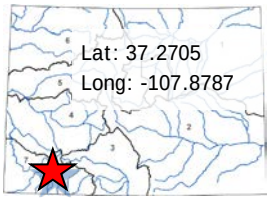
COLORADO
Colorado Water Conservation Board
Department of Natural Resources

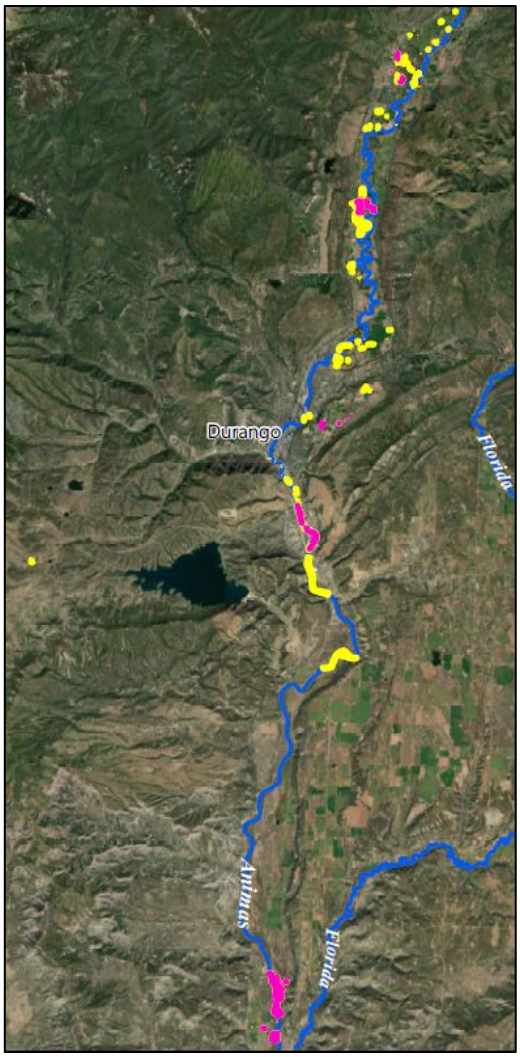
Animas River Removal and Replacement of Invasive Phreatophytes, Phase II Continuation and Strategic Mapping
Mountain Studies Institute

Water Plan Grant Application



LOCATION	
County/Counties:	La Plata
Drainage Basin:	San Juan

DETAILS	
Total Project Cost:	$148,601
Water Plan Grant Request:	$59,299
Recommended amount:	$59,299
Other CWCB Funding:	$45,500
Other Funding Amount:	$42,802
Applicant Match:	$1,000
Project Type(s): Study, Other	
Project Category(Categories): Environment and Recreation	
Measurable Result: 100 acres of restored habitat, 250 Coloradans impacted, 3,550 km^2 mapped for distribution and quantity of Russian olive	



Mountain Studies Institute (MSI) is a nonprofit research and education institution that conducts restoration and monitoring projects to achieve stakeholder-identified resource goals.

Building upon previous efforts, this project will work with private landowners, businesses, and the Southern Ute Indian Tribe to remove Russian olive and tamarisk in the Animas River Watershed. In addition, MSI will use a strategic approach to map the "state of the watershed," quantifying the extent of the Russian olive population by using object-based image analysis methods to create a distribution map in support of state-mandated noxious weed management goals. This mapping effort will be used as an assessment tool to evaluate progress in the basin, an outreach tool for recruiting landowners, and a model for mapping efforts in other basins.

MSI will coordinate with landowners and business owners to educate them about the impacts of invasive species and treatment options, and develop restoration plans for removal of Russian olive and tamarisk. They will also strategically map overall long-term progress in the watershed; and they will remove phreatophytes and replace with native vegetation, where appropriate, by contracting with Southwest Conservation Corps crews.

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Water Plan Grant Application

Instructions

To receive funding for a Water Plan Grant, applicant must demonstrate how the project, activity, or process (collectively referred to as "project") funded by the CWCB will help meet the measurable objectives and critical actions in the Water Plan. Grant guidelines are available on the CWCB website.

If you have questions, please contact CWCB at (303) 866-3441 or email the following staff to assist you with applications in the following areas:

Water Storage Projects	Anna.Mauss@state.co.us
Conservation, Land Use Planning	Kevin.Reidy@state.co.us
Engagement & Innovation Activities	Ben.Wade@state.co.us
Agricultural Projects	Alexander.Funk@state.co.us
Environmental & Recreation Projects	Chris.Sturm@state.co.us

FINAL SUBMISSION: Submit all application materials in one email to *waterplan.grants@state.co.us*
in the original file formats [Application (word); Statement of Work (word); Budget/Schedule (excel)]. Please do not combine documents. In the subject line, please include the funding category and name of the project.

Water Project Summary

Name of Applicant	Mountain Studies Institute
Name of Water Project	Animas River Removal and Replacement of Invasive Phreatophytes, Phase II Continuation and Strategic Mapping

CWP Grant Request Amount	$59,299.00
Colorado Watershed Restoration Program Match	$45,500.00
In Kind Sources	$42,802.00
Applicant Funding Contribution	$1,000.00
Total Project Cost	$148,601.00

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Applicant & Grantee Information	
Name of Grantee(s)	Mountain Studies Institute
Mailing Address	679 E. 2nd Ave., Unit 8, Durango, CO 81301
FEIN	73-1644103
Organization Contact	Marcie Bidwell
Position/Title	Executive Director
Email	marcie@mountainstudies.org
Phone	(970) 387-5161
Grant Management Contact	Carolyn Moeller
Position/Title	Finance Director
Email	finance@mountainstudies.org
Phone	(970) 387-5161
Name of Applicant (if different than grantee)	Amanda Kuenzi
Mailing Address	Same as above
Position/Title	Community Science Director
Email	amanda@mountainstudies.org
Phone	(970) 387-5161

Description of Grantee/Applicant
Provide a brief description of the grantee's organization (100 words or less).
MSI is a nonprofit research and education institution in southwest Colorado. MSI participates in research, restoration, and monitoring projects to achieve stakeholder-identified resource goals. MSI has assembled partners to advance a collaborative approach to address invasive phreatophytes in the Animas Subbasin. In Phase I and Phase II thus far, MSI has worked with over 75 landowners, including local and tribal governments to increase watershed health on approximately 370 acres. In this continuation of Phase II, we intend to assess Russian olive populations through remotely sensed GIS analysis in order to track progress of these collaborative efforts.

