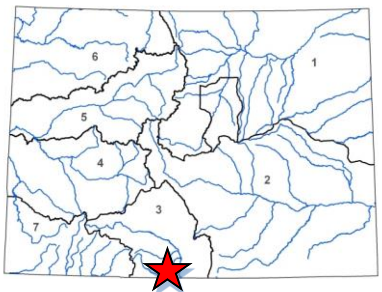
Colorado Watershed Restoration Program Application

Upper Culebra Watershed Assessment
Costilla County Conservancy District

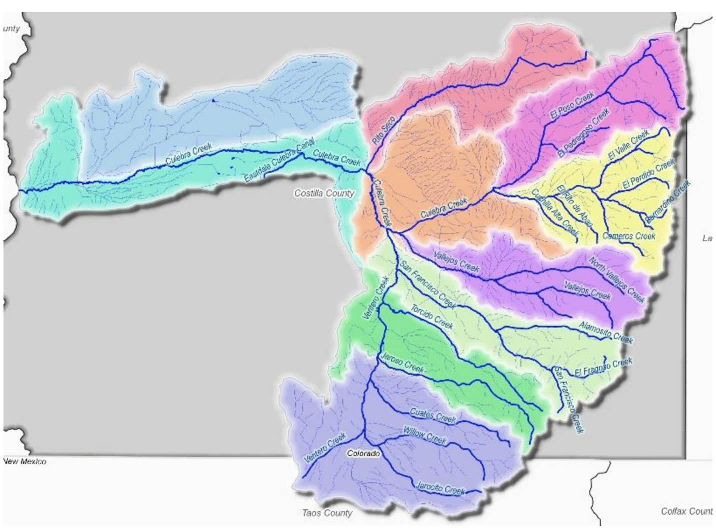
January 2020 Board Meeting



LOCATION	
County/Counties:	Costilla
Drainage Basin:	Rio Grande

DETAILS	
Total Project Cost:	$865,459
Colorado Watershed Restoration Program Request:	$399,831
Recommended amount:	$399,831
Other CWCB Funding (CWP Pending w/ 2/1/2020 application):	$177,225
Other Funding Amount:	$260,403
Applicant Match:	$28,000
Project Type(s): Watershed Plan/Assessment	
Project Category(Categories): Watershed and Stream Restoration	
Measurable Result: Riparian, Aquatic Habitat, Flow Regime, Water Quality, Forest Health, Grazing, Wildlife, Land Use, Geomophology, Infrastructure, and Emergency Management Assessments	

The lead for the Upper Culebra Watershed Assessment project will be the Costilla County Conservancy District. The District is a political subdivision of the State of Colorado, organized pursuant to C.R.S. 37-1-101, et. seq. The District's jurisdictions include approximately 14,373 parcels within the southern half of Costilla County. The District was organized under the Conservancy Law of Colorado on May 26 of 1976. District priorities include recreation, water quality, water augmentation, and watershed restoration and protection.



The Upper Culebra Watershed Assessment (UCWA) is a stakeholder driven watershed assessment that encompasses the Upper Culebra Basin, from the headwaters, on Culebra Peak, to the valley at San Acacio. There are many environmental challenges facing the Upper Culebra watershed, including: extended drought, forest fire potential, extensive beetle kill, water quality impairments, endangered species, degraded habitat, and other anthropogenic impacts. While stakeholders recognize the vital need to implement projects to address these concerns, the current condition of the Upper Culebra Watershed is largely undocumented.

The UCWA will assess the ecological condition of the Upper Culebra watershed by collecting, compiling, and analyzing data characterizing: riparian habitat, geomorphology, geology, adjacent uplands, water infrastructure, aquatic habitat, flow regimes, grazing, forest health, and water quality through the collection of new data and the analysis of existing data. This project will result in a comprehensive assessment of the Upper Culebra Watershed that partners, including our watershed group, federal, state, and local entities, and private landowners, can use to prioritize, secure funding, and implement collaborative, multi-benefit projects that improve the health and resiliency of the Upper Culebra Watershed. The data will be used to create reports, which will be included in the final Upper Culebra Watershed Assessment Report. The UCWA will summarize the causes of current and potential future degradation and prioritize projects for implementation to improve watershed health for ecological and sustainability benefits.

COLORADO WATERSHED RESTORATION PROGRAM
GRANT APPLICATION
August 2019

Upper Culebra Watershed Assessment

Project Title: Upper Culebra Watershed Assessment
Project Location: Southern Costilla County, Colorado. 37.2050° N, 105.5005° W
See map (page:)
Grant Type: Watershed/Stream Restoration/ and/or Protection/Restoration
Requested Amount: $399,831.00
Cash Match: $ 417,628.00
Applied For: $ 359,821.00
In – Hand: $ 57,807.00
In-kind Match:$ 48,000.00
Project Sponsor: Costilla County Conservancy District
324 Main Street
San Luis, CO 81152
Contact Person: Ronda Lobato
719-992-1472
lobator@costillaccd.org

Description of Project:

The Upper Culebra Watershed Assessment (UCWA) is a stakeholder driven watershed assessment that encompasses the Upper Culebra Basin, from the headwaters, on Culebra Peak, to the valley at San Acacio. There are many environmental challenges facing the Upper Culebra watershed, including: extended drought, forest fire potential, extensive beetle kill, water quality impairments, endangered species, degraded habitat, and other anthropogenic impacts. While stakeholders recognize the vital need to implement projects to address these concerns, the current condition of the Upper Culebra Watershed is largely undocumented.

The UCWA was prompted and organized by the Costilla County Conservancy District (CCCD) in partnership with the Land Rights Council (LCR), the Sangre de Cristo Acequia Association (SdCAA), Herederos, Colorado Parks and Wildlife (CPW), Natural Resources Conservation Service (NRCS), Costilla County Emergency Managers, Land Use Department, and Commissioners, Colorado Open Lands, and community stakeholders. Project partners make up a Technical Advisory Team that will assist the hired contractor with project activities and prioritizing recommended projects for implementation.

The UCWA will assess the ecological condition of the Upper Culebra watershed by collecting, compiling, and analyzing data characterizing: riparian habitat, geomorphology, geology, adjacent uplands, water infrastructure, aquatic habitat, flow regimes, grazing, forest health, and water quality through the collection of new data and the analysis of existing data. This project will result in a comprehensive assessment of the Upper Culebra Watershed that partners, including our watershed group, federal, state, and local entities, and private landowners, can use to prioritize, secure funding, and implement collaborative, multi-benefit projects that improve the health and resiliency of the Upper Culebra Watershed. The data will be used to create reports, which will be included in the final Upper Culebra Watershed Assessment Report. The UCWA will summarize the causes of current and potential

future degradation and prioritize projects for implementation to improve watershed health for ecological and sustainability benefits.

Qualifications Evaluation (Maximum of 20 points)

Identify the lead project sponsor and describe the other stakeholders' level of participation and involvement.

The lead for the Upper Culebra Watershed Assessment project will be the Costilla County Conservancy District. The Costilla County Conservancy District ("District") is a political subdivision of the State of Colorado, organized pursuant to C.R.S. 37-1-101, et. seq. ("Conservancy Law of Colorado"). The District's jurisdictions include approximately 14,373 parcels within the southern half of Costilla County ("County"). The District was organized under the Conservancy Law of Colorado on May 26 of 1976. This Service Plan ("Plan") has been developed in accordance with the requirements of the Conservancy Law of Colorado and as included recreation, water quality, water augmentation, and watershed restoration and protection as it top priority. In 2018 the district held an election to remove TABOR restrictions and allow the District to seek grant funds, such as these, to support watershed health. The proposal won with overwhelming support, giving the district the ability to raise grants funds to support such projects.

Together with their partners the District held over 16 stakeholder outreach meeting to better understand landowner and community concerns and identify needs. It was from these meetings that the Project partners were chosen to make up a Technical Advisory Team that will assist the hired contractor with project activities and prioritizing recommended projects for implementation. Together they developed an RFP and identified four partner categories: Funding, Technical, Advisory and Oversight.

Funding Partners include the LOR Foundation, Gates Family Foundation, Costilla County Commissioners, Costilla County Emergency Managers, Colorado Parks and Wildlife, and Colorado Open Lands who will help with proposal writing.
Technical Partners: Tailwater Limited, RedFish Environmental, AloTerra Restoration Services and SWCA Incorporated. This group will be collecting, interpreting and analyzing data.
Advisory partners include a representative from the Land Rights Council (LCR), the Sangre de Cristo Acequia Association (SdCAA), Herederos Grazing Association (HGA), Costilla Conservation District (CCD), Colorado Parks and Wildlife (CPW), Colorado State Forest Service (CSFS) Natural Resources Conservation Service (NRCS), Rio Grande Headwaters Restoration Foundation (RGHRF), Costilla County Emergency Managers, Land Use Department, and Commissioners, Colorado Open Lands, the Rio Grande Basin Roundtable and the Trinchera Ranch Foester. This group will support the technical partners as needed.
Oversight Partners include: Land Rights Council (LRC), the Sangre de Cristo Acequia Association (SdCAA), Herederos Grazing Association (HGA), Costilla Conservation District (CCD), Colorado Parks and Wildlife (CPW), Colorado State Forest Service (CSFS) Natural Resources Conservation Service (NRCS), Costilla County Emergency Managers, Land Use Department, and Commissioners, Colorado Open Lands and the Trinchera Ranch Forester. Will review the process and final product.

Specify in-kind services and cash contributions (match) amount for the proposed activities. See section B.2 of the grant program guidance to determine match funding requirements. Discuss whether other funding sources are secured or pending. 10 points

Organizational Capability (Maximum of 30 points)

What is the applicant organization's history of accomplishments in the watershed? Provide several past project or planning examples. List partner organizations and agencies with whom applicant worked to implement past projects or planning efforts.

The Costilla County Conservancy District has completed the following projects:

- Led the San Marcos Pipeline water export defense. The district provided the legal defense and organization of partners that included the Division of Water Resources
- Water quality monitoring of effluent discharge at the Newmont Mine site. The work at the mine began in January 2008. The district worked with the Newmont, CDHPE, Costilla County Water and Sanitation and the Colorado Division of Mining to collect and analyze samples on a monthly basis and then provide that information to the community.
- Working to obtain water rights to be used as a supplemental water source for surrounding agricultural operations. Partners for this project include Costilla County, SdCAA,
- Served in an advisory role to help develop recreational opportunities within their service area. Partners include Costilla County Commissioners, Town of San Luis, Colorado Open Lands, and Great Outdoors Colorado
- The Upper Culebra Watershed Assessment will be the first whole watershed project done in the area. The district held a special election in 2018 and the community supported the removal of the TABOR Restrictions. With this barrier removed the District went to local organizations the Rio Grande Restoration Foundation and Colorado Open Lands to outline project goals, do comprehensive stakeholder outreach, create an RFP and develop advisory and oversight teams and a funding partners list.

What level of staffing will be directed toward the implementation of the proposed project/planning effort? Discuss the number of staff and amount of time dedicated for the project. Will volunteers be utilized, and if so, how? Include brief resumes for each member of the active project team.

Costilla County Conservancy District has one fulltime project manager that will handle all aspects of the project. This includes access agreements, ingress/egress agreements, outreach to the community, data review, grant reporting, timeline management, payment requests, volunteer recruitment and final deliverable review.

The Tailwater team has built in 4 oversight team meetings (pre, during, and post assessment); 3 community meetings in San Luis (before field work, during field work and assessment findings presentation). Additionally, they have included for each of the 12 tasks Desktop Assessment to include: Compiling existing data sets including aerial imagery, National Land Cover Datasets, disturbance layers, LiDAR, and diversion records and evaluate course level assessments and data gaps. The findings will be used to develop a preliminary assessment of the basin, identify appropriate stratification strategies to develop the field sampling plan.
A Field Assessment to include: Meeting with the technical advisory committee (TAC) and other stakeholders to confirm and/or refine the sampling plan and monitoring protocol based on existing data sets, TAC monitoring goals, and resources available. Use a combination of objective sampling points and rapid assessment methods to evaluate conditions within each drainage. Sampling will be completed such that the protocol is repeatable throughout the watershed, by various observers, and over time. Areas identified with severe degradation will be evaluated for probable cause of degradation and recommended projects or management practices will be added to the priority project list.

The project will use volunteers to do water sampling, forest assessment, and range protocols. Any volunteers on the project will be covered by the Tailwater Limited liability umbrella. Additionally, all volunteers will undergo a data protocol training session and will be supervised by a project team to insure scientific consistency of all data collected.

The assessment team is led by Tailwater Limited with specialized services provided by RedFISH Environmental, AloTerra Restoration Services, and SWCA Incorporated. The teams have significant overlap to provide flexibility in scheduling with additional depth and work-load capacity to perform the assessments.

- **Tailwater Limited** will lead field project management, flow regime, water quality, geology/geomorphology and infrastructure assessments. They will also guide priority projects development. Tailwater Limited is a woman owned Colorado Disadvantaged Business specializing in project organization, data collection and data analysis. They specialize in bathometric surveys and GAT tool assessment. Tailwater has completed projects that include the City of Aurora, Channel Stability Study and the Technical Review of the Columbia Habitat Monitoring Program's: Protocol, Data Quality, & Implementation Project. Tailwater Limited typically works as part of a consortium of multi-disciplinary companies and organizations to complete projects with varying goals and objectives.
- **RedFish Environmental** will lead the aquatic habitat assessment. Redfish Environmental is an environmental consulting firm with an extensive record of delivering high quality products on time, on budget, and according to client specifications. RedFish is an SBA certified 8(a), small, economically disadvantaged company providing environmental planning, permitting, restoration, monitoring, and compliance services to a wide range of stakeholders including private corporations, regulators, and conservation groups. RedFISH has designed and successfully implemented small and large-scale projects across most of the major physiographic provinces of the western U.S. including the Rocky Mountains, the Great Basin, the Desert Southwest, Alaska, and the Pacific Northwest
- **AloTerra Restoration Services** will lead the riparian habitat assessment. From local parks to watershed scale projects AloTerra designs and constructs diverse, highly functioning landscapes within the context of community needs and values. AloTerra staff provide ecological assessments tailored to the project needs, effective and efficient project management, concept through construction-ready designs, stakeholder engagement, construction and revegetation services, and regulatory services for a great variety of projects. Their completed projects include: Upper Poudre Post-Fire Unmet needs (CO). Public and Private Lands and the Living Streambanks: A Manual of Bioengineered Treatments for Colorado Streams (CO).
- **SWCA Inc.** will lead the forest health, grazing, wildlife, historic land use, and adjacent upland assessments. Since 1981, SWCA has helped public and private clients overcome environmental challenges and move their projects forward. Our 100% employee-owned firm offers comprehensive environmental planning, regulatory compliance, and natural and cultural resources management services. Projects include the Goose Creek Watershed Study and the City of Sheridan Ecosystem Restoration project.

Complete project resume for all partners is attached. The technical partners will work together to assist assessment leads to ensure all data is thoroughly and thoughtfully collected and analyzed.

Demonstrate that the project budget and schedule are realistic. Please use the budget/timeline spreadsheet attached to the application. Please note that the start date will take place after funding awards are announced and grants arecontracted. 10 points

The Costilla County Conservancy District sent out an RFP in December of 2018. We received 5 bid proposals. The majority of the proposals were going to rely on existing data existing data as the only source of the assessment. The Upper Culebra Watershed is privately owned, so very little reliable data is available and is fragmented or out of date. Therefore, the review team chose Tailwater Limited, because the Tailwater proposal would use existing data as a baseline and then fill in the gaps using on the ground assessment teams to collect and process data. Their proposal also included community

volunteers an aspect that was very important to stakeholders.

Proposal Effectiveness (50 points)

What information is the project sponsor using to develop the proposed plan or project? Include any relevant information regarding existing watershed plans, stream management plans, geomorphic assessments, flood studies, fire protection plans, riparian conditions assessments, aquatic/terrestrial habitat conditions, wildlife studies, and/or river restoration reports. 10 points
The information about the Upper Culebra Watershed is sparse at best. The Costilla Water Conservancy District sought out partners to better understand the upper watershed conditions. The District heard from the Colorado State Forest Service who described the upper watershed forest condition from the recently completed Colorado State Forest Resource Assessment. James Fischer, the Trinchera Ranch Forester, who manages 100,000 forested acres just north of the Culebra Watershed, shared their Sustainable Forest Initiative assessment and management plan. The District heard from Colorado Parks and Wildlife, District Wildlife Manager, Conrad Albert, who described the wildlife corridors, their conditions and the state of the wildlife that are using them. They also helped understand riparian condition and the disconnect between streams and the adjacent riparian areas and the degradation of those riparian area. We heard from NRCS, Area Rangeland Specialist, Cynthia Villa, who described the degradation of range conditions that exist across the Valley and the threat this is causing for ranchers. The District consulted with the Colorado Rio Grande Restoration Foundation staff, Emma Reesor and Daniel Boyce. We reviewed their upper, middle and lower Rio Grande assessments, and the projects that were implemented as a result of those assessments. We also reviewed their stream management plan and process and how that implementation is working. Finally, we worked with longtime partner Colorado Open Lands, to understand the work that they are doing in the lower watershed and how that work could be augmented by the Upper Culebra Watershed Assessment. We also spent considerable time working with partners from the Rio Grande Basin Roundtable to explore funding options, assessment necessity, and RFP creation.

Discuss the multiple objective aspects of the project and how they relate to each other. Describe similar activities in the watershed and how this project or plan complements but does not duplicate those activities. Multiple objectives may include (but are not limited to) channel stabilization, riparian re-vegetation,habitat improvement, recreation opportunity enhancement, natural hazard reduction,flood mitigation, water supply delivery improvement, fish migration improvement, ephemeral/intermittent channel stabilization, and upland erosion mitigation. 30 points
The objectives of this project are to evaluate the natural resources within the basin to better understand the basin to drive projects and management decisions to protect existing resources, improve degraded conditions, reduce community risk, and improve community resiliency. The project takes a peak to valley approach and includes evaluating plant community composition and health, wildlife and aquatic habitat, and diversions and water related infrastructure within the basin. The project is tailored to evaluate how water and sediment flow through the system in routine and extreme flow conditions and how the water quality changes through the system. The data collected will be used to model the what-ifs in disaster and disturbance planning including fire, infestation, and drought. Floodplain connectivity and fluvial landscapes will be assessed looking at how this affects the rate at which water moves through the system, the stream power associated with floods and dissipation areas (fluvial hazard zones), and the effects on aquatic and riparian communities.

The project will assess existing data sets available through stakeholders and public resources to identify and compile data. From these existing data sets the field assessments will be developed to complement and improve the understanding of the natural resources within the basin. Methods will be adjusted to align with existing data as needed to ensure trend assessments and comparisons can be completed where

possible. Methods will be documented to allow future efforts to expand on data sets and evaluate trends within the basin.

In addition to documenting the conditions within the basin the project is developed to utilize community members and volunteers to broaden the impact of the assessment and provide hands on experiences that can shape the community and spread awareness of the assessment and the overreaching objectives.

The assessment is the first step in collecting the data to develop projects that improve conditions within the basin, reduce risk, and protect natural resources. The data collected and data collection activities will be used to educate the community on best management practices provide opportunities to identify collaborative projects that will improve habitat, mitigate flooding, and improve water supply reliability.

Describe the proposed monitoring or implementation plan. How will the project or plan measure success of its objectives? 10 points

The proposed monitoring includes baseline assessment and inventory of resources within the basin. Where appropriate sample sites will be selected based on stratified site conditions to provide adequate sample of conditions that will be used to characterize conditions in the basin. An overview of the assessments follows:

- Infrastructure assessment evaluates bridges, diversions, and return flows for operation during floods, drought, and routine operations.
- Vegetation assessments will evaluate composition and condition of the plan communities including forests, pastures, riparian, and upland areas.
- Geomorphology assessments will evaluate the stability of slopes and channels within the basin including areas of sediment supply and areas at risk of slope failure during and after a disturbance event such as fire or insect mortality.
- Wildlife inventory and assessments will evaluate habitat condition specific to threatened and endangered species, areas with high potential for human-wildlife conflict, and threats to wildlife and habitat.
- Grazing assessment will evaluate range conditions, existing infestations of invasive species, and current use by livestock and wildlife including communal grazing areas and aspen stand conditions.
- Forest health assessment will evaluate forest composition, forest health, and disturbance history. These assessments will determine areas of greatest concern to target restoration and management to improve forest health and reduce community risk.
- Water quality assessment will collect spatially distributed samples of water quality including standard field parameters, nutrients, and metals.
- Flow regimes assessment will compile available records of water use within the basin including place and timing of use and conduct interviews to supplement data sets to identify opportunities to improve water administration within the basin and develop cooperative agreements to provide water at the right time and place.
- Aquatic habitat assessment will sample conditions within the basin based on habitat suitability index protocols including riparian habitat conditions and evaluate barriers that protect or prohibit population abundance.
- Riparian habitat assessment includes primary hydroseres: bank, overbank, and terrace and canopy cover classes including upper- and mid-canopy cover, understory shrub cover, and ground cover.
- Historic use assessments will be used to provide additional community context to the assessments and support the findings of the measurements from multiple viewpoints.

The success of the project will be measured by the identification of priority projects that can be implemented to improve conditions within the basin. The long-term success of the project is measured by the implementation of the projects and agreements that improve the conditions within the basin in a way that protects community values.

ATTACHMENTS – Please complete the attached scope of work and budget/timeline template. Other documents may be attached to the application in order to support the request for funding. These may include:

- If the project is an implementation project, the applicant is encouraged to include a copy of the watershed plan on which the proposal is based; if such a plan exists (it may be appropriate to provide a link to any such plan)
- Letters of support from other entities and letters of financial commitment
- Pertinent still photos
- Maps and project coordinates (GIS shapefiles if available)

Scope of Work

GRANTEE and FISCAL AGENT: ***Costilla County Conservancy District***

PRIMARY CONTACT: ***Ronda Lobato***

ADDRESS: ***324 Main Street, San Luis, Colorado 81152***

PHONE: ***(719) 992-1472***

EMAIL: **lobator@costillaccd.org**

PROJECT NAME: ***Upper Culebra Watershed Assessment***

GRANT AMOUNT:

INTRODUCTION AND BACKGROUND

The Culebra Watershed is home to some of the oldest farms and permanent settlements in all of Colorado. Their rich agricultural history began as riparian long-lots, which were delineated in 1844, as part of the historic Sangre de Cristo Land Grant. The original settlers who came to the area received a narrow parcel of land called a *vara;* these properties extend perpendicular to the waterways so that settlements could maximize the number of people who could access water for irrigation, livestock and farming. The waterways created to irrigate the varas are community ditches called acequias. Culebra Peak, Colorado's only entirely private fourteener, known locally as La Sierra, stands sentinel at the eastern boundary of the acequia farms, which begin in the foothills of the mountain tract and extend westward to the valley floor. The original settlers took advantage of this natural contour to flood irrigate their land as creeks flowed from the upper watershed down toward the Rio Grande. Today, there are over 400 Hispano farming families who irrigate from the very same acequias hand-dug by their descendants over 150 years ago. These families continue to embrace the philosophy brought from Spain by their ancestors that water is so essential to the life in the watershed, that it must be shared and protected by all community members. The upper watershed is home to seven aboriginal strains of the Rio Grande Cutthroat trout and serves as a critical wildlife corridor for large ungulates moving to and from summer and winter range.

The Spring Fire in 2018 served as a catalyst to set the project in motion. The fire was a reiteration of the apprehensions that the community had about the continued degradation of the upper watershed due to twelve years of drought. The fires and subsequent flooding and debris flows that ravaged the Spring Fire area seemed to mirror the concerns of the Culebra community. The goal of the assessment will be to identify the extent of ecological damage and create a project lists that will insure the safety of the Culebra citizens, their water and the infrastructure. Costilla County is a small under-resourced county brought about by two key issues: a mean income of $17,000 per year and the fact that 98% of the county is privately owned and without critical Payment in Lieu of Taxes (PILT) dollars from the federal government there has not been consistent oversight the upper Culebra watershed. The assessment will move them in a direction that will improve riparian habitat, adjacent uplands, water infrastructure, aquatic habitat, flow regimes, grazing, forest health, and water quality. As well as insuring that the important wildlife corridors, stream reaches and riparian continue to support these federally identified species of concern: 7 aboriginal strains of the Rio Grande Cutthroat trout, Southwest Willow Fly Catcher, and the Yellow Billed Cuckoo.

The Upper Culebra Watershed Assessment (UCWA) is a stakeholder driven watershed assessment that encompasses the Upper Culebra Basin, from the headwaters, on Culebra Peak, to the valley at San Acacio. There are many environmental challenges facing the Upper Culebra watershed, including: extended drought, forest fire potential, extensive beetle kill, water quality impairments, endangered species, degraded habitat, and other anthropogenic impacts. While stakeholders recognize the vital need to implement projects to address these concerns, the current condition of the Upper Culebra Watershed is largely undocumented.

The UCWA was prompted and organized by the Costilla County Conservancy District (CCCD) in partnership with the Land Rights Council (LCR), the Sangre de Cristo Acequia Association (SdCAA), Herederos, Colorado Parks and Wildlife (CPW), Natural Resources Conservation Service (NRCS), Costilla County Emergency Managers, Land Use Department, and Commissioners, Colorado Open Lands, and community stakeholders. Project partners make up a Technical Advisory Team that will assist the hired contractor with project activities and prioritizing recommended projects for implementation.

The UCWA will assess the ecological condition of the Upper Culebra watershed by collecting, compiling, and analyzing data characterizing: riparian habitat, geomorphology, geology, adjacent uplands, water infrastructure, aquatic habitat, flow regimes, grazing, forest health, and water quality through the collection of new data and the analysis of existing data. This project will result in a comprehensive assessment of the Upper Culebra Watershed that partners, including our watershed group, federal, state, and local entities, and private landowners, can use to prioritize, secure funding, and implement collaborative, multi-benefit projects that improve the health and resiliency of the Upper Culebra Watershed. The data will be used to create reports, which will be included in the final Upper Culebra Watershed Assessment Report. The UCWA will summarize the causes of current and potential future degradation and prioritize projects for implementation to improve watershed health for ecological and sustainability benefits.

OBJECTIVES

List the objectives of the project. Please include objectives for all aspects of the project whether funded by the CWCB or not

The objectives of this project are to evaluate the natural resources within the basin to better understand the basin and then to drive projects and management decisions to protect existing resources, improve degraded conditions, reduce community risk, and improve community resiliency. The project takes a peak-to-valley approach and includes evaluating plant community composition and health, wildlife and aquatic habitat, and diversions and water related infrastructure within the basin. The project is tailored to evaluate how water and sediment flow through the system in routine and extreme flow conditions and how the water quality changes through the system. The data collected will be used to model the what-ifs in disaster and disturbance planning including fire, infestation, and drought. Floodplain connectivity and fluvial landscapes will be assessed looking at how this affects the rate at which water moves through the system, the stream power associated with floods and dissipation areas (fluvial hazard zones), and the effects on aquatic and riparian communities.

The project will assess existing data sets available through stakeholders and public resources to identify and compile data. From these existing data sets the field assessments will be developed to complement and improve the understanding of the natural resources within the basin. Methods will be adjusted to align with existing data as needed to ensure trend assessments and comparisons can be completed where possible. Methods will be documented to allow future efforts to expand on

data sets and evaluate trends within the basin.
The assessment is the first step in collecting the data to develop projects that improve conditions within the basin, reduce risk, and protect natural resources. The data collected and data collection activities will be used to educate the community on best management practices provide opportunities to identify collaborative projects that will improve habitat, mitigate flooding, and improve water supply reliability

TASKS

Provide a detailed description of each task using the following format. Detailed descriptions are only required for CWCB funded tasks. Other tasks should be identified but do not require details beyond a brief description.

