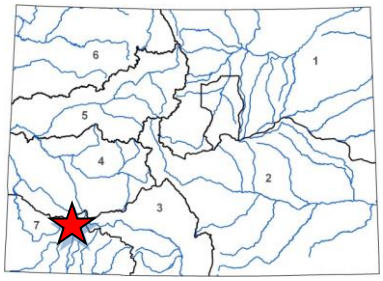
COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Integrated Hydrological Modeling of the San Miguel Watershed
San Miguel Watershed Coalition
September 2022 Board Meeting

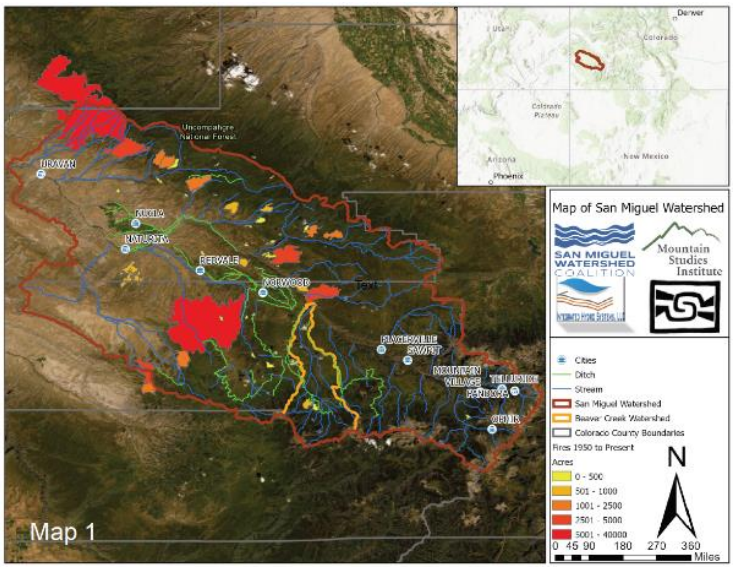
Water Plan Grant Application



LOCATION	
County/Counties: Montrose & San Miguel	
Drainage Basin:	Southwest

DETAILS	
Total Project Cost:	$250,500
Water Plan Grant Request:	$150,000
Recommended amount:	$150,000
Other CWCB Funding:	$0
Other Funding Amount:	$86,500
Applicant Match:	$14,000
Project Type(s): Watershed Plan/Assessment	
Project Category(Categories): Conservation and Land Use	
Measurable Result: A watershed model that will allow for: water availability quantification, land use change evaluation, better understanding of groundwater and surface water interaction, local engagement and the ability to make educated resource decisions.	

The San Miguel watershed in southwestern Colorado is home to abundant forests, steep mountains, world-class outdoor recreation opportunities, and towns with a long history of ranching, logging, and gold, silver, and uranium mining. The vegetation type and cover, precipitation, and geomorphologic characteristics vary markedly from the headwaters to its confluence with the Dolores River. Despite its relatively low population, the watershed's water quantity and quality are and will be impacted by changing residential and commercial development, historic mining, agriculture, and climate change. Preliminary evaluations conducted in the 2021 San Miguel River Non-consumptive Needs Assessment report show that ecosystem services have not been at risk in the past, but changing climate increases the susceptibility to hydrologic challenges in the future. To ensure that the watershed is resilient to climate change, the community and its stakeholders have identified a need for advanced numerical tools to inform conservation and drought contingency plans. Specifically, the community has identified the need to quantify impacts to the complete hydrologic system due to changing climate, land use, and water management, and to evaluate the most effective conservation and management strategies that will ensure a resilient ecosystem and water supply in the future. Additionally, the community stressed the need for a tool that is capable of integrating dynamic weather inputs, modeling complex subsurface hydrogeologic conditions, evaluating the effects of changing land use/cover, and creating effective drought management and conservation planning. Finally, this project will be used as a platform to build capacity of users in the San Miguel watershed and beyond to carry out future analyses on their own.



The proposed Water Plan grant would fund the following tasks to achieve the stated goals:

Task 1: Develop and calibrate a watershed-scale, integrated hydrologic model.
Task 2A: Quantifying water availability under future climatic scenarios.
Task 2B: Create a higher resolution sub-watershed model to examine wildfire risk.
Task 3: Public outreach & modeling workshop

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Water Plan

Water Project Summary

Name of Applicant	San Miguel Watershed Coalition
Name of Water Project	Integrated Hydrological Modeling of the San Miguel Watershed: A modern tool for water resource evaluations
Grant Request Amount	**$150,000.00**
Primary Category	$150,000.00
Conservation & Land Use Planning	
Total Applicant Match	**$14,000.00**
Applicant Cash Match	$0.00
Applicant In-Kind Match	$14,000.00
Total Other Sources of Funding	**$86,500.00**
San Miguel County	$10,000.00
Colorado School of Mines	$10,000.00
Montrose County	$10,000.00
Town of Mountain Village	$10,000.00
Town of Ophir	$1,000.00
Town of Telluride	$10,000.00
Southwestern Water Conservation District	$30,000.00
Town of Naturita	$500.00
Fort Lewis College	$2,500.00
Town of Norwood	$2,500.00
Total Project Cost	**$250,500.00**

Applicant & Grantee Information

Name of Grantee: San Miguel Watershed Coalition
Mailing Address: PO Box 1601 Telluride CO 81435
FEIN: 841,500,508

Organization Contact: Adrian Bergere
Position/Title:
Phone: (518) 817-1607
Email: info@sanmiguelwatershed.org

Grant Management Contact: Adrian Bergere
Position/Title:
Phone: (518) 817-1607
Email: info@sanmiguelwatershed.org

Description of Grantee/Applicant

The San Miguel Watershed Coalition (SMWC) is an independent 510(c)(3) nonprofit organization established in Telluride, Colorado, in 1997. SMWC works to maintain and improve the ecological health of all 80 miles of the

free-flowing San Miguel River. SMWC conducts and facilitates river projects, provides community education opportunities, and conducts water quality testing. SMWC engages stakeholders from throughout the 1,550 square mile watershed—from the western San Juan Mountains to the slick rock canyons of the West End—to participate in collaborative efforts that promote our river's health and the economic vitality of our watershed's communities.