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Type of Eligible Entity (check one)	
	Public (Government): Municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient.
	Public (Districts): Authorities, Title 32/special districts (conservancy, conservation, and irrigation districts), and water activity enterprises.
	Private Incorporated: Mutual ditch companies, homeowners' associations, corporations.
	Private Individuals, Partnerships, and Sole Proprietors: Private parties may be eligible for funding.
X	**Non-governmental organizations (NGO):** Organization that is not part of the government and is non-profit in nature.
	Covered Entity: As defined in Section 37-60-126 Colorado Revised Statutes.

Type of Water Project (check all that apply)	
X	Study
	Construction
	Identified Projects and Processes (IPP)
X	Other

Category of Water Project (check the primary category that applies and include relevant tasks)		
	Water Storage - Projects that facilitate the development of additional storage, artificial aquifer recharge, and dredging existing reservoirs to restore the reservoirs' full decreed capacity and Multi-beneficial projects and those projects identified in basin implementation plans to address the water supply and demand gap. *Applicable Exhibit A Task(s):*	
	Conservation and Land Use Planning - Activities and projects that implement long-term strategies for conservation, land use, and drought planning. *Applicable Exhibit A Task(s):*	
	Engagement & Innovation - Activities and projects that support water education, outreach, and innovation efforts. Please fill out the Supplemental Application on the website. *Applicable Exhibit A Task(s):*	
	Agricultural - Projects that provide technical assistance and improve agricultural efficiency. *Applicable Exhibit A Task(s):*	
X	Environmental & Recreation - Projects that promote watershed health, environmental health, and recreation. *Applicable Exhibit A Task(s): Tasks 1-4 correspond to "Removal of invasive phreatophytes"*	
	Other	Explain:

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Location of Water Project	
Please provide the general county and coordinates of the proposed project below in **decimal degrees**. The Applicant shall also provide, in Exhibit C, a site map if applicable.	
County/Counties	La Plata
Latitude	37° 16' 13.80" N
Longitude	107° 52' 43.32" W

Water Project Overview
Please provide a summary of the proposed water project (200 words or less). Include a description of the project and what the CWP Grant funding will be used for specifically (e.g., studies, permitting process, construction). Provide a description of the water supply source to be utilized or the water body affected by the project, where applicable. Include details such as acres under irrigation, types of crops irrigated, number of residential and commercial taps, length of ditch improvements, length of pipe installed, and area of habitat improvements, where applicable. If this project addresses multiple purposes or spans multiple basins, please explain. The Applicant shall also provide, in Exhibit A, a detailed Statement of Work, Budget, Other Funding Sources/Amounts and Schedule.
Building on the success of MSI's previous efforts, this proposal is a continuation of Phase II, in which MSI will continue to work with private landowners, businesses, and Southern Ute Indian Tribe (SUIT) to remove Russian olive and tamarisk in the Animas River Watershed. In addition, MSI will use a strategic approach to map the "state of the watershed," quantifying the extent of the Russian olive population by using object-based image analysis methods to create a distribution map in the Animas Subbasin in support of state-mandated noxious weed management goals. This mapping effort will be used as an assessment tool to evaluate our progress in the basin, an outreach tool for recruiting landowners, and serve as a model for mapping efforts in other basins. We will **(Task 1) Coordinate** with landowners and business owners to educate them about the impacts of invasive species and treatment options, and develop restoration plans for removal of Russian olive and tamarisk; **(Task 2) Strategically map** to track overall progress in the watershed in the long-term; **(Task 3) Remove phreatophytes** by contracting Southwest Conservation Corps (SCC) crews and replace with native species where appropriate; and **(4) Monitor** for re-sprouts by empowering landowners and our partners.

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Measurable Results		
To catalog measurable results achieved with the CWP Grant funds, please provide any of the following values as applicable:		
NA	New Storage Created (acre-feet)	
NA	New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive	
NA	Existing Storage Preserved or Enhanced (acre-feet)	
NA	Length of Stream Restored or Protected (linear feet)	
NA	Efficiency Savings (indicate acre-feet/year OR dollars/year)	
100	Area of Restored or Preserved Habitat (acres)	
NA	Quantity of Water Shared through Alternative Transfer Mechanisms	
NA	Number of Coloradans Impacted by Incorporating Water-Saving Actions into Land Use Planning	
250	Number of Coloradans Impacted by Engagement Activity	
3,550-km^2 (Animas Subbasin)	Other	Explain: Area mapped for distribution and quantity of Russian olive using remotely sensed data

Water Project Justification
Provide a description of how this water project supports the goals of Colorado's Water Plan, the most recent Statewide Water Supply Initiative, and the applicable Roundtable Basin Implementation Plan and Education Action Plan. The Applicant is required to reference specific needs, goals, themes, or Identified Projects and Processes (IPPs), including citations (e.g. document, chapters, sections, or page numbers). The proposed water project shall be evaluated based upon how well the proposal conforms to Colorado's Water Plan Framework for State of Colorado Support for a Water Project (CWP, Section 9.4, pp. 9-43 to 9-44;)
This project aligns with multiple stated goals in Colorado's Water Plan. MSI began this effort with Phase I, under the Invasive Phreatophyte Control Program. During Phase I, MSI built strong relationships with the community to engage landowners to remove invasive phreatophytes and encouraged replacement with native species. Approximately 290 acres were treated in Phase I from 2016-2018. As a task within Phase I, MSI attempted to map Russian olive within the Animas Subbasin with limited success. Now, one year into the Phase II effort, MSI has continued to engage additional landowners and has already treated 80 acres in 2019. As Phase II progresses, MSI has been introduced to a new method for mapping Russian olive using remotely sensed imagery and object-based imagery analysis. It is important to continue these efforts, building on the momentum established in Phase I and Phase II thus far, while documenting the progress of these efforts at a watershed-wide scale. Overall, our goal is to quantitatively document if the Russian olive populations in the Animas Subbasin are decreasing as a result of our efforts. **Colorado Water Plan, Section 6.2, pg. 6-15.** Goal: *"Colorado's Water Plan uses a grassroots approach to formulate projects and methods that avoid some of the undesirable outcomes of the supply-demand gaps. The plan addresses the gaps from multiple perspectives—such as water storage, reuse, recycling, integrated water management, restoration, and conservation."*

This project supports this goal by working with private landowners and business owners, as well as tribal and local government to restore the watershed by removing invasive phreatophytes.

