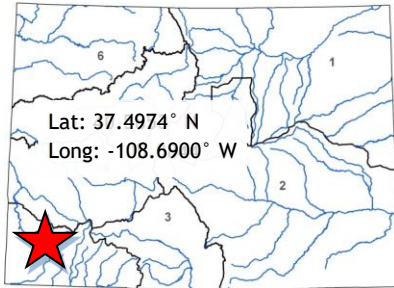




Water Plan Grant Application



L O C A T I O N	
County/Countries:	Montezuma
Drainage Basin:	Southwest

D E T A I L S	
Total Project Cost:	\$170,764.70
Water Plan Grant Request:	\$77,321.50
Recommended Amount:	\$63,380.50
Other CWCB Funding:	\$24,193 (WSRF)
Other Funding Amount:	\$69,251.20
Applicant Match:	\$0
Project Type(s):	Study & Other
Project Category(Categories):	Engagement/Innovation
Measurable Result:	Approximately diversion savings of 6" per year, 2,000 Annually Number of Coloradoans Impacted by Engagement Activity.

The applicant, the Montezuma Land Conservancy (MLC) is a non-profit land trust located in Southwest Colorado. MLC has been protecting 45,000 acres of land since 1998, and describes their organization as leading the way around the country in innovative community engagement strategies that redefine what it means to be a land trust. Through the use of its 83-acre education farm, MLC has expanded its mission and programs to include a critical focus on reconnecting our community to the natural world. Since 2017, these hands-on education programs and youth pathways to careers in conservation have served over 1,200 youth and 140 adults.

The proposed project is located in the Dolores River Basin, and will utilize MLC's 83-acre education farm, Fozzie's Farm, as a site for a collaborative project with a diverse set of local partners. The project will focus on three components: 1) **Scientific Research** to study the use of sensor-based irrigation management on a 5-acre perennial grass systems in conjunction with regenerative agricultural strategies such as rotational grazing and soil health management; 2) **Youth Engagement** through MLC's nationally recognized high school internship programs that will create a critical opportunity to directly engage youth in hands-on education relating to water conservation, innovative agricultural strategies, and citizen based science; and 3) **Landowner and Public Outreach** that will use the demonstration site, social media, printed materials, field days and public forums to educate the public and spark dialogue to address much needed water conservation strategies in the face of increasing drought and transitioning Southwest Colorado towards more climate smart agriculture.

This project meets agricultural goals identified in the Southwest Basin Implementation by working to be more efficient with water use and achieve high conservation. This project also meets goals in the Water Plan by addressing the agricultural gap, as well as the need of the agricultural community by "exploring innovative ways to not only conserve water and increase agricultural efficiency, but also potentially do so without fallowing or reduction of yields allowing farmers to continue to produce their current yields and potentially increase yields".

Funding Recommendation: Staff is recommending a grant of \$63,380.50 from the Engagement and Innovation category of funding. The recommendation is \$13,941 less than requested because the applicant has revised their scope and budget to be consistent with current COVID-19 guidelines.



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Colorado Water Conservation Board

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
Conservation, Land Use Planning
Engagement & Innovation Activities
Agricultural Projects
Environmental & Recreation
Projects

Anna.Mauss@state.co.us
Kevin.Reidy@state.co.us
Ben.Wade@state.co.us
Alexander.Funk@state.co.us
Chris.Sturm@state.co.us

FINAL SUBMISSION: Submit all application materials in one email to [**waterplan.grants@state.co.us**](mailto: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	Montezuma Land Conservancy
Name of Water Project	Montezuma Land Conservancy and Southwest Colorado Research Center: Innovative Agricultural Management and Colorado’s Next Generation of Water Leaders
CWP Grant Request Amount	\$77,321.50
Other Funding Sources <u>Gates Family Foundation</u>	\$30,720.00
Other Funding Sources <u>Great Outdoors Colorado</u>	\$38,531.20
Other Funding Sources <u>Southwest Basin Roundtable</u>	\$24,192.00
Applicant Funding Contribution	\$0
Total Project Cost	\$170,764.70



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Applicant & Grantee Information	
Name of Grantee(s) Montezuma Land Conservancy	
Mailing Address: PO BOX 1522 Cortez, CO 81321	
FEIN: 31-1632961	
Organization Contact: Travis Custer	
Position/Title: Executive Director	
Email: travis@montezumaland.org	
Phone: (970) 565-1664	
Grant Management Contact: Travis Custer	
Position/Title: ""	
Email: ""	
Phone: ""	
Name of Applicant (if different than grantee)	
Mailing Address	
Position/Title	
Email	
Phone	
Description of Grantee/Applicant	
Provide a brief description of the grantee's organization (100 words or less).	
<p>The Montezuma Land Conservancy (MLC) is a non-profit land trust located in Southwest Colorado with a big vision. In addition to protecting 45,000 acres of land since 1998, MLC is leading the way around the country in innovative community engagement strategies that redefine what it means to be a land trust. Through the use of our 83-acre education farm, MLC has expanded its mission and programs to include a critical focus on reconnecting our community to the natural world. Since 2017, these hands-on education programs and youth pathways to careers in conservation have served over 1,200 youth and 140 adults.</p>	



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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- On-farm experiential education and engagement

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. <i>Applicable Exhibit A Task(s):</i>
	Conservation and Land Use Planning - Activities and projects that implement long-term strategies for conservation, land use, and drought planning. <i>Applicable Exhibit A Task(s):</i>
X	Engagement & Innovation - Activities and projects that support water education, outreach, and innovation efforts. Please fill out the Supplemental Application on the website. <i>Applicable Exhibit A Task(s):</i> Task 1 - Irrigation and Soil Research and Monitoring Task 2 - Citizen Science: Youth Exploration and Engagement Task 3 - Public Education and Outreach
	Agricultural - Projects that provide technical assistance and improve agricultural efficiency. <i>Applicable Exhibit A Task(s):</i>



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	Environmental & Recreation - Projects that promote watershed health, environmental health, and recreation. <i>Applicable Exhibit A Task(s):</i>	
	Other	Explain:

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/Countries	Montezuma
Latitude	108 41' 24.1" W
Longitude	37 29' 50.8" N

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.

Located in the Dolores River Basin, this project will utilize the Montezuma Land Conservancy's (MLC) 83-acre education farm, Fozzie's Farm, as a site for a collaborative Engagement and Innovation project with a diverse set of local partners. The project will focus on three components:

1) Scientific Research to study the use of sensor-based irrigation management on a 5-acre perennial grass systems in conjunction with regenerative agricultural strategies such as rotational grazing and soil health management; **2) Youth Engagement** through MLC's nationally recognized high school internship programs that will create a critical opportunity to directly engage youth in hands-on education relating to water conservation, innovative agricultural strategies, and citizen based science. As the next generation of agricultural producers, water consumers, and community leaders, we believe it is key to emphasize and elevate our efforts to prepare youth to take Colorado's water and conservation future head on; and **3) Landowner and Public Outreach** that will use the demonstration site, social media, printed materials, field days and public forums to educate the public and spark dialogue to address much needed water conservation strategies in the face of increasing drought and transitioning Southwest Colorado towards more climate smart agriculture.

Measurable Results

To catalog measurable results achieved with the CWP Grant funds, please provide any of the following values as applicable:



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	New Storage Created (acre-feet)
	New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive
	Existing Storage Preserved or Enhanced (acre-feet)
	Length of Stream Restored or Protected (linear feet)
Approx. diversion savings of 6" per acre/year	Efficiency Savings (indicate acre-feet/year OR dollars/year)
	Area of Restored or Preserved Habitat (acres)
	Quantity of Water Shared through Alternative Transfer Mechanisms
	Number of Coloradans Impacted by Incorporating Water-Saving Actions into Land Use Planning
2,000 + annually through direct education programs, field days, community forums, social media/online outreach, and printed materials	Number of Coloradans Impacted by Engagement Activity
	Other Explain:

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;)

After reviewing supporting documents (BIP, CWP, and EAP plans) we have identified this project will engage the following actionable steps towards accomplishing regional and statewide goals:

Southwest Basin Roundtable Basin Implementation Plan:

In the executive summary of the Southwest Basin Roundtable (SWBRT) BIP it identifies that, *"The Roundtable supports the idea that on a statewide basis we all need to be more efficient with water use and achieve high conservation. Recognizing that municipal demand is one of the driving forces to agricultural dry up..."* The report goes on to identify that crop irrigation requirements are predicted to increase based on changes in climate and resulting higher temperatures and lower irrigation-season precipitation. Coupled with identified irrigation gaps in Montezuma County, this data paints a stark and urgent picture for the Basin: *develop and transition to agricultural models that use water more efficiently, rely on more resilient crop types and practices, and do it yesterday.*

We believe that through innovative practices and technologies agricultural water usage can be reduced without having significant impacts to the economics of farming and ranching operations.



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Further, we believe this can be done while also improving the overall resiliency of the land and thus, over time, likely increase yields with less water.

In Section 1, Table 1 of the BIP there are a number of goals and outcomes listed that this project meets including components within Goal A: Balance All Needs and Reduce Conflict, Goal B: Meet Agricultural Needs, and Goal G: Comply with CO River Compact and Manage Risk (SWBRT BIP, pg. 11).

Goal A: Balance All Needs and Reduce Conflict - This project addresses goal A4: *Promote dialogue, foster cooperation and resolve conflict among water interests in every basin and between basins for the purpose of implementing solutions to Southwest Colorado's, and Colorado's water supply.* While this project is not related directly to an IPP we do believe it helps to accomplish a similar outcome to number 3, "...promote dialogue, foster cooperation, and resolve conflict," by bringing together diverse water users and stakeholders within the community to discuss water conservation strategies (SWBRT, pg.12).

Goal B: Meet Agricultural Needs - Under this goal we believe this project impacts goal B2: *Implement efficiency measures to maximize beneficial use and production,* specifically touching on measurable outcomes 1 and 2 (SWBRT BIP, pg. 13). By working towards these goals this project could act as an example of strategies that could assist in bridging the identified irrigation gap for the Dolores Project of nearly 4,000 AF (SWBRT BIP, pg. 32).

Goal G: Comply with CO River Compact and Manage Risk - This project addresses goal G6: *Support strategies to mitigate the impact of a CO River Compact curtailment should it occur.* By looking at opportunities for agricultural producers to conserve water, increase efficiency, and bring innovative management to their operations, we believe this project will help supplement a growing body of evidence that could inform transitional strategies for southwest Colorado agriculture to adapt to drought and climate change. Should a curtailment ever occur, operations that have transitioned to using less water, and those who are able to create more resilient systems, will be impacted less. Additionally, agricultural water conservation efforts can assist in diverting less water which will also help offset the gaps identified to prevent a curtailment scenario (SWBRT BIP, pg. 18).

The final component of the SWBRT BIP that this project addresses is assisting to support the overall goals identified in the **Roundtable Education Action Plan (EAP)** which identifies the following pertinent short term goals identified in the Outreach Plan of Section 4.1, 1) Encourage education and conservation to reduce demand; and 2) Implement informational events about water conservation and land-use planning and water reuse efforts, tools and strategies (SWBRT BIP, pg. 79).

Colorado Water Plan:

Chapter 10 of the Colorado Water Plan Identifies Colorado's Water Values and actions for implementation. As stated in 10.1:

"Colorado will continue to face natural stressors such as deep droughts, destructive wildfires and catastrophic floods. The best science available indicates that these conditions will only get worse with climate change...Coloradans at all levels—individually, locally, regionally, and statewide—must prepare to respond to these inevitable natural pressures so that Colorado can continue to flourish."

Additionally, 10.1 identifies Colorado's Water Values and states that the water plan will drive towards, *"A productive economy that supports vibrant and sustainable cities; viable and productive agriculture; and robust skiing, recreation, and tourism industry."* This project hits on methods that



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focus on creating a more sustainable community by supporting agricultural innovation, youth education, and general public discourse around the need for water conservation strategies that are necessary to prepare for a transitional future. Chapter 10 further identifies following action items that have been identified as being addressed through this project:

A. Supply Demand Gap: By addressing alternative conservation efforts in agriculture that may, on a larger scale, result in greater water savings as well as public engagement that creates dialogue around water values and addressing topics like the impact of climate change.