TASK 1 – Riparian Habitat Assessment

Description of Task

Assess the condition of riparian habitat throughout the project reach through site visits, targeted surveying, data collection, and the analysis of existing data.

Method/Procedure

Desktop Assessment

The first step of the riparian habitat assessment will be to compile existing data sets including aerial imagery, National Land Cover Datasets, disturbance layers, and LiDAR to identify potential riparian associations within the study area. Existing datasets will be compiled and evaluated. Finally, we will reference the Field Guide to Wetland and Riparian Plant Associations (Carsey, 2003), which includes riparian associations and Hydrogeomorphic (HGM) river classifications (Cooper, 1998) throughout Colorado. This information will be used to generate a list of distinct classes and likely riparian associations to target with the field sampling. There are likely four to five different riverine subclasses in this project area. The streams from the National Hydrography Dataset (NHD) will be evaluated to determine if the streams are appropriately located and classified, and whether the segment is likely to be perennial, intermittent, or ephemeral. The streams will be further classified to include the riparian association. This initial evaluation will be performed in conjunction with Task 2 – Aquatic Habitat Assessment.

Field Assessment

Once the initial compilation of data is complete our team will meet with the technical advisory committee (TAC) and other stakeholders to confirm and/or refine the sampling plan and monitoring protocol based on existing data sets, TAC monitoring goals, and resources available. The final protocol must be repeatable throughout the watershed, by various observers, and over time. The riparian assessments will be conducted on reach lengths of 20 Bankfull widths, or typically between 500 and 1,000 ft, and will be consistent with tools such as Functional Assessment of Colorado Streams (FACStream) and Stream Quantification Tool (SQT). Use a combination of objective sampling points and rapid assessment methods to evaluate riparian associations and riparian health conditions within each drainage. Cover classes to be measured include upper- and mid-canopy cover (using periscope) by species, understory shrub cover by species, and ground cover (using laser) by species and surface class such as rock, soil, and litter. Photo documentation will capture vegetation conditions in each hydrosere as well as the overall riparian association of each site. With reference conditions defined from line-point intercept data, a rapid categorical assessment will be conducted for the remaining sites to classify the condition of the stream banks, overbank, and terrace hydroseres within each riparian association as well as the overall health of the riparian area in question. The rapid assessment will also document impacts to vegetation from grazing, flooding, roadways, and other land use

The reference conditions will be used to determine the degree of departure between degraded reaches and reference reaches, and to inform revegetation criteria for future restoration and land use management projects. Areas identified with severe degradation will be evaluated for probable cause of degradation and

recommended projects or management practices will be added to the priority project list for inclusion in Task 12.

Deliverable

Will include data relating to the condition of riparian habitat throughout the project area including percent of vegetative cover in riparian areas and along streambanks, species composition, impacts to vegetation from grazing, flooding, access easements, livestock grazing, and land use activities. Contractor will identify trends in riparian habitat condition. All electronic data sets including maps detailing riparian classification and sampling points. Detailed samples will be compiled into a report showing photographs and measurement data along with interpretation of data by riparian ecologist.

TASK 2 – Aquatic Habitat Assessment

Description of Task

Aquatic habitat assessment will sample conditions within the basin based on habitat suitability index protocols including riparian habitat conditions and evaluate barriers that protect or prohibit population abundance.

Method/Procedure

The first step of the aquatic habitat assessment will be to collaborate with Colorado Parks and Wildlife and project partners to identify and obtain available aquatic habitat data sets and identify data needs. Existing data sets will be evaluated and compiled, including literature review, compilation of GIS coverages, including U.S. Forest Service Disturbance datasets and aerial imagery. The streams from the National Hydrography Dataset (NHD) will be evaluated to determine if the streams are appropriately located and classified and whether the segment is likely to support aquatic life. This evaluation will stratify the stream segments into Rosgen Stream Classifications in conjunction with Task 1 and Task 9.

Aquatic habitat assessments are coupled with the assessments performed in Tasks 1, 3, 4, and 9 to perform a habitat suitability assessment, including stream cover from vegetation, overhanging banks, turbulence, and depth; availability of spawning gravels including assessment of embeddedness and distribution; holding areas including pool depth and other slow movement areas. Macro-invertebrate sampling will be performed at selected sites to rapidly evaluate stream water quality and available food.

Evaluation of streams for fish barriers that may be critical to maintaining pure-strain populations and those barriers that may be prohibiting population abundance will be evaluated. This will include evaluating road/stream crossings in conjunction with Task 11 for fish passage requirements including height, depth, and velocity.

Deliverable

Data from field assessments and population surveys will be combined to perform a limiting factor analysis which is used to identify degradation within the basin and assist in determining potential project effects on improvement of aquatic habitat. Some limiting factors that have been identified by previous assessments include excess sedimentation impacting spawning beds which results in reductions in the younger age classes. Dried streambeds during important spawning events may prevent fish from accessing refuges, or low flows resulting in higher stream temperatures.

Data will be compiled into a final report documenting measurements, evaluations, and recommendations for improving aquatic habitat. Maps of spatial analysis will be produced along with associated data sets so these data may be made publicly available by the Costilla County Conservancy District. Data collected by the team will be shared with Costilla County Conservancy District. Some data sets obtained through agencies or individuals may necessitate confidentiality be maintained. These datasets will be generalized with agency approval within the final report where necessary.

TASK 3 – Flow Regimes

Description of Task

Flow regimes assessment will compile available records of water use within the basin including place and timing of use and conduct interviews to supplement data sets to identify opportunities to improve water administration within the basin and develop cooperative agreements to provide water at the right time and place.

Method/Procedure

The flow regime assessment will compile available data from within the basin from the available gage records and diversion records, along with evaluation of documentation from other sources. A map including ditches, streamflow gages, and irrigated areas is included as an attachment to this proposal. This evaluation will be completed in conjunction with Task 2, Task 9, and Task 11 to evaluate the flows necessary to maintain aquatic habitat, evaluate condition of diversion structures and associated records, and evaluate opportunities to improve geomorphic conditions

Deliverable

To identify if short-comings in available water supply are the result of diversions and if agreements could be developed to mitigate shortages, or where additional streamflow gages could be installed to improve administration

TASK 4 – Water Quality Assessment

Description of Task

Water quality assessment will collect spatially distributed samples of water quality including standard field parameters, nutrients, and metals.

Method/Procedure

Compile existing data from all known sources including TMDL report. Evaluate spatial characteristics within each sub-drainage. Perform rough assessment of water quality conditions during fall 2019 using specific conductance and pH as surrogate for constituents. Collect grab samples for analysis at key locations such as above and below Sanchez Reservoir, at Culebra Chama gage, and a subset of the secondary drainages. Collect water quality samples from top and bottom at Sanchez Reservoir Sites Deploy five Hobo water temperature loggers to assist in aquatic habitat evaluation and evaluate temporal variation. Plot field parameters and evaluate flow network for changes in water chemistry. Present findings from initial assessment and propose additional sampling based on initial results. Develop 2019/2020 sampling plan including additional sampling for seasonality Evaluate additional sites for assessment with field water quality

Deliverable

Understand water quality throughout the basin, identify trouble spots and recommend projects that will ensure ongoing water quality

TASK 5 – Forest Health Assessment

Description of Task

Forest health assessment will evaluate forest composition, forest health, and disturbance history. These assessments will determine areas of greatest concern to target restoration and management to improve forest health and reduce community risk

Method/Procedure

The Forest Health Assessment will be composed of three phases: 1) accumulation and evaluation of background information to establish baseline data and to determine the need for additional information to be collected by the team for this project; 2) targeted field sampling for additional information data needed for the assessment, including ground-truthing of spatial data layers and aerial imagery; and 3) analysis of all

information to assess the Forest Health trends across the Upper Culebra Watershed and provide recommendations to improve the health of forest resources. A primary source of spatial data for the forest health assessment will be the LANDFIRE database, including data layers for vegetation type and cover, surface fire behavior fuel models, canopy characteristics, fire regime, and disturbance history. In addition, the team has determined that Forest Inventory Analysis (FIA) data are available on the private lands throughout the Culebra Watershed and could be utilized in the assessment through collaboration with the Colorado State Forest Service (CSFS). The CSFS can also provide statewide forest health assessment findings, which will contribute a landscape level context to the Forest Health report.
The survey plots will follow U.S. Forest Service (USFS) common stand exam protocols and will be assigned at random locations within each stand using GIS. Stand exams will capture information regarding site condition, vegetation composition, tree age, height, basal area and diameter, canopy structure and cover, insect and disease factors, dead and downed fuel loading, and snag density. Plot-level survey work would be carried out in the fall, spring, or summer, as dictated by weather conditions. Surveys would be delayed by heavy snow fall due to the need to gather surface fuel data. Two crews of two experienced staff members will complete the stand surveys. The number of required plots will depend on the homogeneity of stands within the watershed and the density of available FIA data. The team will utilize a UAV drone to survey the watershed to determine the degree of stand homogeneity and gather aerial data. The drone can be used to develop an orthophotomosaic across representative portions of the watershed, and through post processing, this data can be extrapolated to the watershed level.

Deliverable
Understanding of overall forest health, site condition, vegetation composition, tree age, height, basal area and diameter, canopy structure and cover, insect and disease factors, dead and downed fuel loading, and snag density, which will lead to projects that will improve forest quality and reduce fire risk.

TASK 6 – Grazing and Upland Assessment
Description of Task
Grazing assessment will evaluate range conditions, existing infestations of invasive species, and current use by livestock and wildlife including communal grazing areas and aspen stand conditions

Method/Procedure
The team will conduct a qualitative grazing assessment detailing the current observed condition of ecological sites within the proposed project area. The assessment will begin by analyzing current Natural Resource Conservation Service (NRCS) Ecological Site Descriptions (ESDs). Qualified range ecologists will then complete qualitative observations of each ecological site to determine current use (livestock and wildlife) and make general observations of range condition, utilization, and other landscape level observations. The team will use a modified observation form, taking aspects from NRCS National Range and Pasture Handbook (NRCS 2003) and the Bureau of Land Management Interpreting Indicators of Rangeland Health (Pellant et al. 2005) manuals. SWCA will notate any large infestations of invasive species and large variations from the ESDs. SWCA will utilize high-quality aerial imagery to assist in the development of baseline grazing infrastructure throughout the watershed.

The assessment of the adjacent uplands will be completed in conjunction with the Riparian Habitat Assessment, Grazing Assessment, and Forest Health Assessment. Once the initial desktop analysis has been performed the team will develop an appropriate protocol for the Uplands Assessment that will be completed in conjunction with the Riparian Health Assessment, Forest Health Assessment, and Grazing Assessment. The upland conditions will be assessed using a rapid assessment method.

Deliverable
To determine true grazing trends, pressure, and forage utilization and establish protocols for future monitoring and make recommendations for grazing and upland habitat improvement.

TASK 7 – Wildlife Assessment

Description of Task

Wildlife inventory and assessments will evaluate habitat condition specific to threatened and endangered species, areas with high potential for human-wildlife conflict, and threats to wildlife and habitat.

Method/Procedure

Team will use a combination of GIS data and aerial survey data to complete a desktop review to inventory major upland habitat types and document land use within the Project Area. The team will make an initial evaluation of:

the potential for suitable habitat for these species to occur within the project area; the potential for suitable pollinator species habitat within the project area; suitable habitat corridors with high potential for use by migratory wildlife species; potential threats to wildlife and/or their habitats; and areas and land-use practices with the potential for human–wildlife conflict. For example, areas where agricultural land use overlaps with mule deer seasonal use areas, creating higher potential for wildlife damage to crops, or areas where seasonal livestock grazing may degrade wildlife habitat.

The team will also provide an analysis of potential human–wildlife conflicts in the Project Area and, in collaboration with CPW, NRCS, and the Advisory team, make recommendations to address conflicts. The team will also identify potential areas where there is an opportunity to improve habitat to help CPW, NRCS, and the Advisory team achieve short- and long-term goals for the overall Project Area.

The team will conduct the following field-based activities:

Wildlife Inventory: Field-based inventory of key wildlife species (specific species to be identified in coordination with CPW, NRCS, and Advisory team) to determine species occurrence and general use areas within the Project Area. Wildlife species potentially of interest for inventory are federally and state protected species and those with high potential for human–wildlife conflict as identified in the desktop analysis. Some, but not necessarily all, of the species that could be included in this inventory are mule deer, elk, big horn sheep, black bear, wolverine, southwestern willow flycatcher, yellow-billed cuckoo, big brown bat, Mexican free-tailed bat, silver-haired bat, pallid bat, Townsend's big-eared bat, bald eagle, osprey, peregrine falcon, sandhill crane, burrowing owl, golden eagle, and mountain plover.

• Human–Wildlife Conflict Inventory: Timed field surveys of areas identified in the desktop analysis as having high potential for human–wildlife conflict to identify the status and extent of various indicators of conflict, including, but not limited to, wildlife damage to agricultural crops; grazing impacts to wildlife habitats; and the impact of roadways, fences, and other barriers to wildlife movement.

• Pollinator Inventory: Field-based verification of areas with potentially high value for pollinator species as identified in the desktop analysis and, within those areas, an inventory of pollinator species presence.

• Corridor Inventory: Field-based verification of corridors identified during the desktop analysis as having habitat and land use with high potential for wildlife movement

Deliverable

The team will provide maps of: potentially suitable habitat for threatened and endangered species and species of special concern; areas with potentially high value for pollinator species; habitat and land-use corridors with high potential for wildlife movement; identifiable threats to wildlife and/or their habitats; and areas with high potential for human–wildlife conflict.

TASK 8 – Historic Land Use Assessment

Description of Task

Team will evaluate practices pertaining to human occupation and utilization of the land will be analyzed through time to better understand how the land has been used and whether it can sustain the continuation of traditional use and practice.

Method/Procedure

SWCA will conduct archival research and informal interviews with community members to gather information on human and natural impacts within the area. This research will focus on items such as farming and irrigation, mining and geology, forest use, grazing, and river-based recreation. Innovations and practice pertaining to human occupation and utilization of the land will be analyzed through time to better understand how the land has been used and whether it can sustain the continuation of traditional use and practice.

Deliverable

A report that defines current land use and its sustainability and can residents continue using current practices.

TASK 9 – Geology/Geomorphology Assessment

Description of Task

Geomorphology assessments will evaluate the stability of slopes and channels within the basin including areas of sediment supply and areas at risk of slope failure during and after a disturbance event such as fire or flood event.

Method/Procedure

The initial step in completing a geomorphic assessment is referred to as a Rapid Level Assessment (RLA) (Rosgen, 2009). An RLA is performed through the evaluation of existing remotely sensed data such as aerial imagery, elevation digital elevation models, and calculated data such as disturbance and vegetation data layers. This assessment will compile an inventory of categorized areas, including areas with significant geomorphic risk, along with identified by stakeholders as problem areas, to guide where more detailed field analysis should be performed.

The next step of the assessment is the Rapid Resource Inventory for Sediment and Stability Consequences (RRISSC) (Rosgen, 2009); where the inventory of sites from the first step are visited by geomorphologists and the condition of the site is documented though observations, photographs, and measurements. This portion of the assessment is to target areas to allow the assessment to be completed within the given constraints including time, budget, and resources. The categorization identified in the RLA will be verified to ensure all areas are represented within the sample set. The team will survey sites within 1,500 ft of a road passable by high clearance 4x4 vehicle with landowner permission.

The last step in the field analysis is a Prediction Level Assessment (PLA), (Rosgen, 2009). This is the portion of the assessment where detailed field measurements including profile and cross-sections are measured. The top 10 sites identified through criteria that have been collaboratively developed with the assessment team and stakeholders.

In addition, 10-15 stable sites will be surveyed for Bankfull indicators, cross sections, and profile to develop a regional curve that will be used to identify sites with departure and inform future restoration designs. Additional measurements collected as part of the Aquatic/Riparian Habitat Assessments and infrastructure tasks will merged with the data collected for this task where appropriate.

Deliverable

Deliverables will include all point data, GIS datasets, final maps, report including calculated values, graphs, methods, and summary of findings. To include a potential project list.

TASK 10 – Infrastructure Assessment

Description of Task

Infrastructure assessment evaluates bridges, diversions, and return flows for operation during floods, drought, and routine operations.

Method/Procedure

Existing infrastructure including bridges, diversion structures and ditches, and intake/discharge pipes relate to the stream system and ideally exist harmoniously with each other. This assessment will begin by gathering roadway information from Costilla County and diversion structure locations from Colorado Division of Water Resources GIS files. Our team will assess the information available in these data sets and supplement where necessary, the assessment will complement the Safety and Emergency Management Task 11. Our team will work with stakeholders and other resources to compile a list of additional structures including those associated with water and wastewater facilities, ditch returns, and drains. Evaluation of structures will include structures that are in use and where necessary those structures that were historically place and are no longer used.

Once structures have been identified our team will work with the Technical Advisory Committee to secure access to sites on private property to assess those structures. The assessment will include photographs and detailed notes concerning the structure including overall condition and basic measurements. Our team will evaluate roads within Ceilo Vista via aerial imagery and identify sites that have visible indicators of impacts to the streams or are in high risk zones. The structures will be categorized based on level of degradation of the structure, impacts to geomorphic stability, and impacts to aquatic and riparian ecosystems.

Deliverable

Our team will then develop a list of projects that may be implemented to improve overall watershed health. Projects that relate to historic structures will be reviewed by archaeologists for addition recommendations. The results of this analysis will be formatted into maps for spatial reference, catalogs of information on each of the structures, and compiled within a report detailing methods, findings, and recommendations.

TASK 11 – Safety and Emergency Management Assessment

Description of Task

Identify any existing emergency management plans on key parcels in the upper watershed to include Cielo Vista, Dos Hermanos, Vermijo Park and Sangre de Cristo Ranches (Costilla County Emergency Management). Identify areas of key infrastructure in villages in middle and lower watershed and any practices that could be implemented to protect communities and mitigate damage form fire/flood. Map roadways identify critical access points and make recommendations on improving current assets. Identify area water sources that can be used in case of a wildfire.

Method/Procedure

SWCA is a leader in the assessment of wildfire risk and can utilize various fire behavior modeling tools (including the Interagency Fuel Treatment Decision Support System [IFTDSS], FlamMap, and FARSITE) to determine the areas at greatest risk from catastrophic wildfire and, therefore, areas to be prioritized for wildfire mitigation actions. The team routinely develops composite wildfire hazard and risk assessments for our fire planning work that identify not only fuel hazards, but also areas prone to extreme fire behavior due to climatic trends, potential extreme weather scenarios, and topographic features, and areas that have experienced high frequencies of fire ignitions due to human activity or lightning.

The team will then estimate which areas are most prone to post-fire debris-flow hazards by modeling simulated fire severity scenario data with precipitation, topography, soils, and landcover data. Our methods will be based on the science and research of the U.S. Geological Survey (USGS) Landslide Hazards Program for pre- and post-fire debris-flow hazards assessment. The team will map and assess wildfire response capabilities and weaknesses, including spatial assessments

of ingress and egress on existing roadways, bridges, access points and turnarounds, locations of potential anchor points and fuel breaks to facilitate safe and effective suppression of wildfire, locations of firefighting resources and availability and suitability of suppression water sources. SWCA will utilize the National Hydrography Dataset (NHD) as well as any locally available data, to identify potentially suitable hydrants,

creeks, lakes, cisterns, etc. These water sources will be evaluated for accessibility within a GIS model, and critical access roads will be identified.

Deliverable

The team will present a map deliverable that addresses the safety and emergency management concerns of the advisory team as well as written recommended mitigation actions for safe and effective emergency response, including emergency communications to aid protection of community members and first responders. All findings will be presented in the UCWA report.

Budget Table

Description		Project Cost	CWCB Watershed	CWP	Costilla County Conservancy District	CWA	Dola	SDCNHA	CDHPE	LOR	Gates	In-kind	Total
Task 1	Riparian Habitat Assessment	**62,500.00**	$31,250.00	$15,625.00	$5,625.00	$10,000.00						$2,000.00	$64,500.00
Task 2	Aquatic Habitat Assessment	98,052.00	$49,026.00	$24,513.00	$14,513.00	$10,000.00						$2,000.00	**$100,052.00**
Task 3	Flow Regimes Assessment	**15,200.00**	$7,600.00	$3,800.00	$3,800.00							$2,000.00	**$17,200.00**
Task 4	Water Quality Assessment	61,450.00	$30,725.00	$15,363.00	$4,062.00				$11,300.00			$10,000.00	**$71,450.00**
Task 5	Forest Health Assessment	**129,477.00**	$64,739.00	$32,369.00							$32,369.00	$2,000.00	**$131,477.00**
Task 6	Grazing Assessment	150,950.00	$75,475.00	$37,737.50							$37,737.50	$2,000.00	**$152,950.00**
Task 7	Wildlife Assessment	**72,047.00**	$36,024.00	$18,011.00							$18,012.00	$2,000.00	**$74,047.00**
Task 8	Historical Land Use	42,202.00	$12,202.00	$0.00				$30,000.00				$10,000.00	**$52,202.00**
Task 9	Geology/Geomorphology Assessment	55,450.00	$27,725.00	$13,862.00						$13,863.00		$2,000.00	**$57,450.00**
Task 10	Infrastructure Assessment	63,776.00	$31,888.00	$15,944.00						$15,944.00		$12,000.00	**$75,776.00**
Task 11	Safety and Emergency Management Assessment	**66,355.00**	$33,177.00				$33,178.00					$2,000.00	**$68,355.00**
TOTAL		**817,459.00**	**$399,831.00**	**$177,224.50**	**$28,000.00**	**$20,000.00**	**$33,178.00**	**$30,000.00**	**$11,300.00**	**$29,807.00**	**$88,118.50**	**$48,000.00**	**$865,459.00**
				Apply 2/1/20	Committed	Applied for	Applied for	Applied for	Applied for	Committed	Applied for	Committed	

In-kind as follows:

Bureau of Reclamation:	$10,000. 00	Water Quality Sample Processing	Process an additional 40 samples with student volunteers
Colorado Open Lands:	$ 6,000.00	GPS Source Mapping	Data Gathering and Mapping Assistance
	$ 6,000.00	Assist in Tasks 1,2,9	150 hours at $40.00 per hour (includes benefits)
Community Volunteers	$10,000.00	Assist in Tasks 3,5,6,7,11	667 hours at $15.00 per hour
NRCS	$16,000.00	Tech Review	mapping, grazing, infrastructure (6 technicians at $40 pr hour)

Project Time Line

Task	Description	Target Start Date	Target Completion Date
1	Riparian Habitat Assessment	June 2020	March 2021
2	Aquatic Habitat Assessment	June 2020	March 2021
3	Flow Regimes Assessment	June 2020	March 2021
4	Water Quality Assessment	June 2020	March 2021
5	Forest Health Assessment	June 2020	March 2021
6	Grazing Assessment	June 2020	March 2021
7	Wildlife Assessment	June 2020	March 2021
8	Historical Land Use	June 2020	March 2021
9	Geology/Geomorphology Assessment	June 2020	March 2021
10	Infrastructure Assessment	June 2020	March 2021
11	Safety and Emergency Management Assessment	June 2020	March 2021
	TOTALS		

November 12, 2019

Chris Sturm - Stream Restoration Coordinator

Colorado Water Conservation Board

1313 Sherman St., Rm. 721 Denver, CO 80203

Re: Upper Culebra Watershed Assessment Grant Application

Dear Mr. Sturm,

On behalf of the Rio Grande Basin Roundtable, I am writing to express our strong support for the Upper Culebra Watershed Assessment proposal, submitted by the Costilla County Conservancy District.

The Costilla County Conservancy District has spent the last year conducting a comprehensive stakeholder outreach to better understand both the needs and expectations of an Upper Watershed assessment. This outreach brought to light overwhelming support to better understand the condition of the Upper Culebra Watershed, a concern that was galvanized by the Spring Fire in 2018. There has been little information gathered and so comprehensive data sets are needed. The Conservancy will have contractors looking at forest condition, riparian health, stream reach condition, grazing health and safety. There are over 300 families that live below the watershed, which makes understanding these resource concerns critical.

Their proposal will help the landowners, rights holders and all those living below Culebra Peak, understand the true condition of the various resources that make up the upper Culebra Watershed. This grant will add to the significant investment that has already been made to ensure that this community remains safe and the resources are managed in way that will insure the next 150 years of its use. It is because of the Costilla County Conservancy Districts ongoing commitment to protecting the Culebra that we support this request for funding.

Sincerely,

Nathan Coombs
Rio Grande Basin Roundtable Chairman

Colorado Rio Grande Restoration Foundation
Rio Grande Headwaters Restoration Project
623 Fourth Street
Alamosa, CO 81101
(719) 589-2230

October 10, 2019

Colorado Water Conservation Board
1313 Sherman St., Rm. 721
Denver, CO 80203

Re: Culebra Watershed Assessment

Dear Mr. Sturm,

On behalf of the Rio Grande Headwaters Restoration Project (RGHRP), I am writing this letter in support of the Culebra Watershed Assessment. The Culebra Watershed has a variety of resource assets that include diverse forests, beautiful streams and riparian areas, a variety of plant life and habitat for a myriad of wildlife species. That said, the watershed has also endured 14 years of drought that have taken its toll on all of these resources. The assessment will give a clear picture of watershed condition that can be used to drive management decisions. To that end, the community is working to insure the long-term sustainability of the watershed and the small communities that sit below it.

The RGHRP recently worked with the USFS and stakeholders to complete an assessment of the headwaters and major tributaries of the Rio Grande, the Upper Rio Grande Watershed Assessment (URGWA). The URGWA has been an incredible tool to the area, providing partners the data needed to inform management of these natural resources and improve the resiliency of the watershed. The value of these assessments is great and there is a high need to better understand the Culebra watershed. The assessment will serve as a baseline of information regarding all of the resource aspects that make up the watershed. The study will report the geomorphology constraints, forest condition, river and riparian health, viability, quantity and kind of grazing resources, infrastructure, and safety concerns. This proposal will not only inform us of the resource conditions, but will provide a list of key projects that will help insure long-term viability of the area.

The RGHRP wholeheartedly supports funding this project and look forward to working with the planning team by providing input and data as required. Please let me know if you have any questions.

Sincerely,

Emma Reesor
Executive Director, Rio Grande Headwaters Restoration Project

COSTILLA COUNTY
BOARD OF COUNTY COMMISSIONERS
"Where Colorado Began"

352 Main Street
PO Box 100
San Luis, CO 81152

(719) 672-3372
(719) 672-3962 fax

www.costillacounty-co.gov

October 15, 2019

Costilla County Conservancy District
324 Main St,
San Luis, CO 81152
Attn: Board of Directors

Re: Culebra Watershed Assessment

Dear Members,

The Costilla County Board of Commissioners is writing this letter in support of the Culebra Watershed Assessment. The Culebra Watershed and its 14,000-foot namesake peak, Culebra Peak, sits above the hispano villages that were established when the Sangre de Cristo Land was settled by pioneers from New Mexico in the mid-1800's. There are over 400 families who are heirs of this legacy that live below the watershed that provides irrigation and livestock water, wood for heat and building materials, grazing for our cattle and sheep, and habitat for a myriad of wildlife species.

The Costilla Board of Commissioners understands that the assessment will serve as a baseline of information regarding all of the resource aspects that make up the watershed. The study will report the geomorphology constraints, forest condition, river and riparian health, viability, quantity and identify grazing resources, infrastructure, and safety concerns. This proposal will not only inform the community of the resource conditions but will also provide a list of key projects that will help ensure long-term viability of the area.

The Board wholeheartedly supports funding this project and looks forward to working with the planning team by providing input and data as needed.

Please let me know if you have any questions and thank you for your attention to this matter.