Colorado Water Plan, Section 6.6, pg. 6-157
The policy of the State of Colorado is to identify and implement environmental and recreational projects and methods to achieve the following statewide long-term goals:

- *Promote restoration, recovery, sustainability, and resiliency of endangered, threatened, and imperiled aquatic- and riparian-dependent species and plant communities.*
- *Protect and enhance economic values to local and statewide economies that rely on environmental and recreational water uses, such as fishing, boating, waterfowl hunting, wildlife watching, camping, and hiking.*
- *Support the development of multipurpose projects and methods that benefit environmental and recreational water needs as well as water needs for communities or agriculture.*
- *Understand, protect, maintain, and improve conditions of streams, lakes, wetlands, and riparian areas to promote self-sustaining fisheries and functional riparian and wetland habitat to promote long-term sustainability and resiliency.*
- *Maintain watershed health by protecting or restoring watersheds that could affect critical infrastructure and/or environmental and recreational areas.*

This project supports these goals by removing invasive phreatophytes from a reach of the Animas River that is highly prized for recreational value, including boating and fishing, as well as environmental values, such as wildlife habitat. In Phase I of this project, removal efforts were focused on the upper reaches of the watershed. In year one of Phase II (2019), efforts were focused on the lower part of the Animas River in Colorado, near the New Mexico state line. MSI and SCC encountered populations of Russian olive much denser than in Phase I. It became apparent that additional labor would be needed to complete Phase II. In order to promote sustainability and resiliency, a more aggressive approach to phreatophyte removal is needed.

Additionally, this project aligns with the **Southwest Basin Round Table, Basin Implementation Plan, 2015.** This project addresses and contributes to the Measurable Outcomes of the following goals identified in the BIP.

- *A5 Maintain watershed health by protecting and/or restoring watersheds that could affect critical infrastructure and/or environmental and recreational areas.*
- *D1 Maintain, protect and enhance recreational values and economic values to local and statewide economies derived from recreational water uses, such as fishing, boating, hunting, wildlife watching, camping, and hiking.*
- *E1 Encourage and support restoration, recovery, and sustainability of endangered, threatened, and imperiled aquatic and riparian dependent species and plant communities.*
- *E2 Protect, maintain, monitor and improve the condition and natural function of streams, lakes, wetlands, and riparian areas to promote self-sustaining fisheries, and to support native species and functional habitat in the long term, and adapt to changing conditions.*

Related Studies

Please provide a list of any related studies, including if the water project is complementary to or assists in the implementation of other CWCB programs.

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Supervised Classification of Russian Olive in the Animas Valley with NAIP Imagery and Object-Based Image Analysis, 2019. This pilot study, conducted in June 2019 on the Animas River in La Plata County used USDA NAIP imagery to classify Russian olive, achieving accuracy of 91.3%. Based on the success of this study, MSI intends to hire the author as a subcontractor to map the distribution and quantity of Russian olive for the Animas Subbasin in La Plata and San Juan Counties using these methods.

Animas Watershed Plan, 2011. This Plan identified the loss of native riparian habitat and function as a critical factor in the degradation of the Animas River. While impacts from mine pollution and other water quality degradation are the primary issues, loss of native habitat and stream flows were identified as key factors to address. Further, the following objectives were listed as critical to the Animas River's health: (1) improve riparian condition, including reduction of invasive species, (2) develop strategies to increase and protect stream flows, and (3) utilize conservation easements and habitat programs to create incentives for landowners (Best Management Practices (Animas Watershed Partnership, 2011, p. 39).

City of Durango Community Forest Management Plan – This plan was adopted by the City of Durango in 2014 and calls out the need to eradicate Russian olive and Tamarisk within the city limits.

City of Durango Urban Forest Tree Inventory, 2004 – This study found that in 2004, there were 85 Russian olive and 3 tamarisk present. These numbers have presumably increased since the survey was completed. Most of the Russian olive that were mapped are concentrated in the Bodo Industrial park. The inventory states that a "vital component of this inventory was the quantification of invasive and noxious species such as Russian olive and Tamarisk. These two species alone threaten to completely displace native plant and wildlife and have the potential to forever change the riparian corridor running along the Animas River. A plan will be developed to remove the noxious species from public property soon.

Previous CWCB Grants, Loans or Other Funding

List all previous or current CWCB grants (including WSRF) awarded to both the Applicant and Grantee. Include: 1) Applicant name; 2) Water activity name; 3) Approving RT(s); 4) CWCB board meeting date; 5) Contract number or purchase order; 6) Percentage of other CWCB funding for your overall project.

CWCP IPCP 2016: *1) Applicant*: Mountain Studies Institute (MSI); ***2) Water Activity Name*:** Invasive Phreatophyte Control Program: Animas River Invasive Species Removal Program Phase I; **3) *Approving RT:*** Southwest Basin Roundtable; ***4) SWBRT date:*** November 13, 2015; ***CWCB date:*** April 2016; ***5) Contract number:*** CTGG1 PDAA 2016-1860; ***6) Other CWCB funds:*** 0%; ***7) Completion date:*** April 2018

WSRF 2016: 1) *Applicant:* Mountain Studies Institute (MSI); ***2) Project Name:*** Animas River Community Forum, Phase I; ***3) Approving RT:*** Southwest Basin Round Table; ***4) CWCB Date:*** April 2016; ***5) Contract number***: POGG1 2016-794, POGG1 PDAA 20160000000000000794, ***6) Other CWCB Funds:*** 0%***; 7) Completion Date:*** September 2017

WSRF 2017: 1) *Applicant:* Mountain Studies Institute (MSI); ***2) Project Name:*** Animas River Community Forum in the Southwest Basin, Phase II; ***3) Approving RT:*** Southwest Basin Round Table; ***4) CWCB Date:*** July 2017; ***5) Contract number***: CTGG1 2018-201, POGG1 PDAA 201800000201, ***6) Other CWCB Funds:*** 0%***; 7) Completion Date:*** April 2018

Colorado Water Plan 2018: 1) *Applicant:* Mountain Studies Institute (MSI); ***2) Project Name:*** Animas River Removal and Replacement of Invasive Phreatophytes, Phase II; ***3) Approving RT:*** Southwest

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Basin Round Table; ***4) CWCB Date:*** May 2018; ***5) Contract number***: POGG1, PDAA, 201900002100, ***6) Other CWCB funds:*** 0% ***7) Completion Date:*** August 2023

Colorado Water Plan- Innovation Fund 2018: 1) ***Applicant:*** Mountain Studies Institute (MSI); ***2) Project Name:*** Silverton Science & Innovation Center (SSINC); ***3) Approving RT:*** Southwest Basin Round Table; ***4) CWCB Date:*** Nov 2018; ***5) Contract number***: POGG1, PDAA, 201900002743, ***6) Other CWCB funds:*** 0% ***7) Completion Date:*** 2020