Type of Eligible Entity

- ☐ Public (Government)
- ☐ Public (District)
- ☐ Public (Municipality)
- ☐ Ditch Company
- ☐ Private Incorporated
- ☐ Private Individual, Partnership, or Sole Proprietor
- ■ Non-governmental Organization
- ☐ Covered Entity
- ☐ Other

Category of Water Project

- ☐ Agricultural Projects
  Developing communications materials that specifically work with and educate the agricultural community on headwater restoration, identifying the state of the science of this type of work to assist agricultural users among others.
- ■ Conservation & Land Use Planning
  Activities and projects that implement long-term strategies for conservation, land use, and drought planning.
- ☐ Engagement & Innovation Activities
  Activities and projects that support water education, outreach, and innovation efforts. Please fill out the Supplemental Application on the website.
- ☐ Watershed Restoration & Recreation
  Projects that promote watershed health, environmental health, and recreation.
- ☐ Water Storage & Supply
  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.

Location of Water Project

Latitude	38.130660
Longitude	-108.305987
Lat Long Flag	Stream location: Coordinates based on general location on stream
Water Source	Coordinates based off San Miguel Watershed centroid. Water source: San Miguel
Basins	Southwest
Counties	Montrose; San Miguel
Districts	60-San Miguel River Basin

Water Project Overview

Major Water Use Type	Agricultural
Type of Water Project	Planning (e.g. watershed)

Scheduled Start Date - Design
Scheduled Start Date - Construction
Description
As identified by the Southwest Basin Implementation Plan (SWBIP) and the Environmental and Recreational Needs Assessment of the San Miguel watershed, the San Miguel mainstem and tributary flows are susceptible to significant decreases in water availability, impacting agricultural, municipal, industrial, and recreational water needs. To meet these declines in water supply, the San Miguel Watershed Coalition (SMWC) and its stakeholders have identified a need to implement conservation management actions that create climate and drought resilient water supplies.
To inform decisions around which conservation management actions to prioritize, SMWC proposes to develop an integrated hydrologic/hydraulic tool that can be used to quantify changes in water availability under a changing climate, simulate the hydrologic response to wildfire and wildfire mitigation, evaluate the effectiveness of conservation efforts, and simulate other water management actions.
To enhance water education and innovation within the region, SMWC will create an internship with a Colorado-based university to train students in integrated modeling through hands-on experience and will host a workshop at the end of the project; both tasks are aimed at recruiting and retaining a skilled regional workforce. Additionally, this tool will be hosted by SMWC and will be available to any stakeholder to further understand water resource issues of interest in the San Miguel watershed.
Our proposed work directly supports goals A1, A2, A3, B2, B3, C1, C3, D2, E2, F3, and G3 of the 2022 SWBIP.

Measurable Results

New Storage Created (acre-feet)
New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive
Existing Storage Preserved or Enhanced (acre-feet)
New Storage Created (acre-feet)
Length of Stream Restored or Protected (linear feet)
Efficiency Savings (dollars/year)
Efficiency Savings (acre-feet/year)
Area of Restored or Preserved Habitat (acres)
Quantity of Water Shared through Alternative Transfer Mechanisms or water sharing agreement (acre-feet)
Number of Coloradans Impacted by Incorporating Water-Saving Actions into Land Use Planning
7,500 Number of Coloradans Impacted by Engagement Activity
Other
This project will create a highly effective tool to quantify water availability under a changing climate, allow water resource managers and stakeholders to test conservation strategies, evaluate the impacts of land use change on hydrology, improve fluvial hazard mapping, and address many other hydrologic issues. The watershed has 37,000 acres of irrigated land. The total area of the watershed is 1,560 mi2. The total population of the watershed is ~7500 people.

Water Project Justification

Our proposed work directly supports goals A1, A2, A3, B2, B3, C1, C3, D2, E2, F3, and G3 of the 2022 SWBIP. Both the Southwest Water Plan and the Southwest Basin Implementation Plan (SWBIP) note, the San Miguel watershed leans heavily on its robust agricultural communities and currently lacks water storage capacity compared to other subbasins (Section 5 of the 2022 SWBIP, Section 4.9.2 of the Colorado Water Plan). The Southwest region of Colorado has a pressing need to develop tools, measures, and actions that will assist with water conservation and drought planning while ensuring a viable economy and an intact ecosystem. Southwest Colorado has recently experienced first-hand the negative impacts of drought on the economic wellbeing of its

communities. This last year, many major river systems in the area saw the lowest flows on record, and the U.S. Drought Monitor listed the region as being in exceptional drought -- the highest category possible. As a result of the drought, ranchers and farmers needed to sell large parts of their herds and grow more drought-resistant crops. In addition to the lack of storage, the SWBIP also illustrates that the gap between water need and water availability for agricultural communities in the San Miguel basin is expected to grow with the current trend of decreased precipitation. Communities of the San Miguel watershed want to protect water resources across all sectors (agriculture, recreation, environment, municipal, industry). It is imperative to conserve water across the sectors to preserve the economic and environmental wellbeing of the basin and strive to meet Instream Flow appropriations. Goal D2 of the SWBIP notes the challenge of understanding and supplying the needs of multiple users, as environmental and recreational water supply needs were not quantified at the same level as agriculture before the Environmental and Recreational Needs Assessment (Lotic Hydrological, 2021).

The need for a robust tool to address water conservation and drought planning has also been identified by The San Miguel Partnership (the Partnership) which was a Southwest Basin Roundtable (SWBRT) subcommittee created to develop an E&R Needs Assessment in the San Miguel Watershed. The goal of the Partnership was to quantify E&R needs and identify top priority, multi-benefit projects in the watershed. The need for quantification and increased stakeholder input at the watershed scale was identified by the 2010 E&R needs assessment as part of the Statewide Water Supply Initiative (SWSI), the 2015 Colorado Water Plan, and the 2015 SWBIP. The Partnership's E&R Needs Assessment (Lotic Hydrological, 2021) is a comprehensive technical document created to understand gaps in water quantity data in the San Miguel watershed. The Needs Assessment quantified basic surface water needs based on future climate and growth alternatives without quantifying groundwater's role in the system. SMWC proposes to build and calibrate a more robust, powerful tool to be housed internally, for use in advancing the Partnership and SMWC projects that require more comprehensive modeling of water availability, climate, and hazards. The Partnership specifically mentions Integrated Hydrological Modeling of the San Miguel Watershed as a project to be moved toward the SWBRT IPP list with the specific goal of supporting a number of other identified projects on the list including:

- Wrights Mesa Drought Contingency Planning
- Streamflow Gauge Network Support
- Real-time Water Temperature Monitoring Program
- CC-Highline Ditch Infrastructure Improvements
- Floodplain Restoration Opportunity Inventory
- Invasive Riparian Vegetation Control
- Investigate Creative Water Use Agreements to Protect Fish