Sincerely,

COSTILLA COUNTY BOARD OF COMMISSIONERS;

Steven Romero, Chair

COLORADO OPEN LANDS

October 25, 2019

Chris Sturm, Stream Restoration Coordinator
Colorado Water Conservation Board
1313 Sherman St., Rm. 721
Denver, CO 80203

Re: Upper Culebra Watershed Assessment Grant Application

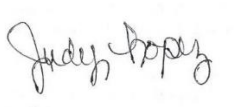
Dear Mr. Sturm,

On behalf of Colorado Open Lands (COL), I am writing to express our strong support for the Upper Culebra Watershed Assessment proposal, submitted by the Costilla County Conservancy District. Colorado Open lands is a private, nonprofit, 50l(c)3 organization based in Lakewood, Colorado. In 2008, Colorado Open Lands became one of the first land trusts in the nation to receive accreditation by the Land Trust Accreditation Commission, an independent program of the Land Trust Alliance. We have been working in Costilla County for over 9 years. Our staff has a wide range of expertise that spans rangeland ecology, conservation easement negotiations and stewardship, ecosystem science, water rights law and habitat restoration. This expertise ensures that the land and habitat that we conserve also remains protected.

COL has partnered with the Costilla County Conservancy District to conserve the private properties in the Lower Culebra Basin. In doing so, we are creating a buffer that protects wildlife corridors, open space and perhaps most importantly the Hispano farms and ranches that hold the States earliest water rights. The Conservancy has been a true partner and we are pleased that they will be assessing the Upper Culebra Watershed.

Their proposal will help the landowners, rights holders and all those living below Culebra Peak, by helping them understand the true condition of the various resources that make up the upper Culebra Watershed. This grant will add to the significant investment that has already been made to ensure that this community remains safe and the resources are managed in way that will insure the next 150 years of its use. It is because of the Costilla county Conservancy Districts ongoing commitment to protecting the Culebra that we support this request for funding.

Sincerely,



Judy Lopez
San Luis Valley Conservation Project Manager
Colorado Open Lands

October 30, 2019

Costilla County Conservancy District
324 Main St.
San Luis, CO 81152
Attn: Board of Directors

Re: Culebra Watershed Assessment

Dear Members,

As owner of the Cielo Vista Ranch, I am writing this letter in support of the Culebra Watershed Assessment. The Culebra Watershed has a variety of resource assets that include diverse forests, beautiful streams and riparian areas, a variety of plant life and habitat for a myriad of wildlife species. However, I understand the watershed has endured 14 years of drought, taking a toll on our natural resources. I share the communities' goal of long-term watershed sustainability of the watershed and the assessment will give a clearer picture of watershed conditions that the community can use to drive management decisions.

I understand that the assessment will serve as a baseline of information regarding all of the resource aspects that make up the watershed. The study will report the geomorphology constraints, forest condition, river and riparian health, viability, quantity and kind of grazing resources, infrastructure, and safety concerns. This proposal will serve to inform us of the resource conditions and give us data for science-based management practices that meet all our goals.

I support funding this project and will have my team provide input and data to assist in the planning process. Please let me know if you have any questions.

Thank you for your attention.

With Regards,

William Harrison

hhR
DOS HERMANOS RANCH
6300 Ridglea Place, #316
Fort Worth, TX 76116

October 24, 2019

Costilla County Conservancy District
324 Main St,
San Luis, CO 81152
Attn: Board of Directors

Re: Culebra Watershed Assessment

Dear Members,

As an owner of Dos Hermanos Ranch, I am writing this letter in support of the Culebra Watershed Assessment. The Culebra Watershed has a variety of resource assets that include diverse forests, beautiful streams and riparian areas, a variety of plant life and habitat for a myriad of wildlife species That said the watershed has also endured fourteen years of drought that have taken their toll on all of these resources. We believe that the assessment will give a clear picture of the watershed condition that we can use to drive our management decisions.

I understand that the assessment will serve as a baseline of information regarding the resource aspects that make up the watershed. The study will report the geomorphology constraints, forest condition, river and riparian health, viability, quantity and kind of grazing resources, infrastructure, and safety concerns. This proposal will not only inform us of the resource conditions, but will provide a list of key projects that will help insure long-term viability of the area. We look forward to receiving a copy of the completed Upper Culebra Watershed Assessment report.

Dos Hermanos Ranch wholeheartedly supports funding this project and look forward to working with the planning team by providing input and data as required.

Sincerely,

Philip C. Williamson

Sangre de Cristo Acequia Association

October 10,2019

Costilla County Conservancy District
324 Main St,
San Luis, CO 81152
Attn: Board of Directors

Re: Culebra Watershed Assessment

Dear Members,

The Sangre de Cristo Acequia Association (SdCAA) is writing in support of the Culebra Watershed Assessment. The SdCAA is the only Colorado association working solely to preserve the rich culture and history of the southern Colorado acequias. The Culebra Watershed and it's 14,000-foot peaks sit above the hispano villages that were established when the Sangre de Cristo Land was legally recognized in the mid 1800's. There are over 400 families who are heirs of this legacy that live below the watershed that provides irrigation and livestock water, our wood for fires and building, grazing for our cattle and sheep, and a myriad of wildlife.

We understand that the assessment will serve as a baseline of information regarding all of the resource aspects that make up the watershed. The study will report the geomorphology constraints, forest condition, river and riparian health, viability, quantity and kind of grazing resources, infrastructure, and safety concerns. This proposal will not only inform us of the resource conditions but will provide a list of key projects that will help insure long-term viability of the area.

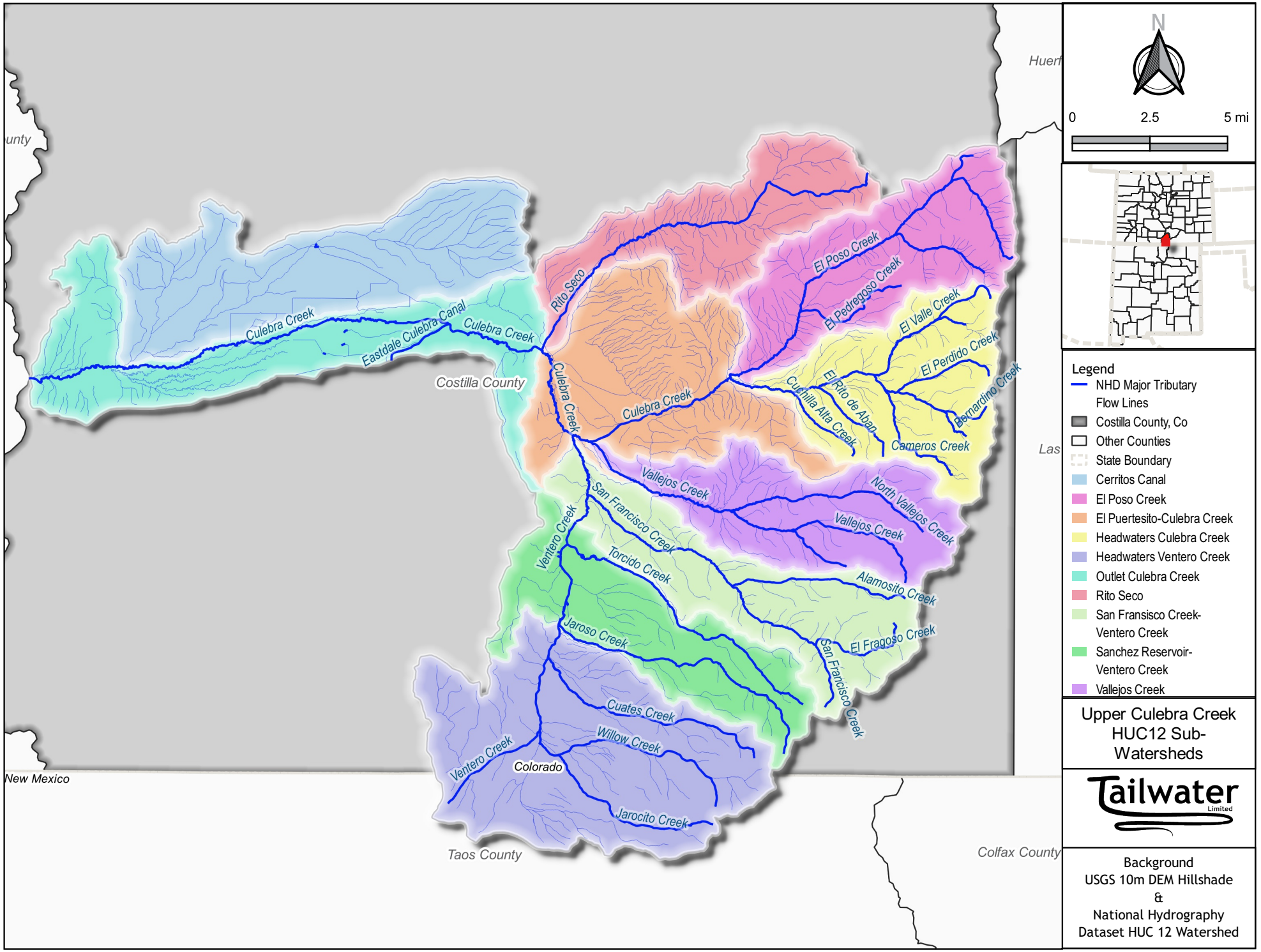
The Sangre de Cristo Acequia Association wholeheartedly supports funding this project and look forward to working with the planning team by providing input and data as required.

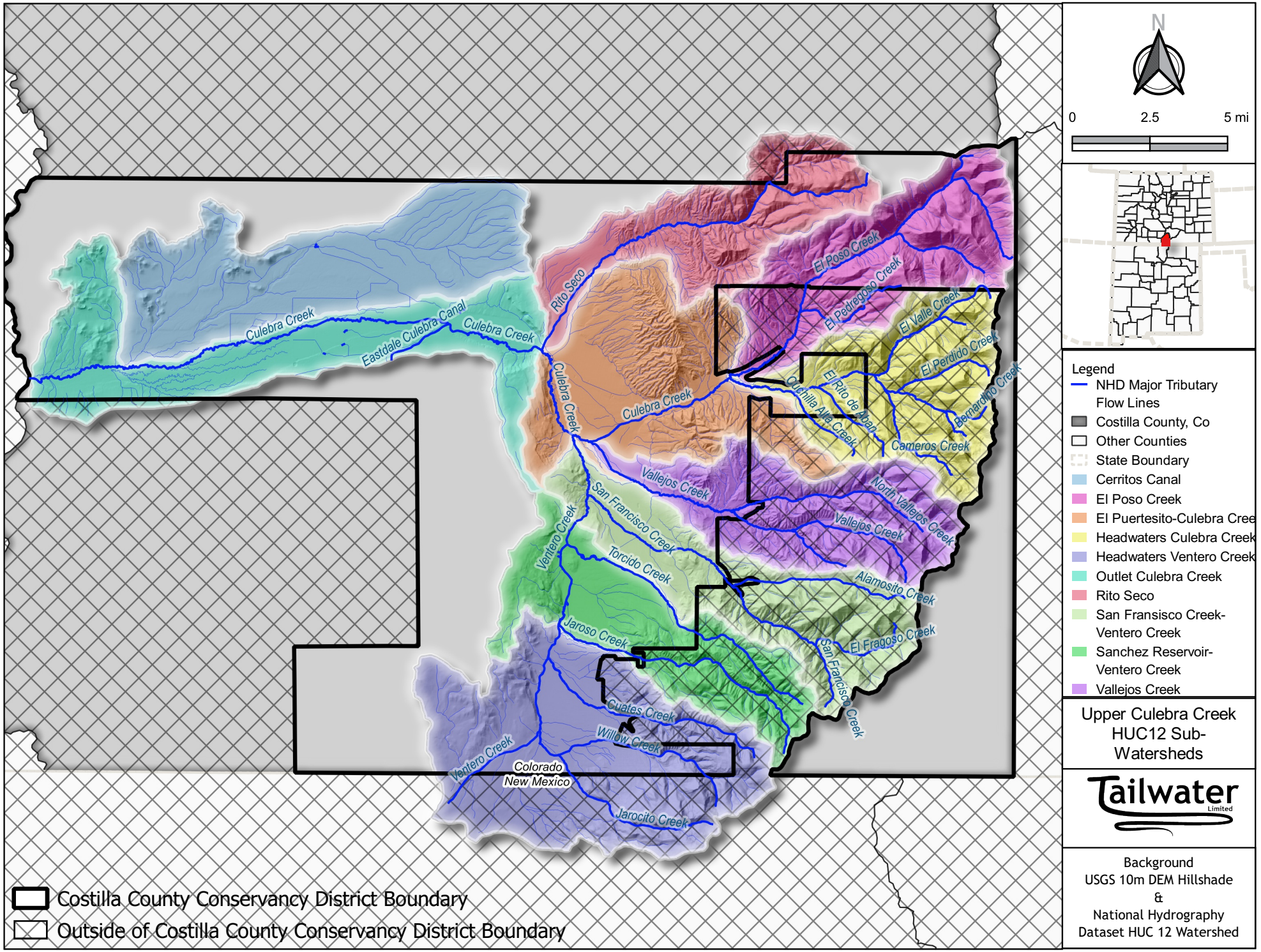
Thank you for your attention.

With Regards,

Delmer Vialpando

Delmer Vialpando
President, Sangre de Cristo Acequia Association


N
0
2.5
5 mi
Legend
NHD Major Tributary Flow Lines
Costilla County, Co
Other Counties
State Boundary
Cerritos Canal
El Poso Creek
El Puertesito-Culebra Creek
Headwaters Culebra Creek
Headwaters Ventero Creek
Outlet Culebra Creek
Rito Seco
San Fransisco Creek-Ventero Creek
Sanchez Reservoir-Ventero Creek
Vallejos Creek
Upper Culebra Creek HUC12 Sub-Watersheds
Tailwater Limited
Background
USGS 10m DEM Hillshade
&
National Hydrography Dataset HUC 12 Watershed
Culebra Creek
Eastdale Culebra Canal
Culebra Creek
Rito Seco
El Poso Creek
El Pedregoso Creek
El Valle Creek
El Perdido Creek
El Rito de Aban
Cuchilla Alta Creek
Bernardino Creek
Cameros Creek
Culebra Creek
Culebra Creek
Vallejos Creek
North Vallejos Creek
Vallejos Creek
San Francisco Creek
Ventero Creek
Torcido Creek
Alamosito Creek
El Fragoso Creek
San Francisco Creek
Jaroso Creek
Cuates Creek
Willow Creek
Ventero Creek
Colorado
Jarocito Creek
Costilla County
Taos County
New Mexico
Colfax County
Las
Huerf
unty


N
0
2.5
5 mi
Legend
NHD Major Tributary Flow Lines
Costilla County, Co
Other Counties
State Boundary
Cerritos Canal
El Poso Creek
El Puertesito-Culebra Cree
Headwaters Culebra Creek
Headwaters Ventero Creek
Outlet Culebra Creek
Rito Seco
San Fransisco Creek-Ventero Creek
Sanchez Reservoir-Ventero Creek
Vallejos Creek
Upper Culebra Creek HUC12 Sub-Watersheds
Tailwater Limited
Background
USGS 10m DEM Hillshade
&
National Hydrography Dataset HUC 12 Watershed
Culebra Creek
Eastdale Culebra Canal
Culebra Creek
Rito Seco
El Poso Creek
El Pedregoso Creek
El Valle Creek
El Perdido Creek
Bernardino Creek
Cameros Creek
El Rito de Aban
Cuchilla Alta Creek
Culebra Creek
Culebra Creek
Culebra Creek
Vallejos Creek
San Francisco Creek
Ventero Creek
Torcido Creek
North Vallejos Creek
Vallejos Creek
Alamosito Creek
El Fragoso Creek
San Francisco Creek
Jaroso Creek
Cuates Creek
Willow Creek
Ventero Creek
Colorado
New Mexico
Jarocito Creek
Costilla County Conservancy District Boundary
Outside of Costilla County Conservancy District Boundary

Assessment Team

The assessment team is led by Tailwater Limited with specialized services provided by RedFISH Environmental, AloTerra Restoration Services, and SWCA Incorporated. Our team includes small businesses including a Certified Women Owned Colorado Disadvantaged Business Enterprise (Tailwater Limited) and an SBA 8(a) Certified Small, Economically Disadvantaged Company (Redfish Environmental LLC). As small businesses we are highly invested in our specialties and the outcomes of our projects.

As shown in the team organizational chart on the following page our teams have significant overlap to provide flexibility in scheduling with additional depth and work-load capacity to perform the assessments.

Our team has worked on projects with a variety of constraints and knows the importance of practical cost-effective solutions to address ecosystem degradation. Our team consists of many practitioners that implement the recommended procedures regularly. We first evaluate projects based on the effectiveness of meeting the goals and objectives without concern for permitting and costs. Once projects have been evaluated based on effectiveness, then permitting and costs are considered including strategies to optimize designs, address political and permitting issues, and lay the initial groundwork for the project to be successfully implemented.

Our team can make recommendations for a variety of solutions to address concerns. Some example projects that could be recommended include bank stabilization to reduce sediment input into the stream system, which would be used to improve water quality and stream channel stability. Changes to grazing practices to reduce impacts by livestock on riparian vegetation to improve stream channel stability. Alternate grazing schedules to reduce livestock wildlife conflict.

Our team knows that without funding projects are often difficult to complete. Our team can provide additional assistance in identifying potential funding sources and completing some of the required attachments necessary to apply for funding as part of the assessment. Our team has worked on a variety of projects funded from public and private funding sources and knows the importance of having the right information and questions answered to receive these funds.

Our team also includes many members that fluently speak Spanish. This will allow us to communicate with an even larger array of stakeholders.

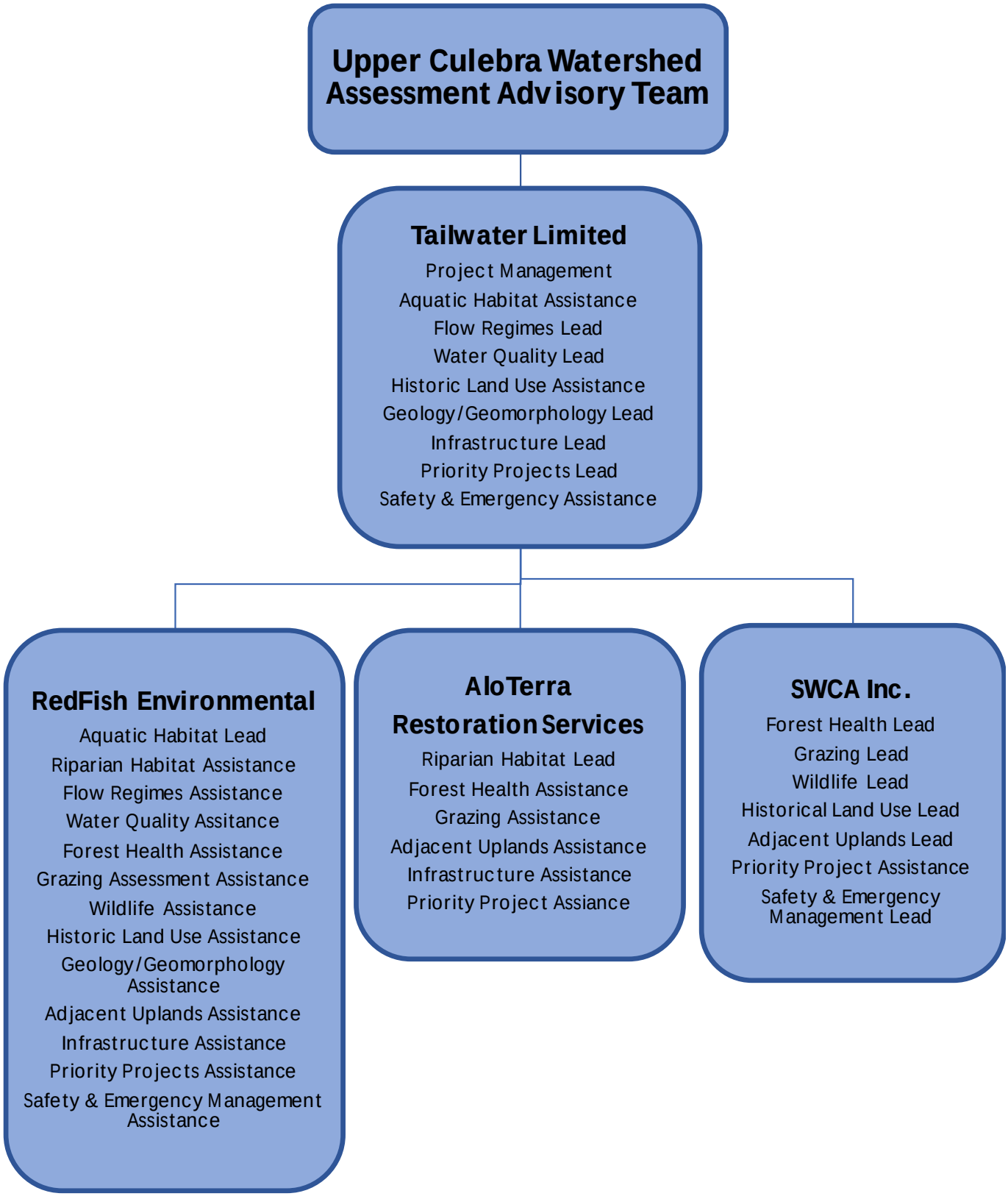
Tailwater Limited

Tailwater Limited (Tailwater) is a Women Owned Colorado Disadvantaged Business Enterprise with roots in San Luis Valley. Andrea Taillacq got her start in water working on a project for the San Luis Valley Museum as a senior at Del Norte High School putting together an interactive project detailing the history of water in the San Luis Valley, she continued this passion for water through college as a Hydrographer for the USGS and then for the State of Colorado in Water Division III. Tailwater specializes in project organization and data collection. Tailwater Limited typically works as part of a consortium of multi-disciplinary companies and organizations to complete projects with varying goals and objectives.

Geomorphology

Tailwater routinely surveys streams and rivers to assess the geomorphic condition of the systems. Greg Taillacq utilizes survey grade equipment including RTK GPS and total stations to produce referenced detailed assessments of channel cross-sections and profiles. Greg Taillacq works with RiverSHARED to develop regional relationships that are used to provide basis for design constraints and documentation for permitting requirements including 404 permitting. Tailwater assesses stream conditions for aquatic habitat quality to identify habitat suitability for game and sensitive species. Greg Taillacq has completed over 180 hours of training courses directly related to geomorphic analysis of streams and

Figure 1. Cattle watching hydrographer La Garita Creek near La Garita, CO.


Upper Culebra Watershed Assessment Advisory Team
Tailwater Limited
Project Management
Aquatic Habitat Assistance
Flow Regimes Lead
Water Quality Lead
Historic Land Use Assistance
Geology/Geomorphology Lead
Infrastructure Lead
Priority Projects Lead
Safety & Emergency Assistance
RedFish Environmental
Aquatic Habitat Lead
Riparian Habitat Assistance
Flow Regimes Assistance
Water Quality Assitance
Forest Health Assistance
Grazing Assessment Assistance
Wildlife Assistance
Historic Land Use Assistance
Geology/Geomorphology Assistance
Adjacent Uplands Assistance
Infrastructure Assistance
Priority Projects Assistance
Safety & Emergency Management Assistance
AloTerra Restoration Services
Riparian Habitat Lead
Forest Health Assistance
Grazing Assistance
Adjacent Uplands Assistance
Infrastructure Assistance
Priority Project Assiance
SWCA Inc.
Forest Health Lead
Grazing Lead
Wildlife Lead
Historical Land Use Lead
Adjacent Uplands Lead
Priority Project Assistance
Safety & Emergency Management Lead

evaluation of degraded systems. Andrea Taillacq has completed over 40 hours of specialized courses directly related to stream channel assessment

Water Quality

Tailwater is experienced in collecting water quality under a variety of conditions including analysis for Clean Water Act and MS4 permitting. We understand how detection limits may affect the results and the conclusion and as such where appropriate utilize laboratory analysis to improve quality of reported data. We maintain calibration logs for all field instruments and utilize bracketed standards for calibration of field instruments including pH, specific conductance, and dissolved oxygen. We sample with the long-term quality and usability in mind when developing sampling programs and data documentation.

Hydrology

From measurement of streamflow to analysis of hydrographic records and measurements Tailwater has extensive experience in hydrology. Our staff includes Andrea Taillacq, who was a hydrographer for the USGS for four years and then in Water Division III (Rio Grande Basin) for four years. Andrea has been to all of the streamflow gages within the Upper Culebra Basin and to many of the diversion structures performing calibration measurements to determine shift and development of stage-discharge rating curves. In addition to direct development of hydrographic records, we have compiled records to determine available water, evaluate system loss, and perform statistical analysis including shift in timing and volume of flows at gaging stations. We have extensive experience evaluating diversion records and providing a comparative analysis of the timing of flows versus the crop irrigation needs in water budget analysis. One characteristic that sets us apart from others is our on the ground experience operating streamflow gages and our understanding of the error associated with these records.

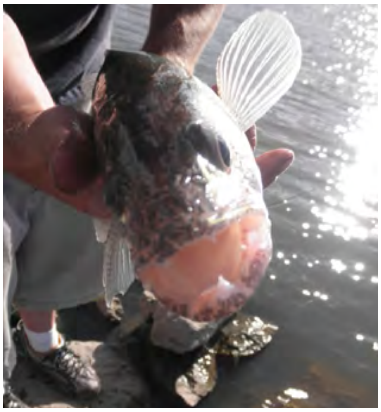


Figure 2. Fishing Sanchez Reservoir, a warm water fishery.

RedFish Environmental LLC

Socio-Ecological Concepts, LLC (SEC) DBA Redfish Environmental (RedFISH) is a Small Business Administration (SBA) - Certified 8(a) company based in Logan, Utah. RedFISH is an environmental consulting firm with an extensive record of delivering high quality products on time, on budget, and according to client specifications. RedFISH provides environmental planning, permitting, restoration, monitoring, and compliance services to a wide range of stakeholders including private corporations, regulators, and conservation groups. RedFISH has designed and successfully implemented small and large-scale projects across most of the major physiographic provinces of the western U.S. including the Rocky Mountains, the Great Basin, the Desert Southwest, Alaska, and the Pacific Northwest. Core services include project management, physical and biological resource inventory and analysis, environmental compliance, ecological restoration and Geographic Information Systems (GIS).

Watershed assessments, fisheries, hydrology, water quality, and environmental evaluations.

RedFISH has completed numerous fisheries and environmental evaluations of projects ranging from licensing or relicensing hydrolelectric facilities, hydrological and water quality assessments and monitoring, watershed assessments of Best Management Practice (BMP) implementation and effectiveness, instream flow recommendations for conservation of Colorado River native fish, to regional assessments of river and stream conditions across Colorado as part of the US EPA National Rivers and Streams Assessments.

AloTerra Restoration Services

Through the engagement of trusted partners, and from AloTerra's rich experience in natural resources project management, ecological restoration, and vegetation monitoring, we provide clients with a wide range of services to meet project needs on time and with great value. Stemming from the experience of nine full-time staff and eight seasonal technicians, AloTerra brings a depth and breadth of knowledge and dedication to help make your important projects successful. Our ecologists, botany technicians, GIS technicians, program supervisors, and regulatory specialists offer a wealth of resources to address your most pertinent needs efficiently. Primary services include

Vegetation Surveys & Permitting

Provide vegetation services to local, state, and federal agencies, including riparian and wetland condition and delineation, rare plant surveys, bond release vegetation monitoring, restoration research, and weed mapping. Prepare NEPA documents, USACE permitting, wildlife and rare plant surveys and reporting (Section 7 of ESA), and other reporting and regulatory compliance.

Restoration Design

Technical design and construction of upland, riparian, wetland, and river systems. Design elements include habitat restoration design, channel and floodplain restoration, wetland mitigation, bioengineering, and a variety of upland re-vegetation and erosion control treatments. Projects include river and riparian restoration in flood-impacted streams, erosion control, alpine restoration, road obliteration, post-fire restoration, and master planning

Construction and Construction Oversight

Through our highly trained staff, AloTerra self-performs a variety of restoration projects. Further, our principals and project managers select and work side-by-side with a variety of trusted heavy equipment operators and construction firms to ensure the right operators and engineers are employed on the right project in order to ensure high quality results.