D. Agriculture: This project addresses the needs of the agricultural community by exploring innovative ways to not only conserve water and increase agricultural efficiency, but also potentially do so without fallowing or reduction of yields allowing farmers to continue to produce their current yields and potentially increase yields. This project is a perfect opportunity for the state to encourage innovation and creativity as outlined in the action plan. Additionally, this process puts farmers and ranchers in the driver seat of their own innovations and shows them opportunities to collaborate with other water needs without making significant sacrifices.

H. Education, Outreach, and Innovation: Through youth engagement, outreach to landowners (particularly young farmers and ranchers), and creating opportunities for diverse public discourse this project applies a multitude of strategies to accomplish this goal. Emphasis should be given to programs that encourage the participation of young people and help to prepare the next generation of water consumers and leaders.

In addition to these sections within Chapter 10, the following sections of the water plan are also pertinent to this project:

1. Chapter 6.3.4 - Agricultural Conservation, Efficiency, and Reuse: In this section it is identified that a goal of this strategy includes assisting Colorado's agricultural industry to become, "*more efficient and resilient, and to reduce non-beneficial water consumption and diversions without affecting statewide agricultural productivity and the environment.*" This project seeks to explore strategies that can reduce non-beneficial consumption and diversion, but also regenerative agricultural strategies that can improve yield while benefiting the overall ecological environment. The southwest must focus on adaptive management and transitional strategies to address climate change, and this is one of those ways. It also identifies specifically the goal of the Southwest Basin Roundtable to, "*implement efficiency measures to maximize beneficial use and production.*"

2. Chapter 9.5 - Outreach, Education, and Public Engagement: This chapter identifies the goal by the state to promote financial assistance of programs that help to inform Colorado water users about issues to promote a sustainable future. To do so, the plan identifies the need for "sophisticated water users," and outreach efforts that, "...promote well-informed community discourse regarding balanced water solutions." As identified above, this project will accomplish this task through engaging a diverse community of users ranging in age, profession, and overall sector of water usage.

We believe that this project directly addresses the needs to not only develop and implement innovative concrete practices to conserve water and use it more efficiently, but to also engage the communities, and in particular the next generation, to become citizens who are prepared to respond.

In similar ways to the SWBRT BIP this project also addresses overarching components and actions identified in the Colorado Water Plan as they relate to agriculture and education and outreach. Agricultural action items identified in Chapter 10 and further explored in Appendix H of the water plan that could be touched on through this particular project include 6.3.4 Agricultural Conservation, Efficiency, and Reuse Actions 1a and 1b: Working with Colorado State University to



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research agricultural water conservation and outreach to the agricultural community about techniques related to innovative soil health strategies.

Southwest Basin Roundtable Public Education, Outreach, and Participation (PEPO) Education Action Plan (EAP):

While the previous 2016/2017/2018 revised version of the PEPO EAP was somewhat lacking in specific goals and outcomes to draw project correlations from. To assist, we also referred to Section 1 of the BIP as stated in the PEPO EAP. Much of the previous plan relates to the creation of the Fact Booklet that would provide average citizens with information about water usage, rights, and law. This project provides an in-person opportunity to engage the public in more in-depth topics of water conservation. It creates an opportunity for critical thinking and analysis for young people, and a way to bring together multigenerational discussion about natural resources.

With the support of the Water Information Program and other community partners, this project helps to facilitate dialogue and demonstration that supports the goals of the SWBRT BIP identified above in Section 1. We believe this project specifically touches on the #2 Objective and Task: *Agricultural Efficiencies: Coordinate and implement workshop(s) focused on on-farm efficiencies and improvements.*

We have also reviewed the draft 2020 EAP and have drawn a few additional connections to our project. The plan acknowledges on pg. 2 the overarching goal as being, *“The Roundtable’s focus in 2020 is to develop media and digital materials for wide distribution in the basin. The PEPO Coordinator will work closely with the Roundtable members will help with the creation [sic] of the materials and outreach to the public.”*

On page 3 of the draft 2020 plan the EAP also notes that one Vision/Goal of the Basin’s Education strategy is to accomplish Measurable objective H in the Colorado Water Plan which is, “focused on improving the level of awareness and engagement regarding water issues in the state by 2020.” We believe that this project, in working closely with the Roundtable and PEPO liaison, can support this effort as an additional means of public outreach to a large audience.

The draft EAP talks states that the main goals for 2020 will include the development of digital outreach materials. The field days and public forums developed during this project can provide the perfect opportunity to disseminate this information to the public in collaboration with the PEPO liaison who was already planning to attend these events and support the project.

Lastly, the 2020 draft plan identifies the PEPO Coordinator’s goal of working with the newly formed Four Corners Water Center at Fort Lewis College to increase engagement of college students. The Water Center is listed as an active partner of this project should it be funded, so again would be a perfect opportunity to support these relationships and the goals of the new EAP.

Unfortunately, the new EAP does not acknowledge the importance of on farm practices as the previous version did. On page 5 of the previous plan was identified the need for Agricultural Efficiency workshops to be held for farmers through CSU Extension and Natural Resource Conservation Service. We still believe this is a valuable component and goal that should be addressed and this project’s focus on community-based programming can help to assist and enhance Basin efforts to inform the public.

Implementation of the EAP should be a multifaceted effort that creates broader collaboration throughout the basin, and this project is an exciting example of what that process could look like. It also places a heavy emphasis on bringing the next generation into the fold, and while not specifically



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identified in the PEPO EAP previous or current versions, we believe this is one of the most critical components of successful Water Plan implementation.

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.

1. [A recent report released by the climate-risk data firm Four Twenty Seven](#), an affiliate of one of the world's largest three credit agencies Moody's, identifies the unavoidable risk associated with the expected impact of past carbon emissions. The report largely explores increasing risks to global water supplies and impacts to the global food system. Amongst the areas identified in the report as most vulnerable to "widespread water stress" include southern Europe and the Mediterranean, the southwest United States, and southern Africa. The report states that these areas are, "anticipated to experience 10 to 20% reductions in dry season rainfall, reductions equivalent to the two decades surrounding the American 'dust bowl.'" These expected changes and others identified in the report, including new data produced by Aqueduct Food and the World Resource Institute (funded by Cargill, one of the world's largest food producers by revenue), show that, "...by 2040 as much as 40% of all irrigated crops will face acute water stress." This report and others make a damning case for immediate action in our region to address water conservation efforts and strategies that allow community-wide transformation and transition in the midst of intensifying conditions.
2. Sensor based irrigation has resulted in considerable irrigation water savings, yet most producers in southwest Colorado do not make irrigation decisions based on targeted approaches, while also utilizing irrigation systems with low efficiency. The region is primarily using gated-pipe and overhead sprinkler irrigation systems confirming the regional application for the research proposed. Sensor-based irrigation management was found to be more beneficial for low-frequency surface and sprinkler irrigation due to large irrigation levels where greater soil-moisture depletions occur between irrigations compared to high-frequency, low irrigation levels seen with micro-irrigation systems (Hanson, et al., 2000). Rivers et al. (2015) demonstrate significant water savings (+ 50%) using soil moisture sensor networks. Dukes et al. (2003) had a 50% water savings using targeted irrigation in a vegetable trial with no significant reductions in yield. Further, the ability to rebound after periods of reduced irrigation has been seen in perennial alfalfa hay systems in western Colorado. Cabot et al. (2017) indicate partial season irrigation treatments on alfalfa fields can be a reasonable approach to reduce water-use while maintaining forage quality despite modest yield reductions.
Targeted irrigation combined with partial season irrigations may become a necessary management strategy in times of water scarcity and to promote in-season water savings on a large scale basis. The research proposed here display the potential for significant irrigation water savings using a sensor-based approach rather than volume based approaches across multiple cropping systems. A need for regional data and an opportunity for demonstration drives the relevancy of the proposed research trial beyond on-location water savings.

Additionally, The American Society of Agricultural and Biological Engineers (ASABE) partnered with the Environmental Protection Agency (EPA) WaterSense program to test the precision accuracy of soil-moisture based irrigation at various depletion levels versus field capacity. Their data recognizes the intra-regional variability of soil-moisture sensing accuracy. The soil type and field conditions of the research proposed in this grant proposal can serve as a regional representation to gain data for demonstration purposes to help



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convert regional irrigation scheduling away from volume based decision making, thereby providing a scalable water savings through irrigation efficiencies.

In a climate smart agricultural management context, soil moisture sensor-based irrigation was shown to reduce the leaching potential of several nutrients (i.e. nitrogen and phosphorus) in a commercial nursery setting. The detailed soil nutrient and quality sampling in the enclosed research protocol will provide measurements for nutrient availability in a 3 feet deep soil profile replicated across treatments. An understanding of nutrient availability in conjunction with water use can provide insight into nutrient loads that leach to water resources. Further, through regenerative grazing practices, Shawver (2019) found that the management of livestock in an irrigated intensive-managed grazing system is the largest impact on forage quality and that with proper management there can be improvement in soil quality. These anticipated additional outcomes will also present data-based demonstration opportunities for regional producers.

Sources:

Cabot, P., J. Brummer, S. Gautam, L. Jones and N. Hansen. 2017. Benefits and Impacts of Partial Season Irrigation in Alfalfa Production. Western Alfalfa and Forage Symposium, <https://alfalfa.ucdavis.edu/+symposium/2017/PDFfiles/Cabot%20Perry%20.pdf>

Dukes, M.D. 2019. Soil Moisture-Based Irrigation Controller Final Test Report. EPA WaterSense Report

Dukes, M., E. Simonne, W. Davis, D. Studstill, and R. Hochmuth. 2003. Effect of Sensor-based high frequency irrigation on bell pepper yield and water use. Proceedings of 2nd International Conference on Irrigation and Drainage, pp. 665-674.

Hanson, B., S. Orloff, and D. Peters. 2000. Monitoring soil moisture helps refine irrigation management. California Agriculture. 38-42 May/June 2000 Vol. 54 No. 3.

Iersel, M., R.M. Seymour, M. Chappell, F. Watson and S. Dove. 2009. Soil Moisture Sensor-Based Irrigation Reduces Water Use and Nutrient Leaching in a Commercial Nursery. SNA Research Conference, Vol. 54.

Rivers, M., N. Coles, H. Zia, N. R. Harris and R. Yates. 2015. "How could sensor networks help with agricultural water management issues? Optimizing irrigation scheduling through networked soil-moisture sensors, 2015 IEEE Sensors Applications Symposium, pp. 1-6. doi: 10.1109/SAS.2015.7133593

Shawver, C. 2019 Effects of Management-intensive Grazing in relation to soil health and forage production in an irrigated perennial pasture system. Colorado State University Thesis. <https://mountainscholar.org/handle/10217/197432>

Soil Moisture-Based Irrigation Control Technologies: WaterSense Specification Update. 2017. EPA WaterSense Report

3. A study completed by professor Kathy Hilimire and former National Young Farmer's Coalition western organizer Kate Greenburg titled "Water Conservation Behaviors Among Beginning Farmers in the Western United States," looked at attitudes and practices of young producers as they relate to natural resource conservation. Namely, the study focused on various factors and variables that influence adoption of conservation practices across young producers. The study found that producers surveyed responded to drought scenarios in a number of ways that included "irrigation improvements, soil health practices, and experimentation with



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drought-tolerant crops.” However, the study showed that the most frequently cited strategies included focus on soil health improvements. This study, along with others cited, shows that water conservation is an important and relevant topic to young producers. It also emphasizes the high probability that these producers are willing to take on innovative practices beyond just changing irrigation infrastructure.

Greenburg, K. and Hilimire, K. 2019. Water Conservation Behaviors Among Beginning Farmers in the Western United States. Journal of Soil and Water Conservation March/April 2019 - Vol. 74, NO. 2. Pp.138-144.

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.

None.

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.

None.



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Submittal Checklist	
	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⁾
N/A	Engineer's statement of probable cost (projects over \$100,000)
X	Letters of Matching and/or Pending 3 rd Party Commitments ⁽¹⁾
Exhibit C	
N/A	Map (if applicable) ⁽¹⁾
N/A	Photos/Drawings/Reports
X	Letters of Support (Optional)
N/A	Certificate of Insurance (General, Auto, & Workers' Comp.) ⁽²⁾
X	Certificate of Good Standing with Colorado Secretary of State ⁽²⁾
X	W-9 ⁽²⁾
N/A	Independent Contractor Form ⁽²⁾ (If applicant is individual, not company/organization)
Engagement & Innovation Grant Applicants ONLY	
X	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.

ENGAGEMENT & INNOVATION GRANT FUND SUPPLEMENTAL APPLICATION

Introduction & Purpose

Colorado's Water Plan calls for an outreach, education, public engagement, and innovation grant fund in Chapter 9.5.