Although the recent Environmental and Recreational Needs Assessment report by Lotic Hydrological (2021) found the San Miguel watershed to be currently functioning well, they noted that it is at serious risk of hydrologic depletion due to climate change. Lotic noted that baseflows and overall groundwater contributions to the San Miguel River are not understood or quantified by current models. Existing tools do not provide the groundwater and climate-driven surface water dynamics needed. Additionally, the Colorado Water Plan and SWBIP (CWP, 9-42,43; SWBIP Goals: B2, B3, E2, F2, F3) identified the need for an integrated understanding of ecohydrologic interactions and watershed resilience to climate change as a "cross-sector challenge" (SWBIP, p.13). These issues and others identified by community members and stakeholders in the basin point to a clear need to develop advanced tools that are accessible to the community to quantify current and projected water availability and demands. Having an accessible, living hydrologic tool will allow stakeholders and resource managers to evaluate innovative conservation solutions to ensure that the basin is using the most effective measures to become climate resilient.

Through the development of a fully integrated groundwater-surface water modeling tool, the water availability throughout the basin will be understood at a high temporal and spatial resolution under varying climatic scenarios. The first step toward an effective conservation and drought contingency plan is understanding how the system will respond to varying levels of drought. Such an understanding directly supports identified community needs by quantifying water availability under projected future climate conditions and allowing for testing of

innovative conservation strategies across sectors, innovative ways to expand storage, and more efficient ways to transport and maintain water in the system (Goals A1, B3, B4, and C3 of the SWBIP). A tool as capable as MIKESHE, housed locally by a non-profit, will allow stakeholders to evaluate the viability of proposed solutions to balance the demands among agriculture, municipal, industrial, and environmental sectors that will allow the community to plan for current and future demands (Goal C1 of the SWBIP).

In addition to understanding water availability under a changing climate, the community identified, as part of the River Restoration study, a clear need to quantify the hydrologic response to wildfire and wildfire mitigation (San Miguel Watershed Coalition, 2022). As part of the proposed study, SMWC plans to create and run a high-resolution model of the Beaver Creek sub-watershed to evaluate the potential impacts of wildfire and wildfire mitigation. The result of the sub-watershed model will help quantify the hydrologic impacts of wildfire mitigation and allow the community to select adaptive and climate resilient management strategies (Goals E2, F3, and G2 of the SWBIP).

SMWC intends this tool be accessible to stakeholders while ensuring that a skilled labor force will be available to use it in the future. To achieve this goal, SMWC will be partnering with Colorado School of Mines to train a graduate student intern on model. Additionally, SMWC in partnership with Colorado-based universities, will host a local and remotely available workshop on integrated hydrologic modeling and the results of our study. The goals of the workshop will be to showcase our results, share knowledge and experience, and inspire and recruit future water resource managers. These goals aim to build the labor pool while helping create a water-fluent public (Goal A3 of the SWBIP).

The MIKESHE code was selected for multiple reasons to address conservation and drought planning needs. Currently, no existing tools or hydrologic models have been developed that are capable of evaluating the broad range of local- to regional-scale water resource issues in the San Miguel River watershed at an appropriate level of surface and subsurface detail and with physical processes. Although a StateMod model has already been created for the watershed, MIKESHE is a much different type of code, but the respective models are considered complementary and can support each other.

MIKESHE is able to simulate complex subsurface flows, storage, and stream-aquifer dynamics (especially groundwater baseflows) that are essential for predicting how physically realistic future changes in land use and climate will impact the system. Importantly, MIKESHE is driven by external, distributed, event-level (hourly) weather inputs (air temperature, precipitation, reference evapotranspiration), which permits evaluation of changes to important simulated hydrologic variables (i.e., groundwater heads, seep/spring discharge, snowpack/snowmelt, stream stage/flow) due to, for example, the changing climate.

To help determine the feasibility of constructing a functional fully integrated model for the San Miguel watershed, we obtained some essential datasets (i.e. topography, surficial geology, surface flow gage data, groundwater wells, and drainage network) and constructed a preliminary model framework as shown on Map 3 in the attached maps document. We believe an adequate dataset exists to construct and calibrate the model.

Evaluating alternative conservation or land use mitigation strategies, especially at a local scale, is challenging without first developing a capable tool. MIKESHE is a robust and versatile tool that can be easily run and modified to answer a multitude of questions. The tool is able to simulate a wide range of managed crop types, crop rotations, irrigation diversions, and water irrigation strategies that will allow users to quantify land use impacts on water availability. It simulates a broad range of hydraulic structures and urbanization, which permits users to evaluate innovative conservation approaches and designs and associated risks to infrastructure and the ecosystem. It is capable of simulating the fate and transport of pollutants in streams and aquifer systems, allowing the user to understand how to best mitigate the long-term impacts of mining and other pollutant inputs. MIKESHE uses rigorous, physically based solutions that are essential for correctly simulating and evaluating engineering designs, operations, and impacts (i.e., dams, diversions, culverts, gates etc.). A key feature of the MIKESHE and MIKEHydro codes is their graphical user interface (GUI), which facilitates faster model development, and, importantly, accessible visualization of inputs and outputs that allows functional use by non-experts. In other words, once the model is built, SMWC and/or stakeholders can visualize and run simulations with different inputs.

The community has identified the importance of developing the MIKESHE tool to pursue stakeholder-identified projects and understand long-term water availability due to its extensive capabilities, accessibility, and its ability to simulate a large number of environmental scenarios. The level of interest is apparent by the list of projects requested to be run after initial development of the tool. Requested future projects included (San Miguel Partnership, 2022; San Miguel Watershed Coalition, 2022):

- Wrights Mesa Drought Contingency Planning
- Streamflow Gauge Network Support
- Real-time Water Temperature Monitoring Program
- CC-Highline Ditch Infrastructure Improvements
- Floodplain Restoration Opportunity Inventory
- Invasive Riparian Vegetation Control
- Investigate Creative Water Use Agreements to Protect Fish
- Post-fire hazard planning and mitigation along the San Miguel and its tributaries and the HWY 145 corridor.

Finally, MIKEHydro (a complementary tool to MIKESHE) is a FEMA-approved package for riverine floodplain delineation. Although not a part of this work, the MIKESHE tool we are proposing to build here could in the future be combined with more detailed channel and valley cross section measurements to build a foundation for improved Fluvial Hazard Zone delineations. Specifically, both scenarios our team will run -- impact of climate change on baseflow and water availability, and the hydrologic response to wildfire and wildfire mitigation – could be used to generate inundation maps that are representative of future hydrologic conditions. These scenarios could provide a new dimension to CWCB's ongoing Fluvial Hazard Zone delineation protocol that more comprehensively addresses future riverine flood risks.