Road and Trail Evaluation and Restoration

Our team's principal restoration ecologist has designed, constructed, and monitored over 60 miles or road and trail obliteration projects in Colorado and Wyoming. His experience includes a sustainable trail use assessment on Culebra Peak, and recommendations for sustainable routes and annual hiker numbers.

SWCA Incorporated

SWCA Environmental Consultants (SWCA) is an employee-owned company of more than 900 natural and cultural resource scientists, engineers, landscape architects, and planners. SWCA was established in 1981 and incorporated (S-corporation) in 1984 in Arizona. Over the past three decades, we have grown to more than 30 offices throughout the United States. We have a long history of working with city, county, state, and federal agencies throughout Colorado and the West to provide professional services to meet a diversity of needs for our clients. We have offices in Fort Collins, Denver, and Durango, Colorado, and Albuquerque, New Mexico which have allowed us to maintain a Colorado presence for more than 25 years.

SWCA provides a full spectrum of environmental services focused on natural and cultural resource management, water resources, regulatory compliance, permitting, planning, air quality, and climate change consulting. We are an employee-owned firm of scientists, planners, and technical specialists who combine scientific expertise with in-depth knowledge of permitting and compliance protocols to achieve technically sound, cost-effective solutions for our clients.

Representative Projects

Our team has compiled a list of some of the projects that have been completed with components similar to the Upper Culebra Watershed Assessment. Our team members are happy to discuss any of these projects with the technical advisory team. We have included may of the reports on a USB drive within the proposal packet.

	Task												
Example Projects	1	2	3	4	5	6	7	8	9	10	11	12	13
	Riparian Habitat Assessment	Aquatic Habitat Assessment	Flow Regimes Assessment	Water Quality Assessment	Forest Health Assessment	Grazing Assessment	Wildlife Assessment	Historical Land Use Assessment	Geology & Geomorphology Assessment	Adjacent Uplands Assessment	Infrastructure Assessment	Identify Causes of Degradation and Identify Priority Projects	Safety and Emergency Management
City of Aurora Stream Stability Assessment		X							X		X	X	X
Technical Review of CHaMP	X	X		X					X				
Uinta Hydroelectric Project - Fish Population, Fish Habitat, and Hydrology	X	X	X	X					X		X	X	
Kuskokwim Stream Assessment		X	X	X					X				
Price River Stream Assessment		X	X						X			X	
Dungeness Habitat Assessment	X	X							X				
Upper Poudre Post-Fire Unmet needs (CO)	X								X			X	X
Living Streambanks: A Manual of Bioengineered Treatments	X												
Goose Creek Watershed Studies	X		X	X					X				X
City of Sheridan Ecosystem Restoration	X	X	X	X	X		X			X	X	X	X
Mesa County Community Wildfire Protection Plan								X		X	X		X
Estancia Basin Watershed Monitoring and Post-Fire Monitoring			X		X	X	X					X	
Westside Watershed Collaborative Forest Restoration Program					X		X		X	X	X	X	X
South Sacramento Restoration Project				X		X	X	X			X	X	X
Sandoval County Community Wildfire Protection Plan					X		X	X		X			X

Electronic Copy of Report Included on USB

Tailwater Limited

City of Aurora Channel Stability Study

Greg Taillacq, while working for Stantec Consulting Services, conducted a channel stability study to identify areas of stream instability within the City of Aurora (2017). Project consisted of a desktop assessment of reaches using post 2013 Flood LiDAR and other data sets to identify areas of instability. Reaches with instability were further assessed to determine a priority list of restoration projects for the City of Aurora. The total cost of this project was approximately $250,000.

Figure 3. Evaluating geomorphology on Oak Gulch, Parker, CO

Contact: John Villines, City of Aurora, (303) 739-7646, jvilline@auroragove.org

A Technical Review of the Columbia Habitat Monitoring Program's Protocol, Data Quality, & Implementation

Tailwater provided data analysis and geographic information systems services for the review of the CHaMP program for Bonneville Power Authority. The assessment project was an assessment of all methods, data, and implementation of a habit assessment program within the Columbia River Basin. Program evaluated riparian habitat, aquatic habitat, water chemistry, geomorphology, among other parameters. The sampling program included 45 sites within each watershed that were selected using Generalized Random Tessellation Sample (GRTS) Design. Tailwater conducted interviews with database managers with Sitka Tech, developed scripts to evaluate data within the database, evaluated personnel permissions and documented the findings within the database management for the CHaMP program. Tailwater also developed scripts to perform basic statistical analysis for all parameters within the CHaMP program so the datasets could be evaluated for consistency and effectiveness. Data evaluation included over 1,000,000 data points; our team was able to identify inconsistencies in data processing as these changes were being made.

Contact: Dave Rosgen, Wildland Hydrology, 11210 N. County Road 19, Fort Collins, CO 80524, (970) 568-0002, dave@wildlandhydrology.com

Additional Tailwater References

David Bidelspach, Five Smooth Stones Restoration, (919) 218-0864, david.bidelspach@fivessr.com

RedFish Environmental LLC

Uintah Hydroelectric Project FERC N0.190. Uintah River Technical Studies. Fish population, Fish Habitat, and Hydrology Studies, Utah

RedFISH conducted a fish habitat study to assess flow-habitat relationships for resident fish in the bypassed reach of the Uintah River hydroelectric project, assessed habitat condition, and addressed potential project effects. RedFISH mapped mesohabitat distribution and composition at bypass reach sites where fish population surveys were also conducted. A physical habitat inventory was completed.

RedFISH conducted a fish population study to characterize density and condition of fish in the bypass section of the Uintah River. Three-pass population depletion estimates were calculated for trout species and descriptive statistics were reported. Structural metrics reported included length frequency distributions, condition factor (K), relative weight (Wr) and proportional stock density (PSD).

A hydrology assessment was also conducted to quantify flows diverted by the hydroelectric project from the Uintah River and other sources. Water right information was compiled, historic flows were summarized from USGS data, and flow duration curves were generated. Canal flows were determined through the installation of staff gauges and water level sensors. Discharge measurements were recorded to develop stage/discharge

rating curves. A water budget was developed. RedFISH addressed the effects of project operation on minimum flow requirements.

RedFISH provided specialized experience in:

- Fish Biology, Aquatic Ecology, Geomorphology, Hydrology
  - Technical Analysis
  - Habitat Evaluations, Mapping and GIS
  - Study Design, Statistics, Data Compilation
  - Field Investigation Planning, Permitting
  - Coordination
  - Regulatory compliance
- Technical writing

Health and Safety: This project adhered to RedFISH health and safety policies/procedures and there were no safety incidents. This project required the use of electrofishing equipment. Relevant training included emergency first responder, USFWS Electrofishing Safety Training, and USFWS Electrofishing Techniques Training. Customer Satisfaction: RedFISH received outstanding ratings for technical, management, quality, and customer satisfaction.

Contact: Patrick Corun, PE, Moon Lake Electric Association, (435) 722-5406, pcorun@mleainc.com

Kuskokwim River Juvenile Salmon Investigation, Alaska

RedFISH provided planning and environmental services in support of the U.S. Army Corps of Engineers Donlin Gold Project Environmental Impact Statement (EIS) in Alaska. RedFISH staff managed and/or provided technical expertise and oversight for a wide range of fish and aquatic resource technical studies within the extensive project area. Services provided for the Juvenile Salmon Investigation included planning, coordination with a multi-disciplinary team and client, fish and fish habitat investigations, and preparation of technical reports. RedFISH prepared preliminary literature review to provide a sound scientific foundation to plan the study and analyze problems that could arise from the proposed development. RedFISH developed planning documents and study plans for fish and fish habitat study, prepared statistical study design, developed field protocols, led field data collection efforts, surveyed and mapped stream habitat, provided study design to conduct spatial statistics analysis using GIS, trained field crews, and provided technical expertise and oversight. Data collected was used to assess potential impacts of proposed development on sensitive fish and aquatic resources.

Field Survey Investigation – A variety of habitats along reaches identified as representative were sampled to assess fish presence/absence, differences in relative abundance of juvenile salmon, and assess differences in habitat availability and use during low and high water conditions.

Physical Data – Characterized habitat conditions.

Habitat Mapping – Simultaneously with fish sampling, all available habitats along each survey reach were mapped. Detailed field mapping was completed over aerial imagery. Mapped habitats were used to assess habitat availability and use, and to examine habitat associations that may be correlated to juvenile salmon presence and relative abundance. Field maps were digitized and spatial statistic analyses were conducted via Geographical Information System (GIS).

RedFISH provided specialized experience in: Fish Biology, Aquatic Ecology, Geomorphology, Technical Analysis, Habitat Evaluations, Mapping and GIS, Study Design and Statistics, Data Compilation, Field Investigation

Planning, Coordination (client, field biologists, boat captains, and helicopter pilots), Training Field Biologists, Technical writing.

Health and Safety: This project adhered to all Client health and safety policies/procedures and there were no safety incidents. This project required complex logistics and coordination to transport staff and equipment via plane, helicopter and boats in Southwest Alaska. Relevant training included emergency first responder, swift water rescue, wilderness firearm, helicopter safety, bear awareness

Contact: Robert (Nick) Enos, Donlin Gold LLC, (604) 684-5900 x 41257, NEnos@bgcengineering.ca

Title and Location: Stream Survey and Flow Recommendation for the Price River, Utah

The Price River drainage (PRD) is an important system for conservation of Colorado River native fish. RedFISH conducted stream surveys, modeled hydraulic parameters, and assessed instream flow requirements. RedFISH was responsible for project management, development of study plan, review of existing literature and data, implementation of field surveys, data quality assurance/control (QA/QC), modeling, data analysis, and reporting. RedFISH coordinated project activities with the client, The Nature Conservancy, Trout Unlimited, and third parties including staff from Utah State University, BLM, and the UDWR.

RedFISH provided specialized experience in: Aquatic Ecology, Geomorphology, Hydrology; Technical Analysis, Habitat, Evaluations, Mapping and GIS; Study Design, Data Compilation; Coordination; Technical writing.

Contact: Laura Belanger, P.E., Western Resource Advocates, (720) 763 - 3718, laura.belanger@westernresources.org

AloTerra Restoration Services

Upper Poudre Post-Fire Unmet needs (CO). Public and Private Lands. 2015-2016

AloTerra provided monitoring, technical design, stakeholder engagement, and 30% concept designs for this project. Three years following the 2012 High Park Fire, this watershed monitoring and analysis project was funded by the Coalition for the Poudre River Watershed (CPRW) to prioritize unmet restoration and resiliency needs within the Cache la Poudre River Watershed. A desktop analysis (burn severity, slope, distance to water source and infrastructure, soil type, previous treatment) and stakeholder engagement produced a list of subwatersheds within the burn area to be field evaluated for existing conditions. AloTerra developed and implemented a post-fire monitoring protocol to assess the condition of hill slopes, gullies, and primary channels in each drainage (over 35 miles of stream), and produced a scoring system to rank the state of recovery and potential restoration needs of each subwatershed. Three high priority subwatersheds were identified to receive restoration design and construction. AloTerra worked with 5SSRR to develop a 30% design for restoration and resiliency for Unnamed 3 tributary. Owner: Coalition for the Poudre River Watershed, for JW Associates.

Contact: Jennifer Kovecses, Coalition for the Poudre River Watershed, (970) 222-5754, jenk@poudrewatershed.org

Living Streambanks: A Manual of Bioengineered Treatments for Colorado Streams (CO), 2016

Responding to the 2013 Front Range flood, AloTerra developed a multi-basin river restoration program with Rocky Mountain Flycasters and Golder Associates to address high priority gaps (capacity, plant materials development, and bioengineering) left by current watershed level planning efforts. The bioengineering manual synthesized best available information (shear stress, plant community ecology, restoration ecology, hydrology and hydraulics, geomorphology, stream power, and nationally recognized treatments) from across the US and internationally to create a manual of treatments tailored to Colorado streams. John assembled and facilitated a technical stakeholder body of 186 individuals from government entities, non-profit organizations, and

engineering firms to provide input into the manual. We assembled a team of technical experts to structure and write the manual in a manner that integrated the best available and most relevant technical and practical information for Colorado stream conditions.

Additional AloTerra Restoration Services Reference

Tom Bates, Arapaho & Roosevelt National Forest & Pawnee National Grassland, (970) 295 - 6648, tobates@fs.fed.us

SWCA Incorporated

Goose Creek Watershed Studies

SWCA completed studies and prepared a watershed-based plan for water quality restoration projects in the Goose Creek Watershed. The hydrology of the Goose Creek Watershed presented a challenge because there are substantial irrigation withdrawals and interbasin transfers and a much larger data set for the mainstem streams (Little Goose, Big Goose, and Goose) than for the small tributaries. There was already an active watershed group that required close collaboration and involvement from SWCA to ensure that stakeholder input was productive and used in the analysis. SWCA overcame the challenges associated with hydrology by working closely with stakeholders to understand the timing and quantity of irrigation withdrawals and transfers, and where possible to correlate a continuous flow data set on Goose Creek with instantaneous flow measurements on tributaries. Throughout the process, SWCA worked closely with key stakeholders in the watershed to ensure that the plan represented ongoing work in the watershed and provided a path forward for lingering source issues. The watershed-based plan will be used by the local conservation district to obtain federal funding for water quality restoration projects in the Goose Creek Watershed. Following approval of the studies, SWCA began working directly with the City of Sheridan to implement stormwater best management practices (BMPs) identified in the implementation plan.

Contact: David Engels, EnTech, dte@entechusa.net, (307) 673.1542

City of Sheridan Ecosystem Restoration

SWCA conducted a feasibility study, under Section 1135 of the Water Resources Development Act of 1986, to develop options for restoration of Big Goose and Little Goose Creeks. The goal of this restoration is to improve the quality of aquatic, wetland, and riparian habitats along the segments of the Goose Creeks that run through the community.

SWCA completed a literature review and historical data survey, including the field inventory of fauna and flora known to occur near or within the project area. SWCA also completed a habitat delineation of wetlands and vegetative communities within the project area. In addition to the data collection, SWCA completed a watershed condition analysis to establish a baseline for physical, chemical, and biological parameters in the watershed. To complete this task, SWCA conducted an extensive geospatial analysis and literature synthesis for various watershed characteristics such as major water features, water quality, water usage, water supply, designated uses, population growth, land use, vegetation, and wildlife. As part of the watershed condition analysis, SWCA used the U.S. Forest Service's Watershed Condition Classification and methodology to conduct a forecast scenario for natural resources in the watershed both with and without the implementation of the Sheridan ecosystem restoration project and best management practices. The watershed condition report included analysis of the entire Goose Creek watershed that includes Goose Creek, Big Goose Creek, and Little Goose Creek sub watersheds to fully capture ecological conditions and better inform improvement feasibility in natural resources.

Contact: Lane Thompson, City Engineer, City of Sheridan, LThompson@sheridanWY.net, 307.675.4232

Mesa County Community Wildfire Protection Plan

Figure 4. Community meeting for Mesa County Community Wildfire Protection Plan

SWCA worked extensively with communities in Mesa County, Colorado, to develop a comprehensive CWPP for the varied mesa and river valley landscape, including the city of Grand Junction and 15 other municipalities. Due to the widespread federal lands in the county, SWCA worked closely with BLM, NPS, and USFS representatives to provide recommendations for fire mitigation that complement existing fire management plans and federal fuel treatment programs. Our Team held numerous public meetings to gather data, including hosting traditional community meetings and attending an annual meeting for a large community association. The CWPP risk assessment incorporated fire history data, topography, weather, and WUI layers and used FlamMap modeling to determine potential fire behavior parameters. This project demonstrates our experience with organizing, and facilitating consensus based planning with diverse stakeholders and also illustrates our experience with complex planning involving multiple jurisdictions, federal environmental law, multiple ecosystems, and multiple emergency service jurisdictions.

Estancia Basin Watershed Monitoring and Post-Fire Monitoring

In 2007 SWCA was awarded a multi-year contract to monitor forest and watershed health in relation to forest thinning on the eastern slopes of the Manzano Mountains. The monitoring project is guided by a steering committee consisting of state, federal, county, and municipal organizations, as well as land grant, tribal, and non-governmental groups. SWCA is responsible for planning and implementing forest thinning monitoring in order to evaluate the effectiveness of thinning treatments relative to soils, hydrology, vegetation, and wildlife. After monitoring began, three major wildfires (Ojo Peak, Trigo, and Big Spring) occurred in the monitoring area in late 2007 and early 2008. In response to these fires, SWCA has additionally initiated a monitoring study of post-Trigo fire recovery of private forest lands, and we have subsequently been approached by other organizations to provide monitoring services on similar forestry/fire projects in the area. Monitoring has continued for 10 years and was renewed under a new contract to continue thru 2018. Among the study findings, forest thinning treatments have resulted in reduced wildfire fuels, increased soil moisture and herbaceous vegetation production, and increased surface water yield to streams that feed groundwater aquifers in the watershed. Long-term projects such as these will also aid in understanding how ecosystems respond to climate change.

Contact: Dierdre Tarr, District Manager, dierdre.tarr@nm.nacdnet.net, (505) 847.2941

Westside Watershed Collaborative Forest Restoration Program

Funded through the USFS Collaborative Forest Restoration Program (CFRP), SWCA is assisting the City of Alamogordo to complete environmental compliance and planning tasks associated with protecting the City's water supply from potential degradation due to forest wildfire. The project consists of forest thinning to reduce fuel loading in critical watersheds on USFS-managed lands. SWCA worked closely with the USFS Lincoln National Forest to conduct site evaluations, including forest stand exams, assessing threatened and endangered species habitat, cultural resources, and watershed conditions. SWCA prepared a biological assessment and environmental assessment (EA) to USFS standards. SWCA has convened and facilitated multidisciplinary group meetings with stakeholders including the City, the USFS, BLM, New Mexico State Forestry Division, Natural Resources Conservation Service, soil and water conservation districts, and local landowners. Successful completion of the project will enable the City and the USFS to seek funding to implement forest thinning.

South Sacramento Restoration Project

In June 2017, SWCA began developing an EIS for the South Sacramento Restoration Project on the Lincoln National Forest (LNF) outside Alamogordo, New Mexico. The LNF, in cooperation with the USFWS and the NMDGF, developed the project to address forest health issues, hazardous fuels, and declining wildlife habitat quality. The project is being developed under Section 602 of the Healthy Forest Restoration Act of 2003, also known as the Farm Bill authority, to treat priority areas that are susceptible to threats from forest insects and disease. SWCA was selected based on our reputation and experience, but also because we have the expertise and staff capacity to meet the LNF's and cooperators' goal of completing the environmental compliance within 18 months for the 140,000-acre landscape-size project. The EIS is a hybrid of a project-specific and programmatic EIS, and as such, SWCA is breaking new ground for how environmental compliance can be done more efficiently both in time and scale. SWCA is currently on track to achieve these goals and anticipates having a Draft EIS available for public review by April 2018. Completing a project of this magnitude within the accelerated time frame has required weekly check-ins with the LNF and strong leadership from SWCA. Thus far, SWCA has developed a scoping report, prepared and facilitated three public meetings, and facilitated approximately 50 virtual online meetings and conference calls with the USFS to develop the proposed action and eight resource specialist reports, which will be summarized for inclusion in Chapters 3 and 4 of the EIS.

Sandoval County Community Wildfire Protection Plan

SWCA prepared a comprehensive CWPP to assist Sandoval County, New Mexico, in reducing the risk of catastrophic wildfire to communities including the City of Rio Rancho and five other municipalities. The plan followed the format of the existing Sandoval County Emergency Operation Plan and Mitigation Plan in order to maximize the efficiency of all-hazard emergency planning for Sandoval County. During the planning process, SWCA facilitated a series of public meetings to gain valuable insight on each community's needs. Existing GIS datasets were integrated to develop a risk assessment framework for the vegetated lands and developed communities within the project area. Particular focus was placed on the protection of the vulnerable lands within the Jemez watershed of the USFS Jemez Ranger District.

Through collaborative development, we identified and prioritized areas for hazardous fuels reduction and recommended realistic measures that homeowners and communities could take to reduce the ignitability of structures throughout the county. The CWPP assessed fire-fighting capability, ingress and egress, suppression water supply infrastructure and fire-fighting resources. Our approach provided Sandoval County with an effective CWPP that has been used to secure funding for implementing recommendations. In 2012, SWCA was retained to assist Sandoval County with an update to the 2008 plan to incorporate changes to the community and landscape resulting from a large wildfire.

Assessment Approach

Our team starts a project with the kick-off meeting where the subject matter experts and project stakeholders meet to develop the overall assessment goals and objectives. Once the goals and objectives of the project have been defined, the team will review existing data sets available for the basin. Our team utilizes Dropbox to seamlessly share data sharing between team members. The team will review the available data sets including USGS, SLV GIS/GPS, FEMA, NRCS, Forest Service, and others to develop the summary of existing data for each of the tasks.

The project partners include an extensive network of resources. Where opportunities to partner and allow for additional efficiency exist, our team can provide a detailed breakdown of the proposed budget and provide an alternative budget that includes these resources.

The team will identify data needs from the existing data and make recommendations for strategies to fill in the gaps through measurement, sampling, or communication and cooperation with appropriate agency or individual to complete the tasks. The team is comprised of individuals with a wide range of backgrounds that may complete any additional sampling necessary. However, for assessment efficiency and other constraints other individuals may be able to complete sub-tasks for a reduced or in-kind and allow the grant funding to be re-directed to expand the assessment elsewhere.

Once the gaps have been filled additional new measurements and assessments may be completed to provide additional new coverage of the basin. Our team will develop a robust sampling plan within the given budget to assess the conditions within the basin and document the status of each of the assessment categories. Where there are existing datasets, new data may be collected to estimate overall trend within the basin.

Our team assumes that access will be granted access to all private property within the study area and that the Costilla County Conservancy District and other stakeholders will assist the assessment team in obtaining permissions to access property prior to sampling efforts.

The assessments associated with each of the tasks in many cases may be completed using a variety of methods. For the purpose of this proposal we have proposed the current standard of assessment. If historic datasets exist, the assessment methods will be adjusted where appropriate to match the existing data for comparative purposes.

Although each of the tasks have been separated by category, this does not mean they are not related. There is extensive overlap in many of the tasks that will be leveraged to allow tasks to be completed efficiency or with greater detail.

Once all the assessments are complete the data from all the steps will be documented including methods and results. The results will also be compiled into a presentation to the stakeholders and other community members. Areas of degradation and projects that could be implemented to address degradation will be compiled by the team and ranked with input from the stakeholders. The top five ranking projects will be developed into conceptual plans for inclusion in the final report.

The final report including the documented results and concept designs will be compiled and formatted. The data sets will be organized with meta-data documentation for delivery to the Costilla County Conservancy District so that they may be available for internal and public use.

Figure 5. Google Earth image of Culebra Creek downstream of San Luis, stream is void of riparian vegetation in many areas and has been straightened through much of this reach. 37°12’16.05” N 105°29’02.80”.

ANDREA TAILLACQ, P.E.

Water Resources Engineer

Summary of Qualifications

Andrea has over fourteen years of experience related to project management, hydrology, water resources, and water rights. After working for federal and state agencies and small and mid-sized consulting firms Andrea and Greg formed Tailwater Limited in July 2016. Andrea has extensive experience in the field collecting hydrographic data and compiling hydrographic and climatic data to evaluate trends to determine historic use, and evaluate changes resulting from change of water use. Andrea has performed over 1,000 streamflow measurements and reviewed thousands of discharge measurements performed by others for completeness and accuracy. Andrea has developed stage-discharge and index-velocity rating curves for real-time computation of streamflow.

Andrea understands the legal processes in Colorado Water Court and Colorado Division of Water Resources and has provided the engineering documentation required for change of use applications and substitute water supply plans. Andrea has provided engineering analysis for application of change of water rights and evaluated engineering analysis performed by others in opposition of change of water rights in Colorado Water Divisions I and II.

Project Experience

Technical Review of the Columbia Habitat Monitoring Program's Protocol, Data Quality, & Implementation

Provided data analyst and GIS services to Wildland Hydrology for the Columbia Habitat Monitoring Program Review. The overall project was designed to provide an objective review of the program which spanned three states from 2011 to 2016. Andrea provided data processing involving statistical analysis of over 1,000,000 data points across 1,815 sites. Andrea summarized the data housed within project database, compared data for changes over processing period. Developed GIS datasets to compare project data with other datasets such as NOAA critical habitat layers and EPA 303(d) listed streams. All routines were scripted to output data summaries to team for rapid review and consistent methodology, and formatting for inclusion in the Team's final report.

Colorado River below Granby Streamflow Gage – Granby, CO

Designed new streamflow gage for Northern Colorado Water Conservancy District using a hybrid design between a standard concrete weir and natural channel design. The streamflow gage was designed to meet fish passage goals to allow fish to have seamless access to waters being released from the dam and the downstream reaches of the Colorado River. Gage was designed with primary flow targets ranging from less than 10 cfs up to approximately 470 cfs with the capacity to pass flood flows near 3,000 cfs.

Builders Aggregate Substitute Water Supply Plan – Fort Morgan, CO

Prepared substitute water supply plan and arranged for augmentation water for a gravel mining operation. Worked with client legal staff to ensure all aspects of the Substitute Water Supply Plan application were met and thoroughly documents. Provided additional guidance to client to ensure accounting was submitted in a timely manner. Performed all aspects of project management including review of invoicing and budget tracking.

Undisclosed Client, Northern Colorado

Provided analysis of historic consumptive use and made recommendations for maximizing water yield under current and future operating scenarios. Evaluated condition of water diversion structure and damage to diversion structure to determine market value of injury due to client as the result of structure damage. Provided preliminary analysis of water yield available to mutual ditch shareholders based on information compiled from five previous change of use decrees and associated engineering reports. Met with current tenant farmer, analyzed property deeds, and evaluated historic aerial imagery and NLCD data to document current and historic crop coverage for use in historic consumptive use analysis. Calibrated local crop coefficients for use within Blaney Criddle method for computation of long-term record of

Professional Registration

- Colorado Professional Engineer (#43790)
- Wyoming Professional Engineer (#16355)

Education

- Applied Fluvial Geomorphology (Rosgen I)
- M.S. Engineering Systems (Civil Specialty), Colorado School of Mines, Golden, CO
- B.S. Engineering (Mechanical Specialty), Colorado School of Mines, Golden, CO
- USGS Certified ADCP Operator (2012)
- USGS Certified Cableway Inspector (2012)

Professional Affiliations

- American Society of Civil Engineers
- American Fisheries Society

historic consumptive use. Computed power coefficient from available electric use and metered pumping to estimated historic diversion records from available power use records.

Hydrographer Colorado Division of Water Resources – Rio Grande Basin, CO

Operated and installed streamgaging stations across the Rio Grande Basin. Prepared 10-day report for Rio Grande Compact and annual reporting of streamflow. Performed streamflow measurements with mechanical meters wading and cableways and using Acoustic Doppler Current Profiler. Performed annual inspection of manned cableways to ensure personnel safety. Evaluated gage pool structures and made recommendations for control design to balance stability and sensitivity for quality long-term record of streamflow. Preformed calibration measurements at diversions structures and gain/loss studies to allow water commissioners to accurately administer water. Performed geomorphic surveys of ephemeral channels to extend rating curve for Muddy Creek at Toonerville to estimate inflows into John Martian Reservoir. Made recommendations on improvement to diversion structures to enable water rights to be administered.