WRP and WSRF 2018: 1) ***Applicant:*** Mountain Studies Institute (MSI); **2)** ***Project Name:*** Watershed Grant Upper San Juan Stream Management Planning, Phase I**; 3)** ***Approving RT:*** Southwest Basin Round Table; **4)** ***CWCB Date:*** 4/27/18***; 5)*** ***Contract number***: POGG1, PDAA, 201800000886; **6)** ***Other CWCB funds:*** 20.7% ***7) Completion Date:*** 1/31/20

Colorado Watershed Restoration Program Grant 2019: 1) ***Applicant:*** Mountain Studies Institute (MSI); ***2) Project Name:*** Animas River Removal and Replacement of Invasive Phreatophytes, Phase II; ***3) Approving RT:*** Southwest Basin Round Table; ***4) CWCB Date:*** January 31, 2019; ***5) Contract number***: Pending, ***6) Other CWCB funds:*** 0%***7) Completion Date:*** Fall 2021

WSRF 2019: 1) ***Applicant:*** Mountain Studies Institute (MSI); ***2) Project Name:*** *Forests to Faucets (F2F): My Water Comes from the San Juan Mountains Teacher Training Workshop Series*; ***3) Approving RT:*** Southwest Basin Round Table; ***4) CWCB Date:*** 4/4/19; ***5) Contract number:*** POGG1,PDAA,201900002804, ***6) Other CWCB funds:*** 0% ***7) Completion Date:*** 01/31/22

WSRF 2019: 1) ***Applicant:*** Mountain Studies Institute (MSI) on behalf of 416-Fire Aquatic Monitoring Research Group; ***2) Project Name:*** *416-Fire Aquatic Monitoring*; ***3) Approving RT:*** Southwest Basin Round Table; ***4) CWCB Date:*** 4/4/19; ***5) Contract number:*** POGG1, PDAA, 201900002894; ***6) Other CWCB funds:*** 0% ***7) Completion Date:*** 5/1/22

WSRF 2019: 1) ***Applicant:*** Mountain Studies Institute (MSI); ***2) Project Name:*** Upper San Juan Watershed Enhancement Partnership (WEP) Multiple Use Project; ***3) Approving RT:*** Southwest Basin Round Table; ***4) CWCB Date:*** 10/10/19; ***5) Contract number:*** POGG1, PDAA 202000002332; ***6) Other CWCB funds:*** 25% ***7) Completion Date:*** 6/30/22

WRP 2020: 1) ***Applicant:*** Mountain Studies Institute (MSI); **2)** ***Project Name:*** Upper San Juan Basin Integrated Water Management Plan, Phase II**; 3)** ***Approving RT:*** Southwest Basin Round Table; **4)** ***CWCB Date:*** March 2020***; 5)*** ***Contract number***: Pending; **6)** ***Other CWCB funds:*** 20.7% ***7) Completion Date:*** April 2021

WSRF 2020: 1) ***Applicant:*** Mountain Studies Institute (MSI) on behalf of 416-Fire Aquatic Monitoring Research Group; ***2) Project Name:*** *416-Fire Aquatic Monitoring*; ***3) Approving RT:*** Southwest Basin Round Table; ***4) CWCB Date:*** March 2020; ***5) Contract number:*** Pending; ***6) Other CWCB funds:*** 0% ***7) Completion Date:*** April 2021

Taxpayer Bill of Rights

The Taxpayer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect your application.

Not Applicable

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Submittal Checklist	
AK	I acknowledge the Grantee will be able to contract with CWCB using the Standard Contract.
Exhibit A	
X	Statement of Work(1)
X	Budget & Schedule(1)
NA	Engineer's statement of probable cost (projects over $100,000)
X	Letters of Matching and/or Pending 3rd Party Commitments(1)
Exhibit C	
X	Map (if applicable)(1)
	Photos/Drawings/Reports
X	Letters of Support (Optional)
	Certificate of Insurance (General, Auto, & Workers' Comp.) (2)
	Certificate of Good Standing with Colorado Secretary of State(2)
	W-9(2)
	Independent Contractor Form(2) (If applicant is individual, not company/organization)
Engagement & Innovation Grant Applicants ONLY	
NA	Engagement & Innovation Supplemental Application(1)

(1) Required with application.
(2) Required for contracting. While optional at the time of this application, submission can expedite contracting upon CWCB Board approval.

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Colorado Water Conservation Board
Water Plan Grant - Exhibit A

Statement Of Work	
Date:	February 1, 2020
Name of Grantee:	Mountain Studies Institute
Name of Water Project:	Animas River Invasive Plant Removal and Replacement Project, Phase II Continuation and Strategic Mapping
Funding Source:	Environmental and Recreation Projects

Water Project Overview:

Building on the success of MSI's previous efforts, this proposal is a continuation of Phase II, in which MSI will continue to work with private landowners, businesses, and Southern Ute Indian Tribe (SUIT) to remove Russian olive and tamarisk in the Animas River Watershed. In addition, MSI will use a strategic approach to map the "state of the watershed," quantifying the extent of the Russian olive population by using object-based image analysis methods to create a distribution map in the Animas Subbasin in support of state-mandated noxious weed management goals. This mapping effort will be used as an assessment tool to evaluate our progress in the basin, an outreach tool for recruiting landowners, and serve as a model for mapping efforts in other basins.

We will **(Task 1) Coordinate** with landowners and business owners to educate them about the impacts of invasive species and treatment options, and develop restoration plans for removal of Russian olive and tamarisk; **(Task 2) Strategically map** to track overall progress in the watershed in the long-term; **(Task 3) Remove phreatophytes** by contracting Southwest Conservation Corps (SCC) crews and replace with native species where appropriate; and **(4) Monitor** for re-sprouts by empowering landowners and our partners.

Project Objectives:

Objectives include:

- Subcontract SCC to clear Russian olive and tamarisk within the Animas River watershed. Focus areas include private parcels in the southern portion of the Animas River watershed, just north of the state line, Southern Ute Indian Tribal lands, and Bodo Industrial Park.
- Retreatment of areas treated in Phase I.
- Strategic mapping of the Animas Subbasin, in order to quantify the current state of Russian olive infestation.
- Refinement of methods for mapping Russian olive populations using remotely sensed data and object-based image analysis that will be repeatable in other watersheds (possibly statewide).
- Continue MSI's outreach and education efforts to engage landowners and business owners to continue monitoring their own properties for re-sprouting phreatophytes in perpetuity.