A compilation of the references cited in the proposal is presented as Appendix A.

Related Studies

The Integrated Hydrological Modeling of the San Miguel Watershed: A modern tool for water resource evaluations project will be complementary to the following studies:

- State of the San Miguel Watershed Report, 2020 (Climate, Water Quality, Water Quantity, Vegetation, Soils & Habitat Restoration, Development, Recreation and Tourism, Production)
- San Miguel River Restoration Study, 2022 (Section 02, 05).

The project will assist the objectives/initiatives identified by the following studies/documents and projects on the SWBRT's IPP list:

- San Miguel Environmental and Recreational Needs Assessment, Section 3.2.1, 3.3.1,
- Southwest Basin Implementation Plan, 2022 (Sections A1, A2, A3, B2, B3, C1, C3, D2, E2, F3, and G3)
- Southwest Basin Implementation Plan List:

o The Norwood Water Commission's proposed development of the Town of Norwood's 5 CFS conditional water right out of the San Miguel would travel in a pipeline following the existing utilities right of way up Beaver Creek Canyon and on to Wrights Mesa.

o Town of Ophir investigation of methods to provide for the long term water supply possibly including diversion and storage facilities. Town of Ophir is interested in using MIKESHE modeling to understand long-term water availability in Waterfall Creek, the town's municipal water source.

o Understand baseflow conditions to inform the proposed instream flow on lower Naturita Creek. Instream flow protection has been proposed for lower Naturita Creek because it provides spawning habitat for flannelmouth sucker, bluehead sucker, and roundtail chub. In addition, Naturita Creek provides year-round habitat for speckled dace. An instream flow right could potentially protect agricultural lands and deliver water to downstream users on the San Miguel River.

- San Miguel Partnership Strategies and Initiatives for Meeting San Miguel Water Use Needs

o Integrated Hydrological Modeling of the San Miguel Watershed is listed as number 12 on this list of projects

developed by the San Miguel Partnership (Partnership). The Partnership felt that Hydrological Modeling will be especially useful in advancing the goals of project numbers 1, 10, 11, and 13. Advanced integrated hydrological modeling may also be used to advance project numbers 14, 15 and 16 (See Appendix C for the full list of projects and details):

- 1: Wrights Mesa Drought Contingency Planning
- 10: Streamflow Gauge Network Support
- 11: Real-time Water Temperature Monitoring Program
- 13: CC-Highline Ditch Infrastructure Improvements
- 14: Floodplain Restoration Opportunity Inventory
- 15: Invasive Riparian Vegetation Control
- 16: Investigate Creative Water Use Agreements to Protect Fish.

A compilation of the references cited in the proposal is presented as Appendix A.

Taxpayer Bill of Rights

No Tax Bill of Rights provided

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Colorado Water Conservation Board
Department of Natural Resources

Last Updated: May 2021

Colorado Water Conservation Board
Water Plan Grant – Statement of Work – Exhibit A

Statement Of Work	
Date:	**7/1/2022**
Name of Grantee:	**San Miguel Watershed Coalition**
Name of Water Project:	**Integrated Hydrological Modeling of the San Miguel Watershed: A modern tool for water resource evaluations**
Funding Source:	**Colorado Water Plan Grant**

Water Project Overview:

The San Miguel watershed in southwestern Colorado is home to abundant forests, steep mountains, world-class outdoor recreation opportunities, and towns with a long history of ranching, logging, and gold, silver, and uranium mining. The vegetation type and cover, precipitation, and geomorphologic characteristics vary markedly from the headwaters to its confluence with the Dolores River. Despite its relatively low population, the watershed's water quantity and quality are and will be impacted by changing residential and commercial development, historic mining, agriculture, and climate change. Preliminary evaluations conducted in the 2021 San Miguel River Non-consumptive Needs Assessment report show that ecosystem services have not been at risk in the past, but changing climate increases the susceptibility to hydrologic challenges in the future. To ensure that the watershed is resilient to climate change, the community and its stakeholders have identified a need for advanced numerical tools to inform conservation and drought contingency plans. Specifically, the community has identified the need to quantify impacts to the complete hydrologic system due to changing climate, land use, and water management, and to evaluate the most effective conservation and management strategies that will ensure a resilient ecosystem and water supply in the future. Additionally, the community stressed the need for a tool that is capable of integrating dynamic weather inputs, modeling complex subsurface hydrogeologic conditions, evaluating the effects of changing land use/cover, and creating effective drought management and conservation planning. Finally, this project will be used as platform to build capacity of users in the San Miguel watershed and beyond to carry out future analyses on their own. This element is addressed in Task 3, below.
The proposed Water Plan grant would fund the following tasks to achieve the stated goals above:

Task 1 - Develop an Integrated Hydrologic Model. The San Miguel Watershed Coalition (SMWC) and its partners propose using DHI's physically based, climate-driven, hydrologic/hydraulic software code, MIKESHE to construct a fully-integrated (surface water-groundwater-climate) model of the entire San Miguel watershed system. MIKESHE has been used extensively throughout the southwestern US and internationally on a broad range of water resources problems. The stand-alone surface water hydraulic part of the code, MIKEHydro, is FEMA-approved for flood studies. MIKESHE simulates a wide range of distributed output at flexible temporal scales (minutes to years), including stage and flows in wetlands/streams, vertical soil moisture, infiltration, soil evaporation, plant transpiration, snow storage/melt, complex 3D aquifer flow, seepage, and coupled stream-aquifer flow. MIKESHE can simulate impacts of climate change, irrigation (diversions, leakage, applications and return flows), complex hydraulic structures and operations (related to water efficiency, conservation, and green infrastructure), and integrated water quality (i.e., stream temperatures, sediment, and metal concentrations).

Last Updated: May 2021

Task 2 – Use the Model to Improve Understanding of Integrated System Hydrology. A MIKESHE model of the San Miguel watershed provides stakeholders with a robust, active water management tool that a) will improve understanding of fundamental integrated hydrologic system behavior and controlling factors, b) be able to predict a range of current and potential future impacts due to climate change, fires, floods, extended droughts, water quality degradation, and development, and c) can be used to help design and assess alternative engineering or conservation approaches that will allow resource managers to make informed choices to help ensure the basin is resilient against climate change.