Student Hydrographic Technician – Colorado Water Science Center – Lakewood Colorado

Performed all duties of a hydrographic technician including streamflow measurements, streamflow and water quality record work up and checking. Collected water quality field parameters (specific conductance, pH, dissolved oxygen) and prepared samples for processing at national laboratory including nutrients, metals, dissolved organic carbon, mercury, and others. Collected samples from sites in Rocky Mountain National Park and Zirkle Wilderness to assess the affects of atmospheric deposition on water quality in high mountain sites including mercury deposition from fly ash. Performed stormwater sampling including evaluating streamflow conditions to determine when to launch automated samplers, processed stormwater samples from Urban Run-off, assisted in preparation of annual reports and 5-year trend report for MS4 permit compliance. Routinely met with clients and citizen groups to provide educational presentation on process used to monitor water quality and streamflow including professional and student groups. Completed master's thesis research operating automated dye-dilluation streamflow measurement system and provided measurements for quality assurance and control including dual-dilution methods for developing rhodamine WT standards and analyzing rhodamine WT concentrations in solution with high viscosity. Performed streamflow measurements and water quality sampling for Tollgate Creek Selenium Study.

Publications

Rosgen, D and Others, A Technical Review of the Columbia Habitat Monitoring Program's Protocol, Data Quality & Implementation, Wildland Hydrology, March 16, 2018.

Taillacq, A., 2017, Water crossing state lines a closer look at the Rio Grande compact. 2017 Utah and Colorado/Wyoming Chapters of the American Fisheries Society Joint Meeting, Grand Junction, CO. Feb. 21-23, 2017.

Fleming, A., 2008, Measuring streamflow in ice-affected streams using an automated dye-dilution system. Thesis (M.Sc.)--Colorado School of Mines, 2008.Division of Engineering.@xi, 85 leaves.

Bossong, C.R., and Fleming, A.C., 2008, Summary and evaluation of the quality of stormwater in Denver, Colorado, October 2001 to October 2005: U.S. Geological Survey Scientific Investigations Report 2008–5134, 102 p.

GREG TAILLACQ

CADD Designer | Environmental Scientist | Fisheries Biologist

Summary of Qualifications

Greg has over thirteen years of experience related to fisheries, geomorphology, environmental assessment, and river restoration. After working for a large consulting firm for five years he joined Tailwater Limited as a co-owner. Greg has extensive experience in performing geomorphic assessement, he has performed surveys in over seven states on projects ranging from the smallest trickle up to the North Platte River. Greg has taken this field experience and applied this background to designing river systems using Natural Channel Design and developing engineering plan sets.

Greg is versed in numerous techniques to collect geomorphic data including RTK GPS, total stations, ADCPs, laser and sight levels, and 3D scanners. He has been operating survey grade instruments for over eight years in direct relationship to geomorphology and environmental assessment. He has developed data collection platforms to improve data collection efficiency and reduce post-processing time on large-scale impact evaluations.

Greg uses a variety of Geographic Information Systems and AutoCAD to analyze data and produce deliverables ranging from detailed plan set production, watershed assessment reports, and presentation graphics. He has successfully completed permitting for projects and performed post-project compliance requirements for USACE permits as well as permitting for local agencies.

Project Experience

IPC Arroyo – Tracy, CA

The project site is located within a proposed industrial development which included a federal canal crossing and two roadway crossings. Canal culvert is undersized resulting in high downstream channel stress and subsequent head cutting. Since additional conveyance was infeasible funder the existing canal proposed plans sized downstream scour pool to prevent channel erosion. Performed site evaluation to document existing conditions within an urban development in the planning process and directed California PLS in data collection. Developed preliminary plans for stream corridor alignment utilizing natural channel design techniques and limited shear stress design approaches. Evaluated hydrographic conditions and stormwater management plan to determine flood frequency and conveyance requirements. Ensured proposed design was feasible within project constraints including culvert crossing and belt-width.

City-wide channel stability study – City of Aurora

Used remotely sensed data such as LiDAR, aerial photography, land use data, TIGER, SSURGO, and other datasets to identify stream reaches with a high potential for instability. Developed field sampling plan for identified sites and performed field verification of the desktop assessment. Summarized field findings and identified cause of degradation and developed a list of potential restoration projects to improve channel stability within the City of Aurora. Field verification included geomorphic assessment of impacted reaches using RTK GPS, collecting longitudinal and cross-sectional data. Restoration projects were ranked based on risk assessment.

Assessment of Existing Conditions and Pre-Development Proposed Design – Urban Drainage and Flood Control District, Colorado

This work is performed on an on-going sub-contracted basis for Five Smooth Stones Restoration. Greg assists in performing assessments of existing conditions at proposed development sites, using RTK GPS, and develops proposed channel alignment that could be used by a developer to convey post-development run-off using Natural Channel Design techniques and reference reach data. The proposed channels reduce construction and maintenance cost by maintaining a channel slope and sinuosity that balances aggradation and degradation. Stable cross-section surveys are being compiled into a regional curve for Urban Drainage and Flood Control District to provide a basis for channel dimensions within the region. In some developments proposed alignments are optimized into a thee-dimension design surface including structure placement for construction. This process has been completed at numerous sites over the last 18 months with projects

Education

- Applied Fluvial Geomorphology (Rosgen I)
- River Morphology and Applications (Rosgen II)
- River Assessment and Monitoring (Rosgen III)
- M.S. Environmental Science and Engineering, Colorado School of Mines, Golden, CO
- B.A. Double Major Biology (emphasis in Conservation Biology and Environmental Science) and Environmental Studies, Western State College, Gunnison, CO
- NOAA Certified Groundfish Observer
- Certified Bear Guard
- OSHA 40-hr HAZWHOPER

Professional Affiliations

- American Fisheries Society

ranging from preliminary concept design to completed channel construction/restoration. Channel designs include nested channel to meet flood mitigation goals, reduce channel maintenance, allow for changes in baseline hydrograph resulting from changes in run-off characteristics resulting from development. Channels are sized based on appropriate ratios for channel classification and target shear stress based on arid environment vegetation thresholds. Many of th e projects are completed with intern staff who are trained throughout the process from GPS operation, gemorphic data collection, up to plan optimization.

AutoCAD Templates and Plan Production

Developed custom AutoCAD Templates for specific projects to meet client CAD standards. Provided training on use of AutoCAD to clients to improve efficiency in plan production for Natural Channel Design. Implemented data short-cuts and dynamic labeling to improve update work-flows and prevent accidental modification of un-related surfaces during design updates. Style templates promote consistent professional engineering plan sets. Maintains standard file structure to ensure files can be located by all technicians working on the project past, present, and future.

Construction Observation North Platte River (Wyoming), Fall River (Colorado), Illinois River (Oklahoma), and Others

Provide client representation during construction for river restoration projects. Document post-construction conditions to begin post-project monitoring, using RTK GPS. Provided communication and clarification between construction team and project engineers and client. Assist construction crews by verifying invert elevations of structural elements. Provide documentation required for permit compliance. Performed site staking for channel grading.

Fisheries Technician Colorado Division of Wildlife, Monte Vista, CO

Performed population estimates across San Luis Valley on streams, rivers, lakes, and reservoirs. Spawned rio grande cutthroat trout in Haypress Reservoir. Collected rio grande cutthroat young of the year for genetic sampling. Assisted with Rotanone reclamation projects on Hermosa Creek near Durango, CO and Woods Lake and Tributaries near Ridgeway, CO. Stocked rio grande cutthroats in the San Luis Valley. Certified boat inspector. Collected stonefly shells for on-going assessment of river restoration project on Collier State Wildlife Area and Wason Ranch.

Aquatic Sampling to Assess Waterbodies for Proposed Pipeline – Alaska

Performed biological assessments or streams at proposed pipeline stream crossing locations to determine presence/absence of salmon in streams that were not cataloged for permitting a proposed 300+ mile pipeline. Performed baseline fisheries monitoring for proposed gold mine. Develop ArcPad application to improve data management and data processing efficiency including complete check-in/check-out procedure to track and communicate project status to managers and client. Performed benthic invertebrate sampling, field water chemistry, electroshocking and seining, collected biological samples for metals concentration, habitat mapping using MesoHABSIM, performed geomorphic assessment.

Biological Technician – Fisheries – Morrison, CO

Performed preliminary river restoration surveys using total station survey equipment. Classified streams to the Rosgen Stream Classification system. Performed Fish population surveys using backpack electroshocker and analyzed data in Colorado Division of Wildlife JakeOmatic. Performed preliminary assessments for the Happy Meadows Upper South Platte Restoration Project. Provided assistance to forestry program by setting up units for mechanical thinning, evaluated post thinning conditions to verify basal area and fuel levels to ensure contractor compliance. Performed preliminary surveys for gauss hawk and albert squirrel. Performed pawnee montane skipper surveys to estimate population and extent of the endangered butterfly. Completed S-130/190 and S-290 Basic and Intermediate Wildland Firefighting and Wildland Fire Behavior.

North Pacific Groundfish Observer – Alaska

Certified National Marine Fisheries Service certified groundfish observer. Observed Commercial fishing vessels out of Dutch Harbor and Kodiak Island, Alaska to ensure vessels abide by State and Federal Regulations. Sampled hauls brought aboard vessel for species composition, sex/length frequency, and otolith collection. Monitored hauls for mammals, sea birds, and prohibited species including Salmon, Halibut, Pacific Herring, Tanner Crabs, and King Crabs.

ERNESTO A. DE LA HOZ

Senior Aquatic Ecologist

EDUCATION:

2003 **M.S. Aquatic Ecology. Utah State University.**

2000 **B.S. Fisheries and Wildlife Management. Utah State University.**

1996 **B.S. Marine Biology. Universidad de Bogotá Jorge Tadeo Lozano, Santa Fé de Bogotá, Colombia.**

PROFESSIONAL EXPERIENCE - POSITIONS AND RESPONSIBILITIES:

2007-Present - PRINCIPAL | SENIOR SCIENTIST | PROJECT MANAGER, Redfish Environmental LLC.

Responsibilities encompass a full range of managerial functions including financial, personnel, and equipment needs, as well as setting company direction, business development, proposal preparation, performance or supervision of technical work, project management, and interaction with clients. Manage personnel, budgets and schedules. Projects completed under contract by RedFISH include:

- Uinta Basin Fish Habitat, Fish Populations, Hydrology, and Terrestrial Studies. FERC Project 190 (2015-2018). Project Manager/Senior Ecologist. Moon Lake Electrical Association Inc. RedFISH conducted fish habitat, fish population, hydrology, and rare plant surveys for the Project. Refined proposed study plans. Consulted with agencies and stakeholders. Conducted biological and physical habitat surveys, analyzed data and prepared reports for agency and stakeholder review. Under contract with Moon Lake Electric Association.
- Stream Survey and Flow Recommendation for the Price River, UT (2017-2018). Project Manager/Senior Aquatic Ecologist. Project conducted under contract with Western Resources Advocates (WRA; member of the Upper Colorado River Endangered Fish Recovery Program).
- Fishers Ranch and Mountain Queen, Western Colorado - Aquatic Resource Management and Water Quality Monitoring (2017-2018). Project Manager/Senior Aquatic Ecologist. Work conducted under contract with Henke Property LLC.
- **San Juan River and Animas River Fish Surveys and Fish Tissue Sampling. EPA Gold King Mine Spill Monitoring, New Mexico (2017).** Project Manager/Senior Aquatic Ecologist. This project is part of EPA's monitoring effort following the Gold King Mine spill near Silverton, CO. Work conducted under contract with PG Environmental.
- Lower Jordan River Flow Study. Senior Aquatic Ecologist. Lower Jordan River Commission. 2015-2017. Work conducted for Jordan River Commission under subcontract with Cirrus Ecological Solutions.
- Alexander Reservoir Water Quality Monitoring. Senior Aquatic Ecologist. PacifiCorp. 2015. Work conducted for PacifiCorp under subcontract with Cirrus Ecological Solutions.
- Rilda Creek Fish and Aquatic Invertebrate Monitoring. Project Manager/Senior Aquatic Ecologist. For PacifiCorp/Energy West Mining Company. 2007-2017. Project Manager/Ecologist. Work conducted under contract with Energy West Mining.
- Dungeness River Fish Habitat Assessment and Dungeness River Side Channel Fish Habitat Surveys. Project Manager/Senior Aquatic Ecologist. For Jamestown S'Klallam Tribe, Washington. 2014-2015. This project was completed by RedFISH under two separate contracts with the Jamestown S'Klallam Tribe.
- Kuskokwim River Juvenile Salmon Investigation. Senior Fisheries Biologist and Aquatic Ecologist. For Donlin Gold LLC. 2014.
- Rainbow Smelt in the Kuskokwim River. Senior Fisheries Biologist and Aquatic Ecologist. For Donlin Gold LLC. 2014. Under subcontract with Owl Ridge Environmental Consultants Inc.
- Alaska North Slope Non-Native Plant Survey, Umiat, Alaska. Project Manager. For Linc Energy Operations Inc. 2014. This project was conducted by RedFISH under contract with Linc Energy Operations Inc.
- Alaska North Slope Fish Surveys. Senior Aquatic Ecologist. For ConocoPhillips Alaska. 2013. Under contract with MJM Research LLC.
- National Rivers and Streams Assessment (NRSA). Designated fish taxonomist for U.S. Environmental Protection Agency (EPA) National Rivers and Streams Assessment (NRSA) in Colorado and Wyoming. Lead aquatic ecologist and senior fish biologist. Under contract with PG Environmental.
- Alaska North Slope Lake Water Quality Sampling. Senior Aquatic Ecologist. For Repsol. 2013. Work completed under contract with MJM Research LLC.
- Conservation Effects Assessment Project (CEAP) - Utah. Prepared for Utah State University (USU). 2010. Project Manager/Ecologist.

- Elk Spring Invertebrate Surveys - Utah. Prepared for Energy West Mining Company. 2007. Project Manager/ Ecologist.

2010-2012 senior aquatic ecologist/Project manager, Ottertail Environmental, Inc.

Lead aquatic ecologist and fisheries biologist. Responsible for the implementation of several complex projects in Alaska. Supervised a team of 3 to 5 biologists and field technicians and coordinated project implementation with clients and other contractors. Prepared technical proposals; designed studies; conducted data analysis and prepared draft and final reports. Responsibilities also included marketing and business development. Projects included:

- Natural Gas Pipeline Aquatics Study - Alaska. Prepared for Donlin Gold, LLC. Senior Aquatic Ecologist/Team Leader. Conducted baseline aquatic surveys for a proposed natural gas pipeline along 313 miles in interior Alaska.
- Crooked Creek Baseline Aquatic Monitoring - Alaska. Prepared for Donlin Gold, LLC. Senior Aquatic Ecologist.
- Winter Stream Substrate Temperature Analysis, Crooked Creek - Alaska. Prepared for Donlin Gold, LLC. Senior Aquatic Ecologist.
- Resistance Board Fish Weir, Crooked Creek - Alaska. Prepared for Donlin Gold, LLC. Senior Aquatic Ecologist.
- White River Biological Assessment, White River - Utah. Prepared for Anadarko Petroleum Corporation. Senior Aquatic Ecologist. Assisted Anadarko with the submission of construction permit applications to the U.S. Corps of Engineers.

2008-2010 LEAD AQUATIC ECOLOGIST/FISH BIOLOGIST, Bio-West, Inc.

Lead aquatic ecologist and fisheries biologist. Responsible for the implementation of several projects in Utah, Nevada, and New Mexico. Supervised a team of 3 to 5 field biologists and technicians. Prepared technical proposals, designed studies, lead field data collection, conducted data analysis, and prepared draft and final reports. Responsibilities also included project management, marketing and business development. Projects included:

Fisheries and Environmental Evaluations:

- San Juan River Hydrology, Geomorphology, and Habitat Studies - New Mexico and Utah. Prepared for San Juan River Basin Recovery Implementation Program. 2008-2010. Lead Fisheries Biologist/Assistant Project Manager. Research study to identify specific habitat types utilized by young endangered fish (Colorado pikeminnow and razorback sucker) in the San Juan River, New Mexico, Utah. Planned and coordinated sampling activities, conducted statistical analyses, and prepared reports for peer review. Presented results in technical, scientific, and public meetings. Assisted with inter-agency coordination and data management.
- Springs Ecological Evaluation and Mapping of Biological Resources - Nevada and Utah. Prepared for the Southern Nevada Water Authority. 2008-2009. Lead Aquatic Ecologist, Crew Leader.
- Muddy River Headwater Macroinvertebrate Investigations – Utah. Prepared for the Southern Nevada Water Authority. 2008. Aquatic Ecologist.
- Lake Mead Razorback Sucker Study, Nevada and Arizona. Prepared for the Southern Nevada Water Authority and U.S. Bureau of Reclamation. 2008-2010. Fisheries Biologist/Aquatic Ecologist.
- ATK Launch Systems Biological Inventory - Utah. Prepared for ATK. 2008. Lead Aquatic Ecologist.

NEPA Projects:

- Great Salt Lake Minerals EIS. Prepared for the US Army Corps of Engineers. 2008-2010. Lead Aquatic Ecologist.
- Brantley and Avalon Reservoirs Resource Management Plan Amendment. Prepared for the U.S. Bureau of Reclamation. 2008- 2010. Lead Fisheries Biologist.

- Jicarilla Biological Assessment. Prepared for the Jicarilla Apache Nation. 2008-2010. Assistant Project Manager/Fisheries Biologist. Consultation for existing and potential future water depletions in accordance with the Jicarilla Apache Tribal Water Rights Settlement Act. Prepared Biological Assessment in coordination with the Jicarilla Apache Nation, the Bureau of Reclamation, and the U.S. Fish and Wildlife Service.

2006-2008 RESEARCH ASSOCIATE, Utah State University.

Conducted research on economic, social, and biophysical factors influencing the adoption of agricultural conservation management practices along the Little Bear River Watershed and the potential effects of such practices on water quality. Developed geo-databases. Conducted statistical analyses. Analyzed and summarized data. Presented results in scientific meetings and prepared manuscripts for peer review.

2003-2006 LEAD Aquatic ecologist/resource specialist, Cirrus Ecological Solutions.

Lead aquatic ecologist and fisheries biologist. Prepared technical proposals, designed studies, lead field data collection, conducted data analysis, and prepared draft and final reports. Responsibilities also included project management, marketing, and business development. Projects included:

Fisheries and Environmental Evaluations:

- Rio Tinto Mine Aquatic Assessment. Prepared for the Humboldt-Toyabe National Forest. Completed in 2005. Project Manager.
- Bear River Hydroelectric Project FERC No. 20. Draft Environmental Report. Cove Development Decommissioning. Prepared for PacifiCorp. Completed in 2004. Resource specialist/Lead Aquatic Ecologist.
- Muddy Creek and North Horn Coal Tracts Technical Reports. Prepared for Manti-LaSal National Forest, Utah. Completed in 2004. Resource specialist.

NEPA Projects:

- Environmental Assessment for Rotenone Treatments in the Willow Creek Drainage, Uinta and Grand Counties, Utah. Prepared for the Utah Division of Wildlife Resources (UDWR). Completed in 2006. Project Manager/Resource Specialist.
- Steamboat Environmental Assessment. Prepared for Medicine Bow-Rout National Forest. Completed 2005. Resource specialist. Prepared biological assessment, evaluation, and management indicator species report. Assisted in the EA preparation. Issues analyzed included the effects of water withdrawals for snowmaking operation on endangered species in the Yampa River Basin, Colorado.
- Brundage Mountain Land Exchange Environmental Assessment. Prepared for the Payette National Forest. Completed 2005. Resource specialist. Assisted with project scoping and issue identification. Prepared fisheries section of the EA. Assessed potential effects of the land exchange on threatened, endangered, and/or sensitive species or critical habitat that occur in the South Fork Salmon River and the Little Salmon River, Idaho.
- North Sheep Environmental Impact Statement. Prepared for Sawtooth National Forest and Sawtooth National Recreation Area, Idaho. Completed 2004. Analyzed effects of proposed grazing activities on soil characteristics (erodibility, fertility, and productivity), streambank conditions, and the potential effects of sedimentation on fisheries and aquatic resources. Assisted in the assessment of included in the affected environment section compliance with the guidelines and regulations of the Forest Management Plan.

Total Maximum Daily Load (TMDL) Projects:

- Echo Reservoir, Utah, TMDL (Completed 2005); Otter Creek, Utah, TMDL (Completed 2005); Lower Jordan River, Utah, TMDL; and Upper Bear River, Utah, TMDL. Prepared for the Utah Division of Environmental Quality. Assisted with the preparation of TMDL reports. Prepared aquatic invertebrate, trophic state, and phytoplankton assessments. Created and managed water quality and flow databases. Prepared statistical summaries. Conducted assessment of existing water quality and flow conditions, water quality standards assessment and evaluation, and pollutant load calculations.

2003 Research Associate, USGS Utah Cooperative Fish and Wildlife Research Unit.

Conducted stream and lake fisheries surveys. Collection of limnological data in Lake Powell. Compiled data for a fish-habitat modeling project.

2001-2003 - Graduate Research Assistant, Utah Cooperative Fish and Wildlife Research Unit.

Conducted ecological and fisheries research. Investigated native-non native fish interactions along a longitudinal stream gradient, and assessed the effects of biotic and abiotic factors on their condition,

abundance, and distribution. Received National Science Foundation (NSF) award for the research; paper presented at the Society for Conservation Biology. Canterbury, UK. 2002.

1998-2001 Research Assistant, Utah State University Limnology Laboratory.

Performed laboratory analysis of biological samples; identified and enumerated planktonic organisms; analyzed and interpreted survey data; updated and maintained project data files; organized and managed chemical inventory; managed hazardous waste; assisted in maintenance and repair of equipment. Supervised junior technicians. Projects included:

- Nutrient export from high mountain lakes to outflow streams: The importance of inflow hydrodynamics and in-lake processes.
- Limnological analyses of Sawtooth Valley Lakes, Idaho.
- Effects of nutrient limitation, light limitation, and invertebrate grazers on phytoplankton living in deep chlorophyll layers.

1996 - Biologist, Foundation for Rural Research and Development (FIDER), Colombia.

Assisted senior biologist to organize and conduct technical work for the maintenance of fish growth and fattening ponds and lakes; verified age and sex of fish; followed feeding process and verification of conversion into weight; analyzed water quality; supervised technicians.

1995-1996 - Research Assistant, National Institute of Fisheries and Aquiculture (INPA), Colombia.

Analyzed biological data from the fisheries in the Colombian Atlantic coastal region. Assisted in monitoring of fishing activities of two specific endangered species; managed and updated project data files; and generated technical reports.

SELECTED TECHNICAL REPORTS AND PUBLICATIONS (listed Chronologically):

De la Hoz, E.A. 2018. Price River R2CROSS Instream Flow Assessment, Carbon County, Utah. Report prepared for Western Resource Advocates. Redfish Environmental LLC. Logan, Utah. 79 Pages.

De la Hoz, E.A. 2017. Macroinvertebrates and fish monitoring at Rilda Creek, Emery County, Utah (2004-2017). Report prepared for the Energy West Mining Company. Redfish Environmental LLC. Logan, Utah. 18 pages + Appendices.

De la Hoz, E.A. , and J. Barker. 2017. Frying Pan Canyon Ranch water quality monitoring report. Report Prepared for Henke Property LLC. Redfish Environmental LLC. Logan, Utah. 8 Pages.

De la Hoz, E.A., and J. Barker. 2017. The Mountain Queen water quality monitoring and stream sediment assessment report. Report Prepared for Henke Property LLC. Redfish Environmental LLC. Logan, Utah. 13 Pages.

Barker, J., and E.A. de la Hoz. 2017. Uintah Hydroelectric Project FERC No, 190. Uinta River Hydrology Assessment. Report Prepared for Moon Lake Electric Association. Redfish Environmental LLC. Utah. 47 pages.

De la Hoz, E.A., K. Lawrence, and W.J. Miller. 2016. Uintah Hydroelectric Project FERC No, 190. Uinta River Fish Habitat Study. Report Prepared for Moon Lake Electric Association. Redfish Environmental LLC. Utah. 23 pages + Appendices.

Lawrence, K., and E.A. de la Hoz. 2016. Uintah Hydroelectric Project FERC No, 190. Uinta River Fish Population Study. Report Prepared for Moon Lake Electric Association. Redfish Environmental LLC. Utah. 23 pages + Appendices.

Morris, W.A., L.L. Moulton, E.A. de la Hoz, and J. Barker. 2015. Kuskokwim River juvenile salmon investigation: 2014-2015. Report prepared by Owl Ridge NRC for Donlin Gold. Anchorage Alaska.

De la Hoz, E.A., and D. Monahan. 2015. Dungeness River side channel habitat survey, Clallam County, Washington. Prepared for the Jamestown S'Klallam Tribe. Redfish Environmental LLC. Logan, Utah. 34 pages.

Everett, C., and E.A. de la Hoz. 2014. Non-native plant species survey of Linc Energy Lease Area in the Northeast National Petroleum Reserve Alaska, North Slope, Alaska. Report prepared for Linc Energy Operations Inc. Redfish Environmental LLC. Logan, Utah. 6 pages + Appendices.

De la Hoz, E.A., M. Jessop, and R. McLean. 2012. 2011 Aquatic Biomonitoring Report. Donlin Gold Project. 2004-2011 Data Compilation. Prepared for Donlin Gold- Barrick Gold Corporation. OtterTail Environmental Inc. Colorado. 160 pages.

De la Hoz, E.A., M. Jessop, and R. McLean. 2012. Assessment of Substrate Freezing in Winter Fish Habitat in Crooked Creek, Alaska. Prepared for Donlin Gold- Barrick Gold Corporation. OtterTail Environmental Inc. Colorado. 26 pages.

Jessop, M., E.A. De la Hoz, and R. McLean. 2012. Donlin Gold Natural Gas Pipeline Project. 2010-2011 Aquatics Study. Prepared for Donlin Gold- Barrick Gold Corporation. OtterTail Environmental Inc. Colorado. 79 Pages.

Jackson-Smith, D.B., M. Halling, E.A. de la Hoz, J.P. McEvoy, and J. Horsburgh. 2010. Measuring conservation program BMP implementation and maintenance at the watershed scale. Journal of Soil and Water Conservation 65(6): 413-423.

Bliesner, R., E.A. de la Hoz, P. Holden, and V. Lamarra. 2010. San Juan River Basin Recovery Implementation Program – Detailed Reach Study. Report for the San Juan River Basin Recovery Implementation Program. 63 pages.

De la Hoz, E.A. 2006. Environmental assessment of rotenone treatments in the Willow Creek Drainage, Grand and Uinta Counties, Utah. Prepared by Cirrus Ecological Solutions for the Utah Division of Natural Resources and the Utah Reclamation Mitigation and Conservation Commission. June 2006. Salt Lake City, UT. 45p.

De la Hoz, E.A. 2005. Benthic macroinvertebrate assessment. Rio Tinto Mine natural resource damage assessment. Report prepared for the Humboldt-Toyabe National Forest. May 2005. 21 pages.

De la Hoz, E.A., and P. Budy. 2005. Effects of biotic and abiotic factors on the distribution of trout along a longitudinal stream gradient. Environmental Biology of Fishes 72(4): 379-391.

De la Hoz, E.A., and P. Budy. 2004. Linking environmental heterogeneity to the distribution and variability in prevalence of Myxobolus cerebralis in streams. Transactions of the American Fisheries Society 133(5): 1176-1189.

