Planning • Projecting

August 1, 2011

RE: Federal funding opportunity No. R11SF81307
Sky Island Alliance Grant Application: *Spring, Seeps and Shallow Groundwater Inventory, Assessment and Management Planning Project*

To whom it may concern:

Pima Association of Governments' (PAG) Watershed Planning Program supports the proposed Sky Island Alliance's (SIA) project to inventory and assess springs, seeps and shallow groundwater areas. The proposed project would cover areas of immediate interest to PAG and our jurisdictions. The inventory and assessment of seeps and springs and development of a regional accessible database would be invaluable to our understanding of water availability in rural natural areas in our region.

Seep and springs are resources that are critical to native species and are greatly valued by our citizenry. Our rare riparian areas are critical in the survival of the majority of our region's wildlife and the strong conservation ethic in our region has shown support for the preservation of these water resources.

PAG's Watershed Programs focuses on regional planning and data provision in order to promote and assist our member jurisdictions to make wise regional planning decisions. Toward that end, PAG has mapped geographic extent of important shallow groundwater areas and intermittent streams in Pima County and has additionally worked with other organizations to share information about the valuable resources provided by riparian habitats. Over the years, PAG has worked with Pima County to manage, maintain, and improve habitat and stream conditions. PAG also provides critical drought information to state reporting systems, agency managers, planners and well owners in shallow groundwater areas.

The SIA project will fill an important data gap in understanding our riparian and shallow groundwater system through its seep and spring inventory project. Since rural areas in our region depend on groundwater for drinking supplies, this information has an added human health and welfare element. In addition, the citizen scientist portion of the project will help educate key individuals about the importance of these critical resources. The regional database portion of the project will greatly aide our region's ability to access and monitor spring and seep health in the face of rising temperatures and increased drought conditions associated with climate change. In addition, the project's focus on development of climate change adaptation measures will make us more able to protect our fragile resources from these threats.

Sky Island Alliance has worked closely with PAG staff in the past and it has been a great source of information in our region. Our office should be able to assist the project by supplying shallow groundwater and riparian information, and we will gladly provide professional input as part of a team of water professionals and agency personnel.

Sincerely,

Claire Zucker
Pima Association of Governments
Watershed Planning Manager

Mead Mier
Pima Association of Governments
Senior Watershed Planner



Pima County
Office of Sustainability and Conservation

Trevor Hare
Landscape Restoration Program Manager
Sky Island Alliance
300 E University Boulevard Suite 270
Tucson Arizona 85705

July 28, 2011

Dear Mr. Hare,

Pima County strongly supports the project entitled "Springs, seeps and shallow groundwater inventory, assessment, and management." Springs, seeps and shallow groundwater resources are of critical importance in maintaining the biodiversity of the region, a fact that was recognized throughout the development of the County's Sonoran Desert Conservation Plan (SDCP). In fact, surface water and associated groundwater resources were identified as the most important conservation target in a planning effort that included biological and cultural resource conservation targets. Since that time, Pima County has been collecting limited information on springs, seeps, and shallow groundwater, but more information is needed to adequately protect these resources. The proposed program will achieve this objective and provide a means to engage citizens in their monitoring and management. The inclusion of citizens into the process has been a key to the success of the SDCP and other monitoring and management activities in the region, including Sky Island Alliance's carnivore tracking program.

Pima County believes that Sky Island Alliance (SIA) is uniquely qualified to undertake this effort, for two principal reasons. First, SIA has a proven track record in bringing scientists, practitioners, and the public into both dialogue and action. Such collaboration is critical on a project of this temporal and spatial scope. Second, SIA is a recognized leader in engaging citizens in the collection of information and participation in management action actions such as restoration.

Pima County looks forward to working closely SIA in this exciting new endeavor.

Sincerely,

A handwritten signature in black ink, appearing to read "Brian Powell". The signature is fluid and cursive, with the first name "Brian" being more prominent than the last name "Powell".

Brian Powell, M.S.
Program Manager



**Santa Cruz County
Community Development Department**

Airport - *Larry Tiffin*
Building - *Robert Banzhof*
Central Permits - *Norma Northcross*

Mary Dahl, Director

August 1, 2011

To whom it may concern:

I am writing today to lend support to Sky Island Alliance's proposed project to inventory and assess springs, seeps and shallow groundwater areas of the Sky Island region, including sites in Santa Cruz County, in order to develop critical baseline and decision support information that will help conserve these critical resources. This letter is in support of their application for federal funding opportunity No. R11SF81307.

In the Sky Island region of the arid southwest, water resources are critical. While aquatic, semi-aquatic and riparian habitats occupy less than 1% of the state of Arizona's land base, 60-75% percent of resident wildlife species depend on these habitats to sustain their populations. These sites can harbor 100-500 times more species than the surrounding arid landscape. These rare resources are of high biological value as a source of water for wildlife, create rare habitats, and can provide thermal refuge in a harsh environment.

This project proposes to fill an important data gap by creating a spring, seep and shallow groundwater database that is focused at the regional level and includes data and information from a variety of sources.

The County is interested in the geographic information mapping project outcomes. We can immediately use this data to inform discussions about development strategies and limitations. Although our GIS program is embryonic at this time (compared to the enormous potential of this tool), we are constantly interested in new data that will help and our decision-makers "see" the impacts and benefits of their land use decisions.

We are excited about this project as we recognize the importance of springs and seeps not only to wildlife and plants but also to human well-being. We look forward to working with Sky Island Alliance to develop critical baseline information on these resources and to craft management strategies we can institute collaboratively to protect and, when necessary, restore them.

Should you need anything further from me, let me know.

Best regards,

A handwritten signature in black ink that reads "Mary Dahl".

Mary Dahl
Director



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: July 29, 2011

Trevor Hare
Landscape Restoration Program Manager
Sky Island Alliance
P.O. Box 41165
Tucson, AZ 85717

Dear Mr. Hare:

I am writing today to lend support to Sky Island Alliance's proposed project to inventory and assess springs, seeps and shallow groundwater areas of the Sky Island region in order to develop critical baseline and decision support information that will help conserve these critical resources in the face of climate change. This letter is in support of federal funding opportunity No. R11SF81307.

The Coronado National Forest (NF) has primary responsibility for managing 1.78 million acres of National Forest Lands in Southeastern Arizona. These lands include much of the region known as the Madrean Sky Islands, widely scattered mountain ranges that serve as the watershed for adjacent grasslands and desert valleys. My staff is currently in the process of revising the Coronado National Forest Land and Resource Management Plan. As part of this process, a comprehensive assessment of current conditions revealed that the species at greatest risk within the boundaries of the Coronado NF are those that depend on aquatic environments. We are also currently conducting a comprehensive watershed condition assessment, and identifying priority watersheds in which to apply treatments to improve conditions.

These assessments, as well as a number of other studies, have identified changing climate conditions as a future threat to sustaining the wildlife and ecosystems within the Coronado NF, especially those that depend on mesic or aquatic environments. Your project proposes to fill an important data gap by creating a spring, seep and shallow groundwater database that is focused at the regional level and includes data and information from a variety of sources. This database will be immediately useful to us as we develop our Forest Plan, and continue to conduct our watershed condition assessment, which will inform management decisions and allocation of limited resources.



Our recent assessments highlight the importance of springs and seeps not only to wildlife and plants but also to human well-being. We look forward to working with Sky Island Alliance to develop critical baseline information on these resources and to craft management strategies we can institute collaboratively to protect and restore them in the face of climate change.

Sincerely,



JIM UPCHURCH
Forest Supervisor

cc: Robert Lefevre, Salek Shafiqullah