- **Task 2a. Model Future Climate Scenarios**. A range of future scenarios will be simulated to provide a detailed understanding of how both surface flows, soil moisture, evapotranspiration, and groundwater flows change under future climate change projections.
- **Task 2b. Simulate Wildfire Impacts**. SMWC also proposes to simulate a land use modification scenario involving post-fire changes in the Beaver Creek sub-watershed. Beaver Creek was selected because of its central location, complex geography, land ownership, water use and land use, and because this watershed includes the Gurley Ditch, which supplies water to Farmers Water shareholders, including the Town of Norwood. Beaver Creek canyon also contains a natural gas pipeline to Wrights Mesa and Norwood, where development of a conditional water right and associated pipeline has been proposed to pump water from the main-stem San Miguel to augment Norwood's municipal water supply.

Task 3. Public Outreach. The public outreach component of this project will include three activities. First, in partnership with the Colorado School of Mines, SMWC will develop an internship that will train a graduate student on integrated hydrologic modeling to ensure local talent is available to address the ever-increasing stresses of climate change on our watersheds. Second, presentations to local stakeholders will be conducted by the team to present the findings of the project and the modeling results. Third, a week-long workshop will be conducted to train interested local and regional stakeholders on integrated hydrologic modeling.
SMWC will work in close coordination with local stakeholders to design and request future model simulations to understand how changes in land use, climate, pollution, remediation, and other factors will affect future water quality and quantity in the watershed. SMWC plans to use the modeling tool to support future projects in all categories of the CWP (Agriculture, Conservation, Land Use, Water Storage/Supply, Recreation/Environment).

Project Objectives:

1) Improve the understanding of the hydrologic condition and functioning of the San Miguel watershed, including the spatial and temporal interplay between groundwater and surface water resources.
2) Use the hydrologic modeling tool to identify and quantify areas and river reaches are most at risk of impacts from drought and flooding due to the changing climate, building on the work of the San Miguel Environmental and Recreational Needs Assessment (Lotic Hydrological, 2021).
4) Use the results from the modeling effort to help prioritize the most effective mitigation and restoration measures for the watershed.
5) Increase stakeholder engagement and understanding of the hydrological risk of wildfire in the watershed and identify the most effective wildfire and post-fire hazard mitigation measures in the Beaver Creek subwatershed.
6) Present findings of climate and wildfire effects on hydrology of the watershed to stakeholders.
8) Increase technical modeling capabilities in Southwest Basin and greater Rocky Mountain/Southwest region by hosting a modeling training.
7) Develop in-house technical expertise at the San Miguel Watershed Coalition for future use of the model to: advance the projects listed in the San Miguel Partnership's Strategies and Initiatives for Meeting San Miguel Water Use Needs (2022); assist in long-term development of water projects and conservation with SMWC stakeholders; and understand wildfire and post-hazard risks across the watershed.

Last Updated: May 2021

Tasks
Task 1 - Develop and calibrate a watershed-scale, integrated hydrologic model.
Description of Task:
Model Development/Calibration. Before evaluating where water conservation strategies might best be applied within the complex surface-subsurface San Miguel River hydrologic system, detailed information on the surface and subsurface flow system, and all inflows, outflows, internal storage dynamics, must be characterized, quantified and understood at an appropriate level. Existing watershed models of the system do not provide this level of detail. For example, groundwater baseflow and interaction with surface flows are not included in existing models, yet these elements are critical to designing conservation mitigation measures that will effectively address the depletion of regional groundwater supplies resulting from extended droughts and climate change. The goal of this task is to create and calibrate an integrated surface water-groundwater model of the entire San Miguel watershed. The SMWC and stakeholders propose using the climate-driven, hydrologic/hydraulic software code MIKESHE, offered by the Danish Hydrologic Institute (DHI), to construct the fully integrated model. This modeling tool simulates a wide range of hydrologic problems and provides detailed outputs for all system hydrologic processes, including wetlands/channel flows, soil moisture, complex aquifer flows, and discharge to streams, wetlands, and springs. The tool can simulate river diversions and irrigation applications, complex hydraulic structures and operations, evapotranspiration, dust-on-snow events, and integrated water quality (i.e. stream temperatures, sediment, and metal concentrations). The model will build on the 2021 Environmental and Recreational Needs Assessment conducted by Lotic Hydrological using the Colorado Water Conservation Board simulation model StateMod. MIKESHE will improve simulation of stream-aquifer flows, particularly groundwater baseflow contributions to surface flows. It will also explicitly incorporate a subsurface aquifer framework, based on available data and conceptualization, that will govern losing and gaining river reaches and ditches and the impacts of all specified groundwater pumping. Calculating dynamic and distributed groundwater-aquifer flows in detail -- and modeling how these are affected by irrigation, pumping, and changing land use and climate -- are critical to supporting conservation and land use planning efforts.
Method/Procedure:

Last Updated: May 2021

Data Collection/Database. The first step is to compile all available spatial/temporal surface and subsurface hydrologic and hydrogeologic datasets into a comprehensive Geographical Information System (GIS) project database that will be managed by SMWC. This dataset will be made available for public download. Example datasets are summarized in Table 1.

Table 1. Environmental datasets and sources used to create the baseline San Miguel watershed model.

Dataset	Source
Topography	10m Digital Elevation Model.
Surface hydrologic drainage network	Already defined in MIKEHydro using 60-m data.
Soils	USDA-SSURGO or other appropriate dataset for the area
Vegetation distribution	National Land Classifications/Landfire datasets
Spatially distributed, sub-daily (hourly) Climate Data	Precipitation, Air Temperature and Reference ET will be obtained from NASA's National Land Data Acquisition System (NLDAS).
Leaf Area Index	MODIS satellite LAI 4-, or 8-day Average, 1 km spacing and major Veg Types
Surface and subsurface geology and hydrogeologic properties	Surficial Geologic maps (USGS and Colorado Geological Survey), well locations, completions, aquifer testing, geologic/geophysical borehole logs (from state engineer, Oil & Gas commission, DOE etc.).
Groundwater levels seep/springs	USGS NWIS/national spring database/other
Observed streamflow	USGS NWIS; other local gage sites
Baseline water quality	At limited locations, using water quality data collected by SMWC

Characterization and Conceptualization. In the next step, the data are reviewed and used to produce secondary hydrologic and hydrogeologic characterizations (3D aquifer/aquiclude hydrostratigraphic configurations, groundwater potentiometric surfaces for each aquifer unit, etc.). These characterizations are then used to define a 3D integrated conceptual flow model for the entire system that describes how water enters the system (distributed precipitation, snow etc.), flows through it, and discharges from it (baseflows, actual evapotranspiration etc.). This conceptualization is used as the basis for constructing the numerical model, using either raw or interpreted datasets.