The overall goal of the Engagement & Innovation Grant Fund is to enhance Colorado's water communication, outreach, education, and public engagement efforts; advance Colorado's water supply planning process; and support a statewide water innovation ecosystem.

The grant fund aims to engage the public to promote well-informed community discourse regarding balanced water solutions statewide. The grant fund aims to support water innovation in Colorado. The grant fund prioritizes measuring and evaluating the success of programs, projects, and initiatives. The grant fund prioritizes efforts designed using research, data, and best practices. The grant fund prioritizes a commitment to collaboration and community engagement. The grant fund will support local and statewide efforts.



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The grant fund is divided into two tracks: engagement and innovation. The Engagement Track supports education, outreach, communication, and public participation efforts related to water. The Innovation Track supports efforts that advance the water innovation ecosystem in Colorado.

Application Questions

*The grant fund request is referred to as “project” in this application.

Overview (answer for both tracks)

In a few sentences, what is the overall goal of this project? How does it achieve the stated purpose of this grant fund (above)?

Colorado’s landscape continues to change and mounting variables such as drought and population growth place an increasingly heavy burden on the state’s water supplies. These issues, and others, create a palpable sense of urgency to develop and implement more resilient agricultural practices and prepare the next generation to address these issues head on. This project seeks to utilize a diverse set of partnerships to bring agricultural water research, regenerative agricultural practices, youth education, and community outreach together at Montezuma Land Conservancy’s education center, Fozzie’s Farm, further perpetuating an innovative land trust model emphasizing not only the importance of conserving natural resources but improving our community’s connection to the natural world.

Engagement Track: This project achieves the stated purpose through addressing needs identified directly in the Colorado Water Plan, goals set forth in the Southwest Basin BIP and PEPO plans, and allows state resources to drive collaboration of multiple agencies. By providing hands-on water education to high school aged youth that are exploring pathways to jobs in conservation and agriculture, these programs better prepare the next generation to incorporate water concerns into their decision making as adults.

If Colorado’s Water Plan is going to be implemented with success, it must include a multigenerational approach and place an elevated emphasis on youth engagement. Additionally, through their hands-on participation in irrigation water research alongside Colorado State University, these students will play a key role in helping project partners convey the results to the community through a series of local forums, social media and online outreach, and printed materials. In collaboration with MLC and their teachers, students will also be encouraged to take their knowledge back to the classroom to share. We know that this type of peer-to-peer transfer of knowledge is critical to adoption and furthers outreach goals.

Innovation Track: This project achieves the stated purpose of the innovation track by incorporating agricultural water research using sensor-based soil moisture technologies to advise irrigation management. To enhance the use of this technology the project also focuses on the link between soil health and other regenerative agricultural management techniques and water conservation. Sacrificing yield or fallowing land to save water does not always play out in the best interest of producers or the land. We believe that a focus on land management in conjunction with the use of advanced agricultural technologies can achieve both increased on farm abundance and water savings.

We often hear from producers, particularly younger farmers and ranchers, that innovation in Southwest Colorado agriculture is lacking and behind the curve of many places around the state and country. Young producers are hungry for ways to advance their operations, and are concerned about traditional practices no longer being effective in the face of drought and increasingly tight margins. We know that the future of the southwest is going to include hotter, drier conditions and it seems guaranteed that irrigation allocations will continue to be stressed. Never has it been more important for producers of all sizes to explore and implement transitional climate smart agricultural strategies.



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Overview (answer for both tracks)
<p>This project offers an opportunity for this type of research to happen, in conjunction with Colorado State University staff, on a property that is representative of many properties around the region, both in soil composition, water rights, and acreage.</p>
<p>Who is/are the target audience(s)? How will you reach them? How will you involve the community?</p> <p>The target audience in this project are landowners, youth, and general community members interested in expanding their knowledge and application of water conservation and agriculture. We know that the solution to water conservation in Colorado is a multifaceted effort with no silver bullet, and no one group that will sufficiently be able to address all the challenges. Community wide efforts from all sectors are needed to address this complex issue. During this project outreach to audience members will happen in the following ways:</p> <p>Landowners: Landowners need to see examples, they need to be able to walk the land, look at practices, become inspired, and ask questions. They are hands-on. To achieve this type of outreach MLC will host one producer field days annually at Fozzie's Farm in conjunction with Colorado State University, the High Desert Conservation District, and Water Information Program. Field days will include an indoor presentation at Fozzie's Farm Education Center followed by an in-field observation and discussion. Key focal points will include both research design and agricultural management strategies being explored. All landowners, stakeholders, and the public will be welcomed to attend, but emphasis will be placed on outreach to young agricultural producers who have expressed a desire to explore more innovative strategies.</p> <p>Youth: Youth (generally accepted as 18-25) are the next generation of landowners, consumers, decision makers, and leaders. They are the future of conservation in Colorado, and they bear the greatest inheritance of water issues coming down the pipe. Youth must be actively engaged, now, to help prepare them for the immensity of this challenge. Outreach to youth will happen in two distinct ways:</p> <ol style="list-style-type: none">1. Youth participation in research and public outreach through the MLC Summer Agricultural Immersion Program and High School Internship Program. This four-week program partners with Southwest Open School (SWOS) in Cortez and brings in a group of high school participants (approximately 10-15) each year focused on an introduction to agricultural practices and natural resource conservation. Summer Program students and interns will lend a direct hand with CSU staff in the scientific process. While Summer Program students will only participate for four weeks, the high school interns will be present throughout the irrigation season to participate in scientific research, outreach, and analysis.2. Youth Water Education and Peer-to-Peer Engagement through Fort Lewis College's (FLC) Environmental Studies student internship placements. In collaboration with the FLC Environmental Studies program this grant will create a unique opportunity to place college interns with MLC. Student are required to complete 150 hours of internship to complete their major. This project will place one (1) FLC intern per summer at Fozzie's Farm. Students will work with MLC to design specifics of their internship to cater to interests but may include assisting with the research, youth programs, public outreach, and data analysis. <p>General Public: The general public, like all consumer groups, must play a huge role in water conservation. However, if they are not well informed, they are not well equipped to take on this role. By providing broader access to educational opportunities, and creating dialogue around water</p>



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Overview (answer for both tracks)
<p>conservation, we hope the general public can become more knowledgeable water consumers and better understand their personal impact to the overall situation.</p> <p>In addition to the landowner field days (which would be open to the general public) this grant will also seek to host one (1) water conservation related forum per year of the grant at Fozzie's Farm. This forum will include presentations by project partners about water conservation topics and also act as an opportunity to update the public on research results. By educating and engaging community members with different backgrounds such as agriculture, recreation, and consumers we hope to help drive dialogue around a collaborative approach to water conservation.</p> <p>Youth intern participants will assist with field day presentations, which will help to create opportunity to bring youth voices to the table and promote youth leadership and engagement around this topic. We will invite the general public, county commissioners, NRCS, local soil conservation districts, water conservancy districts, agricultural producers, 4-H and FFA students, Extension personnel, environmental and recreation stakeholders such as Dolores River Boating Advocates, and other identified community water stakeholders.</p>
<p>Describe how the project is collaborative or engages a diverse group of stakeholders. Who are the partners in the project? Do you have other funding partners or sources?</p>
<p>As identified above, this project seeks to engage a broad spectrum of individuals and agencies from around the community. Additionally, the project seeks to engage a wide range of ages and sectors from around the community. We believe strongly that the best way to succeed in our efforts to conserve natural resources and strengthen our community's resilience and transitional capacity in the face of climate change is to collaborate and create long-lasting partnerships. The Montezuma Land Conservancy has successful track record in convening these efforts such as the Montezuma Inspire Coalition which brings 18 community non-profits together with a focus on connecting youth to the outdoors.</p> <p>To meet the goals of this project we will bring together multiple sectors of water stakeholders including: research, agriculture, land conservation, and education. By creating this type of collaboration we ensure that we are able to deliver a well-rounded effort that no single partner could do alone.</p> <p>The partners that will be directly engaged in this project are:</p> <ol style="list-style-type: none"> 1. Montezuma Land Conservancy 2. Colorado State University 3. High Desert Conservation District 4. Fort Lewis College: Environmental Studies and Four Corners Water Center 5. Southwest Open School 6. Water Information Program 7. Southwest Basin Roundtable <p>Additional community stakeholders we expect to engage include:</p> <ol style="list-style-type: none"> 1. Dolores Water Conservancy District (DWCD) 2. Montezuma Valley Irrigation Co. (MVI) 3. Mancos Water Conservancy District (MWCD) 4. Mancos Conservation District (MCD) 5. Natural Resource Conservation Service (NRCS) 6. Dolores River Boating Advocates (DRBA) 7. Local Agricultural Producers



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Overview (answer for both tracks)
<p>There are both identified cash and in-kind match being brought to this project. Current cash match funding partners include support from the Gates Family Foundation and Great Outdoors Colorado which help to support the Montezuma Land Conservancy's youth internship and summer programs. This project also received recent support from the Southwest Basin Roundtable in the amount of \$24,192 which supports the first phase of the project including the installation of the research equipment and funding for the second year of high school youth programs.</p> <p>This project contains a significant amount of cash match, totaling nearly 50% of total project costs.</p>
Describe how you plan to measure and evaluate the success and impact of the project?
<p>Success and evaluation of the project will be broken into a few different qualitative and quantitative components as follows:</p> <ol style="list-style-type: none">1. Number of community members engaged: This will include the overall number of youth, agricultural producers, and community members engaged through the field days, youth programs, and public forum presentations.2. Impact Surveys: The project will utilize surveys tailored to the specific constituents (landowner, youth, general public) to gauge both changes in levels of understanding about water conservation and regenerative agricultural strategies. They will also include questions that seek to understand and gauge qualitative changes in attitudes towards water conservation.3. Scientific Research: Colorado State University will develop protocols for implementing and analyzing the irrigation and soil health research component. Along with youth interns and MLC staff, CSU will assist in the evaluation of the research and help compile a white paper at the culmination of the grant to discuss the impacts and conclusions of the work.
What research, evidence, and data support your project?
<ol style="list-style-type: none">1. A recent report released by the climate-risk data firm Four Twenty Seven, an affiliate of one of the world's largest three credit agencies Moody's, identifies the unavoidable risk associated with the expected impact of past carbon emissions. The report largely explores increasing risks to global water supplies and impacts to the global food system. Amongst the areas identified in the report as most vulnerable to "widespread water stress" include southern Europe and the Mediterranean, the southwest United States, and southern Africa. The report states that these areas are, "anticipated to experience 10 to 20% reductions in dry season rainfall, reductions equivalent to the two decades surrounding the American 'dust bowl.'" These expected changes and others identified in the report, including new data produced by Aqueduct Food and the World Resource Institute (funded by Cargill, one of the world's largest food producers by revenue), show that, "...by 2040 as much as 40% of all irrigated crops will face acute water stress." This report and others make a damning case for immediate action in our region to address water conservation efforts and strategies that allow community-wide transformation and transition in the midst of intensifying conditions.2. Sensor based irrigation has resulted in considerable irrigation water savings, yet most producers in southwest Colorado do not make irrigation decisions based on targeted approaches, while also utilizing irrigation systems with low efficiency. The region is primarily using gated-pipe and overhead sprinkler irrigation systems confirming the regional application for the research proposed. Sensor-based irrigation management was found to be more beneficial for low-frequency surface and sprinkler irrigation due to large irrigation levels where greater soil-moisture depletions occur between irrigations compared to high-frequency, low irrigation levels seen with micro-irrigation systems (Hanson, et al., 2000).



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Rivers et al. (2015) demonstrate significant water savings (+ 50%) using soil moisture sensor networks. Dukes et al. (2003) had a 50% water savings using targeted irrigation in a vegetable trial with no significant reductions in yield. Further, the ability to rebound after periods of reduced irrigation has been seen in perennial alfalfa hay systems in western Colorado. Cabot et al. (2017) indicate partial season irrigation treatments on alfalfa fields can be a reasonable approach to reduce water-use while maintaining forage quality despite modest yield reductions.

Targeted irrigation combined with partial season irrigations may become a necessary management strategy in times of water scarcity and to promote in-season water savings on a large scale basis. The research proposed here display the potential for significant irrigation water savings using a sensor-based approach rather than volume based approaches across multiple cropping systems. A need for regional data and an opportunity for demonstration drives the relevancy of the proposed research trial beyond on-location water savings.