Task 1 – Outreach/Coordination

MSI (applicant) will serve as the coordinator for the project. Duties will include outreach to landowners, coordination of partners and matching funds, all administrative tasks, including progress reports to the CWCB. Most of the outreach effort will be focused within two main areas:

1) Landowners along the mainstem Animas River, adjacent to Southern Ute Indian Tribal lands. – MSI began a successful campaign in 2019 to outreach to these landowners and began removal work in these areas. The Russian olive populations in these areas were so thick that the SCC crew could not complete all the removal on the parcels for which MSI had obtained signed agreements for removal in 2019. MSI intends to continue clearing operations in 2020, and in subsequent years, until complete.

2)Business owners within Bodo Industrial Park (Bodo). MSI completed approximately 100 acres There are a minimum of 65 large, mature Russian olive (City of Durango Urban Forest Tree Inventory, 2004) growing within the City of Durango's (COD) right-of-way within Bodo. MSI will work with the business owners to ensure they will agree to removal of mature trees that serve as landscaping around their businesses.

MSI is uniquely qualified for this role, as we have created a public outreach campaign over the past four years under the Invasive Phreatophyte Control Program, and Phase II of this project. MSI has built momentum and public awareness around Russian olive and tamarisk eradication.

MSI currently holds a database of private landowners within the Animas River watershed that would like to participate in future Russian olive eradication efforts. The total area of these private parcels is over 550 acres. If awarded, we will continue seeking additional funds to assist private landowners with eradication efforts on a cost-share basis.

Method/Procedure:

MSI will outreach to business owners within Bodo, private landowners, and the community at large. We will raise awareness of the current threat of urban and ex-urban Russian olive and tamarisk seed sources that compromise riparian habitat, agricultural activities, and water security. MSI will utilize existing outreach materials to continue to build public support for removal of seed sources in both riparian areas and areas planted as ornamental landscape trees. We will continue to employ our communication and engagement plan, brochures, public presentations, website, and media for print, web, and social networking.

SCC will offer chain saw and herbicide training to youth corps and landowners to share best practices for safe and effective maintenance.

Grantee Deliverable: Describe the deliverable the grantee expects from this task

MSI will work with private landowners and Bodo Industrial Park businesses, to remove Russian olive and tamarisk (if present) at least 100 additional acres within the Animas River watershed; and recruit and retain additional participants for Phase III. This work will also include retreatment of previously treated parcels.

CWCB Deliverable: Describe the deliverable the grantee will provide CWCB documenting the completion of this task

Deliverables: Updated outreach materials, power point presentation materials; 3 presentations in general Durango community; 2 articles in regional print media; and present at restoration conferences. Interim and final report summarizing outreach activities, contacts with landowners, and accomplishments.

Tasks

Task 2 – Strategic Mapping of Russian Olive

Description of Task:

MSI will contract with Four Corners Mapping and GIS, a remote sensing specialist, to map the distribution and quantity of Russian olive in in the 3,550-km^2 Animas Subbasin. The subcontractor proposal is included in Attachment A.

As a follow-up to the 2019 pilot study, ***Supervised Classification of Russian Olive in the Animas Valley with NAIP Imagery and Object-Based Image Analysis***, MSI proposes to use remote sensing methods to create a baseline distribution map of Russian olive in the Animas Subbasin in La Plata and San Juan Counties in support of state-mandated noxious weed management goals.

Existing vegetation mapping in the Animas Valley consists of relatively low-resolution classifications of vegetative communities. These classifications are inadequate for the needs of MSI, which requires up-to-date canopy-scale delineation of Russian olive to monitor spread and efficacy of treatment applications. The mapping effort proposed here will serve as a "baseline" of RO distribution to provide a means for MSI to monitor treatment efforts. MSI intends to repeat this mapping effort on a biennial timeline to be able to track spread and refine treatment efforts with the long-term goal of improving watershed health while fulfilling the State's mandate to prevent the spread of this invasive species.

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Tasks
Method/Procedure:
General Scope for Region-Scale Remote Sensing of Russian olive 1 Determine study area: Animas Subbasin (USGS WBD HUC 14080104). 2 Procure remote sensing software 3 Acquire data and imagery: LiDAR, NAIP imagery, County datasets, etc. (all data is free). 4 Develop processing masks and ancillary datasets: NDVI, LiDAR-derived height band, etc. 5 Develop land cover classes and collect training and testing samples. This may include identification of samples via visual inspection of aerial imagery and/or a field component (ground truthing). 6 Segmentation and classification. 7 Validation: Construction of confusion matrices based on reference and classification data. 8 Refinement of segmentation and classification parameters: Repeat Steps 6-8 as necessary until desired accuracy is achieved. For more details on scope and methodology as determined in the pilot study, see the Story Map at: bit.do/russianolive; and the project poster here: ibb.co/ynjSn6q.
Grantee Deliverable: Describe the deliverable the grantee expects from this task
Geodatabase of mapped Russian olive in vector and raster format. Russian olive will be mapped across the 3,550-km2 Animas Subbasin. This data may be used by MSI or the subcontractor for analysis, planning, visualization, hard copy exhibits, and other products to support weed management.

Tasks
Task 3 – Removal/Replacement
Description of Task:
MSI and Southern Ute Tribe will contract with SCC to remove Russian olive on multiple private and public properties. The contract will support the training and deployment of SCC youth corps to remove trees and apply herbicide. SCC will utilize best management practices (see methods) to treat Russian olive and tamarisks. Tribal Lands Southern Ute Indian Tribe (SUIT) proposes to treat 450 acres of tamarisk and Russian olive on tribally-owned portions of land along the Animas River. Treatment will involve cutting these invasive species to ground level, applying herbicide, piling slash, planting native cottonwoods and burning slash piles. SUIT has completed all environmental compliance required for these tasks. Private Parcels MSI will coordinate with private landowners and business owners. MSI will offer assistance for eradication on a cost-share basis. We currently have approximately 550 acres identified of private