Model Calibration. The model will be calibrated against all available data from multiple years of varying hydrologic conditions, including gaged stream and ditch flows, groundwater water level elevations, seep/spring flows, actual evapotranspiration (https://eeflux-level1.appspot.com/), and snow-course data (snow water equivalent; using SNOTEL, global historical climatology network – GHCN [https://www.ncei.noaa.gov/products/land-based-station/global-historical-climatology-network-daily], and CoCORaHs [https://www.cocorahs.org/]). Key calibration targets for this effort will depend in large part on

the availability of baseline observational monitoring data. Calibration will focus on and prioritize areas most affected by land use changes, and, where possible, where water conservation efforts are likely to occur.
Calibration Sensitivity Evaluation. As part of calibration, a sensitivity evaluation will attempt to identify and rank the most important/sensitive model inputs controlling system response (especially of greater land use impacts and future water conservation efforts), including:

- Key surface and subsurface parameters (i.e,. aquifer properties, stream-aquifer leakage)
- External climate
- Recent land use.

Through the calibration process, areas of lower model calibration performance will indicate where underlying data gaps are present, and/or the areas of poor characterization/conceptualization that will require further evaluation. Importantly, any calibration 'error' must be translated into uncertainty in predictions (i.e., a range of possible predicted system conditions). Any simulations of conservation measures must then address/report a range of equally plausible results. Other available tools or evaluations simply will not provide this level of detail and complexity in predicting the nature and range of benefits of conservation measures.
The model will also be used to assess the sensitivity of system flows and storage dynamics to recent land use practices (e.g., irrigation, diversions, groundwater pumping). The sensitivity of individual land use impacts on regional and local-area integrated system hydrologic response will be assessed to the following:

- Groundwater pumping
- Irrigation (diversions, canal leakage, field application, tailwater runoff)
- Urbanization/imperviousness, routing.

Data Gaps. A review of the data collection and synthesis and the results of model calibration will reveal where gaps in data are present. SMWC will identify types and areas where data gaps exist and provide recommendations on where data, data types, and collection frequency can be collected to further improve calibration and reduce uncertainty in predictions.

Deliverable:

The products from Task 1 will include hydrologic and hydrogeologic data gathered for model development listed in Table 1 and maps and figures generated by the model. The data will be housed in a central location hosted on SMWC's website, for all stakeholders to easily access for free. We will produce detailed maps and figures demonstrating the results of model calibration and depicting how surface water flows, especially baseflows, have changed over time. The maps and figures will also be stored on SMWC's website and will be used in the workshop described in Tasks 3.
Once calibrated, we will post-process the substantial amount of output into meaningful, detailed spatial plots, animations, and graphical time series/charts that convey how simulated output like groundwater recharge, groundwater levels, and streamflow vary over the entire coupled hydrologic system, in response to every storm event over a period of many years. We will use post-processed output to evaluate and document the existing range of system responses to historical climate conditions. These simulations will be geared toward gaining an improved understanding of the baseline hydrology, water quality, and ecology of the San Miguel watershed, providing a sound understanding to build a conservation and drought contingency plan.

Tasks

Task 2A – Quantifying water availability under future climatic scenarios.

Description of Task:

Last Updated: May 2021

Using the calibrated baseline model from Task 1, we will simulate a range of future climate scenarios over the entire watershed to understand how system hydrologic conditions could shift under a changing climate (affecting air temperature, precipitation, and reference evapotranspiration). These scenarios will focus on showing sensitivity of system flows and water balance to future climate change, with emphasis on changes in stream-aquifer baseflows (low flow periods).

Method/Procedure:

We propose to conduct climate change scenarios with the regional calibrated MIKESHE San Miguel Watershed model using data generated from the ClimateNA software, based on data from PRISM and WorldClim for current climate, and downscaled data from the Coupled Model Intercomparison Project Phase 6 (CMIP6) database corresponding to the 6th International Panel of Climate Change (IPCC) Assessment Report (AR6) for future projections (AdaptWest Project, 2021). Datasets include ensemble projections averaging 13 CMIP5 models and 9 individual AOGCMs for different emission scenarios (SSP1-2.6, SSP2-4.5, SSP4-6.0 and SSP5-8.5) for projections over 2050s, 2080s (individual) and 2041-2070 and 2071-2100 (ensembles). Monthly changes to hourly MIKESHE model input datasets (i.e., air temperature, precipitation, and reference evapotranspiration) will be generated from the downscaled monthly GCM projections. Up to three climate scenarios will be selected for use in simulating future MIKESHE conditions, and we will attempt to bracket the high and low range of projected GCM changes in air temperature and precipitation to produce a range of possible changes in system hydrology.

Deliverable:

We will generate detailed maps and figures to show the simulated changes in various model outputs, including but not limited to stream flows, groundwater levels, evapotranspiration, water balances and springs/wetlands. A description of the approaches used, and the maps and figures will be incorporated in the biannual progress reports and the Final Report submitted to CWCB. The maps and figures will also be incorporated in the presentation for stakeholders and academic institutions.
We will also produce a peer-reviewed manuscript for publication, in collaboration with the graduate student intern (see Task 3), outlining the process so that it is repeatable in other watersheds.

Tasks

Task 2B – Create a higher resolution sub-watershed model to examine wildfire risk.

Description of Task:

Last Updated: May 2021

The wildfire "season" now extends throughout the year in many parts of the western US, and the San Miguel watershed has varying degrees of wildfire risk and recovery potential. For this task we will create a higher resolution, sub-watershed model and use it to improve our understanding of detailed hydrologic/hydraulic response to post-wildfire and wildfire mitigation under varying climatic scenarios. Dr. Jason Sibold of Colorado State University, a forestry expert with extensive local experience, will support this task. The results will provide resource managers with more detailed information to improve decisions aimed at increasing the watershed's resilience to a changing climate. The more detailed modeling will also identify key forested areas best suited for wildfire mitigation.