Additionally, The American Society of Agricultural and Biological Engineers (ASABE) partnered with the Environmental Protection Agency (EPA) WaterSense program to test the precision accuracy of soil-moisture based irrigation at various depletion levels versus field capacity. Their data recognizes the intra-regional variability of soil-moisture sensing accuracy. The soil type and field conditions of the research proposed in this grant proposal can serve as a regional representation to gain data for demonstration purposes to help convert regional irrigation scheduling away from volume based decision making, thereby providing a scalable water savings through irrigation efficiencies.

In a climate smart agricultural management context, soil moisture sensor-based irrigation was shown to reduce the leaching potential of several nutrients (i.e. nitrogen and phosphorus) in a commercial nursery setting. The detailed soil nutrient and quality sampling in the enclosed research protocol will provide measurements for nutrient availability in a 3 feet deep soil profile replicated across treatments. An understanding of nutrient availability in conjunction with water use can provide insight into nutrient loads that leach to water resources. Further, through regenerative grazing practices, Shawver (2019) found that the management of livestock in an irrigated intensive-managed grazing system is the largest impact on forage quality and that with proper management there can be improvement in soil quality. These anticipated additional outcomes will also present data-based demonstration opportunities for regional producers.

Sources:

Cabot, P., J. Brummer, S. Gautam, L. Jones and N. Hansen. 2017. Benefits and Impacts of Partial Season Irrigation in Alfalfa Production. Western Alfalfa and Forage Symposium, <https://alfalfa.ucdavis.edu/+symposium/2017/PDFfiles/Cabot%20Perry%202.pdf>

Dukes, M.D. 2019. Soil Moisture-Based Irrigation Controller Final Test Report. EPA WaterSense Report

Dukes, M., E. Simonne, W. Davis, D. Studstill, and R. Hochmuth. 2003. Effect of Sensor-based high frequency irrigation on bell pepper yield and water use. Proceedings of 2nd International Conference on Irrigation and Drainage, pp. 665-674.

Hanson, B., S. Orloff, and D. Peters. 2000. Monitoring soil moisture helps refine irrigation management. California Agriculture. 38-42 May/June 2000 Vol. 54 No. 3.



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Overview (answer for both tracks)	
<p>Iersel, M., R.M. Seymour, M. Chappell, F. Watson and S. Dove. 2009. Soil Moisture Sensor-Based Irrigation Reduces Water Use and Nutrient Leaching in a Commercial Nursery. SNA Research Conference, Vol. 54.</p> <p>Rivers, M., N. Coles, H. Zia, N. R. Harris and R. Yates. 2015. "How could sensor networks help with agricultural water management issues? Optimizing irrigation scheduling through networked soil-moisture sensors, 2015 IEEE Sensors Applications Symposium, pp. 1-6. doi: 10.1109/SAS.2015.7133593</p> <p>Shawver, C. 2019 Effects of Management-intensive Grazing in relation to soil health and forage production in an irrigated perennial pasture system. Colorado State University Thesis. https://mountainscholar.org/handle/10217/197432</p> <p>Soil Moisture-Based Irrigation Control Technologies: WaterSense Specification Update. 2017. EPA WaterSense Report</p> <p>3. A study completed by professor Kathy Hilimire and former National Young Farmer's Coalition western organizer Kate Greenburg titled "Water Conservation Behaviors Among Beginning Farmers in the Western United States," looked at attitudes and practices of young producers as they relate to natural resource conservation. Namely, the study focused on various factors and variables that influence adoption of conservation practices across young producers. The study found that producers surveyed responded to drought scenarios in a number of ways that included "irrigation improvements, soil health practices, and experimentation with drought-tolerant crops." However, the study showed that the most frequently cited strategies included focus on soil health improvements. This study, along with others cited, shows that water conservation is an important and relevant topic to young producers. It also emphasizes the high probability that these producers are willing to take on innovative practices beyond just changing irrigation infrastructure.</p> <p>Greenburg, K. and Hilimire, K. 2019. Water Conservation Behaviors Among Beginning Farmers in the Western United States. <i>Journal of Soil and Water Conservation</i> March/April 2019 - Vol. 74, NO. 2. Pp.138-144.</p>	
Describe potential short- and long-term challenges with this project.	
<p>Short-term Challenges:</p> <p>Short-term challenges for this project include implementation of the irrigation research design and variables associated with short term research projects. For example, irrigation allocations could vary dramatically during the short scope of this grant and drawing conclusions may prove difficult. Environmental and agricultural variables may also create additional variables that make analysis of the research challenging. As with most scientific processes, a longer timeline will be necessary to understand the true impact of the project. If awarded, partners will work to overcome this challenge by seeking additional funding to extend the research into the foreseeable future.</p> <p>Another short-term challenge will be growing the outreach component. Our experience has shown us that both agricultural producers and the general public are misinformed about the magnitude of issues like soil and water conservation. There are some who find the topic intriguing, and they represent a small, innovative group. Much of the general public still does not yet comprehend the extent of the water issues around the state and therefore is not always attracted to discussions or</p>	



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learning opportunities. We believe we can overcome this by casting a larger net throughout the community through the collaborative efforts of our partners.

Long-term Challenges:

Long-term challenges for this project will include broad implementation of agricultural strategies and the scaling-up of findings. Making changes in agricultural practices on a broad scale can pose many challenges for producers, particularly when agricultural markets and margins are slim. Often it can take many years for new trends in research to reach broad implementation which has been the case in many water and soil conservation strategies (take no-till, cover cropping, or irrigation efficiency work for example).

Long-term funding to support extended research and community education programs can also be a challenge. Often funders do not want to continue to support extended funding of projects in favor of seeding money to new projects. This creates challenges in sustainability of programs for non-profits that are left to look for new funding sources to continue their work. We anticipate that to truly understand the results of both agricultural research and changing consumption patterns within the community will take a deeper investment than the scope of this grant provides.

Please fill out the applicable questions for either the Engagement Track or Innovation Track, unless your project contains elements in both tracks. If a question does not relate to your project, just leave it blank. Please answer each question that relates to your project. Please reference the relevant documents and use chapters and page numbers (Colorado's Water Plan, Basin Implementation Plan, PEPO Education Action Plan, etc.).

Engagement Track

Describe how the project achieves the education, outreach, and public engagement measurable objective set forth in Colorado's Water Plan to "significantly improve the level of public awareness and engagement regarding water issues statewide by 2020, as determined by water awareness surveys."

Section 10.2: Measurable Objectives and Adaptive Management- Part H identifies the goal of, "significantly improve the level of public awareness and engagement regarding water issues statewide by 2020, as determined by water awareness surveys," stating that the CWP will expand efforts to engage the public and, "promote well-informed community discourse and decision making regarding balanced water solutions."

This project directly incorporates both the education and outreach components of this goal by incorporating youth programs and landowner/public outreach events, such as the identified field days, sharing research results and educating the public. Furthermore, the project seeks to bring together diverse community partners and stakeholders, as well as a variety of community members from varying backgrounds, to create opportunities for well-informed discourse. As stated throughout this application, we believe that answers to the challenges presented by the water plan will require a multifaceted and diverse approach. By bringing together community members from agriculture, recreation, natural resource conservation, and education (along with the general public water consumers) we believe we can create the most robust and sustainable solutions that benefit the community.

Describe how the project achieves the other measurable objectives and critical goals and actions laid out in Colorado's Water Plan around the supply and demand gap; conservation; land use; agriculture; storage; watershed health, environment, and recreation; funding; and additional.



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This project addresses a number of the objectives laid out in **Chapter 10: Critical Action Plan**. In 10.1: Colorado's Water Values it is identified that the water plan will drive towards, "A productive economy that supports vibrant and sustainable cities; viable and productive agriculture; and robust skiing, recreation, and tourism industry." This project hits on methods that focus on creating a more sustainable community by supporting agricultural innovation, youth education, and general public discourse around the need for water conservation strategies. Chapter 10 further identifies following action items that have been identified as being addressed through this project:

- A. **Supply Demand Gap:** By addressing alternative conservation efforts in agriculture that may, on a larger scale, play a role in greater water savings as well as public engagement that creates dialogue around water values and addressing topics like the impact of climate change.
- D. **Agriculture:** This project addresses the needs of the agricultural community by exploring innovative ways to not only conserve water and increase agricultural efficiency, but also potentially do so without fallowing or reduction of yields allowing farmers to continue to produce their current yields and potentially increase yields. This project is a perfect opportunity for the state to encourage innovation and creativity as outlined in the action plan. Additionally, this process puts farmers and ranchers in the driver seat of their own innovations and shows them opportunities to collaborate with other water users without making significant sacrifices.
- H. **Education, Outreach, and Innovation:** Through youth engagement, outreach to landowners (particularly young farmers and ranchers), and by creating opportunities for diverse public discourse this project applies a multitude of strategies to accomplish this goal. Emphasis should be given to programs that encourage the participation of young people and help to prepare the next generation of water consumers and leaders.

In addition to these sections within Chapter 10, the following sections of the water plan are also pertinent to this project:

1. **Chapter 6.3.4 - Agricultural Conservation, Efficiency, and Reuse:** In this section it is identified that a goal of this strategy includes assisting Colorado's agricultural industry to become, "more efficient and resilient, and to reduce non-beneficial water consumption and diversions without affecting statewide agricultural productivity and the environment." This project seeks to not only explore strategies that can reduce non-beneficial consumption and diversion, but also regenerative agricultural strategies that can improve yield while benefiting the overall ecological environment. The southwest must focus on adaptive management and transitional strategies to address climate change, and this is one of those ways. It also identifies specifically the goal of the Southwest Basin Roundtable to, "implement efficiency measures to maximize beneficial use and production."
2. **Chapter 9.5 - Outreach, Education, and Public Engagement:** This chapter identifies the clear goal by the state to promote financial assistance of programs that help to inform Colorado water users about issues to promote a sustainable future. To do so, the plan identifies the need for "sophisticated water users," and outreach efforts that, "...promote well-informed community discourse regarding balanced water solutions." As identified above, this project will accomplish this task through engaging a diverse community of users ranging in age, profession, and overall sector of water usage.

Describe how the project achieves the education, outreach, and public engagement goals set forth in the applicable Basin Implementation Plan(s).



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In the executive summary of the Southwest Basin Roundtable (SWBRT) BIP it identifies that, *“The Roundtable supports the idea that on a statewide basis we all need to be more efficient with water use and achieve high conservation. Recognizing that municipal demand is one of the driving forces to agricultural dry up...”* The report goes on to identify that crop irrigation requirements are predicted to increase based on changes in climate and resulting higher temperatures and lower irrigation-season precipitation. Coupled with identified irrigation gaps in Montezuma County this data paints a stark and urgent picture for the Basin: develop and transition to agricultural models that use water more efficiently, rely on more resilient crop types and practices, and do it yesterday.

We believe that through innovative practices and technologies agricultural water usage can be reduced without having significant impacts to the economics of farming and ranching operations. Further, we believe this can be done while also improving the overall resiliency of the land and thus, over time, likely increase yields with less water.

In Section 1, Table 1 of the BIP there are a number of goals and outcomes listed that this project meets including components within Goal A: Balance All Needs and Reduce Conflict, Goal B: Meet Agricultural Needs, and Goal G: Comply with CO River Compact and Manage Risk (SWBRT BIP, pg. 11).

Goal A: Balance All Needs and Reduce Conflict - This project addresses goal A4: Promote dialogue, foster cooperation and resolve conflict among water interests in every basin and between basins for the purpose of implementing solutions to Southwest Colorado’s, and Colorado’s water supply. While this project is not related directly to an IPP we do believe it helps to accomplish a similar outcome to number 3, “...promote dialogue, foster cooperation, and resolve conflict,” by bringing together diverse water users and stakeholders within the community (SWBRT, pg.12).

Goal B: Meet Agricultural Needs - Under this goal we believe this project impacts goal B2: Implement efficiency measures to maximize beneficial use and production, with specifically touching on measurable outcomes 1 and 2 (SWBRT BIP, pg. 13). By working towards these goals this project could act as an example of strategies that could assist in bridging the identified irrigation gap for the Dolores Project of nearly 4,000 AF (SWBRT BIP, pg. 32).