Tasks
land for future project work. Our objective for this continuation of Phase II is to improve a minimum of 100 additional acres on private parcels.
Method/Procedure:
On all lands, treatment will involve using the following methods: Cut-Stump treatment method The cut-stump technique involves cutting the trees and shrubs to ground level and spraying stumps with the herbicide (Garlon 4 or Rodeo) and JLB oil. Chain saws, brush cutters, lopping shears and other hand tools will be used. Stumps will be sprayed using hand-held spray bottles, sprayers, or "painted on". The herbicide will be applied to the stump immediately following cutting to maximize efficiency of the herbicide treatment. Frill cut treatment method or "hack-and-squirt" Using a hatchet, machete, or similar device a frill cut will be made at a downward angle at proper spacing around the trunk (not completely girdling the tree). After striking, the hatchet will be pulled backwards to produce a "cup" to hold the herbicide. Cuts will be made to penetrate through the bark into living cambium tissue. Herbicide (Garlon 4 or Rodeo) mixed with JLB oil, according to label, will be sprayed into the frill cuts using a squirt bottle or sprayer. This method will be used to control individual trees greater than five inches in diameter. This method is best for the protection of wildlife habitat due to no immediate canopy removal or disturbance. The standing dead trees left behind become good habitat trees. Basal bark treatment method This method is used to address younger plants and re-sprouts with stems no larger than 6 inches in diameter. Herbicide will be sprayed onto 12-15 inches of bark around entire stem near the base of the plant. All treatment methods will be applied after the plant has bloomed and prior to dormancy, between September and November for maximum effectiveness and to reduce re-sprouting. In most areas slash will be piled for burning when appropriate conditions allow. In some cases, slash will be hauled off site for burning or chipping.
Deliverable:
SUIT lands: Treatments to improve approximately 450 acres within the reservation. Private parcels: Treatments to improve approximately 100 acres on private parcels. In addition, SCC will conduct training for herbicide and chainsaw use for all crew members (16-32 participants). In total, invasive species and their seed sources will be removed from approximately 550 acres. MSI will provide monthly invoices and quarterly reports with accomplishments documented by SCC. These reports will include acres improved. A final report will include maps of all areas treated and supporting GIS layers.

Last Updated: July 2019

Tasks
Task 4 – Monitoring/Reporting
Description of Task:
Monitoring will be conducted at all project sites to identify and address re-sprouting. SUIT lands: MSI will coordinate with SUIT Division of Wildlife staff to monitor for re-sprouts. SUIT will treat re-sprouts on treated areas as appropriate. Private parcels: MSI will coordinate with private landowners and business owners to monitor for re-sprouts. As part of Task 1, MSI will educate landowners on identification and early eradication of re-sprouts. Landowners will be empowered to self-monitor and maintain their parcels.
Method/Procedure:
"Before and after" photo points will be established at each treatment site, as is the standard protocol for SCC crews. Photo points will be GPS'd. Each area treated by SCC will be mapped using a handheld tablet. A standard data form will be filled out at each site to document the number of stems treated, method employed, and total area treated. This data is paired with the geospatial data for future monitoring.
Deliverable:
Monitoring will be conducted at all project sites. Photo points and GIS data will be recorded on a tablet and data archive for each site. Data sets will be shared with all partners and CWCB. MSI will provide monthly invoices and quarterly reports with accomplishments documented by SCC. These reports will include acres improved. A final report will include maps of all areas treated and supporting GIS layers.

Budget and Schedule
This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format.

Reporting Requirements
Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status of the tasks identified in the statement of work, including a description of any major issues that have occurred and any corrective action taken to address these issues.

Last Updated: July 2019

Reporting Requirements

Final Report: At completion of the project, the applicant shall provide the CWCB a Final Report on the applicant's letterhead that:

- Summarizes the project and how the project was completed.
- Describes any obstacles encountered, and how these obstacles were overcome.
- Confirms that all matching commitments have been fulfilled.
- Includes photographs, summaries of meetings and engineering reports/designs.

The CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

Payment

Payment will be made based on actual expenditures and must include invoices for all work completed. The request for payment must include a description of the work accomplished by task, an estimate of the percent completion for individual tasks and the entire Project in relation to the percentage of budget spent, identification of any major issues, and proposed or implemented corrective actions.

Costs incurred prior to the effective date of this contract are not reimbursable. The last 10% of the entire grant will be paid out when the final deliverable has been received. All products, data and information developed as a result of this contract must be provided to CWCB in hard copy and electronic format as part of the project documentation.

Performance Measures

Performance measures for this contract shall include the following:
(a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in Exhibit B. Per Water Plan Grant Guidelines, the CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.
(b) Accountability: Per Water Plan Grant Guidelines full documentation of project progress must be submitted with each invoice for reimbursement. Grantee must confirm that all grant conditions have been complied with on each invoice. In addition, per Water Plan Grant Guidelines, Progress Reports must be submitted at least once every 6 months. A Final Report must be submitted and approved before final project payment.
(c) Monitoring Requirements: Grantee is responsible for ongoing monitoring of project progress per Exhibit A. Progress shall be detailed in each invoice and in each Progress Report, as detailed above. Additional inspections or field consultations will be arranged as may be necessary.
(d) Noncompliance Resolution: Payment will be withheld if grantee is not current on all grant conditions. Flagrant disregard for grant conditions will result in a stop work order and cancellation of the Grant Agreement.

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan Grant - Exhibit B
Budget and Schedule

Prepared Date:

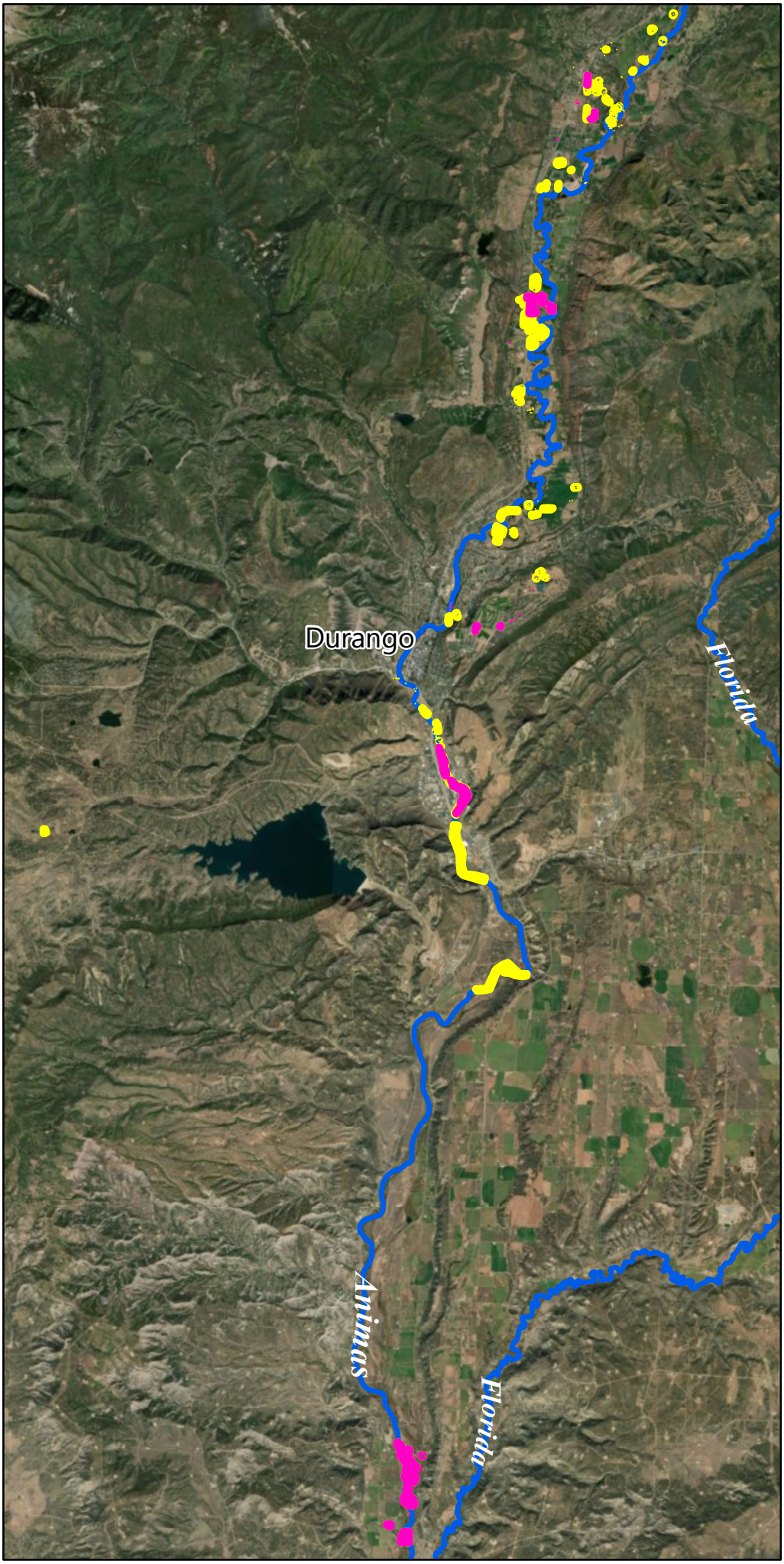
Name of Applicant:

Name of Water Project:

Project Start Date:

Project End Date:

Task No.	Task Description	Task Start Date	Task End Date	Grant Funding Request	Match Funding	Total
1	Task 1- Outreach/Coordination	July 1, 2020	May 1, 2022	$0.00	$5,500.00	$5,500.00
2	Task 2- Strategic Mapping	July 1, 2020	Jan 31, 2022	$43,755.00	$1,000.00	$44,755.00
3	Task 3 - Removal/Replacement	Sept 1, 2020	Nov 30, 2021	$11,000.00	$74,500.00	$85,500.00
4	Task 4- Monitoring/Reporting	July 1, 2020	June 30, 2022	$0.00	$8,302.00	$8,302.00
	Indirect Costs			$4,544.00		$4,544.00
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
			Total	$59,299.00	$89,302.00	$148,601.00



Russian Olive Removal Project

Treatment sites where invasive plant species *Elaeagnus angustifolia* (Russian olive) and *Tamarix spp* (Tamarisk) were removed

Phase I Treatment

Phase II Treatment

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Mountain Studies Institute
SAN JUAN MOUNTAINS COLORADO

January 28, 2020

Colorado Water Conservation Board
ATTN: Chris Sturm
1313 Sherman St. Room 721
Denver, CO 80203

RE: Animas River Removal and Replacement of Invasive Phreatophytes, Phase II Continuation and Strategic Mapping

Dear Colorado Water Conservation Board,

I am writing to express my support for Mountain Studies Institute's proposal Animas River Removal and Replacement of Invasive Phreatophytes, Phase II Continuation and Strategic Mapping. Mountain Studies Institute has been working cooperatively working with the Southwest Conservation Corps to accomplish the stated project goals since 2015. These cooperative efforts benefit riparian ecosystems throughout the southwestern U.S.

SCC is prepared to offer 5 weeks of crew capacity to assist with project implementation and an associated in-kind volunteer match of $10,000.

SCC employs a diverse group of young women and men and completes important conservation projects for the public benefit. Founded as a non-profit organization in 1998 to continue the legacy of the Civilian Conservation Corps of the 1930s, SCCs employment and educational projects are sponsored primarily by land management agencies and municipalities throughout the southwest region of the U.S. More about SCC's programs can be found on its website.

Please contact me at 970-759-3935 if you have any questions.

Sincerely,

Kevin Heiner

Kevin Heiner
kevin@conservationlegacy.org
https://sccorps.org/
Director, Southwest Conservation Corps
A Program of Conservation Legacy
701 Camino del Rio, Suite 101
Durango, CO 81301

SOUTHERN UTE INDIAN TRIBE

January 27, 2020

Colorado Water Conservation Board
ATTN: Chris Sturm
1313 Sherman St. Room 721
Denver, CO 80203

RE: Animas River Removal and Replacement of Invasive Phreatophytes, Phase II Continuation and Strategic Mapping

Dear Colorado Water Conservation Board,

I am writing to express my support for Mountain Studies Institute's proposal Animas River Removal and Replacement of Invasive Phreatophytes, Phase II Continuation and Strategic Mapping. Mountain Studies Institute is cooperatively working with the Southern Ute Indian Tribe to accomplish the stated project goals. We share several connected projects and understand the importance of treating tamarisk and Russian olive in the region. These cooperative efforts benefit riparian ecosystems throughout the southwestern U.S.

The Southern Ute Division of Wildlife Resource Management has applied for $45,557 in federal funds with an additional $3,382 of matching tribal funds. If awarded, the combined total of $48,939 will be put towards the effort of reducing invasive phreatophytes.

The Southern Ute Division of Wildlife Resource Management fully supports this much needed project and if you have any questions please feel free to contact me at (970) 563-0130.

Thank you,

Steve Whiteman, Division Head
Southern Ute Wildlife Resource Management Division

SOUTHWEST BASINS ROUNDTABLE
Michael Preston, Chair
c/o Dolores Water Conservancy District
P.O. Box 1150
Cortez, Colorado 81321
970-565-7562

January 27, 2020

Chris Sturm
Colorado Water Conservation Board
1580 Logan Street, Suite 600
Denver, Colorado 80203

SUBJECT: SWBRT Letter of Support Animas River Removal and Replacement of Invasive Phreatophytes and Strategic Mapping Project

I am writing in support of Mountain Studies Institute's application for funding to support the Animas River Removal and Replacement of Invasive Phreatophytes and Strategic Mapping project. This Project was presented at the January 15, 2020 Southwest Basin Roundtable Meeting. The Roundtable unanimously approved providing a letter of support for this worthwhile proposal. A quorum of Roundtable members was present.