Method/Procedure:

The climatic outputs from Task 2A will be combined with developed wildfire and wildfire mitigation scenarios to understand which areas are at highest risk from post-fire flooding and where wildfire mitigation would be most beneficial.
Wildfire scenarios can be developed by evaluating changes in Leaf Area Index (LAI) from local, relevant fires via the MODIS satellite. Reference values for a range of wildfire intensities will then be generated and applied to the Beaver Creek forested vegetation. Similarly, to create wildfire mitigation scenarios, basal area pre and post treatment will be collected from LiDAR data in a local and relevant watershed that has had wildfire mitigation. An empirically derived coefficient will be derived to relate basal are to LAI, so that representative reductions can be simulated in the Beaver Creek sub-watershed. Recent projects using MIKESHE modeling (e.g., for Flagstaff AZ pre-fire treatment/post-fire evaluations) indicated that additional inputs need to be changed in the model (i.e., surface resistance, soil hydraulic properties, layering, vegetation properties such as types, roots, detention storage, etc.). Another critical element in terms of improved simulated response is to burn severity maps into the sub-watershed model.
The sub-watershed model that simulates pre-/post-fire impacts can translate the changes in flow (both surface and subsurface) into the regional flow model, and the regional model can then translate these watershed changes to rest of system.

Deliverable:

We will generate detailed maps and figures outlining key infrastructure at risk from post-wildfire flooding and where mitigation measures will be most effective. We will also generate figures showing how wildfire mitigation may increase snow accumulation and retention, as well as water availability due to decreased transpiration. A description of the approaches used to create the higher-resolution sub-watershed model and the wildfire risk and mitigation scenarios will be incorporated in the biannual progress reports and the Final Report submitted to CWCB. The maps and figures will also be incorporated in the presentation for stakeholders and academic institutions.

Tasks

Task 3 – Public Outreach

Description of Task:

Last Updated: May 2021

The community and educational outreach components of this project will have three goals. First, we seek to train a graduate student in the use of integrated modeling tools so the State of Colorado is developing a workforce capable of tackling the range of water resource challenges to come. Second, we seek to communicate the benefits of integrated modeling tools for local stakeholders within the San Miguel watershed, as well as other representative community and watershed groups throughout the state of Colorado. Third, we aim to train local and regional stakeholders to run the model and create their own scenarios. We will accomplish these goals through three complementary activities.

Towards the first goal, this project will fund an internship through a regional university (Colorado School of Mines), through which a graduate student will become trained in developing and using integrated hydrologic modeling tools to evaluate watershed response to climate and land use changes. As part of this University partnership, we hope to also demonstrate the utility of these tools more broadly through university departments. As part of our outreach efforts, we have identified and communicated with professors from local and regional colleges and universities (Fort Lewis, Western Colorado University, University of Colorado – Boulder, Colorado School of Mines). Our approach to building the technical workforce is to work with the professors to identify an appropriate course or set of students that would most benefit from learning how to use the tool.

Second, the team will present the finding of the project and the modeling results to local stakeholders that have expressed an interest in the effort and have contributed letters of support and, in some cases, in-kind and cash funding (see Exhibit A). When the stakeholder representatives see the results of the modeling effort and the scenarios evaluated, it will be easier for them to visualize additional scenarios and evaluations that could be run using the model.

Third, using the San Miguel watershed model as an example, we will organize and host a week-long workshop to demonstrate the benefits and potential applications of this type of tool for assessing conservation and land use projects in other basins. The workshop will be targeted toward the local and regional stakeholder groups that might use these tools in the future, including watershed coalitions, NGOs, agricultural interests, and water managers. The workshop will cover the following topics:

- Watershed needs
- A general introduction to integrated hydrologic modeling and the MIKESHE code/capabilities
- Development and calibration of the San Miguel model
- In-depth system complete hydrologic flows/storage response dynamics to distributed, long-term, hourly climate variations
- Sensitivity of hydrologic flow system to land use and development
- Results of selected scenarios

Method/Procedure:

Last Updated: May 2021

A professor from the Colorado School of Mines has agreed to donate her time to the project and will work with our team to identify a graduate student intern in her program who will work with us throughout Task 1 to help build the model. The costs for the graduate student intern are identified in the budget in Exhibit A. Through our extensive interaction with the student, they will learn how to accomplish the work required to build and calibrate and MIKESHE model, including: data collection for model inputs, characterization and conceptualization, model calibration, and evaluation of calibration sensitivity.

Our outreach will also include presentations of the modeling results to local communities and stakeholders. Part of this outreach will include gathering requests for additional scenarios and evaluation of proposed mitigation measures that would improve land and water conservation in the watershed.

The results from the previous two tasks will be incorporated into a workshop aimed at local stakeholders that will be led by Dr. Bob Prucha, and the entire technical team working on the proposed project will engage with the workshop participants. The list of partners in Exhibit A who have contributed letters of support and funding will be invited to attend the workshop, which will likely be held at Fort Lewis College and in Norwood and include remote attendance capability. The workshop will also be open to resource managers, counties, towns, federal and state land managers, private landowners, business interests, and nonprofit organizations. A week-long workshop will include the following topics:

1. Watershed needs
2. Introduction to integrated modeling tools
3. San Miguel datasets/GIS
4. 3D conceptualization and model development/assumptions
5. Calibration performance
6. Sensitivity evaluations
7. Climate change evaluation
8. Local-scale sub-catchment treatment/post-fire evaluation
9. Conclusions and next steps
10. Discussion.

A week-long workshop will provide much more capacity building than a shorter course, will include continuing education credit certificates, and will very likely gain more attendees, especially from agency staff and universities to learn MIKESHE and the details and results of San Miguel MIKESHE model. The week-long workshop will also provide additional capacity locally and could be offered free to attendees. If such a course were offered by DHI, for comparison, each attendee would be charged thousands of dollars to attend. Importantly, DHI would provide continuing education certificates. Participants would bring their own laptops, we would provide the model just created, and we would run through the output and conduct hands-on exercises. DHI would also provide the software, but the course would be conducted outside the auspices of DHI. The week-long workshop offers a way to increase capacity building at low cost – and to gain further engagement with the wider academic and agency communities. We propose to hold the first two days of the workshop at Fort Lewis College, which has offered their facilities, and the last three days of the workshop in Norwood at the Lone Cone Library, which has high-speed internet and would allow for a part-day fieldtrip to visit sites examined in the San Miguel watershed model.

Deliverable:

Our collaboration with Colorado School of Mines will result in a graduate student earning a part of their degree. As noted in Task 2A, the student will assist the team in preparing a paper for publication in the peer-reviewed literature. Ideally the paper will be published in an open-access journal to allow access to all interested parties. Costs for open-access fees are included in the budget.

Presentations to the stakeholders will be created and conducted by the team and will be make available on the SMWC website. An integrated list of requested future scenarios and land and water conservation measure evaluations will be created and also made available on the SMWC website and made available to all stakeholders.