Goal G: Comply with CO River Compact and Manage Risk - Here we see this project addressing goal G6: Support strategies to mitigate the impact of a CO River Compact curtailment should it occur. By looking at opportunities for agricultural producers to conserve water, increase efficiency, and bring innovative management to their operations we believe this will help to transition southwest Colorado agriculture to be more adaptive and climate smart. Should a curtailment ever occur, operations that have transitioned to using less water, and those who are able to create more resilient systems, will be impacted less. Additionally, agricultural water conservation efforts can assist in diverting less water which will also help offset the gaps identified to prevent a curtailment scenario (SWBRT BIP, pg. 18).

The final component of the SWBRT BIP that this project addresses is assisting to support the overall goals identified in the Roundtable Education Action Plan (EAP) which identifies the following pertinent short term goals identified in the Outreach Plan of Section 4.1, 1) Encourage education and conservation to reduce demand; and 2) Implement informational events about water conservation; land-use planning; and water reuse efforts, tools and strategies (SWBRT BIP, pg. 79).

Describe how the project achieves the basin roundtable’s PEPO Education Action Plans.

The recent 2016/2017/2018 revised version of the PEPO EAP is admittedly somewhat lacking in specific goals and outcomes to draw correlations from. To assist, we also referred to Section 1 of the BIP as stated in the PEPO EAP. Much of the plan relates to the creation of the Fact Booklet that would provide average citizens with information about water usage, rights, and law. On page 5 the



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plan also identifies the need for Agricultural Efficiency workshops to be held for farmers through CSU Extension and Natural Resource Conservation Service. Unfortunately, this plan was designed to be carried out by the PEPO committee but does not set goals or measurable objectives that take into consideration other outside entities carrying out components of the plan. Additionally, the plan was only set with objectives through 2018.

That said, clearly, this project helps to facilitate dialogue and demonstrates support of the SWBRT BIP goals identified above in Section 1. We believe this project specifically touches on the #2 Objective and Task: Agricultural Efficiencies: Coordinate and implement workshop(s) focused on on-farm efficiencies and improvements.

We believe that implementation of the EAP should be a multifaceted effort that creates broader collaboration throughout the basin, and this project is an exciting example of what that process could look like. It also places a heavy emphasis on bringing the next generation into the fold, and while not specifically identified in the PEPO EAP, we believe it to be one of the most critical components of successful Water Plan implementation.

Innovation Track
Describe how the project enhances water innovation efforts and supports a water innovation ecosystem in Colorado.
An innovative ecosystem in Colorado requires collaboration and diversity above all else. Just like a natural ecosystem, this system of innovation must build on the understanding that no single part of the system can effectively stand alone, but rather requires the interactions of the whole. In this same way, we believe the answer to Colorado's innovation efforts will be enhanced by bringing together multiple partners in our community that represent different sectors and end users. This project takes a unique approach to addressing agricultural needs while conserving water. We will use this demonstration as an opportunity to educate the public and engage the next generation to spark their creativity to drive forward innovation to address water challenges.
Describe how the project engages/leverages Colorado's innovation community to help solve our state's water challenges.
This project directly engages the innovation community in Colorado by working alongside Colorado State University to promote research and design of innovative agricultural strategies that address water gaps and promote best management practices that keep the land more viable with less water. By welcoming diverse stakeholders to explore the project we hope to also engage other sectors of the innovation community such as technology and technical service providers that play key roles in addressing Colorado's water challenges.
Describe how the project helps advance or develop a solution to a water need identified through TAP-IN and other water innovation challenges. What is the problem/need/challenge?
While this project is not directly engaged with TAP-IN it does follow the general concepts and principles identified in TAP-IN's goals. To achieve these goals TAP-IN identifies a critical equation: "Insightful End Users, Passionate Problem-Solvers, Creative Thought Leaders, and Driven Changemakers = Pathways to Partnership, Targeted Collaborations, and Game-Changing Solutions". Without a doubt, this project incorporates all of these targeted strategies to achieve its goals. We see the problem as two-fold: 1) Colorado has an immense need to identify strategies to address demand management issues, and 2) Achieving the goals of the Colorado Water Plan, long-term, will require shifting the culture of water use across all sectors. With agriculture representing the largest user, why not start there? The challenge: Does addressing these water gaps need to mean following



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Innovation Track
<p>land, or can producers conserve water and increase abundance while also better preparing our communities to transform in the face of climate change?</p> <p>We believe we can achieve both, but it will require exactly the strategy identified by TAP-IN: insight, passion, creativity, and drive.</p>
<p>Describe how this project impacts current or emerging trends; technologies; clusters, sectors, or groups in water innovation.</p> <p>Trends in agricultural technology continue to make huge strides. Remote sensing and monitoring technologies allow farmers and ranchers the opportunity to bring low-cost advancement to their operations increasing both efficiency and yield. Additionally, there is an increase in the emergence of innovative regenerative agricultural strategies that seek to focus on the use of holistic land management strategies that improve the land while also creating abundant yields. Climate research has shown that agriculture can play an integral role in sequestering carbon from the atmosphere through sound grazing management and an emphasis on soil health. The end result is a direct and positive impact on climate change and water conservation. As carbon is removed from the atmosphere and stored in soils, so increases the water holding capacity, nutrient cycling, and plant resiliency.</p> <p>These efforts, coupled with the use of ever improving irrigation and soil moisture monitoring technologies can better inform producers on when to apply water, and how to do so in the right amounts. Increased yields, healthier land, an improved environment, and water conservation can go hand in hand. The beauty of this process is that it brings together scientists, the technology sector, technical service providers, and agricultural producers to address problems that impact us all.</p>



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Colorado Water Conservation Board
Water Plan Grant - Exhibit A

Statement Of Work	
Date:	January 29, 2019
Name of Grantee:	Montezuma Land Conservancy
Name of Water Project:	Montezuma Land Conservancy and Southwest Colorado Research Center: Agricultural Water Efficiency Study at Fozzie's Farm Innovative Agricultural Management and Colorado's Next Gen Water Leaders
Funding Source:	- Gates Family Foundation - Southwest Basin Roundtable - Great Outdoors Colorado
Water Project Overview:	
<p>This project seeks to bring together a diverse collaboration of partners in Montezuma County to engage, educate, and empower youth, agricultural producers, and the general public. Our goal is to help create a more resilient, connected, and collaborative community that is positioned to transition into the future of water in Colorado in the face of climate change and a growing population. To accomplish this goal we will bring together dedicated community partners, each with their own area of expertise, to collaborate on a project that no single partner would be able to carry out on their own. The project will utilize an education farm owned by the Montezuma Land Conservancy (MLC), called Fozzie's Farm, as a site for research and public education.</p> <p>The project will be broken into two funding phases, the first of which has been fully funded through the support of the Southwest Basin Roundtable. The first phase will include the installation of the research component to look at regenerative agricultural strategies that focus on building soil health as a method for conserving water, while also looking at the use of technology to measure soil moisture as a method for more efficient irrigation applications. Additionally, Phase 1 will support the majority of outstanding costs for the High School youth internship programs carried out by MLC, in collaboration with Southwest Open School. This internship program will engage the next generation of conservation leaders in direct, hands-on scientific and public engagement opportunities.</p> <p>Phase 2 of the project funding, represented in this funding proposal to CWCB, will build upon Phase 1 by supporting additional youth engagement opportunities through MLC's programs and the hiring of Fort Lewis College Environmental Studies student interns. Phase 2 also includes a significant public outreach component in collaboration with our project partners and other community stakeholders including the growing Four Corners Water Center at Fort Lewis College. This phase will include annual field days, public forums, and project information disseminated through multiple electronic and printed methods.</p>	
Project Objectives:	



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Objective 1: Design and Implement a long-term irrigation and soil health monitoring protocol that includes methods of measurement, monitoring, and analysis which will be carried out by student interns in collaboration with researchers from Colorado State University. Emphasis will be placed on exploring transformative, climate smart agricultural practices combining the use of management informed water savings technology with regenerative agricultural practices;

Objective 2: Empower and engage the next generation of conservation leaders, our youth, through hands-on experiential opportunities to take science into their own hands, explore career opportunities in natural resources and agriculture, and advocate for a more resilient and transformative future;

Objective 3: Work with project partners to develop and implement youth and adult education opportunities to share information about water conservation and detail findings of the projects. Education will focus on three subsets of the community: landowners, youth, and the general public.

Tasks
Task 1 - Irrigation and Soil Research Monitoring
Description of Task:
<p>With Colorado State University (CSU) research staff at the helm, this task will seek to design and implement a scientific research project on MLC's Fozzie's Farm. This project will focus on soil moisture monitoring for the purpose of enhanced irrigation water application strategies, and monitoring soil health over time as management changes occur on the farm. The goal is to show producers and the public strategies for conserving water through both application management and changes in overall farm management that seek to use improved soil health as a method of water conservation. While this protocol will be developed with Fozzie's Farm needs in mind, the goal is to create something easily replicable on other agricultural operations.</p> <ol style="list-style-type: none">Subtask 1a- Research Design:<ul style="list-style-type: none">Develop a scientifically sound protocol for measuring agricultural water diversion, consumptive use, and runoffDevelop biological monitoring protocol to look at elements of soil health and forage managementSubtask 1b- Youth Science:<ul style="list-style-type: none">Develop age appropriate engagement opportunities for youth programs to collect, analyze, and present research data with support from CSU staffWork with Southwest Open School administration to allow students to receive appropriate high school credits for their participation in the research project inside and outside of the school yearSubtask 1c- Evaluation and Analysis:<ul style="list-style-type: none">Create an evaluation protocol for understanding the impact and making recommendations to improve on-farm managementAt the end of grant cycle evaluate research results and prepare a public presentation and white paper to share with stakeholders
Method/Procedure:



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Tasks

A 5-acre field will be divided where one portion of the field will use sensor-based irrigation that will be timed based on soil moisture measurements indicating need (treatment field) and the other portion of the field (control field) will irrigate based on volume determined on weekly measurements (i.e. 1 inch/week). Soil moisture sensors (CR655, Campbell Scientific, Logan, UT) will be placed within both the treatment and control fields at depths of 12 and 24 inches using data loggers (CR 1000x) taking measurements in 15 minute intervals.

A Giddings probe will be used to take soil samples to 3 feet June 2020 and June 2021. We will take three sets of samples in both the research and control fields. Soil samples will be analyzed for total nitrogen, total organic carbon, total organic nitrogen; H3A extract: nitrate-nitrogen, ammonium-nitrogen, inorganic nitrogen, total phosphorus, inorganic phosphorus, organic phosphorus, potassium, calcium, magnesium and the Haney test for an indicator of soil health.

In the research and control field three GPS points will be selected as representative points in the fields. At this location photo-points and line transects will be done. SWCRC staff will train MLC staff and Fozzie's student interns. MLC staff and Fozzie's student interns will complete the monitoring. Using a 4.8 ft² hoop clipping will be done by randomly throwing the hoop from this GPS point. This will be done to calculate pounds of standing forage before and after grazing. At the same time photo points will be completed using the GrassSnap App in established points that will be replicated throughout the study each time before and after grazing.

Using the protocols established by the Colorado Rangeland Monitoring Guide 100-foot line transects will be conducted at the beginning of this study and at the end of this study in the month of June to evaluate the changes in plant composition. While we do not anticipate many changes in plant composition over the course of this grant, this data will give us baseline data for future pasture monitoring.

MLC will work with CSU to find appropriate avenues for youth engagement and public outreach and will work with Southwest Open School staff to connect youth programs to high school credits. MLC will also act in collaboration with CSU staff to develop the white paper and distribute to stakeholders.

Deliverable:

Based off the in-text citations:

- 1) We expect to see an overall net reduction in water use based on sensor measurements.
- 2) We expect less water to be over applied past root depth thus saving water and making it more efficiently utilized.
- 3) We will achieve the measurements of reduced water use from data logger management.
- 4) We expect forage yield to remain the same or improve, despite less water being applied because water will only be applied in the root zone. We will use range/pasture monitoring techniques to document any changes. Proper grazing is a critical component for lbs/acre of forage production to increase and bare ground to decrease.

We will achieve the measurements of reduced water use from data logger management. Traditional range measurements will be utilized to document any changes in yield based off the irrigation treatments. This project will serve as both a demonstration and in-field research for local farmers and ranchers to observe and adopt for their management practices.



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Tasks

Measurable Objectives:

1. Determine soil moisture requirements based off sensors installed in field. Overall water savings are expected based on informed irrigation treatments.
2. Sample both soil and above ground biomass to determine any net changes in yield from the project field.
3. Quantify results and distribute to area producers to make informed irrigation decisions based on sensor management rather than calendar scheduling.