CERTIFICATIONS:

- Emergency First Responder - CPR. Training Certificate
- Swift Water Rescue Training and Certification
- Electrofishing Safety (USFWS-CSP2202)
- Principles and Techniques of Electrofishing (USFWS-CSP2201)
- ArcGIS. ESRI Training.
- PADI Certified open water and advanced scuba diver
- Wilderness Firearm Training Certificate

Other Training:

- Alaska Safety Handbook
- North Slope Environmental Field Handbook
- BP Alaska Safety Handbook
- North Slope Cultural Awareness
- Polar Bear Awareness
- Polar Bear Denning-Human Interaction
- Predator and Waste Management
- Helicopter Safety Training
- Universidad Jorge Tadeo Lozano. Administration and Development of Aquaculture Enterprises

JUSTIN BARKER

Senior Scientist | GIS Specialist

Geographer with 21 years of experience in the environmental consulting including experience leading teams, coordinating and managing projects, designing and conducting terrestrial, wetlands and aquatic monitoring projects. Experience as a logistics coordinator and GIS specialist. Justin has conducted a broad range of natural resource management activities across the western U.S. Experience in: wetland determinations and permitting, fisheries surveys, water quality collection and analysis, threatened and endangered species surveys, and technical writing. Experience in the analysis and reporting for NEPA and ESA compliance documents on large-scale federal and tribal government projects. He has led biological assessments and evaluations, environmental assessments, and numerous FERC licensing and re-licensing projects. He is experienced in environmental compliance and technical writing. Field operational level manager for multiple fisheries, water quality, and habitat assessments completed for SJRIP from 1997 to 2013.

EDUCATION:

1996 B.S., Geography Earth Resources, Utah State University.

PROFESSIONAL EXPERIENCE:

2012-Pres Senior Scientist RedFISH Environmental, LLC.

1997-13 Project Manager, Senior Scientist, Ecosystems Research Institute.

2005-12 Project Manager, Senior Scientist, Symbiotics Energy Corp.

PROJECT EXPERIENCE:

2017 **Moon Lake Electric Association, Uintah Hydroelectric Project P-190, Neola, Utah.** Project Scientist, Field Scientist and GIS Specialist for studies associated with the relicensing effort.

2015-17 **Lower Jordan River Flow Study.** Senior Project Scientist/Water Quality Specialist. Lower Jordan River Commission. Work conducted for Jordan River Commission under subcontract with Cirrus Ecological Solutions.

2014-15 **Dungeness River Fish Habitat Assessment and Dungeness River Side Channel Fish Habitat Surveys.** GIS Specialist for Jamestown S'Klallam Tribe, Washington.

PacifiCorp Alexander Reservoir P-20, Soda Springs, Idaho. Senior Scientist; Water quality monitoring for the Bear River during the drawdown of Soda Reservoir to conduct dam repairs and radial gate replacement.

2014 **Kuskokwim River Juvenile Salmon Investigation**. Senior Scientist/GIS Specialist for studies associated with YOY salmon and preferred habitat use in the Kuskokwim River for Donlin Gold LLC, Alaska.

2013 **PacifiCorp Ashton Reservoir P-2381, Ashton, Idaho.** Project Manager; Water quality monitoring and analysis for certifying Ashton Dam as a low impact hydro through the Low Impact Hydro Institute (LIHI).

2010-12 **PacifiCorp Ashton Reservoir P-2381, Ashton, Idaho.** Project Manager; Water quality monitoring and analysis of the Henrys Fork River during the rehabilitation of Ashton Dam. As part of the rehabilitation of Ashton Dam we installed two long term water quality monitoring stations on the Henrys Fork River. Water quality data was collected to minimize potential exceedances of Idaho Standards during the rehabilitation of the dam. Additionally, water quality data collected was used to develop a relationship between turbidity and TSS to calculate sediment load from the project area.

PacifiCorp Ashton Reservoir P-2381, Ashton, Idaho. Project Manager and senior field scientist for the collection of echo soundings and sediment cores; GIS data analysis and modeling of bathymetry and sediment depths with a sediment transport modeling component.

2008-10 **Grace Hydroelectric Project P-20, Grace, Idaho**. Project Manager; Author of Boater Flow water quality study; senior field scientist for the collection and analysis of water quality data. As part of the settlement agreement with stakeholders and PacifiCorp flows were released through the bypass section of the Bear River. Flows range from 75 cfs to in excess of 1,000 cfs during high runoff years. Over time sediment accumulates in the bypass reach and flushes during these high-water events. Large qualities of sediment have the potential to mobilize and flush through the system in a short period of time. ERI was contracted to monitor the water quality during these large releases, calculate sediment load and effects to the aquatic system.

OTHER RELEVANT EXPERIENCE:

- Habitat restoration monitoring of RERI sites to reopen closed secondary channels and increase river wide low velocity habitats for fishes.
- Assisted USFWS with the preparation of a scope of work for the collection of high resolution aerial photographs and 6" vertical Lidar data throughout the San Juan flood plain.

- San Juan Recovery and Implementation Program alternate committee member for Ecosystems Research Institute.
- Detailed Aquatic Habitat Studies, San Juan River, 1,200 habitats sampled.
- Aquatic Habitat Mapping, San Juan River, Animas River Confluence to Clayhills Crossing, Utah.
- Razorback Sucker Augmentation Ponds, Navajo Indian Irrigation Project, Farmington, New Mexico. water quality studies and management to increase growth rates of Razorback Suckers in grow out ponds. Modifying phosphorus and nitrogen ratios to increase growth rates, water quality monitoring.
- Habitat Mapping and Endangered Fish locations during catfish removal program, San Juan Riverfrom Hogback Diversion to Clay Hills.
- Fish Tissue Contaminants Sampling, San Juan River, San Juan River, New Mexico Utah, sampled native species such as flannelmouth sucker, bluehead sucker and speckled dace.
- Spawning Bar Habitat Studies for Pikeminnow and Razorback sucker, Colorado and San Juan Rivers. (RM 3).
- Fish Bioenergetics and Fall Monitoring, San Juan River, Blanco, New Mexico to Bluff, Utah, population estimates, 5 pass removal boat electrofishing, block seine electrofishing.
- Utah DWR low velocity habitat study, San Juan River from Hogback Diversion (RM158) to Clay Hills.
- Backwater Habitat Studies, San Juan, Green and Colorado Rivers.
- Contribution to long-term geomorphology and habitat studies on the San Juan River and Tributaries.
- Falula Springs Wetland Investigations. Wetland delineation, permitting, and mitigation planning for a 140-acre parcel in Laketown, UT.
- Stansbury Park Wetland Investigations. 260-acre wetland delineation. First Utah case for the significant nexus test to waters of the US. Tooele, UT
- Bison Creek Resort Community Wetland Investigations. Right of Way Delineation, 404 permitting for the 450 acre development, Stream Alteration Permitting, Mitigation planning, and design of treatment wetlands to remove additional nutrients from wastewater discharge into shallow groundwater. Huntsville, UT.
- Jones-Simkins Wetland Investigations. Wetland delineation, permitting, and compliance associated with Logan City Special Area Management Plan. Logan, UT
- Black Bear Resort, Retreat at Bear Lake Community Development. 240-acre wetland delineation along the shore of Bear Lake. St Charles, ID.
- Battle Creek Wetland Investigation. 140-acre wetland delineation. Preston, ID.
- San Juan River Wetlands Investigations. 100-acre delineation associated with the Navajo-Gallop pipeline project. Farmington, NM.
- United States Department of Justice. Wetland determination and significant nexus test to navigable water for expert witness testimony regarding U.S. vs. Mid-Valley Pipeline. Bayou D'Arbonne, LA.

CERTIFICATIONS:

- OSHA 40-Hour HAZWOPER certification
- Army Corps of Engineers Wetland Delineation and Management Training
- Electrofishing Safety (USFWS-CSP2202)
- Principles and Techniques of Electrofishing (USFWS-CSP2201)

MICHAEL P. SIPOS

Senior Wildlife Biologist | Project Manager

Wildlife biologist with 16 years of experience in the environmental consulting field. Experience in: project management, wildlife research and management, habitat restoration and restoration planning, wetland delineation, and environmental site assessments throughout the western U.S. Designed and implemented numerous long-term and short-term research programs and either led or contributed to over 100 NEPA projects for local, state, federal agencies, and private organizations. Skilled in the application of GIS/GPS technologies to natural resource issues, technical writing, and report preparation. Experienced with logistics coordination, personnel management, and training. Experienced with the NEPA process including Section 7 consultations, ESA, CWA, and MBTA. Holds USFWS permits for southwestern willow flycatcher *Empidonax traillii extimus* and yellow-billed cuckoo *Coccyzus americanus*.

EDUCATION:

1998 M.S. Wildlife Science. New Mexico State University.

1996 B.S. Wildlife Science. New Mexico State University.

PROFESSIONAL EXPERIENCE - POSITIONS AND RESPONSIBILITIES:

2018 **Senior Wildlife Biologist, Redfish Environmental.**

Performing or supervising technical work, project management.

2015-2018 **Principal, Senior Wildlife Biologist, WMR Environmental LLC.**

Lower Duchesne Wetlands Restoration Project Yellow-billed Cuckoo Studies. Lower Duchesne River, Utah. Project Manager/Senior Wildlife Biologist under contract with BIO-WEST, Inc. to conduct yellow-billed cuckoo studies in support of a wetland restoration project along the lower Duchesne River near Myton, UT. Studies are conducted following survey protocols established by the U.S. Fish and Wildlife Service prior to construction activities to either minimize or completely avoid impacts to the species. All project work is being conducted under USFWS Permit TE00442C-0

2016-17 **U.S. Highway 89 Environmental Impact Statement. Salt Lake and Davis Counties, Utah.** Project Manager/Senior Wildlife Biologist under contract with BIO-WEST, Inc. Responsible for all aspects of the EIS as it related to Wildlife including federally protected threatened and endangered species and state species of concern. Conducted endangered species specific surveys and assessed existing habitat for quality and suitability for state and federally protected species. Prepared all relevant portions of the Environmental Impact Statement using guidelines established by the Utah Department of Transportation including the evaluation of project impacts by alternative to wildlife and associated habitat.

U.S. Highway 20 Environmental Assessment, Island Park, Idaho. Project Manager/Senior Wildlife Biologist under contract with BIO-WEST, Inc. Responsible for all aspects of the EA as it related to Wildlife including federally protected threatened and endangered species and state species of concern. Assessed existing habitat for quality and suitability for state and federally protected species and evaluated impacts to wildlife resulting from key issues such as wildlife-vehicle collisions. Prepared all relevant portions of the Environmental Assessment using guidelines established by the Idaho Department of Transportation including the evaluation of project impacts by alternative to wildlife and associated habitat. Also provided methods for mitigating long-term impacts resulting from the implementation of the proposed project or any of its alternatives.

Snake River Winter Waterfowl Studies, Idaho Falls, Idaho. Project Manager/Senior Wildlife Biologist under contract with Ecosystem Sciences to conduct winter waterfowl studies along sections of the Snake River north of Idaho Falls, Idaho in support of a Federal Energy Regulatory Commission (FERC) permit application to develop a small hydroelectric plant. The primary purpose of the study was to assess the effects of lower water surface elevations on the availability of habitat for waterfowl; especially in the winter when icing further restricted habitat availability. Surveys were conducted from fixed-wing aircraft as well as from the ground to document winter uses by guild (divers vs. dabblers, etc.), presence of predators such as raptors, and percent of winter habitat that is unavailable because of freezing. Study plans and methods were developed in cooperation with Idaho Fish and Game to help manage water consumption and manage available habitat.

2004- 15 **Wildlife Department Manager/Project Manager/Senior Wildlife Biologist | BIO-WEST, Inc.**

Responsible for a staff of as many as 10 wildlife biologists and technicians, department resources, scheduling, project management, and marketing. Performed experimental design, developed research protocols, trained staff, and conducted data analysis for numerous long-term research programs in Utah, Nevada, Arizona, Montana, North and South Dakota, and Nebraska. Presented research results at a variety of professional meetings and symposium. Responsible for all aspects of NEPA evaluations and document preparation as they related specifically to wildlife and associated habitat. Responsible for a variety of GIS

tasks including the delineation of remotely sensed terrestrial habitat and predictive habitat modeling. Also responsible for managing all state and federal permits necessary to complete projects.

2003-04 **Senior Environmental Scientist, Habitat Restoration Biologist, Wildlife Biologist, GIS Specialist | Marston Environmental, Inc.**

Lead environmental scientist, habitat restoration and wildlife biologist responsible for wildlife studies and habitat restoration projects on lignite mines at various locations in east Texas to ensure that mine operators remained in compliance with rules and regulations as established by the Texas Railroad Commission. Conducted air quality studies at coal fired power plants and conducted Phase I and II Environmental Site Assessments.

2002-03 **Environmental Scientist/Project Manager/GIS Specialist | LopezGarcia Group (Wendy Lopez & Associates).**

Responsible for conducting Phase I and II Environmental Site Assessments and Transaction Screens in accordance with appropriate ASTM standards, GIS support for all company projects, completion of wetland delineations and associated permit applications, and preparation of NEPA documents and other documents such as Integrated Natural Resource Management Plans. Also worked in cooperation with other organizations and agencies to complete Total Maximum Daily Load (TMDL) projects on lakes and rivers throughout the states of Texas and New Mexico.

1999-02 **Field Crew Leader and Wildlife Biologist | Parsons Environmental Sciences.**

Led field crews in support of the New Mexico Office of the State Engineer efforts to adjudicate surface and ground water rights in the lower Rio Grande Valley of New Mexico. Responsibilities included managing field crews and resources, locating, documenting, and mapping all beneficial use ground water wells. Conducted wildlife studies and document preparation for NEPA projects ranging from Categorical Exclusions to Environmental Impact Statements, conducted Affected Property Assessments at decommissioned military facilities to facilitate the process of completing facility closures, and conducted studies to evaluate the movement of contaminants through the food chain.

1993-99 **Long-Term Ecological Research Technician/Teaching Assistant/Research Assistant | New Mexico State University, Las Cruces.**

Collected vegetation data for the Long Term Ecological Research program on the US Department of Agriculture Jornada Experimental Range, as well as for the Land Condition Trend Analysis program at White Sands Missile Range. Instructed undergraduate labs, designed and implemented research of small mammals including kangaroo rat (*Dipodomys* spp.) and bat species, and conducted mule deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*) pellet count surveys.

1989-93 **Nuclear, Biological, and Chemical Specialist / Medical Specialist | US Army, Landstuhl, Germany.**

Coordinated deployment of personnel for several missions; conducted command inspections; trained nuclear, biological, and chemical teams; maintained equipment; and served as a medic in pediatric and neurosurgical wards.

CERTIFICATIONS:

- Emergency First Responder - CPR. Training Certificate
- Former Emergency Medical Technician certified – National Registry
- All-Terrain Vehicle Safety
- Institutional Animal Care and Use Committee Certification (University of Montana and New Mexico State University)
- ArcGIS. ESRI Training.
- Wetlands Delineation training through the Wetlands Training Institute
- U.S.F.W.S National Conservation Training Center Inter agency Consultation for Endangered Species Training
- U.S. Fish and Wildlife Service Yellow-billed Cuckoo Training and Certification
- U.S. Fish and Wildlife Service Southwestern Willow Flycatcher Training and Certification
- Global Position System Certification through the Texas Commission on Environmental Quality
- Hazardous Waste Operator certified
- Helicopter and Fixed-wing aircraft safety training
- Mine Safety and Health Administration (MSHA) training
- Occupational Safety and Health Administration (OSHA) training

- National Environmental Policy Act (NEPA) training
- U.S. Army

PUBLICATIONS/PRESENTATIONS:

Sipos, M.P., M.C. Andersen, W.G. Whitford, and W.R. Gould. 2002. Graminivory by *Dipodomys ordii* and *Dipodomys merriami* on four species of perennial grasses. The Southwestern Naturalist 47(2):276-281.

Sipos, M.P. The quantitative assessment of ecological risk. Second Annual Career Symposium, St. Edwards University, Austin, Texas.

Sipos, M.P., M.C. Andersen, W.G. Whitford, and W.R. Gould. Graminivory by *Dipodomys ordii* and *Dipodomys merriami* on four species of perennial grasses. 32nd Joint Annual Meeting of the Arizona and New Mexico Chapters of The Wildlife Society (Gallup, New Mexico).

Sipos, M.P., M.C. Andersen, W.G. Whitford, and W.R. Gould. Interactions between *Dipodomys ordii* and *Dipodomys merriami* on four species of perennial grasses. 1998 Graduate Research and Arts Symposium. New Mexico State University (Las Cruces).

STEVEN R. RIPPLE

Senior Plant Ecologist | Wetland Scientist

Plant ecologist and botanist with 30 years of experience in the environmental consulting field. Experienced managing and conducting threatened, endangered, and sensitive (TEPC, TES) species surveys in compliance with ESA; vegetation mapping projects; noxious weed mapping and monitoring projects; habitat mitigation, monitoring, and replacement plans; and various plant ecological studies throughout

Utah, Colorado, Wyoming, Arizona, Texas, Idaho, New Mexico and Nevada. Experienced managing environmental projects including: Biological Assessments, EAs, and EIS. Experienced in studying and evaluating wetland and riparian ecosystems, conducting jurisdictional wetland projects including delineations, CWA Section 404 permitting, stream alteration permitting, mitigation plans, and mitigation project monitoring projects.

EDUCATION:

1990 M.S., Plant Ecology, New Mexico State University.
1986 B.S., Biology (Botany emphasis), University of Wisconsin.
1985 B.S., Geology, University of Wisconsin.

PROFESSIONAL EXPERIENCE:

2018 Senior Botanist. Redfish Environmental.
2008-18 Owner/Project Manager. SRA. Botanical and Ecological Services.
2000-08 Independent Contractor. Botanist/Plant Ecologist.
1991-00 Botanist/Plant Ecologist. BIO-WEST.
1987-91 Independent Contractor. Botanist/Plant Ecologist.

PROJECT HIGHLIGHTS (complete project list available on request):

2018 Ute ladies'- tresses Survey. Uintah Basin, UT. Moon Lake Electric Association. RedFISH task manager/ botanist.

Halsted Weed-Seed Relocation Project. Collected weeds seeds of the same species collected over a hundred years ago. Photo documentation and UTM coordinates of all collected species using GPS was used. USU Weed Science Department. Various locations.

2016-17 Mantua Area Stream Monitoring. Conducted a Multiple Indicator Monitoring (MIM) Habitat Monitoring and Mitigation study on two streams near the Mantua Reservoir. USU Water Quality Extension. Mantua, UT.

2009-15 Uintah basin TES Species Surveys, Wetland Delineations, Noxious Weed Mapping. Various Oil and Gas, Pipeline, and Power Companies. Uinta Basin UT.

2005-12 Nevada Springs Vegetation Inventory and Ute ladies'- tresses Surveys. Mapped the vegetation, conducted plant species inventories, and surveyed for *Spiranthes diluvialis* at numerous springs and wetlands in northern and central Nevada, and western UT. Las Vegas Water Authority.

Mona to Oquirrh Transmission Corridor Project. Managed a rare plant survey, wetland delineations, and noxious weed mapping for approximately 150 miles of transmission line and access road sites in central and northern UT. Provided several sections of content for NEPA documents (BA and EIS) as well as compliance documents for CWA Sec. 404 permitting.

Southwest Intertie Project. Managed rare plant surveys, wetland delineations, and noxious weed mapping for approximately 600 miles of transmission line and access road sites in NV and ID. Provided several sections of content for NEPA documents (BA and EIS).

Diamond Fork Ute ladies'- tresses Monitoring Project. Conducted a monitoring project of *Spiranthes diluvialis* throughout Diamond Fork Canyon to assess potential impacts monitor changes in *Spiranthes diluvialis* and riparian habitat, provide consultation for habitat mitigation and habitat replacement due to removal of water diversions as part of the Central Utah Project.

2000-02 Upper Columbia Basin Riparian Habitat Study. Collected riparian plant data for a study of the riparian health and the effectiveness of monitoring riparian areas and streams in the Upper Columbia River Basin of ID, NV, OR, and WA. USFS Research Station.

Chippewa National Forest TES Plant Survey. Managed and conducted a TES plant survey on over 5,000 acres of the Chippewa National forest in North-central MN.

1997-00 Okanogan and Colville National Forests Vegetation Mapping Project. Managed a 2-million acre, vegetation mapping project in northeastern WA. Extensive data collection was required including collection of UTM based GPS data, photographic documentation and GIS data. Hired and supervised a crew of 10 field technicians.

New Mexico Reservoir Resource Management Plans. Classified and mapped the vegetation and conducted TES plant surveys of approximately 100,000 acres of U.S. Bureau of Reclamation lands surrounding Heron, Brantley, Elephant Butte, and Caballo Reservoirs, NM. Provided several sections of content for NEPA documents (BA and EA).

1995-97 Deschutes National Forest Sensitive Plant Surveys. Managed a TES plant survey of several thousand acres on the Deschutes National Forest in OR. Hired and managed a crew of 5 technicians. Central OR.

Virgin River Ecological Evaluation. Classified the vegetation communities and mapped a 50-mile length of the riparian corridor associated with the Virgin River. GIS data collection was required as was aerial photo interpretation. NV and AZ.

1992-03 Shoshone National Forest Soil and Vegetation Data Collection. Conducted a data collection project in remote wilderness areas in the sub-alpine and alpine areas. Gathered plant community type, successional stage, soil type, landscape parameters, species composition, and various other data for a Forest Service/ Utah State University research mapping project. Western and Southern WY.

Rulison, Colorado Rare Plant Survey. Managed and conducted a TES plant survey for a road construction project through BLM lands.

1987-91 White Sands Missile Range and Fort Bliss TES Surveys. Managed several TES plant and animal surveys on White Sands Missile Range, NM and Fort Bliss, TX and surrounding areas.

SELECT PUBLICATIONS AND REPORTS (complete list available on request):

2010-13 Five Environmental Assessments and Twelve Biological Assessments for various Oil Gas and Pipeline projects throughout the Uinta Basin - Example: 2012. Environmental Assessment for a Right of Way (ROW) within S34 T4S R5W Duchesne County, Utah, prepared by Outlaw Engineering for the Utah Division of Wildlife Resources. & Ripple S.R. 2012. Biological Assessment for the proposed Berry Petroleum DWR 8-12-55 and DWR 1-12-55 Well and Access Road. Duchesne County, Utah. Berry Petroleum, Denver, CO.

Ripple S.R. 2011. Ute ladies'-tresses (*Spiranthes diluvialis*) Survey Report for the Ruby Preserve, Cache County,Utah. Bear River Land Conservancy. Logan, UT.

Ripple S.R. 2011. Wetland Delineation Report for the Limber to Terminal Section of the Mona to Oquirrh Transmission Corridor Project. EPG. Salt Lake City, UT.

Ripple S.R. 2010. Rare Plant and Noxious Weed Report for the Mona-Limber and Limber-Oquirrh Sections of the Mona to Oquirrh Transmission Corridor Project. EPG. Salt Lake City, UT.

Ripple S.R. Rare Plant Specialist Report for the SWIP Northern Portion Transmission Line Corridor. EPG. Salt Lake City, UT.

Ripple S.R. and B. M. Atkin A. 2008. An Ecological Study and Monitoring Project of Ute ladies'-tresses on the Diamond Fork River, Utah. Central Utah Project. Salt Lake City, UT.

Senior Archaeologist

EDUCATION:

1995 Quaternary Studies, University of Utah.

1989 M.A, Anthropology / Geoarchaeology, University of Wyoming.

1981 B.S., Anthropology, University of Idaho.

1978 Anthropology (emphasis in prehistoric archaeology and geoarchaeology), University of Wyoming.

PROFESSIONAL EXPERIENCE:

2018 Professional Geologist/Senior Geoarchaeologist. Manager and principal investigator RedFISH Environmental along with project skills.

1986-18 Owner, Professional Geologist/Senior Geoarchaeologist Western GeoArch Research, LLC (formerly doing business as William Eckerle, Consulting Geoarchaeologist). Program manager, project manager, and principal investigator for Western GeoArch Research LLC, conducting geoarchaeological investigations for NHPA Section 106 compliance projects. Successful completion of hundreds of investigations and technical reports with over 40 clients and over 600 prehistoric Criterion D sites assessed. Investigations span the Great Plains, Rocky Mountains, Basin and Range, Columbia Plateau, and Colorado Plateau, including projects in Arizona, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, North Dakota, Utah, Washington, and Wyoming.

1981-86 Project Supervisor (Archaeological Crew Chief), Office of the Wyoming State Archaeologist, Laramie, archaeological crew chief/project director on NHPA Section 106 compliance projects. Focused on Criterion D prehistoric sites. Listed on employer's BLM cultural resource permit to supervise crew conducting survey, limited testing, and excavation.

1973-81 Seasonal archaeological crew member for a variety of archaeological consulting firms. Department of Sociology and Anthropology Montana State University, archaeological crew member on National Historic Preservation Act (NHPA) Section 106 compliance projects in Montana with a focus on inventory, testing, and excavation of Criterion D prehistoric sites.

Department of Sociology and Anthropology Montana State University, archaeological field school supervisor and geoarchaeologist.

Pro-Lysts, Inc. archaeological crew member on NHPA Section 106 compliance projects in Montana, Oregon, and Washington with a focus on inventory and testing of Criterion D prehistoric sites.

University of Idaho, Laboratory of Anthropology, archaeological crew member and report author on NHPA Section 106 compliance project in Idaho with a focus on inventory of Criterion D prehistoric sites.

PROJECT HIGHLIGHTS:

Editing, Eighteenmile Creek and State Highway 29 Culvert to Bridge Project, Idaho, by Sundance Consulting, Inc. for RedFISH Environmental. Geoarchaeologist and Principal Investigator, Western GeoArch Research LLC. Edited archaeology class III inventory report for adequacy, Project performed for RedFISH Environmental for the Bureau of Reclamation.

2017 Archaeological Construction Monitoring of a Buried Electric Powerline Trench, Jackson Hole, Wyoming. Geoarchaeologist, Western GeoArch Research LLC. Acted as geoarchaeologist and archaeological construction monitor for 2 mile long, 2 meter deep powerline trench. Documented the geology, soils, geomorphology, and potential associational integrity of prehistoric artifact locations. Project performed for Cannon Heritage Resources, Inc., Lower Valley Energy Co. and the Federal Energy Regulatory Commission.

2014-16 Geoarchaeological Assessment of Site Associational Integrity for 15 Sites, as well as the Creation of a GIS Site Burial Model, Lake Waring, Nevada. Geoarchaeologist and Principal Investigator, Western GeoArch Research LLC. Assessed site associational integrity and the geoarchaeological context for 15 prehistoric sites as part of data recovery to permit the Newmont, Long Canyon mine on BLM lands. Developed a GIS site burial model for project area within Pleistocene pluvial Lake Waring in northeastern Nevada. Collected optically simulated luminescence samples from lakebed sediments and used dates to reconstruct the Lake Waring drawdown history to help model prehistoric subsistence and settlement changes over time. Project conducted under contract with ASM Affiliates.

Testing/Reevaluation of Archaeological Sites in the North Training Area, Camp Guernsey, Wyoming. Geoarchaeologist and Co-principal Investigator, Western GeoArch Research LLC (along with Ken Cannon, USU Archaeological Services, Inc. and Molly Boeka Cannon, Utah State University). Created and evaluated an experimental, minimally invasive site testing protocol to apply to site reevaluation. Experimented with multiple earth augering and geophysical techniques to determine the presence/absence of buried, intact, cultural zones and features. Determined which experimental techniques best assessed the presence/

absence of data that could be used to address important archaeological research questions to support site eligibility recommendations. Project conducted under contract with USU Archaeological Services, Inc. Prime contract, US Army, Wyoming National Guard.

2015 Geoarchaeological Assessment of Site Associational Integrity for Site 48TE414 at Jenny Lake, Grand Teton National Park, Wyoming. Geoarchaeologist and Principal Investigator, Western GeoArch Research LLC. Assessed site associational integrity and geoarchaeological context of one prehistoric site at Jenny Lake, Grand Teton National Park, Utah. Project conducted under contract with the US Department of Interior, National Park Service.

Geoarchaeological Assessment of Site Associational Integrity for the Old Spanish Trail Corridor on the Fish Lake National Forest, Utah. Geoarchaeologist and Principal Investigator, Western GeoArch Research LLC. Assessed site associational integrity and geoarchaeological context for trail ruts thought to be part of the Old Spanish Trail on the Fish Lake National Forest, Utah. Project conducted under contract with the US Department of Agriculture, National Forest Service.