The goals of this project include removal of invasive phreatophytes in the Animas River watershed, and mapping of the distribution and quantity of Russian olive in in the 3,550-km2 Animas Sub-basin using remotely sensed data.

This project addresses and contributes to the measurable outcomes of the following goals identified in the Southwest Basin Round Table, Basin Implementation Plan, 2015:

- A5 Maintain watershed health by protecting and/or restoring watersheds that could affect critical infrastructure and/or environmental and recreational areas.
- D1 Maintain, protect and enhance recreational values and economic values to local and statewide economies derived from recreational water uses, such as fishing, boating, hunting, wildlife watching, camping, and hiking.
- E1 Encourage and support restoration, recovery, and sustainability of endangered, threatened, and imperiled aquatic and riparian dependent species and plant communities.
- E2 Protect, maintain, monitor and improve the condition and natural function of streams, lakes, wetlands, and riparian areas to promote self-sustaining fisheries, and to support native species and functional habitat in the long term, and adapt to changing condition.

The Southwest Basin Roundtable supports this effort to improve overall watershed health and to improve the assessment of phreatophytes in the sub-basin through this mapping effort.

Please feel free to contact me at 970-739-4181, or mpreston@frontier.net, if you have questions or wish to discuss this application in more detail.

Sincerely,

Michael Preston, Chair
Southwest Basin Roundtable

Proposal & Scope

January 29, 2020

Amanda Kuenzi
Mountain Studies Institute
679 East 2nd Ave, Suite 8
Durango, Colorado 81301

Re: Proposal for GIS Services
Proposal No. P20001

Ms. Kuenzi:

Four Corners Mapping and GIS, LLC is pleased to present this proposal for Geographic Information Science (GIS) services for Mountain Studies Institute (MSI) for remote sensing and mapping of Russian olive in the Animas Subbasin, La Plata and San Juan Counties, Colorado. This cover letter outlines details regarding the tasks and deliverables associated with this proposal. An itemized Cost Estimate is attached.

Task: Remote Sensing and Mapping of Russian Olive

Existing vegetation mapping in the Animas Valley consists of relatively low-resolution classifications of vegetative communities. It is the understanding of Four Corners Mapping & GIS, LLC that these classifications are inadequate for the needs of MSI, which requires up-to-date canopy-scale delineation of Russian olive (RO) to monitor spread and efficacy of treatment applications. As a follow-up to a successful pilot study in 2019 which mapped RO in a study area on the Animas River using object-based image analysis and USDA NAIP imagery undertaken as part of the completion of a master's degree in GIS at the University of Denver by Anna Riling, Four Corners Mapping and GIS, LLC is proposing to use these proven remote sensing methods to create a baseline distribution map of RO in the Animas Subbasin in La Plata and San Juan Counties in support of state-mandated noxious weed management goals.

The mapping effort proposed here may serve as a "baseline" of RO distribution to provide a means for MSI to monitor treatment efforts. It is the understanding of Four Corners Mapping & GIS, LLC that MSI intends to repeat this mapping effort to be able to track spread and refine treatment efforts with the long-term goal of improving watershed health while fulfilling the State's mandate to prevent the spread of this invasive species.

Scope

The following is a general scope for region-scale remote sensing of RO:

1. Determine study area: Animas Subbasin (USGS WBD HUC 14080104).
2. Procure remote sensing software (see attached cost estimate).
3. Acquire data and imagery: LiDAR, NAIP imagery, County datasets, etc.
4. Develop processing masks and ancillary datasets: NDVI, LiDAR-derived height band, etc.

5. Develop land cover classes and collect training and testing samples. This may include identification of samples via visual inspection of aerial imagery and/or a field component (ground truthing).
6. Segmentation and classification.
7. Validation: Construction of confusion matrices based on reference and classification data.
8. Refinement of segmentation and classification parameters: Repeat Steps 6-8 as necessary until desired accuracy is achieved.

The attached Cost Estimate provides a quantitative breakdown of personnel, software, and equipment estimated for this project. A mapping effort of this scale in this geographic locale has not yet been undertaken, namely mapping RO in the Animas Subbasin; Four Corners Mapping & GIS, LLC based the estimate upon the experience, methodology, and parameters determined in the pilot study, as well as the consideration of remote sensing industry standards and a literature review of previous work. For more details on scope and methodology as determined in the pilot study, see the pilot project's Story Map at: bit.do/russianolive, and the project poster here: ibb.co/CW1PDJ5.

Deliverables

The deliverable for this proposal is a geodatabase of mapped Russian olive in vector and raster format. Russian olive will be mapped across the 3,550-square kilometer Animas Subbasin. This data may be used by MSI or the subcontractor for analysis, planning, visualization, hard copy exhibits, and other products to support weed management.

It is the understanding of Four Corners Mapping & GIS, LLC, that any software and equipment acquired by MSI through this project will remain the property of MSI following project completion.

This estimate includes costs as determined in good faith and to the best of our knowledge of the project scope. In the event that elements of scope change and/or the proposed tasks cannot be completed in the time and budget allowed under this proposal, Four Corners Mapping & GIS, LLC, will notify MSI as soon as possible to determine an appropriate course of action.

Thank you for the opportunity, and please don't hesitate to contact me at 970.903.8575 or annariling@gmail.com,

Respectfully,

Anna Riling, MS, PG
Cartographer/Geologist
Four Corners Mapping and GIS, LLC

Attachments: Cost Estimate

Four Corners Mapping & GIS
3165 West 3rd Ave
Durango, Colorado 81301
Phone: 970.903.8575

COST ESTIMATE

PROPOSAL #	DATE
P20001	1/29/2020

SUBMITTED TO:

Amanda Kuenzi
Mountain Studies Institute
679 East 2nd Avenue, Suite 8
Durango, Colorado 81301
970.387.5161

TASKS & DELIVERABLES

1. Remote sensing and mapping of Russian olive.
2. Geodatabase of mapped Russian olive in vector and raster format.

DESCRIPTION	QTY	TYPE	UNIT PRICE	AMOUNT
Remote Sensing Analyst	480	HR	78.00	37,440.00
Trimble eCognition (monthly software subscription)	3	MO	555.00	1,665.00
Trimble eCognition (annual maintenance)	1	$	250.00	250.00
HP Z6 G4 Workstation	1	$	3,511.20	3,511.20
				-
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				-

Thank you!

SUBTOTAL	42,866.20
TAX RATE	0.00%
TAX	-
TOTAL	**$ 42,866.20**

If you have any questions about this invoice, please contact
Anna Riling | 970.903.8575 | annariling@gmail.com