Sensor-based irrigation management was found to be more beneficial for low-frequency surface and sprinkler irrigation due to large irrigation levels where greater soil-moisture depletions occur between irrigations compared to high-frequency, low irrigation levels seen with micro-irrigation systems (Hanson, et al., 2000).

Rivers et al. (2015) demonstrate significant water savings (+ 50%) using soil moisture sensor networks. Dukes et al. (2003) had a 50% water savings using targeted irrigation in a vegetable trial with no significant reductions in yield. Further, the ability to rebound after periods of reduced irrigation has been seen in perennial alfalfa hay systems in western Colorado. Cabot et al. (2017) indicate partial season irrigation treatments on alfalfa fields can be a reasonable approach to reduce water-use while maintaining forage quality despite modest yield reductions.

Targeted irrigation combined with partial season irrigations may become a necessary management strategy in times of water scarcity and to promote in-season water savings on a large-scale basis. The research proposed here display the potential for significant irrigation water savings using a sensor-based approach rather than volume-based approaches across multiple cropping systems. A need for regional data and an opportunity for demonstration drives the relevancy of the proposed research trial beyond on-location water savings.

Additionally, The American Society of Agricultural and Biological Engineers (ASABE) partnered with the Environmental Protection Agency (EPA) WaterSense program to test the precision accuracy of soil-moisture based irrigation at various depletion levels versus field capacity. Their data recognizes the intra-regional variability of soil-moisture sensing accuracy. The soil type and field conditions of the research proposed in this grant proposal can serve as a regional representation to gain data for demonstration purposes to help convert regional irrigation scheduling away from volume-based decision making, thereby providing a scalable water savings through irrigation efficiencies.

In a climate smart agricultural management context, soil moisture sensor-based irrigation was shown to reduce the leaching potential of several nutrients (i.e. nitrogen and phosphorus) in a commercial nursery setting. The detailed soil nutrient and quality sampling in the enclosed research protocol will provide measurements for nutrient availability in a 3 feet deep soil profile replicated across treatments. An understanding of nutrient availability in conjunction with water use can provide insight into nutrient loads that leach to water resources. Further, through regenerative grazing practices, Shawver (2019) found that the management of livestock in an irrigated intensive-managed grazing system is the largest impact on forage quality and that with proper management there can be improvement in soil quality. These anticipated additional outcomes will also present data-based demonstration opportunities for regional producers.

Deliverables from this task also include a written scientific procedure and design with clear monitoring protocols that will allow this research to continue long-term. CSU you will assist in the installation of the research components. All monitoring information will be recorded and analyzed. The grantee will



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Tasks

deliver a final white paper at the conclusion of the project. MLC in collaboration with CSU will also deliver one field day per year to producers and the public during the course of the grant. In addition, grantee will draw from the experience to document all successes, challenges, and lessons learned to incorporate into grant reporting, future fundraising and program design.

Tasks

Task 2 - Citizen Science: Youth Exploration and Engagement

Description of Task:

We believe in the power of youth and the importance of preparing the next generation to meet the challenges of water conservation and climate change head on. For the Water Plan to be successfully implemented, emphasis on youth engagement should be a primary priority. By engaging youth in the direct scientific research of this project, as well as the public outreach, we seek to empower young people to take agency in conservation and advocacy. To this end, youth will be a key player in this grant at all steps.

Research has also shown the power and impact of experiential education in schools and the importance of getting youth outdoors to connect to nature. By engaging youth in the research portion of this grant we offer a unique opportunity to learn about physical sciences, agriculture, the scientific method, and critical thinking which further develop important lifelong skills. Additionally, youth high school and college participants will be eligible to receive credits towards graduation.

MLC has worked diligently with Southwest Open School (SWOS) and Fort Lewis College (FLC) to identify opportunities for students to receive credits towards graduation for participation in our Summer Agricultural Immersion Program and Student Internships. Not only do these programs provide youth the opportunity for academic credits but they also touch on key principles emphasized in the Colorado Department of Education's work based learning and Innovative Learning Opportunities which state:

"Innovative learning opportunities may include work-based learning such as apprenticeships or residency programs, enrollment in postsecondary courses taught on college campuses, competency-based learning or capstone projects, and other learning experiences that are designed to help students develop and demonstrate personal, entrepreneurial, civic and interpersonal, and professional skills as described in CDE's Essential Skills Required in the Colorado Academic Standards."

SWOS staff have identified the following Work Based Learning opportunities and essential skills created by this grant:

1. Initiative/Self Direction
2. Adaptability/flexibility
3. Perseverance/Resilience Critical thinking/problem solving
4. Inquiry/Analysis
5. Collaboration/teamwork
6. Communication
7. Global/Cultural Awareness
8. Civic engagement



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Tasks

9. Task/time management
10. Career awareness
11. Leadership

Students are eligible to receive .25 credits per 30 hours for work based learning that incorporates these essential skills. Work based learning that incorporates on-farm labor allows students .25c credits per 60 hours. Students are also eligible to receive academic credits for English and speech for the public outreach component of this grant as well as science and math credits (including integrated science, life science, earth science, and agricultural science) for the research component. Please feel free to contact applicant for a complete breakdown of Colorado State educational standards used by SWOS administration to cite these credits as it is too extensive for the purposes of this application.

Fort Lewis College maintains a robust Environmental Studies program that allows students to explore a variety of avenues including food systems, sustainability, natural resource conservation, GIS, and non-profit work to name a few. As part of their graduation requirements students must complete a 150-hour internship. This grant will place one (1) college intern per year during the summer programs. Interns will have the opportunity to work directly with MLC staff to customize their internship hours within the grant deliverables based on their interests and focuses. FLC program faculty have identified a need for more local internship opportunities and this project also helps to fulfill that need.

1. Subtask 2a- MLC Summer Program and Internships:

- Work with Southwest Open School staff and administration to award participating students school credits relevant to the project to support graduation requirements
- Work with FLC faculty to award participating interns with hours necessary to support graduation requirements
- Create opportunities for youth involved in the MLC programs and FLC internships to present their experiences back to peers at school
- Engage teachers and FLC faculty to help support participating students and draw further connections to curriculum

2. Subtask 2b- Provide Youth Based Water Education:

- Work with project partners including FLC interns and faculty to provide education to summer program youth about the importance of water conservation and the challenges faced around the state connected to the Colorado Water Plan
- Have summer program youth visit other agencies and stakeholders around the county that can reinforce a water conservation theme

3. Subtask 2c- Youth as Citizen Scientists:

- Summer program youth and interns will work alongside CSU research staff to collect field data from the research site
- Students will work through the scientific method to hypothesize, observe, measure, test, and analyze the results
- During field days and public outreach events students and interns will assist CSU and MLC staff in presenting the findings and importance of water conservation to the public

Method/Procedure:



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Tasks
<p>MLC will first work with SWOS staff and administration to identify how the scientific research component and public outreach fits into student’s graduation requirements. The goal will be to connect the project to state standards for graduation and award relevant credits to students. Additionally, MLC will ensure that FLC requirements are met to award relevant internship hours to student interns placed in the grant. MLC and CSU will design the four-week summer program and FLC internships include direct participation of students in the research and analysis of the irrigation and biological monitoring. Youth and MLC staff will organize and carry out the annual field day and public presentations and MLC staff and SWOS teachers will work with students to present their findings and thoughts on water conservation during these outreach events. MLC will work in collaboration with SWOS and FLC teachers and faculty to find other relevant opportunities for students to present their findings at school or incorporate their experience into other projects.</p>
<p>Deliverable:</p> <p>The deliverable of this portion of the grant will include documentation of students receiving school credit for their participation and creating a connection to state standards that could help to inform future programs and strengthen experiential strategies between SWOS, FLC, and MLC as well as a model for other programs statewide. Documentation of youth participation will be included in the white paper and final report. This will include but is not limited to: pictures, recorded video interviews, student surveys, and quotes. In addition, grantee will draw from the experience to document all successes, challenges, and lessons learned to incorporate into grant reporting and future fundraising and program design.</p>
<p>Task 3 - Public Education and Outreach</p>
<p>Description of Task:</p> <p>One of the fundamental goals of this request is to increase the public awareness and education revolving around water conservation, particularly agricultural producers who are responsible for the largest sector of water usage. Producers in Montezuma County, particularly younger farmers and ranchers, have identified that local innovation is dramatically behind the curve compared to other areas of the state and country. Additionally, producers also identify the significant pressure drought puts on their operations, and the need to address these challenges. This project creates an opportunity to highlight and explore one such innovative option and engage these young producers in dialogue about regenerative management and transformative methodologies that can address the impacts of drought and climate change.</p> <p>By achieving this goal, we seek to create a more informed and empowered community of water users that is more capable of thinking critically about water challenges facing Colorado and how we might make our community more resilient to increased drought and water shortages.</p> <p>This task focuses on connecting the research and youth components to the larger community to help disseminate the information and spark discussion around water conservation strategies on and off farm. The High Desert Conservation District (HDCD) and Fort Lewis College’s Four Corners Water Center will be key collaborators for this task co-facilitating both the field days and public forums. HDCD has extensive contact with many landowners in the county and has extensive experience with landowner outreach and education. Subtasks for this item are broken out by target audiences relevant to this grant.</p> <p>1. Subtask 3a- Landowners:</p>



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- Collaborate with HDCD, FLC Water Center and CSU to host one (1) field day per year for agricultural producers and public to learn about the research project and its findings
- Focus on engaging young agricultural producers who have expressed a desire to explore innovative strategies
- Invite other stakeholder agencies and organizations to join the field day discussions and presentations and provide additional resources to attending producers
- Provide information that helps inform agricultural water usage and conservation strategies
- Administer Landowner Survey to gauge changes in knowledge and attitudes towards water conservation

2. Subtask 3b- Youth:

- Work with Summer Program Youth and FLC Interns to do additional peer to peer presentations at Southwest Open School to inform other students of water conservation issues and strategies
- Incorporate Youth participation in public meetings
- Administer Youth Survey to gauge changes in knowledge and attitudes towards water conservation

3. Subtask 3c- General Public:

- Collaborate with HDCD and FLC's Four Corners Water Center to host one (1) public presentation per year at Fozzie's Farm for the general public to learn about the project and engage with other community stakeholders and partners
- Organize presentations from grant partners and other community stakeholders during this forum to increase the diversity of information available to the public
- Administer adult survey to gauge changes in knowledge and attitudes towards water conservation

Method/Procedure:

Montezuma Land Conservancy and High Desert Conservation District will take the lead on organizing and marketing the various outreach events in collaboration with project partners including Colorado State University, Southwest Open School, Fort Lewis College, and the Water Information Program. Landowner field days will be held during the irrigation season when the project can be effectively demonstrated and there are appropriate outdoor weather conditions. MLC staff will organize and carry out all youth related outreach in collaboration with the youth from the summer program, SWOS staff, Fort Lewis College, and the Water Information Program. Field days and public forum presentations will be held at the Fozzie's Farm education center building which provides ample indoor space for over 50 people and allows access to the outdoor research site. MLC and HDCD will take the lead in organizing partners and marketing for these events. All outreach will take place through various avenues including social media, e-news, printed fliers, and mailers. Partners will be expected to support outreach through their respective avenues.

Deliverable:



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Deliverables will include public outreach numbers and collected survey information, which will be compiled for reporting to CWCB and used in subsequent fundraising, outreach, and planning with community partners and stakeholders. The goal is that this project is just the beginning of a long-term effort to grow related research and outreach. This grant will provide critical baseline numbers and lessons learned to improve future efforts.

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.

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.