2014 Geoarchaeological Assessment of Site Associational Integrity for Site 42SL627, Jordan River Delta/Great Salt Lake, Utah. Geoarchaeologist and Principal Investigator, Western GeoArch Research LLC. Assessed site associational integrity and the geoarchaeological context for one prehistoric site as part of data recovery to permit the US Army National Guard Readiness Center at the Jordan River Delta/Great Salt Lake, near Salt Lake City, Utah. Project performed for USU Archaeological Services.

Geoarchaeological Assessment of 16 Sites for Long Canyon, Nevada. Geoarchaeologist and Principal Investigator, Western GeoArch Research LLC. Backhoe trenching, bucket auger probes, and OSL dating of 16 sites to determine age and intactness of cultural materials. Assess lithostratigraphy, soils, geomorphology and site formation processes. Discuss results and interpretations of geochronology, site formation processes, and geological history. Present results in an illustrated technical report. Field information was used to assist, in conjunction with SSURGO soils mapping, for modeling the site burial potential for project area. Site chronostratigraphic information was used to help reconstruct the basin's pluvial lake history and shoreline changes to determine distribution of prehistoric wetlands.

SKILL SET:

- Program management, project management, and principal investigator on a wide variety of Section 106 prehistoric overview, Class III, and data recovery projects for federal, state, and private proponents.
- Responsible for hiring, training, and task management of a variety of technical and non-technical staff including archaeologists, GIS specialists, and geoarchaeologists.
- GIS modeling of site burial potential for prehistoric overviews and environmental impact statements. Site eligibility evaluations based on the presence of associational integrity during Class III inventories. Data recovery geoarchaeological analysis including geomorphology, soils, and site formation studies. Geochronology including radiocarbon, optically stimulated luminescence, and tephra. Research coordination and management for multi-disciplinary paleoenvironmental investigations (pollen, diatom, isotope, ostracod, and macrofloral) for off-site mitigation on section 106 process projects.

MEMBERSHIPS:

- Register of Professional Archaeologists, American Cultural Resources Association, Society of American Archaeology, Idaho Professional Archaeological Council, Montana Archaeological Society, Utah Professional Archaeological Council, Wyoming Archaeological Professional Association.

WORKSHOPS:

- Idaho statewide BLM meeting, Montana Archaeological Society, Montana SHPO, Utah statewide BLM meeting, Utah interagency cultural resource meeting, Wyoming Association of Professional Archaeologists, Wyoming BLM/SHPO protocol meeting.
- Plains Anthropological Conference, Rocky Mountain Anthropological Conference, Great Basin Anthropological Conference, Montana Archaeological Society, Utah Professional Archaeological Council, Wyoming Archaeological Professional Association, Idaho Archaeological Society, Three Corners Conference, Nevada Archaeological Association and Northwest Anthropological Conference.

REPORTS, PUBLICATIONS, and PAPERS PRESENTED AT CONFERENCES:

Current Research in the Pleistocene, Archaeology in Montana, Wyoming Archaeologist, Wyoming Geological Survey, Society of American Archaeology.

Eckerle, William. 2016. Geoarchaeological Observations on Data Recovery Performed at 24CB2201, Pryor Mountains, Montana. Western GeoArch Research, LLC. Submitted to Mustardseed Cultural & Environmental Services, LLC. Copies available from Western GeoArch Research, LLC, Alta, Wyoming.

Eckerle, William. 2016. Supplemental letter report to the full GCM report of site 24JF699, Whitetail Creek, Montana. Western GeoArch Research, LLC. Submitted to Steve Platte, Montana Department of Transportation. Copies available from Western GeoArch Research, LLC, Alta, Wyoming.

Eckerle, William. 2016. Supplemental letter report to the full GCM report of site 24MA778, Madison County, Montana. Western GeoArch Research, LLC. Submitted to GCM Services, Inc. Copies available from Western GeoArch Research, LLC, Alta, Wyoming. Wyoming College. Copies available from Archaeological Services of Western Wyoming College, Rock Springs.

Eckerle, William. 2015. After the Glaciers Departed. Paper presented at the Geologists of Jackson Hole, March 17, 2015. Jackson Hole, Wyoming.

Eckerle, William. 2015. Climate, Settlement, and Subsistence Variation in the Middle Rocky Mountains. Oral presentation at the Montana Archaeological Society 58th Annual Meeting, Great Falls, Montana.

Eckerle, William. 2015. Holocene Alluvial Geology of the Eagle Tree Archaeological Site (48CO2920), Converse County, Wyoming. Paper presented at the 2015 GSA Rocky Mountain and Cordilleran Section Meeting, Casper, Wyoming.

Cannon, Kenneth P., William Eckerle, Molly Boeka Cannon, Jonathan M. Peart, Sasha Taddie, Houston Martin, John Blong, Paul Santarone, Sara Shults, and Margo Taylor. 2015. Final Report for Testing/Reevaluation of Archaeological Sites in the North Training Area, Camp Guernsey, Wyoming. USU Archeological Services, Inc. Submitted to Wyoming Military Department, Cheyenne, Wyoming. Copies available from USU Archeological Services, Inc., Logan, Utah.

Cannon, Kenneth P., William Eckerle, Molly Boeka Cannon, Jonathan Peart, Paul Santarone, and Sara Shults. 2015. Developing a Minimally Invasive Protocol for Assessing Site Eligibility on the North Training Area, Camp Guernsey, Wyoming. Poster presented at the SAA 80th Annual Meeting, San Francisco, California.

Eckerle, William. 2014. Review of Soils, Climate & Society: Archaeological Investigations in Ancient America. By John Wingard and Sue Hayes.

MEMBERSHIPS

Certified Fire Ecologist, Association for Fire Ecology

Member, Association for Fire Ecology

Member, International Association of Wildland Fire

RESEARCH

*Folliott, P.F., **C.L. Stropki**, H. Chen, and D.G. Neary. 2011. The 2002 Rodeo-Chediski Wildfire's Impacts on Southwestern Ponderosa Pine Ecosystems, Hydrology, and Fuels. Research Paper RMRS-RP-85, Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.*

Valencia County Community Wildfire Protection Plan (CWPP) and Update; New Mexico. SWCA worked with a varied group of agency and local stakeholders to develop a comprehensive CWPP for a bosque and rangeland ecosystem. The CWPP involved extensive public outreach and grassroots development. SWCA was retained to complete a 5-year update to the original plan. *Role: Fire Ecologis.t Facilitated stakeholder and public meetings. Responsible for data collection and analysis and assisting in the development of the final plan.*

Otero County CWPP; Otero County, New Mexico. SWCA worked with a large multi-agency working group to develop a CWPP that would address catastrophic fire risk in a diverse WUI. SWCA developed an intricate wildfire risk and hazard assessment that required refining an existing fuel classification layer to incorporate recent and planned fuel treatment projects on local and landscape scales. The CWPP involved collaborative planning that incorporated a large range of stakeholders. The CWPP is being used to implement recommended fuel reduction projects in a number of high-risk watersheds. *Role: Project Manager. Facilitated stakeholder and public meetings. Responsible for data collection and analysis and assisting in the development of the final plan.*

Sandoval County CWPP Update; Bernalillo, Sandoval County, New Mexico. SWCA developed through extensive community involvement and public outreach and close work with the county emergency management officer(s), fire prevention officer(s), and core planning team. SWCA employed collaborative development and strong public involvement techniques to prepare this comprehensive CWPP, which the counties use to effectively seek funding for implementation of highlighted projects. *Role: Fire Ecologist. Facilitated stakeholder and public meetings. Responsible for data collection and analysis and assisting in the development of the final plan.*

Ojo Peak Post-Fire CFRP; Torrance County, New Mexico; Claunch-Pinto Soil and Water Conservation District. SWCA was retained to assist with post fire restoration following the Ojo Peak Wildfire, which burned approximately 7,000 acres, including the upper watershed of Ox Canyon, which contains perennial pools and springs. This restoration was aimed at channel stabilization and revegetation. The effort involved the construction of more than 20 structures that assisted with mitigating upland channel erosion during this project. *Role: Watershed Scientist/Project Manager. Responsible for obtaining the necessary 404/401 permitting and structure design, installation, and subsequent monitoring.*

Claunch-Pinto Soil and Water Conservation District and Torrance County CWPP; New Mexico. SWCA produced two high-profile plans that coordinated the needs of government agencies and multiple communities and enabled the client to receive future funding for wildfire and wildland urban interface (WUI) mitigation; one of these CWPPs is included on the National Database of State and Local Wildfire Hazard Mitigation Programs as an exemplary CWPP. Further, SWCA was retained to complete the 5-year updates of the plans. *Role: Project Manager and Fire Ecologist.*

KEITH BRYANT GIDO, PH.D.

Senior Zoologist | Biologist

EDUCATION:

1999 Ph.D., Zoology, University of Oklahoma.
1995 M.S., Biology, University of New Mexico.
1991 B.A., Fisheries and Wildlife Sciences, New Mexico State University.

EMPLOYMENT:

2018- Senior Fish Biologist/Aquatic Biologist - Technical and Scientific Advisor, Redfish Environmental.
2012-pres Professor, Division of Biology, Kansas State University.
2006-12 Associate Professor, Division of Biology, Kansas State University.
2001-06 Assistant Professor, Division of Biology, Kansas State University.
1999-01 Postdoctoral Research Assistant, Sam Noble Oklahoma Museum of Natural History.
Spg 2000 Postdoctoral Research Assistant, University of Oklahoma Biological Survey.
1996-99 Graduate Teaching Assistant, Department of Zoology, University of Oklahoma.
1995-96 Graduate Research Assistant, Department of Zoology, University of Oklahoma.
1994-95 Graduate Teaching Assistant, Department of Biology, University of New Mexico.
1993-94 Graduate Research Assistant, Department of Biology, University of New Mexico.

PROFESSIONAL SERVICES:

2017-pres U.S. Army Corps of Engineers, Sustainable Rivers Program for the Kansas River, Steering Committee.
2012-pres Editorial Board, Freshwater Science.
2018-21 Board of Governors, Southwestern Association of Naturalist.
2017-18 Glen Canyon Dam Adaptive Management Program, Independent Review Panel.
2015-16 National Science Foundation Panel Member.
2015 San Juan River Recovery and Implementation Program Flow Evaluation Workshop.
2013-14 President, Kansas Chapter of the American Fisheries Society.
2010-14 Science Advisory Team, NSERC HydroNet Program.
2007-10 Board of Editors, Ecological Applications.
Board of Governors, Southwestern Association of Naturalist.
2009 Gila River Science Panel.
2007 Rio Grande Silvery Minnow Recovery Plan Peer Review.
2004-06 National Science Foundation Panel Member.
2002-03 Proposal reviews: Middle Rio Grande Valley Endangered Species Act Collaborative Program, Science Subcommittee (9 grants reviewed).
2001 Maryland Sea Grant. Proposal review panel for Grand Canyon Monitoring and Research Center.

RESEARCH GRANTS AT KANSAS STATE UNIVERSITY:

2017-22 U.S. Fish and Wildlife Service. Multi-scale factors influencing occurrences of Topeka Shiner (Notropis topeka) in the Flint Hills, Kansas. $126,393.

2017-22 U.S. Bureau of Reclamation. Population size, mobility and early life history of Razorback Suckers in the San Juan River – Lake Powell complex. $1,133,713.

2017-20 Kansas Department of Wildlife and Parks. Relative contribution of gizzard shad to food webs in small Kansas impoundments. $280,000. Centimeters to Continents. $1,198,081.

2015-18 National Parks Service. Determine Implications of Non-Native Stocked Fish on Native Stream Communities at TAPR. $22,770.

National Parks Service. Management Plan for the federally endangered Topeka shiner (*Notropis topeka*) within Tallgrass Prairie National Preserve. $24,750.

National Parks Service. Assessing geomorphological conditions of Tallgrass Prairie National Park upland prairie stream reaches at TAPR. $23,759.

2014-16 New Mexico Department of Game and Fish. Effects of the Whitewater-Baldy Complex Fire on Warmwater Fishes in the Gila River Basin, New Mexico. $170,076.

2011-16 National Science Foundation (W. Dodds and K.Gido). Collaborative Research: Scale, Consumers and Lotic Ecosystem Rates (SCALER): 2011-13

U.S. Bureau of Reclamation. Metacommunity Dynamics of Gila River Fishes. $187,152. (no cost extension through September 2014).

2011-15 U.S. Bureau of Reclamation. Use and importance of tributaries to sustaining native fish communities in San Juan River. $292,648.

PEER REVIEWED PUBLICATIONS (* indicates KSU post doc or graduate students):

118. *Cathcart, C.N., C.A. Pennock*, C.A. Cheek, M.C. McKinstry, P.D. MacKinnon, M.M. Conner and K.B. Gido. In press. Waterfall formation at a desert river-reservoir delta isolates endangered fishes. Reservoir Research and Applications.

116. *Pennock, C.A., C.N. Cathcart, S.C. Hedden, R.E. Weber, and K.B. Gido. 2018. Fine-scale movement and habitat use of a prairie stream fish assemblage. Oecologia 186:831-842.

114. *Cathcart, N.C., K.B. Gido, M.C. McKinstry, P.D. MacKinnon. 2018. Patterns of Fish Movement at a Desert River Confluence. Ecology of Freshwater Fishes 27:492-505.

109. Pilger, T.J., K.B. Gido, D.L. Propst, J.E. Whitney*, and T.F. Turner. 2017. River network architecture, genetic effective size, and distributional patterns predict differences in genetic structure across species in a dryland stream fish community. Molecular Ecology 26: 2687-2697.

108. *Whitney, J.E., K.B. Gido, S.C. Hedden*, G.L. Macpherson, T.J. Pilger, D.L. Propst, and T.F. Turner. 2017. Identifying the source population of fish re-colonizing an arid-land stream following wildfire-induced extirpation using otolith microchemistry. Hydrobiologia 797: 29-45.

107. *Troia, M.J. and K.B. Gido. 2017. Testing metabolic cold adaptation as a driver of warm-water fish species replacement along the river continuum. Environmental Biology of Fishes 100:265-279.

105. *Pennock, C.A., K.B. Gido, J.S. Perkin* and.V.D. Weaver. 2017. Collapsing range of an endemic Great Plains minnow, peppered chub Macrhybopsis tetranema. American Midland Naturalist 177:57-68.

103. *Hedden, S.C. and K.B. Gido. 2016. Movement distances and activity of introduced flathead catfish Pylodictis olivaris in the upper Gila River basin, New Mexico, and potential impacts on native fishes. Southwestern Naturalist 61:210-216.

101. *Pennock, C.A., B.D. Frenette*, M.J. Waters* and K.B. Gido. 2016. Survival and Tag Retention of Southern Redbelly Dace Chrosomus erythrogaster Injected with Two Sizes of Passive Integrated Transponder (PIT) Tags. North American Journal of Fisheries Management 36:1386–1394.

100. *Hedden, S.C., J.E. Whitney and K.B. Gido. 2016. Introduced Flathead Catfish Pylodictis olivaris Consumptive Demand on Native Fishes of the Upper Gila River, New Mexico. North American Journal of Fisheries Management 36:55-61.

98. Gido, K.B., J.E. Whitney*, J.S. Perkin*, and T.F. Turner. 2016. Fragmentation, connectivity and fish species persistence in freshwater ecosystems. In: Closs et. al. (eds). Fish Conservation. Cambridge University Press.

95. Franssen, N.R., S.L. Durst, K.B. Gido, D.W. Ryden, V. Lamarra, and D.L. Propst. 2016. Long-term fish community dynamics from spatially intensive monitoring of a managed desert river. River Research and Applications 32: 348-361.

93. *Cathcart, C.N., K.B. Gido, and M. McKinstry. 2015. Fish Community Distributions and Movements in Two Tributaries of the San Juan River, New Mexico and Utah, USA. Transactions of the American Fisheries Society 144:1013-1028.

92. *Whitney, J.E., K.B. Gido, T.J. Pilger, D.L. Propst and T.F. Turner. 2015. Biotic response to consecutive wildfires in a warmwater dryland river network. Freshwater Science 34:1510-1526.

91. Pilger, TJ, K.B. Gido, D.L. Propst, J.E. *Whitney, T.F. Turner. 2015. Comparative conservation genetics of protected endemic fishes in an arid-land riverscape. Conservation Gentics. 16:875-888.

72. Gido, K.B., D.L. Propst, J.D. Olden and K.R. Bestgen. 2013. Multi-decadal responses of native and introduced fishes to natural and altered flows in streams of the American Southwest. Canadian Journal of Fisheries and Aquatic Sciences. 70:554-564.

BOOKS:

Gido, K.B. and D.A. Jackson (eds.). 2010. Community Ecology of Stream Fishes: Concepts, Techniques and Approaches. American Fisheries Society Symposium Series 73, Bethesda, MD. 684 pp.

JOHN GIORANENGO, CERP

Principal Restoration Ecologist

Summary of Qualifications:

John's drive to continually improve the science and practice of ecological restoration grows out of a passion for conserving natural resources. Since 1996 John has provided a broad range of services to local, state, and federal agencies, and private land management clients and non-profit partners to restore riparian, wetland, and upland habitats from the peaks to the prairies. With 22 years of experience in natural resources, and over 220 projects completed, John has extensive botanical knowledge in multiple ecosystems and plant associations across the CO Front Range. John began his natural resources career in 1993 as a volunteer, salvaging and planting riparian shrubs and trees along the Green River in Washington. Completing an MS degree in Rangeland Ecology from CSU in 2000, John has been providing botanical and vegetation monitoring services in Colorado for 21 years. He worked for Boulder OSMP for two seasons providing botanical and ecological assessments in wetland and riparian habitats, and has conducted extensive line-point intercept monitoring for mine land bond-release projects, post-fire plant community research projects, wetland delineations, riparian research projects, and a great variety of upland vegetation assessments. John has also lead and co-lead botany workshops, field trips, and trainings throughout Colorado. John is a co-author of the Field Guide for Harvesting and Installing Willow and Cottonwood Cuttings, for Living Streambanks: a manual of bioengineering treatments for Colorado Streams, the Guide to Alpine Restoration for Colorado 14ers, and other local and regional ecological and restoration resources. In 2017 John joined the first cohort of Certified Ecological Restoration Practitioners, a new certification program managed by the Society for Ecological Restoration.

Experience Highlights:

- 22 Years of botany experience, including 20 years in Boulder & Larimer County
- Baseline & evaluation monitoring (science based, 20 years)
- Line-point Intercept monitoring (15 years)
- Willow instructor and field trip leader for CoNPS (2007 and 2017)
- Stream Visual Assessment Protocol (SVAP2) on 45 miles of Big Thompson, NRCS, 2016
- Project Team Management (75 projects in Colorado, leading highly complex teams of professionals)
- Technical lead on multiple natural resources guides and manuals for Colorado.
- Poaceae, Carex, Potentilla, and Asteraceae (2002-2007, CoNPS)

Education/Training

- M.S. Rangeland Ecosystem Science, Emphasis in ecological restoration and soil surface hydrology, Colorado State University (2000, CSU)
- B.S. Business Administration, minor in Ecology (1993, SDSU)
- Wetland Delineation (2002, USACE)
- Functional Assessment of Colorado Wetlands (FACWet, 2015)

Certifications

- Certified Ecological Restoration Practitioner (SER, 2017)

Related Project Experience:

Riparian Assessments and Riparian Ecological Design:

John has performed river and riparian assessments and riparian ecological design on over 250 miles of stream in Colorado over 20 years. This work included Stream Visual Assessment Protocol (NRCS), River Health Assessments, Streambank Stability Assessments, Gulley Stability Assessments, Riparian Health Assessments, Baseline Conditions to inform restoration treatments, and other assessments. Clients included Colorado Natural Heritage Program, Coalition for the Poudre River Watershed, US Fish and Wildlife Service, City of Loveland, Colorado Parks and Wildlife, Fourmile Creek Coalition, engineering firms, private land owners, and other private entities.

Wetland Delineation and USACE Permitting (Section 404 of Clean Water Act):

Since 2002, John has completed over 25 wetland delineations and ordinary high water mark surveys, and has completed more than 15 404 pre-construction notifications (USACE, PCN), all resulting in successfully permitted (Nationwide 27, 37, 14, and others) river and wetland restoration projects. Wetland delineations are performed according to the USACE May 2010 Regional Supplement to 1987 Wetlands Delineation Manual: Western Mountains, Valleys, and Coastal Regions, Version 2.0 or as appropriate for the region in question. Data from delineations is mapped and used to understand the level of impact from planned construction/ restoration activities (i.e., conflict areas), and to inform a Pre-construction Notification. For river-related projects, an Ordinary High Water Mark (OHWM) survey is conducted following USACE guidelines in the 2005

USACE Regulatory Guidance Letter 05-05, Ordinary High Water Mark Identification. Below is a brief list of projects he has been involved with that include wetland delineations and permitting.

CLIENTS: Coalition for the Poudre River Watershed, Estes Park Watershed Coalition, Crow Creek Construction, S20, North State Environmental, St. Vrain Creek Coalition, and others.

City of Boulder Wetland Mapping and Delineation (CO). Open Space & Mountain Parks. 2000-2002

ROLE: Project implementation.
Working for the City of Boulder, Open Space and Mountain Parks, John implemented 15 wetland conservation projects, including mapping, vegetation monitoring, groundwater monitoring, and delineation for over 75 acres of marsh, wet meadow, and riparian wetland habitats in the plains of eastern Colorado. Project data was analyzed and provided for conservation of federally listed species (*Spiranthes diluvialis*), ecological restoration, urban development projects, wetland mitigation sites, and conservation planning.
EMPLOYER: City of Boulder, Open Space and Mountain Parks

Biological and Natural Resource Inventories and Ecological Restoration Design:

Developed and managed ecological assessment and monitoring programs related to conservation impacts in grassland, riparian, wetland, alpine, riparian, ponderosa pine and sagebrush ecosystems throughout Colorado and Wyoming, including habitat evaluations for Section 7 of ESA. John has not only conducted assessments, but he has developed new protocols such as the Streambank Stability Assessment Protocol, Gulley Stabilization Assessments, River Resiliency Assessment protocol, and others. He has worked with regional, state, and local agency staff to develop training curricula for weed management, willow restoration, and ecological restoration for the Colorado Outdoor Training Initiative and Wildlands Restoration Volunteers.

John has developed over 90 ecosystem restoration designs for the federal, state, and local agencies, and served in a lead team role for over 175 restoration projects ranging from plant materials collection to road obliteration and riparian restoration. Design experience includes bioengineering, development of site-adapted plant palettes and seed mixes, establishment of revegetation hydroseres, wetland mitigation, soil amendment and mulch specifications, willow and cottonwood cuttings, site protection measures, floodplain grading, stream habitat improvements, and more. He became a Certified Ecological Restoration Practitioner in 2017.

Mineland Bond Release Monitoring and Research (Line-Point Intercept):

Phase II and Phase III bond release for Colorado Coal Mines, 2016

Evaluating biomass production and vegetation cover required for Phase II and Phase III bond release, John Giordanengo of AloTerra conducted line-point intercept, repeat photography, and biomass sampling of three mine sites (Yoast, Seneca I, Seneca II) in Routt County, Colorado. Serving as one of several botany leads, John was responsible for locating randomized transects, organizing field data collection efforts, managing field crew members, and proper species identification. Surveys were conducted in mining sites between 10 and 20 years old, as well as a variety of reference sites. EMPLOYER: AloTerra Restoration Services, as subcontractor to ESCO associates.

Summitville Mineland Reclamation Research, 1998

Responding to superfund mineland reclamation needs, Colorado State University established long-term research sites to examine the influence of soil amendments (organic carbon, N, P, and interactions of OC, N, and P) and seed mixes (early-, mid-, and late-seral herbaceous mixes) on revegetation success at an alpine hard rock mine site in Southern Colorado. John Giordanengo conducted vegetation monitoring to support research efforts, including line-point intercept, above ground biomass sampling, and seed collection.
EMPLOYER: Colorado State University

Piceance Basin Oil Shale Reclamation Research, 1998-1999

In an effort to develop effective post-mining reclamation treatments, this study evaluated the interaction of seed mixes and nutrient manipulation (N, P, and OC) on establishment of native vegetation for oil shale mining sites in the Piceance Basin of Colorado. John Giordanengo conducted vegetation monitoring (line-point intercept), above ground biomass sampling, and application of soil amendments on long-term research sites. John also provided data entry, and QA/QC for research data.
EMPLOYER: Colorado State University

Phase II bond release for Black Mesa Coal Mine, 2000

Evaluating biomass production and vegetation cover required for Phase II post-mining bond release, John Giordanengo conducted line-point intercept, repeat photography, and biomass sampling for Black Mesa Mine Coal Mine, Arizona. Serving as assistant botanist, John was responsible for locating randomized transects, organizing field data collection efforts, and proper species identification in reclamation and reference areas.
EMPLOYER: ESCO associates.

Eagle Butte Mine Baseline Monitoring, 2000

Baseline monitoring to document species diversity, abundance, and plant community composition for Eagle Butte coal mine in Central Wyoming. John Giordanengo provided species identification, data collection, location of field transects, repeat photo points, and seasonal staff management.
EMPLOYER: ESCO associates

DANA FLETT

Restoration Ecologist I

Dana's life-long love of natural spaces fuels a responsibility to manage and restore land and waterways according to best practices and moral integrity. With a Master of Science in wetland ecology and restoration, Dana works across a variety of ecosystems from alpine, forested areas, uplands, riparian corridors, and meadows. She has participated in a great diversity of restoration projects over the last five years and is especially skilled in revegetation and seeding treatments aimed at improving plant community function and structure. She thrives in a setting where she supervises restoration crews, helping to improve their understanding of ecology principals and restoration techniques.

She frequently lectures and holds workshops on wetland ecology and restoration methodology, inspiring a high level of engagement with her audience. Her research and educational outreach has taken her to Colombia, Peru, and Ecuador. Dana specializes in stakeholder engagement, fostering excellent communication as a means to achieve satisfying and goal-oriented results. She has experience working with a variety of land managers and owners including national parks, a variety of United States Forest Service lands, and state and county lands.

Education/Training

- M.S. Ecology, Emphasis on Wetland Ecology and Restoration, Colorado State University, Fort Collins, CO, 2018.
- B.S. Conservation and Resource Studies, minor in Forestry, University of California Berkeley, Berkeley, CA, 2011.

Certifications

- Certified Wilderness First Responder and CPR (NOLS, 2011, 2014, 2017)
- Swiftwater Rescue Technician Level I and II (Sierra Rescue International, 2010 & 2011)
- Avalanche Certification Level I and II (2010 & 2011)

RESTORATION PROJECTS AND RESEARCH

Sierra Nevada Fen Restoration (Plumas County, CA). 2015-2018.

ROLES: Harvest seeds, site assessments, design, permitting, implementation, oversight of restoration crew, revegetation

This restoration project occurred in a Research Natural Area in a Wilderness in the northern Sierra Nevada of California. Five fen wetlands were prioritized for restoration using a variety of techniques including geomorphic restoration (i.e., recontouring shallow erosion gullies using block and fill techniques and soil plugs), re-introduction of native clonal sedges, and cattle exclosures.

COLLABORATORS: Region 5 United States Forest Service, Feather River Land Trust

Tuolumne Meadows Greenhouse Gas Restoration (Yosemite National Park, CA). 2015-2018.

ROLES: Revegetation, crew supervision, project management, researcher

This five-year project aims to quantify the effects of a restored Carex plant community on greenhouse gas emissions and vegetation composition. Desired outcomes include increased soil organic matter and increased soil water-holding capacity. A total of 38,500 seedlings were planted between 2016 and 2018. A combination of fenced, unfenced, and control plots were installed across the landscape. Treatment plots are compared to un-planted control plots. This project seeks to inform protocols and time lines for restoration in sub-alpine environments across the region.