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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: Montezuma Land Conservancy

Name of Water Project: Montezuma Land Conservancy and Southwest Colorado Research Center: Innovative Agricultural

Project Start Date:

Project End Date:

Task No.	Task Description	Task Start Date	Task End Date	Grant Funding Request	Match Funding	Total
1	Irrigation & Soil Research Monitoring			\$473.00	\$9,412.00	\$9,885
2	Citizen Science: Youth Exploration and Engagement			\$58,860.00	\$84,031.20	\$142,891
3	Public Education & Outreach			\$14,400.00	\$0.00	\$14,400
	Other Direct Costs			\$3,589	\$0	\$3,589
Total				\$77,321.50	\$93,443.20	\$170,764.70



Colorado Water Conservation Board
Water Plan Grant - Detailed Budget Estimate
Fair and Reasonable Estimate

Prepared Date:
Name of Applicant: **Montezuma Land Conservancy**
Name of Water Project: **Montezuma Land Conservancy and Southwest Colorado Research Center: Innovative Agricultural Management and Colorado's Next Generation of Water Leaders**

Research Project, Programs and Outreach Coordination

Task 1 - Irrigation and Soil Research Monitoring

Subtasks	Item	Hourly Rate	# Hours	Sub-total	Item Cost	Item Quantity	Sub-total	Total	CWCB Funds	Matching Funds (Cash)	Source of Match
Subtask 1a - Research Design											
In-field Equipment	PS150- Backup Battery	\$ -	\$ -	-	\$ 305.00	1.00	\$ 305.00	\$ 305.00	\$ -	\$ 305.00	SWBRT
	CR 1000x - Data Logger	\$ -	\$ -	-	\$ 1,700.00	1.00	\$ 1,700.00	\$ 1,700.00	\$ -	\$ 1,700.00	SWBRT
	C 655 - Soil Probe	\$ -	\$ -	-	\$ 261.50	2.00	\$ 523.00	\$ 523.00	\$ -	\$ 523.00	SWBRT
	CR 300 - Feeder Data Logger	\$ -	\$ -	-	\$ 693.00	1.00	\$ 693.00	\$ 693.00	\$ -	\$ 693.00	SWBRT
	Logger Net Software	\$ -	\$ -	-	\$ 790.00	1.00	\$ 790.00	\$ 790.00	\$ -	\$ 790.00	SWBRT
	Flow Meter	\$ -	\$ -	-	\$ 925.00	1.00	\$ 925.00	\$ 925.00	\$ -	\$ 925.00	SWBRT
	Flow Meter Pipe Alteration	\$ -	\$ -	-	\$ 120.00	1.00	\$ 120.00	\$ 120.00	\$ -	\$ 120.00	SWBRT
	Flow Meter Saddle	\$ -	\$ -	-	\$ 200.00	1.00	\$ 200.00	\$ 200.00	\$ -	\$ 200.00	SWBRT
	4G Cellular Module 1 yr Sub.	\$ -	\$ -	-	\$ 682.00	1.00	\$ 682.00	\$ 682.00	\$ -	\$ 682.00	SWBRT
	Antennae Cable	\$ -	\$ -	-	\$ 100.00	1.00	\$ 100.00	\$ 100.00	\$ -	\$ 100.00	SWBRT
Telemetry Setup	4G Antennae	\$ -	\$ -	-	\$ 100.00	1.00	\$ 100.00	\$ 100.00	\$ -	\$ 100.00	SWBRT
	Surge Protection Kit	\$ -	\$ -	-	\$ 225.00	1.00	\$ 225.00	\$ 225.00	\$ -	\$ 225.00	SWBRT
	Hog Panels 34"x16'	\$ -	\$ -	-	\$ 20.00	10.00	\$ 200.00	\$ 200.00	\$ -	\$ 200.00	SWBRT
Equipment Enclosure Cages	T-Posts	\$ -	\$ -	-	\$ 6.00	14.00	\$ 84.00	\$ 84.00	\$ -	\$ 84.00	SWBRT
Laptop Computer	HP i7 Business Laptop	\$ -	\$ -	-	\$ 800.00	1.00	\$ 800.00	\$ 800.00	\$ -	\$ 800.00	SWBRT
Maintenance and Replacement					\$ 1,000.00	1.00	\$ 1,000.00	\$ 1,000.00	\$ -	\$ 1,000.00	SWBRT
Contingency and Shipping (5%)		\$ -	\$ -	-	\$ 350.00	1.00	\$ 350.00	\$ 375.00	\$ -	\$ 375.00	SWBRT
Subtask 2a - Youth Science											
Science Journals	Youth Journals Year 1 x 12	\$ -	\$ -	-	\$ 25.00	1.00	\$ 25.00	\$ 25.00	\$ -	\$ 25.00	SWBRT
	Youth Journals Year 2 x 12	\$ -	\$ -	-	\$ 25.00	1.00	\$ 25.00	\$ 25.00	\$ -	\$ 25.00	SWBRT
Student Equipment	Work Gloves - Assorted sizes	\$ -	\$ -	-	\$ 17.00	4.00	\$ 68.00	\$ 68.00	\$ 68.00	\$ -	-
	Irrigation Boots - Assorted sizes	\$ -	\$ -	-	\$ 25.00	10.00	\$ 250.00	\$ 250.00	\$ 250.00	\$ -	-
Subtask 3a - Evaluation and Analysis											
Soil Health and Forage Sampling	Haney Soil Test Year 1	\$ -	\$ -	-	\$ 60.00	2.00	\$ 120.00	\$ 120.00	\$ -	\$ 120.00	SWBRT
	Forage Analysis Year 1	\$ -	\$ -	-	\$ 25.00	6.00	\$ 150.00	\$ 150.00	\$ -	\$ 150.00	SWBRT
	Haney Soil Test Year 2	\$ -	\$ -	-	\$ 60.00	2.00	\$ 120.00	\$ 120.00	\$ -	\$ 120.00	SWBRT
	Forage Analysis Year 2	\$ -	\$ -	-	\$ 25.00	6.00	\$ 150.00	\$ 150.00	\$ -	\$ 150.00	SWBRT
Biological Monitoring Equipment	Pensola Light-Line Spring Scale	\$ -	\$ -	-	\$ 55.00	1.00	\$ 55.00	\$ 55.00	\$ 55.00	\$ -	-
	Forage Clipping Range Hoop	\$ -	\$ -	-	\$ 25.00	1.00	\$ 25.00	\$ 25.00	\$ 25.00	\$ -	-
	Clipboards (12-pk)	\$ -	\$ -	-	\$ 20.00	1.00	\$ 20.00	\$ 20.00	\$ 20.00	\$ -	-
	100 ft measuring tape	\$ -	\$ -	-	\$ 25.00	1.00	\$ 25.00	\$ 25.00	\$ 25.00	\$ -	-
	Fiskars forage sheers	\$ -	\$ -	-	\$ 15.00	2.00	\$ 30.00	\$ 30.00	\$ 30.00	\$ -	-
Subtask Total								\$ 9,885.00	\$ 473.00	\$ 9,412.00	

Task 2 - Citizen Science: Youth Exploradion and Engagement

Subtasks	Item	Hourly Rate	# Hours	Sub-total	Item Cost	Item Quantity	Sub-total	Total	CWCB Funds	Matching Funds (Cash)	Source of Match
Subtask 2a - MLC Summer Program and Internships											
Summer Agricultural Immersion Program	Student Weekly Stipend Year 1	\$ -	\$ -	-	\$ 415.00	12.00	\$ 4,980.00	\$ 4,980.00	\$ -	\$ 4,980.00	GOCO
	Student Weekly Stipend Year 2	\$ -	\$ -	-	\$ 415.00	12.00	\$ 4,980.00	\$ 4,980.00	\$ -	\$ 4,980.00	SWBRT
	Food Year 1	\$ -	\$ -	-	\$ 800.00	1.00	\$ 800.00	\$ 800.00	\$ -	\$ 800.00	GOCO
	Food Year 2	\$ -	\$ -	-	\$ 800.00	1.00	\$ 800.00	\$ 800.00	\$ -	\$ 800.00	SWBRT
	Supplies Year 1	\$ -	\$ -	-	\$ 200.00	1.00	\$ 200.00	\$ 200.00	\$ -	\$ 200.00	GOCO
	Supplies Year 2	\$ -	\$ -	-	\$ 200.00	1.00	\$ 200.00	\$ 200.00	\$ -	\$ 200.00	SWBRT
	Student Transportation Year 1	\$ -	\$ -	-	\$ 800.00	1.00	\$ 800.00	\$ 800.00	\$ -	\$ 800.00	GOCO
	Student Transportation Year 2	\$ -	\$ -	-	\$ 800.00	1.00	\$ 800.00	\$ 800.00	\$ -	\$ 800.00	SWBRT
	Student Program Intern Year 1	\$ 13.00	940	\$ 12,220.00	\$ -	\$ -	\$ -	\$ 12,220.00	\$ -	\$ 12,220.00	GFF
	Student Program Intern Year 2	\$ 13.00	940	\$ 12,220.00	\$ -	\$ -	\$ -	\$ 12,220.00	\$ 12,220.00	\$ -	-
High School Internships	Student Farm Interns Year 1	\$ 12.00	500	\$ 6,000.00	\$ -	\$ -	\$ -	\$ 6,000.00	\$ -	\$ 6,000.00	GFF
	Student Farm Interns Year 2	\$ 12.00	500	\$ 6,000.00	\$ -	\$ -	\$ -	\$ 6,000.00	\$ -	\$ 6,000.00	SWBRT
	Program Director year 1*	\$ 22.00	190	\$ 4,180.00	\$ -	\$ -	\$ -	\$ 4,180.00	\$ -	\$ 4,180.00	GOCO
SWOS Staff Program Director	Program Director Year 2*	\$ 22.00	190	\$ 4,180.00	\$ -	\$ -	\$ -	\$ 4,180.00	\$ 4,180.00	\$ -	-
MLC Outreach and Education Coordinator	Project Coordinator Year 1*	\$ 28.72	960	\$ 27,571.20	\$ -	\$ -	\$ -	\$ 27,571.20	\$ -	\$ 27,571.20	GOCO
	Project Coordinator Year 2*	\$ 26.00	960	\$ 24,960.00	\$ -	\$ -	\$ -	\$ 24,960.00	\$ 24,960.00	\$ -	-

MLC WPG Project Administration	Project Administration Year 1*	\$ 50.00	150	\$ 7,500.00	\$ -	\$ -	\$ 7,500.00	\$ 5,500.00	\$ 2,000.00	SWBRT	
	Project Administration Year 2*	\$ 50.00	150	\$ 7,500.00	\$ -	\$ -	\$ 7,500.00	\$ 7,500.00	\$ -		
MLC Youth Programs Administration	Youth Programs Admin 2020-2021*	\$ 50.00	250	\$ 12,500.00	\$ -	\$ -	\$ 12,500.00	\$ -	\$ 12,500.00	GFF	
<i>*Indirect Cost Breakdown: Indirect cost calculated at a billing rate of \$50.00/hr to accomplish services related to accounting and grant/programs management associated with this proposal. Includes Executive Director and Operations Manager</i>											
Subtask 2b - Youth Based Water Education											
Fort Lewis College Student Interns	Student Stipend + Mileage Year 1	\$ 15.00	0	\$	\$	\$	\$	\$	\$		
	Student Stipend + Mileage Year 2	\$ 15.00	0	\$	\$	\$	\$	\$	\$		
							Subtask Total	\$ 138,391.20	\$ 54,360.00	\$ 84,031.20	
Task 3 - Public Education and Outreach											
Subtasks	Item	Hourly Rate	# Hours	Sub-total	Item Cost	Item Quantity	Sub-total	Total	CWCB Funds	Matching Funds (Cash)	Source of Match
Subtask 3a - Landowners											
Field Days	Food Year 1	\$		\$	\$	1.00	\$	\$	\$	\$	
	Food Year 2	\$		\$	\$	1.00	\$	\$	\$	\$	
Ft. Lewis College Faculty - Water Center Presenter	Year 1	\$ 150.00	0	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	
	Year 2	\$ 150.00	5	\$ 750.00	\$ -		\$ -	\$ 750.00	\$ 750.00	\$ -	
High Desert Conservation District	Field Day Co-Facilitator Year 1	\$ 50.00	0	\$	\$		\$	\$	\$	\$	
	Field Day Co-Facilitator Year 2	\$ 50.00	50	\$ 2,500.00	\$ -		\$ -	\$ 2,500.00	\$ 2,500.00	\$ -	
Subtask 3b - Youth											
		\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	
		\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	
		\$ -		\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	
Subtask 3c - General Public											
Public Forums	Food Year 1	\$		\$	\$	1.00	\$	\$	\$	\$	
	Food Year 2	\$		\$	\$	1.00	\$	\$	\$	\$	
Ft. Lewis College Faculty - Water Center Presenter	Year 1	\$ 150.00	0	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	
	Year 2	\$ 150.00	5	\$ 750.00	\$ -		\$ -	\$ 750.00	\$ 750.00	\$ -	
High Desert Conservation District	Public Forum Co-Facilitator Year 1	\$ 50.00	0	\$	\$		\$	\$	\$	\$	
	Public Forum Co-Facilitator Year 2	\$ 50.00	50	\$ 2,500.00	\$ -		\$ -	\$ 2,500.00	\$ 2,500.00	\$ -	
							Subtask Total	\$ 6,500.00	\$ 6,500.00	\$ -	
Other Direct Costs (see below)								\$2,047.50	\$2,047.50	\$ -	
Total Project								\$156,823.70	\$ 63,380.50	\$ 93,443.20	

Other Direct Costs

Item:	Copies & Printing (Black & White)	Copies & Printing (Color)	Materials and Final Report Production	Lodging and Meals	Travel Expenses (Airfare and Car Rental)	Mileage	Total
Units:	No.	No.	Lump Sum	Per Diem	Lump Sum	Miles	
Unit Cost:	\$0.15	\$0.50				\$0.575	
Project Outreach Materials	0	100			0		\$50
Report, Conclusions and Recommendations	150	150	\$ 1,900		0		\$1,998
Ft. Lewis College Faculty - Water Center Presenters (yr 1 & 2)							0
Ft. Lewis College Student Intern (yr 1 & 2)							0
Total Units:	150	250	1,900	0	0	0	
Total Cost:	\$23	\$125	\$1,900	\$0	\$0	\$0	\$2,047.50

Secured Match Percentages (% of Total Project)		Total Value
Gates Family Foundation (GFF)	19.59%	\$ 30,720.00
Great Outdoors Colorado (GOCO)	24.57%	\$ 38,531.20
Southwest Basin Roundtable (SWBRT)	15.43%	\$ 24,192.00
Total Project Secured Cash Match	59.58%	\$ 93,443.20
Total CWCB Request (% of Total Project)		40.42%
		\$ 63,380.50

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

October 25, 2019

Ben Wade, CWCB Education & Innovation Activities Water Plan Grant Program
VIA: Email

Re: Letter of support for Montezuma Land Conservancy Water Efficiency Study at Fozzie's Farm

Dear Ben,

As the Chair of the Southwest Basin Roundtable, I am writing to offer support for the Montezuma Land Conservancy Water Efficiency Study at Fozzie's Farm.

This Project aligns well with the Southwest BIP Goals B2: Implement efficiency measures to maximize beneficial use and production as well as the Education and Outreach Goals in the BIP and State Water Plan. The Project also aligns with Roundtable Education Action Plan (EAP) goals: 1) Encourage education and conservation to reduce demand, 2) Implement informational events about water conservation and land use planning, and 3) Support agriculture efficiency projects identified as IPPs.

The SWBRT is very supportive of efforts to support the next generation of farmers and ranchers, as well as building community awareness and support for the ongoing viability of agriculture. This project contributes to both of these values supported by a foundation of objective monitoring, also highly valued by the SWBRT.

Another feature worth noting is that the Montezuma Land Conservancy who has facilitated Conservation Easements on tens of thousands of acres of agricultural land will be working with the Open High School to directly engage students in water and grazing management along with methods for monitoring water efficiency and sustainable grazing practices.

Getting young people away from their devices and out in an agricultural setting where they can learn hands on is a key to this innovation along with the educational exchanges that will occur as community people visit and get involved with Fozzie's Farm,

Please give this application your favorable consideration. If you have questions contact me at 970-565-7562 or mpreston@frontier.net.

Sincerely,

A handwritten signature in blue ink, appearing to be 'MP', is written over a faint circular stamp.

Michael Preston, Chair
Southwest Basin Roundtable



Southwest Open School

P.O. Box DD, Cortez, Co 81321

Phone 970-565-1150

Fax 970-565-8770

January 2nd, 2020

Re: Support for Montezuma Land Conservancy Work

To: Colorado Water Conservation Board

Attn: Ben Wade, Project Manager

1313 Sherman St., Rm. 721

Denver, CO 80203

It is my pleasure to write this letter of strong support and enthusiasm for the proposed project that the Montezuma Land Conservancy is wishing to undertake. The students benefiting from this project, particularly the students and students' families from Southwest Open School, will reap the rewards from this expansion of this work.

As the Director of the Southwest Open School, I can attest to the ongoing collaborative relationship with the Montezuma Land Conservancy and Fozzie's Farm. Together, we provide youth development programming in the areas of service-learning, leadership development, and character development. We are thrilled to continue collaboration with MLC in order to provide support to the program in the following areas:

- Educational programming related to service learning, leadership and character development
- Strong academic enrichment and credit offerings throughout the school year
- Continued youth development programming in future endeavors

It is our sincere hope that you will give this proposal your most careful consideration. The impact of this future work is substantial. Our students will be able to interface with the Montezuma Land Conservancy in new and meaningful ways. Children in our rural community face many barriers to success and we believe that this proposal will provide opportunities to the children, their families and the community that they may not have otherwise.

Sincerely,

Matthew Keefauver

Director, Southwest Open School



**SOUTHWESTERN COLORADO
RESEARCH CENTER**
COLORADO STATE UNIVERSITY

16898 Road Z
Yellow Jacket, CO 81335

December 20, 2019

Montezuma Land Conservancy
2748 W. Montezuma Ave.
Cortez, CO 81321

To whom it may concern,

I am writing in support of the Montezuma Land Conservancy's Colorado Water Conservation Board Water Plan grant proposal titled "Montezuma Land Conservancy and Southwest Colorado Research Center: Innovative Agricultural Management and Colorado's Next Generation of Water Leaders". The staff at the Colorado State University Agricultural Experiment Station Southwestern Colorado Research Center feel that the efforts of this organization provide a critical educational and stewardship role for the local community.

Partnering with Montezuma Land Conservancy on the research proposed will allow for a collaborative approach to improving water conservation throughout the region. The research and outreach components targeting youth and young farmers will provide a key need for education to the next generation of agricultural producers and stewards of crucial resources. The data generated from this research will also provide producers with necessary demonstration and understanding for improved irrigation efficiencies on their operations.

Please feel free to contact our staff with any additional questions.

Sincerely,

Kathleen Russell

Manager/Research Scientist
Colorado State University
Southwestern Colorado Research Center



FORT LEWIS COLLEGE®
DURANGO, COLORADO

Colorado Water Conservation Board
Attn: Ben Wade
1313 Sherman St. Room 721
Denver, CO 80203

Subject: Montezuma Land Conservancy Water Plan Grant Application

January 28, 2020

Dear Colorado Water Conservation Board,

I am writing to enthusiastically support the Montezuma Land Conservancy's grant application entitled *Innovative Agricultural Management and Colorado's Next Generation of Water Leaders*. This grant would directly support interns from Fort Lewis College's Environmental Studies major with experiential learning opportunities in water leadership.

The Environmental Studies major at Fort Lewis College follows an interdisciplinary course of study that draws from natural and social sciences. Many students in the major are deeply engaged with water science and conduct research on water quality, river management, wastewater treatment, etc. Another common area of emphasis for students is in agriculture and food systems. The internship opportunities that MLC would create for Fort Lewis College students with this funding tie together these two critical topics, water and agriculture, in a very meaningful way for students. The college interns would gain practical experience in innovative methods of researching, measuring, and conserving water in an agricultural setting. Further, Fort Lewis College interns would be well suited to serve as mentors for the high school youth program also a part of this grant application. The college interns would be able to mentor high school students and share about their college experiences, both of which are likely to empower high school students to investigate college options for themselves.

Over my seven years at Fort Lewis College, I have seen how critical internships are for student success. Internships help students define their future career goals, create invaluable skills, and serve as important resume entries. Fort Lewis College is a highly diverse, public, liberal arts college. Many students are first generation college students and/or from low income backgrounds. MLC has taken important steps to make these internships financially possible for Fort Lewis College students by offering hourly pay and covering mileage for driving to and from Durango. The college internship opportunities this grant would create for Fort Lewis College are authentic and meaningful launchpads for future careers in water leadership.

Thank you,
Dr. Kathy Hilimire
Assistant Professor and Sustainability Coordinator
Department of Environment and Sustainability, Fort Lewis College
(970)247-6169
kehilimire@fortlewis.edu



January 24, 2020

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

Dear Board Members:

I am writing to support the Montezuma Land Conservancy's (MLC) proposal to the Colorado Water Conservation Board for Colorado Water Plan Implementation funds. This funding will support MLC and their community partners in setting up an agricultural irrigation study with a heavy emphasis on youth engagement and public outreach. MLC will leverage these funds with \$38,531.20 in funding received from Great Outdoors Colorado (GOCO) through our Generation Wild Initiative.

Great Outdoors Colorado (GOCO) is a public trust fund that dedicates a portion of Lottery proceeds to the future of Colorado's outdoors, including projects that preserve, protect, and enhance our state's wildlife, park, river, trail, and open space heritage. In 2015, GOCO launched Generation Wild, a \$25million statewide initiative aimed at getting more kids outside more often. Fifteen Generation Wild coalitions are working hard in urban, rural, suburban and mountain communities to break down barriers to outdoor access. MLC is leading the Montezuma Inspire Coalition in their work to provide equitable access to parks and programs across Montezuma County. MLC is the only land trust to receive a Generation Wild grant and has emerged as a leader in the statewide movement to get kids outside.

GOCO strongly supports MLC's vision to further activate its educational site, Fozzie's Farm, for scientific research, landowner and public outreach and youth engagement opportunities. Conservation needs in Colorado are vast, and this grant would accelerate MLC's work to meet the conservation challenges and opportunities unique to southwest Colorado. MLC's continued, innovative work to reconnect its community with the natural world is a model for the land trust community here in Colorado and nationally.

Please consider funding this proposal and reach out if you need additional information. You can contact me at ccastilian@goco.org and 303-226-4533.

Kind regards,

A handwritten signature in black ink, appearing to read "Chris Castilian".

Chris Castilian
Executive Director



628 West 5th Street
Cortez, CO 81321
970.529.8368

info@highdesertconservation.org
HighDesertCD.org

Planting Seeds of Inspiration to Promote Conscious Stewardship of our Natural Resources

27 January, 2020

To: Colorado Water Conservation Board

RE: Montezuma Land Conservancy Water Plan Grant Application

To Whom It May Concern,

It is with a great deal of enthusiasm that the High Desert Conservation District supports the Montezuma Land Conservancy / Colorado State University-Southwest Colorado Research Center application titled '*Innovative Agricultural Management and Colorado's Next generation of Water Leaders*'.

The over-allocation of the Colorado River combined with increasing demand and extreme climatic events make improving irrigation efficiency in agriculture critically important for the future of agricultural productivity. The importance of streamlined irrigation management resulting in significant water savings through the utilization of targeted irrigation and modern soil moisture measuring techniques cannot be over-stated and this project will provide an excellent in-situ example for agriculturists throughout this arid region to learn improved methods of increasing water use efficiency.

Furthermore, Fozzie's Farm has provided a valuable opportunity for helping to educate and empower the next generation of conservation leaders through boots-on-the-ground, hands-on experiential opportunities for the last few years. This project will be another opportunity for area youth to gain more appreciation for environmental science, where our food comes from, and the wonders of the natural world. In essence, this is an investment in our future as we 'grow' young farmers.

The High Desert Conservation District fully supports this project and is excited by the opportunity to participate and contribute. Thank you for giving this project your consideration and support.

Regards,

A handwritten signature in dark ink, appearing to read "Greg Vlaming". The signature is fluid and cursive, with a large initial "G" and "V".

Greg Vlaming-District Manager
High Desert Conservation District



Four Corners Water Center
Fort Lewis College
1000 Rim Road
Durango, CO 81301

Dr. Gigi Richard
ph +1.970.247.6561
email: garichard@fortlewis.edu

January 28, 2020

Colorado Water Conservation Board
Attn: Ben Wade
1313 Sherman St. Room 721
Denver, CO 80203

Subject: Montezuma Land Conservancy Water Plan Grant Application

Dear Colorado Water Conservation Board,

I am writing in support of the Montezuma Land Conservancy's (MLC) application for funding to support their engagement and innovation proposal. The MLC has a proven track record in engaging youth in educational agricultural activities and building strong community engagement in southwestern Colorado. The Four Corners Water Center at Fort Lewis College is looking forward to collaborating with MLC to connect Fort Lewis College students with MLC activities and to support their educational field days.

The Four Corners Water Center is committed to working with the MLC in the development and presentation of educational field days at Fozzie's Farm for agricultural producers and the general public as outlined in Task 3 of the grant proposal. In addition, the water center will support the MLC as needed with educational and outreach activities.

We appreciate the opportunity to work with the MLC and their outstanding staff and look forward to this new collaboration.

Sincerely,

Gigi Richard, Ph.D.
Director
Four Corners Water Center