COLLABORATORS: Yosemite National Park and California Department of Fish and Wildlife

Research Assistant in Wetland Ecology (Fort Collins, CO). 2015-2018.

ROLE: Researcher

Peatlands serve as significant carbon storage reservoirs relative to their abundance on the landscape yet impacts to these important ecosystems are numerous. Studies on the effects of cattle grazing on these systems are few. Dana measured water table dynamics, vegetation composition, CO_2 fluxes, and impacts due to cattle hoof punching at four fens in the northern Sierra Nevada of California to understand the natural functioning of these peatlands and the effects of cattle grazing on the ecosystem. Areas with and without cattle hoof punching were compared to assess impacts from cattle to the effects of erosion gully-induced water table draw down on the potential for CO_2 sequestration. Intact fens demonstrated carbon storage potential, her analysis indicates that even small amounts of cattle hoof punching negatively affects this process and greater disturbance results in greater potential for carbon losses. This work culminated in a thesis titled: The Influence of Hydrologic Regime, Vegetation, and Land Use on Carbon Dynamics of Northern Sierra Nevada Fens.

Restoration of Salt Springs Habitat (Whiskeytown Recreation Area, CA). 2016.

ROLE: Crew member

This habitat restoration project aimed to restore habitat of the only known occurrence of the endemic grass species *Puccinellia howellii*. Alterations to landforms, water flow paths, water chemistry ,and road construction reduced *P. howellii* habitat by more than 50%. Restoration efforts included excavation of buried habitat, recovery of spring water sources, redirection of surface water runoff from the adjacent highway, and channel redesign. Course-scale removal of fill material was done by heavy equipment operators while fine-scale removal was done by hand.

COLLABORATORS: Whiskeytown Recreation Area, National Park Service

Humbug Valley Meadow Restoration (Plumas County, CA). 2013.

ROLE: Crew supervisor

This project aimed to restore sheet-flow hydrology to a damaged meadow in the northern Sierra Nevada. A combination of heavy equipment, hand tools, and revegetation techniques were used to achieve restoration goals. Youth in the California Conservation Corps were utilized to plant hundreds of willow cuttings and move large debris to armor stream banks and assist in erosion control and bank protection.

COLLABORATORS: Plumas Corporation, United States Forest Service

INTERNATIONAL RESEARCH

Assistant Instructor (Huaraz, Peru). 2017.

This 10-day field course was titled: Application of Ecological and Hydrological Methods and Analysis of Andean Peatlands. The course addressed methodology to implement successful research, science, restoration, and management in high-mountain wetlands. Attendees included consultants, professionals and professors from throughout South America. All of Dana's lectures and field discussions were led in Spanish.

Paleoecology collection trip (Colombia, South America). 2018.

A $500 travel grant was used to travel to Colombia for a teaching and methods sharing trip with collaborators from the United States and South America. Peat cores were extracted from a variety of high elevation locations and shipped back to the United States for carbon and macrofossil analysis.

BOARDS, COMMITTEES, AND VOLUNTEER POSITIONS

Member, 2017-present: Society of Wetland Scientists, CO Rocky Mountain Chapter
Board Member, 2015-present: Friends of the Plumas Wilderness, Quincy, CA
Member, 2014-present: California Alumni Foresters, UC Berkeley, CA
Volunteer, 2016: Central Rockies Society for Ecological Restoration, CO
Founding Member, 2016-2018: Forest and Range Science Graduate Student Organization, Colorado State University, CO
Committee Member, 2014: Watershed Restoration Curriculum Development Committee, Feather River College, CA
Advisor, 2011-2013: Sustainability Action Team, Feather River College, CA
Member, 2011-13: Farmer Education and Economic Development Committee, Quincy, CA
Member, 2008-11: UC Berkeley Foresters, CA
Member, 2007-11: Society for Agricultural and Food Ecology, UC Berkeley, CA

AWARDS

- American Association for the Advancement of Science Program for Excellence, 2018
- Outstanding Teaching Assistant Award, CSU, Warner College of Natural Resources, 2018
- Regents and Chancellors Scholar, 2007-11
- Alumni Leadership Scholar, 2007-2008

JAKE POWELL

Senior Project Manager | Ecologist

Mr. Powell's background and his familiarity of the project area bring a level of experience that will allow him to provide efficient and applicable analysis of resources and proposed action development for protection of the watershed. Mr. Powell is a Senior Project Manager and Ecologist in SWCA's Sheridan, Wyoming, office, where he manages projects; develops business relationships; provides technical expertise in vegetation, endangered species, reclamation, and habitat; and leads regulatory and permitting projects. He has more than 19 years of ecological, environmental, and natural resource experience throughout the western states, including more than 11 years working on federal, state, and private projects in Wyoming.

Mr. Powell leads work out of the Sheridan office on water resources, mining, reclamation, and endangered species projects and issues. He has extensive experience in assessing vegetation, wildlife, and ecological impacts and planning in Wyoming and the surrounding states. In addition to his SWCA experience, he has previously worked as a federal rangeland management specialist, federal botanist, wildlife habitat research associate, and consulting wildlife biologist and NEPA specialist.

YEARS OF EXPERIENCE
19

EXPERTISE
NEPA and regulatory permitting
Watershed assessment

Ecological analysis

Botany and vegetation ecology

Threatened and endangered species

Wildlife habitat
Wetlands
Stakeholder engagement

EDUCATION

B.Sc., Range Science; Montana State University; Bozeman, Montana

TRAINING

USFS Advanced NEPA Effects Analysis training, USFS; 2009

S130 Wildfire Training and Subsequent Refreshers, USFS; 2003-2011

USFS NEPA/NFMA Training, USFS; 2007

Conflict Resolution Facilitation Training, USFS; 2010

BLM NEPA Training, 40-hours, BLM & SWCA; 2014

Wetland Delineation Certification, Wetland Training Institute; 2015

SELECTED PROJECT EXPERIENCE
(* denotes project experience prior to SWCA)

Goose Creek Watershed Study; Sheridan County, Wyoming; Wyoming Water Development Office (WWDO). SWCA developed a characterization of the Goose Creek watershed as part of a larger effort to analyze the watershed for potential irrigation improvement projects for the Wyoming Water Development Office. *Role: SWCA Project Manager. Responsible for coordinating the watershed characterization effort and providing watershed analysis for wildlife, wetlands, vegetation, soils, land use, and ecological sites.*

City of Sheridan Ecosystem Inventory and Habitat Delineation; Sheridan County, Wyoming; City of Sheridan. SWCA conducted a feasibility study under Section 1135 of the Water Resources Development Act of 1986 to develop options for restoration of Big Goose and Little Goose Creeks. The study included completing inventories of wildlife habitat, wetlands, vegetation communities, and individual flora and fauna. *Role: Project Manager. Provided technical guidance, budget management, and oversight of regulatory documents.*

Alkali Reservoir Environmental Impact Statement (EIS); Washakie County, Wyoming; WWDO & BLM Worland Field Office (FO). SWCA is preparing an EIS for the construction of a new irrigation and recreation reservoir. *Role: Team Ecologist. Responsible for affected environment and impact analysis for livestock grazing, wildlife, and sensitive species.*

Leavitt Reservoir EIS; Bighorn County, Wyoming; WWDO & BLM Cody FO. SWCA is preparing an EIS for a reservoir restoration and expansion project. *Role: Team Grazing Specialist and Resource Coordinator. Responsible for coordinating and reviewing the analysis and writing of all involved resource specialists, assisting Project Manager and BLM on alternatives development and public scoping, and completing affected environment and impact analysis for livestock grazing.*

North Platte Environmental Restoration Master Plan; Casper, Natrona County, Wyoming; Stantec, Inc. Stantec and SWCA teamed to provide an environmental restoration master plan that provided an assessment of the existing morphology and riparian vegetation conditions of a proposed channel and riparian restoration strategies for a 13.5-mile stretch of the North Platte River that flows through the City of Casper, the Town of Mills, and Natrona County. SWCA conducted aquatic resource inventories, cultural surveys, revegetation planning, and permitting services in support of the development of the final restoration design. *Role: Environmental Specialist. Provided technical oversight of the assessments and reporting.*

SWCA ENVIRONMENTAL CONSULTANTS

VICTORIA AMATO

Fire and Forestry Specialist

Ms. Amato is a natural resources planner with a diverse academic background in forestry, fire ecology, and resource management. While working with SWCA, she has collaborated with a variety of land management agencies across the United States, including the U.S. Forest Service (USFS), the Bureau of Land Management (BLM), and the National Park Service (NPS), studying fuels reduction treatments, forest stand structure, fire behavior, remote sensing classification, and monitoring of burned areas. She has completed classes and coursework in forest and vegetation management, silviculture, forest ecology, ecological restoration, fire ecology, fire behavior, and fire management, and she is familiar with fire modeling using FlamMap, FIREMON, FARSITE, BehavePlus, and FOFEM. She has managed multiple NEPA compliance projects in support of fire management planning, fuel reduction, and forest restoration, and she is the contract manager for a large BPA with the NPS for NEPA and fire management planning services across the United States.

YEARS OF EXPERIENCE
13

EXPERTISE
Natural resource management
Community wildfire protection plans (CWPP)
Forest ecology and management
Fire management planning
Fire effects monitoring
Ecological restoration
Habitat monitoring
Community outreach and youth training

EDUCATION
M.S., Forestry, e: Fire Ecology/ Habitat Management; Colorado State University; Fort Collins, Colorado; 2006
M.S., Resource Management; University of Edinburgh, Scotland; 2003
B.S. with honors, Geography; University of Exeter, England; 2000

REGISTRATIONS/ CERTIFICATIONS Type II Fire Fighter (Red Card), New Mexico; 2017

TRAINING
National Incident Management System IS-00700a, Federal Emergency Management Agency; 2017

SELECTED PROJECT EXPERIENCE

Estancia Basin Watershed Monitoring; Torrance County, New Mexico; Claunch-Pinto Soil and Water Conservation District. For this 10-year contract, SWCA has monitored forest and watershed health in relation to forest thinning on the eastern slopes of the Manzano Mountains to evaluate the effectiveness of thinning treatments. *Role: Environmental Specialist. Served as fire ecologist and burn monitoring specialist for a study investigating thinning and fire effects on vegetation, hydrology, and watershed health.*

Westside Watershed Collaborative Forest Restoration Program; Otero County, New Mexico; City of Alamogordo. Funded through the USFS Collaborative Forest Restoration Program (CFRP), SWCA assisted the City of Alamogordo in completing environmental compliance and planning tasks associated with protecting the City's water supply from potential degradation resulting from forest wildfire. The project consists of forest thinning to reduce fuel loading in critical watersheds on USFS-managed lands. SWCA worked closely with the USFS Lincoln National Forest to conduct site evaluations, including forest stand exams and assessing threatened and endangered species habitat, cultural resources, and watershed conditions. SWCA prepared the biological assessment and environmental assessment to USFS standards. *Role: Environmental Specialist. Served as forest planning specialist in the development of the EA.*

South Sacramento Restoration Project Environmental Impact Statement; Otero County, New Mexico; NM Department of Game and Fish. SWCA is working with the Lincoln National Forest in cooperation with the U.S. Fish and Wildlife Service and the New Mexico Department of Game and Fish to develop the South Sacramento Restoration Project, which would address forest health issues, hazardous fuels, watershed quality, and declining wildlife habitat quality on the Sacramento Ranger District at a landscape scale. The project area covers approximately 140,000 acres, and the EIS analyzes potential impacts of the fuel treatment actions to a range of natural, cultural, and socio-economic resources. *Role: Fire and Fuels Specialist. Authored the fire and fuels specialist report and EIS sections.*

Santa Clara County Community Wildfire Protection Plan; Santa Clara County, California; Santa Clara County Fire Department. SWCA developed a high-end CWPP and unit plan for the county that incorporates a multitude of agencies and jurisdictions. SWCA coordinated all stakeholder and community meetings and facilitated an extensive outreach effort through an online survey portal and other online media. The CWPP comprised a comprehensive risk/hazard analysis that includes an assessment of wildland and urban fuels.

TRAINING (CONTINUED)

USDA Forest Inventory Analysis Training; 2010

FIREWISE Communities, Firewise Communities USE; 2007

Wildland Firefighter Refresher and Arduous Fitness Test, Valencia County Fire Department; 2017

Forest Vegetation Simulator, Rocky Mountain Research Station; 2006

FIREMON Training, USFS Rocky Mountain Research Station; 2003

S130/190 Basic Wildland Firefighter; 2017

ICS for Single Resources and Initial Action Incident, ICS-200, Federal Emergency Management Agency; 2017

1-100 Introduction to the Incident Command System, Federal Emergency Management Agency; 2017

S290 Wildland Fire Behavior; 2014

NEPA Navigator Training, Archer Institute of Environmental Training; 2012

Comprehensive NEPA, SWCA Environmental Consultants; 2007

Teaching Assistant, Forest Management and Silviculture, Colorado State University; 2006

MEMBERSHIPS

Member, Association for Fire Ecology

Member, International Association of Wildland Fire

Member, Society of American Foresters

Member, The Wildlife Society

Role: Project Manager. Led all tasks in the development of the CWPP, including facilitating multi-group stakeholder meetings, managing risk assessment development, overseeing the community outreach process, and authoring the draft and final CWPP document.

Utah Parks Fire Management Plan Environmental Assessment; Multiple National Parks in Utah; National Park Service. The SWCA Team was selected under a blanket purchase agreement to develop an EA in support of revised fire management plans for 13 park units in Utah, Colorado, and Arizona. SWCA completed internal scoping and developed a programmatic EA that addresses fire management actions applied across these diverse park units. *Role: Environmental Specialist. Served as NEPA resource writer and provided internal scoping for EA in support of FMPs for 13 NPS units in Utah, Arizona, and Colorado.*

Carlsbad Field Office Resource Management Plan/Environmental Impact Statement Update; Multiple Counties in New Mexico; U.S. Bureau of Land Management. SWCA helped the BLM Carlsbad Field Office update of the office's RMP, producing a Class I cultural resource report, conducting visual resource and travel inventories, and compiling a socioeconomic baseline report. SWCA also facilitated public meetings and alternative development workshops and prepared the Draft EIS. *Role: Environmental Specialist. Completed fire and fuels resource sections of the DEIS.*

Valencia County Community Wildfire Protection Plan Update; Los Lunas, Valencia County, New Mexico; County of Valencia. SWCA completed the original Valencia County CWPP in 2012 and was contracted to complete the 5-year update in 2017. The Valencia County CWPP addresses wildfire risk and hazards to communities in the wildland urban interface, which includes several high-risk communities near the Rio Grande River corridor. The original CWPP and update includes extensive fire behavior modeling to guide the development of risk-reduction recommendations related to fire response, fuel reduction, public education and outreach, and structural ignitability. *Role: Fire Planning Lead/Meeting Facilitator,*

La Merced del Manzano CFRP; Torrance County, New Mexico; Claunch-Pinto Soil and Water Conservation District. To support planning, monitoring, and compliance activities for a 500-acre restoration project in ponderosa pine forest, SWCA conducted resource studies and assisted with the completion of NEPA, ESA, and NHPA compliance, which lead to a completed categorical exclusion document and a signed FONSI. *Role: Fire and Forestry Specialist.*

Alamo Navajo Multi-Jurisdictional Landscape Analysis; Socorro County, New Mexico; Alamo Navajo School Board, Inc. Subcontracted to fulfill the existing conditions analysis for funds from the Collaborative Forest Restoration Program (CFRP) for proposed fire and fuel treatment within the Cibola National Forest, SWCA conducted a multi-crew, 6,182-acre natural and cultural resources survey of USFS land. *Role: Environmental Specialist. Served as the fire and forestry specialist and NEPA planner.*

Alamo Navajo Chapter Integrated Resource Management Plan, Phase 3; Alamo, Socorro County, New Mexico; Alamo Navajo School Board, Inc. In a phased project approach, SWCA developed alternatives to management, identified planning issues, and drafted the IRMP document, which was adopted by the Alamo Navajo Chapter in 2013. *Role: Environmental Specialist. Served as section writer for forestry and woodland resources for tribal Resource Management Plan.*

Mesa County Community Wildlife Protection Plan; Grand Junction, Mesa County, Colorado; Mesa County. SWCA worked collaboratively with Mesa County and surrounding communities to prepare a wildfire protection plan that provides recommendations to abate catastrophic wildfire and minimize their impacts to communities. *Role: Project Manager. Served as project manager, planning lead, and community outreach facilitator for a fire planning document in a Colorado mesa setting.*

SWCA ENVIRONMENTAL CONSULTANTS

SARAH G. LUPIS

Wildlife Biologist

Ms. Lupis is a biologist and assistant project manager with an emphasis on wildlife, terrestrial ecosystems, and collaborative natural resources management. She works on projects to find win-win solutions for communities and the environment. She has worked on wildlife, habitat, and watershed projects in the Intermountain West, California, and New England that focused on sage steppe ecosystems, endangered species, and land use planning.

Ms. Lupis has skills in project design and management, fieldwork and logistics, public meeting facilitation and presentations, and is a skilled writer and technical editor. She has assisted with watershed, wildlife, and habitat improvement projects; and authored, contributed to, and edited environmental assessments, biological assessments, wetland delineations, and species-specific conservation plans. She has designed and led multi-stakeholder collaborative public-input processes to help communities manage natural resources in Utah, Colorado, and Virginia. She is published in peer reviewed journals. He has led and worked on projects in Utah, Wyoming, California, Colorado, Massachusetts, and Virginia.

YEARS OF EXPERIENCE

15

EXPERTISE

Wildlife Surveys and Monitoring

Natural Resource Management/ Monitoring

Technical Writing

Plant Identification

Technical Editing/Formatting

Training Development

Environmental Conflict Resolution

Threatened and Endangered Species Surveys

Wildlife Corridor Studies

Conservation Planning Mitigation Banking

Terrestrial Wildlife Management

EDUCATION

M.S., Forest, Range and Wildlife Sciences; Utah State University, Logan, Utah; 2005

B.S., Wildlife Conservation; University of Massachusetts, Amherst, Massachusetts; 1998

SELECTED PROJECT EXPERIENCE
(* denotes project experience prior to SWCA)

*__Bear River National Wildlife Refuge Access Road Improvement Project, Box Elder County, Utah.__ Designed, coordinated, and conducted breeding bird surveys for ground nesting migratory birds on the Bear River National Wildlife Refuge to assess impacts of a proposed access road improvement project. *Role: Wildlife Biologist*

*__Tejon Ranch Community and Conservancy Corridor Analyses, Tehachapi, California.__ Utilized GIS and field surveys to identify movement corridors for deer, coyotes, gray foxes, and mountain lions. *Role: Assistant Project Manager*

*__Machine Lake Mitigation Bank, Brigham City, Utah.__ Utilized high resolution airborne multispectral imagery to verify the reestablishment of wetland and playa habitats for the assignment of mitigation credits for an approximately 5000-acre wetland mitigation bank on the Bear River Delta of the Great Salt Lake. *Role: Wildlife Biologist*

*__Halligan Water Supply Project Larimer County, Colorado.__ Conducted field surveys for Preble's meadow jumping mouse for proposed reservoir expansion project in Colorado. Additionally, I wrote project reports for our clients and the U.S. Fish and Wildlife Service. *Role: Wildlife Biologist*

*__Assessment and Resource Management Plan for Talisker-Tuhaye Residential Golf Course Development, Wasatch County Utah.__ Responsible for baseline plant community inventories and wildlife habitat assessment. *Role: Wildlife Biologist*

*__Habitat and Population Assessment of Gunnison sage-grouse, San Juan County, Utah.__ Designed and conducted habitat assessments. Invited to advise the Bureau of Land Management, The Nature Conservancy, and other wildlife extension specialists on formal Conservation Action Planning processes. *Role: Project Manager*

*__Greater sage-grouse Conservation and Management Plans for Morgan-Summit, Rich County, Strawberry Valley, Uintah Basin, and West Desert.__ Coordinated and facilitated local working groups, wrote conservation plans, designed and implemented a habitat management project. *Role: Project Manager*

***Gunnison's and White-tailed Prairie Dog Conservation Plan, Utah.** Facilitated a multi-disciplinary science team to finalize the statewide conservation plan for Gunnison's and White-Tailed Prairie Dog and conducted a public review process in coordination with Utah Division of Wildlife Resources. *Role: Project Manager*

KIMBERLY PARKER

Architectural Historian and Historian

Ms. Parker is an architectural historian, historian, and archaeologist in SWCA's Albuquerque office. She has participated in fieldwork, report writing, and editing for survey projects throughout the state of New Mexico and specializes in surveys of the built environment and archival research projects. Ms. Parker has conducted research at public libraries, county buildings, state archives, and multiple other research facilities to review historic newspapers, journals, patents, photographs, and many other historic documents. Multiple projects within rural areas illustrate her experience working with irrigation facilities (including acequia systems), ranching, farming, homesteading, and other land uses. Ms. Parker has over 19 years of experience in the Southwest, Idaho, South Dakota, the Oklahoma Panhandle, Arkansas and Western Tennessee.

YEARS OF EXPERIENCE

19

EXPERTISE

Built environment surveys

Archival Research

HABS/HAER Documentation

EDUCATION

B.A., History m: Anthropology; University of New Mexico; 1999

PERMITS

Meets Secretary of Interior Standards for Architectural Historian and Historian

Listed as an Historian in the New Mexico State Historic Preservation Office Directory of Qualified Personnel

Listed as a Historian for the City of Santa Fe

TRAINING

Completing Section 106: Resolving Adverse Effects and Writing Agreement Documents; 2012

Section 106: Principles and Practice; 2010

Historic Landscapes: Planning, Management, and Cultural Landscape Reports; 2006

New Mexico Archaeological Council Acequia Workshop; 2006.

Historic Homesteads Workshop: BLM NM State Office and New Mexico Archaeological Council; 2010

SELECTED PROJECT EXPERIENCE

Historic American Engineering Record (HAER) Modified Documentation of Bridge 5287 on NM 102 over Tequesquite Creek, Harding County, New Mexico: Documented Bridge 5287 following modified HAER guidelines per the New Mexico Department of Transportation/Federal Highway Administration. Created a brochure depicting the history of Harding County to serve as mitigation for the bridge replacement. *Role: Project Manager, Historian and Author*

Historic Bridges in New Mexico; an Updated Guide for Evaluation: Documented twenty-four historic bridges as part of a project that resulted in an updated guide for the evaluation of New Mexico bridges that has been published as NMDOT Cultural Resource Technical Series Report No. 2014-1. *Role: Field Supervisor, Historian and Author*

Cultural Resource Survey for the Santa Rosa Bridge and Roadway Alignment Between US 54 and NM 91, Guadalupe County, New Mexico: Responsible for field documentation of historic buildings and structures along the proposed project route. In addition, specialized archival research was conducted on the Celso Baca property. This included research on multiple land patent applications, tax records, and other local histories to piece together a proposed cultural landscape representative of Mr. Baca's overall holdings throughout the area that had initially been granted to him by the Spanish Government. *Role: Historian, GIS Specialist, Co-author of report*.

Homesteading and Ranching Archaeological Sites in Southeastern New Mexico (along the Delaware River), Eddy County, New Mexico: Responsible for National Register of Historic Places nomination, archival history including General Land Office Homestead Patents, personal communication with local historians, research at CSWR and multiple websites. *Role: Historian, GIS Specialist, and Co-author of National Register of Historic Places nomination form.*

Cambray Bridge Mitigation; Luna County, New Mexico: Responsible for archival research; including review of microfilm at the University of New Mexico (Zimmerman and Center for Southwest Research [CSWR]), Works Progress Administration documents at the New Mexico Archives in Santa Fe, U.S. federal census reports online and at the University of New Mexico, Luna-Deming Mimbres Museum Archives, Luna County courthouse files, oral histories at the New Mexico Farm and Ranch Museum and CSWR, General Land Office Homestead Patents, HABS/HAER Level II report for Cambray Bridge on NM 549, internet research utilizing websites such as Ancestry.com, Genealogy.com, the GLO website, Federal Highway Administration history, and many other websites. Served as co-author of report that integrates oral history performed by a co-worker. *Role: Historian and Co-author of Mitigation Report.*

CODY L. STROPKI, PH.D.

Watershed Scientist | Quality Assurance | Quality Control

Dr. Stropki is a certified fire ecologist and watershed science expert in SWCA's Albuquerque office. He has considerable experience in wildland fire science, including 16 years of professional and academic experience. His work in fire ecology has focused on wildfire risk management, community wildfire protection planning, post-fire restoration, and post-fire ecosystem monitoring in the Western United States. Dr. Stropki's teaching experience includes courses at the university level, both nationally and internationally, on a range of topics, including wildland fire management; fire ecology; watershed management; dendrochronology; and natural resource management, including the NEPA process. Dr. Stropki has authored or coauthored more than 17 technical and peer-reviewed publications ranging in topics from wildfire effects on natural resources to community wildfire protection plans

YEARS OF EXPERIENCE

16

EXPERTISE

Wildland fire resources/fire ecology

Fire effects monitoring

Fire management planning
Forest ecology and management

Community outreach and youth training

Watershed management, soils, and hydrology

Riparian and riverine restoration

EDUCATION

Ph.D., Watershed Management, m: Soils; University of Arizona, Tucson; 2011

Master of Water Resources; University of New Mexico; 2003

B.S., Environmental Science; Marietta College; Marietta, Ohio; 2001

TRAINING

Fire-fighter Type II

S130/190 Basic Wildland Firefighter

S290 Wildland Fire Behavior

RT-130 Fire Refresher and pack test

USDA Forest Inventory Analysis Training; 2010

FIREWISE Communities, 2007

Comprehensive NEPA, SWCA Environmental Consultants; 2007

FIREMON Training, U.S. Forest Service; 2003

SELECTED PROJECT EXPERIENCE

Restoration Project; Otero, New Mexico; New Mexico Department of Game and Fish and USFS. SWCA is developing an Environmental Impact Statement (EIS) for a 20-year landscape-scale forest restoration project on USFS lands in the Sacramento Mountains. SWCA is responsible for facilitating meetings with agencies and the public and drafting resource specialist reports and the Draft and Final EIS. *Role: Project Manager/ Resource Specialist. Leads public outreach meetings, handles coordination between SWCA and US Forest Service, and serves as NEPA resource writer for watershed and soils report.*

Westside Watershed Collaborative Forest Restoration Program; Otero County, New Mexico; City of Alamogordo. SWCA assisted the City of Alamogordo with environmental compliance and planning tasks associated with protecting the city's water supply from potential degradation resulting from forest wildfire. The project consisted of forest thinning to reduce fuel loading in critical watersheds on USFS-managed lands. The project ties closely to recommendations made by SWCA in the Otero County CWPP developed previously. *Role: Watershed Scientist/Project Manager. Coordinated and trained field staff on forest-monitoring protocols, led field crews on surveys, and severed as a writer for the watershed and soils report.*

Chaves County CWPP; Chaves County, New Mexico; Chaves County. SWCA's development of this plan included extensive community involvement, close work with the county fire prevention officer, and the integration of existing GIS datasets to deliver recommendations for realistic measures to reduce the ignitability of structures throughout the area. *Role: Project Manager. Facilitated stakeholder and public meetings. Responsible for data collection and analysis and assisting in the development of the final plan.*

San Miguel County Biomass Feasibility Study, San Miguel County, New Mexico. San Miguel County Biomass Feasibility Study, San Miguel County, New Mexico. SWCA was selected to develop a feasibility study that analyzed the potential to support up to two wood pellet production facilities in New Mexico. A geographic information system (GIS) database was developed to acquire, manage, analyze, and present the data for this preliminary assessment. As part of this analysis SWCA also addressed economic feasibility, site infrastructure and transportation logistics, and the available labor pool to determine if the potential for a wood biomass plant exists in New Mexico. *Role: Deputy Project Manager. Facilitated document development. Responsible for data collection and analysis and senior QA/QC of the final plan.*