The workshop will be recorded, and the agenda and course materials will be made available to those who participate in the workshop.

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

Last Updated: May 2021

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.

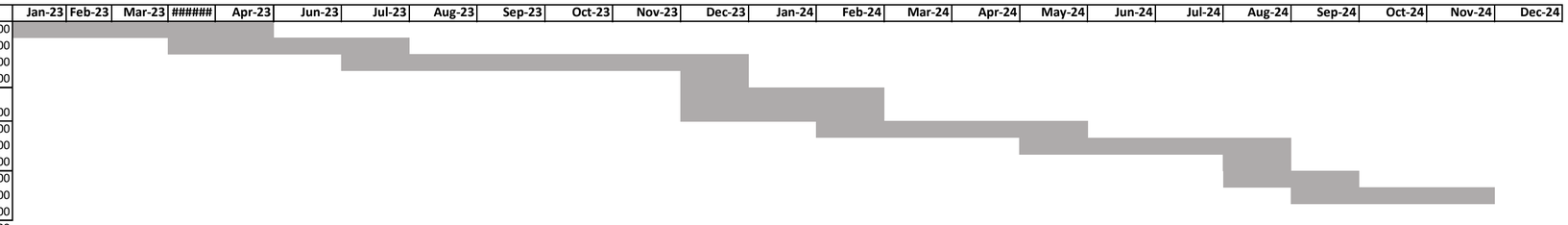
Costs incurred prior to the effective date of this contract are not reimbursable. The last 10% of the entire grant will be paid out when the final deliverable has been received. All products, data and information developed as a result of this contract must be provided to as part of the project documentation.

Performance Measures

Performance measures for this contract shall include the following:
(a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in Exhibit C. Per 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 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 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.

Combined Budget and Schedule for Project Tasks

Task Description	Sub-task	
Task 1 – Develop and calibrate a watershed-scale, integrated hydrologic model.	Data collection and GIS synthesis	$52,000.00
	Data gathering for current climate	$10,000.00
	Calibrate regional model	$39,000.00
	Progress reports	$3,000.00
Task 2 – Simulate changing hydrologic conditions under future climate scenarios (Task 2A). Create a higher resolution sub-watershed model to examine hydrologic response to wildfire and wildfire mitigation (Task 2B).	Develop and process regional climate scenario	$29,000.00
	Calibrate sub-watershed model	$15,000.00
	Develop and run wildfire burn and	$39,000.00
	Progress reports	$3,000.00
Task 3 – Present findings to local stakeholders. Help build workforce in SW colorado through a intigraded modeling workshop.	Create and give presentations for	$12,000.00
	Integrated hydrologic modeling workshop	$14,500.00
	Prepare final report and publications	$34,000.00
	Task 1 Subtotal	$104,000.00
	Task 2 Subtotal	$86,000.00
	Task 3 Subtotal	$60,500.00
	Total Budget	**$250,500.00**



Funding Partner	Amount	kind
District	$30,000	Cash
Town of Telluride	$10,000	Cash
San Miguel County	$10,000	Cash
Montrose County	$10,000	Cash
Town of Mountain Village	$10,000	Cash
Town of Norwood	$2,500	Cash
Town of Ophir	$1,000	Cash
Town of Naturita	$500	Cash
Fort Lewis College	$2,500	In-kind
Colorado School of Mines	$10,000	In-kind
SMWC Technical Project Team	$14,000	In-kind
Total Matching Funds	***$74,000***	
Total In-Kind Support	***$26,500***	
Total Matching Funds	***$100,500***	

Date	Meeting Length	Adrian Bergere, SMWC	Dr. Jake Kurzweil, MS	Dr. Bob Prucha, Integrated Hydro Systems L	Dr. Ann Maest, Buka Environment	Description
8/30/2021	1	1	1	1	1	Project Team Meeting
9/13/2021	1	1	1	1	1	Project Team Meeting
10/28/2021	1	1	1	1	1	Project Team Meeting
11/2/2021	1	1	1	1	1	Project Team Meeting w/Stacy Beaugh, San Miguel Partnership
11/3/2021	1	1	1		1	Jake and Adrian meeting with Chris Sturm (CWCB)
11/9/2021	1	1	1	1	1	Project Team Meeting
11/15/2021	1	1	1	1	1	Project Team Meeting
12/15/2021	1.5	1		1	1	Project Team Meeting
1/10/2022	1	1	1	1	1	Project Team Meeting
1/25/2022	1	1	1	1	1	Meeting w/Mickey O'Hara at TNC
2/8/2022	1	1	1	1	1	Project Team Meeting
2/11/2022	1	1	1			Meeting with Town of Mountain Village
2/23/2022	1.5	1	1	1	1	Project Team Meeting
3/1/2022	1.5	1	1	1	1	Project Team Meeting
3/21/2022	1	1				Meeting w/Steve Wolff, SWCD
3/23/2022	1.5	1	1			Meeting w/Mickey O'Hara at TNC
3/29/2022	1.5	1	1	1	1	Project Team Meeting
4/13/2022	1.5	1	1	1	1	Project Team Meeting
4/19/2022	1	1				Meeting w/Norwood Mayor, Cany Meehan
4/27/2022	3	1				San Miguel County BOCC Work Session Presentation
4/28/2022	1	1	1			Meeting w/Dr. Jason Sibold at CSU discussing fire modeling
5/16/2022	2	1				Montrose County BOCC Work Session Presentation
5/18/2022	1	1	1	1	1	Project Team Meeting
5/19/2022	1	1	1			Meeting w/Chris Sturm, CWCB
5/19/2022	1	1	1			Town of Mountain Village Council Meeting
6/3/2022	1.5	1	1	1	1	Project Team Meeting
6/14/2022	1	1				Town of Telluride Council Presentation
6/18/2022	1	1	1	1	1	Project Team Meeting
6/28/2022	1.5	1	1	1	1	Project Team Meeting
5/9/2022	2	1				Naturita Board of Trustees Presentation
5/9/2022	1	1				Norwood Water Commission Presentation
5/10/2022	2	1				Town of Norwood Board of Trustees Meeting
4/19/2022	3	1				Meeting w/Town of Nucla and Town of Norwood
3/30/2022	2	1				Telluride Ecology Commission Meeting

Personnel	Adrian	Jake	Bob	Ann
Total Hours	46	26.5	21.5	22.5
Subtotal In-Kind	$2,300	$2,915	$4,300	$4,500

Total In-Kind **$14,015**

TOWN OF TELLURIDE

OFFICE OF THE TOWN MANAGER

June 17, 2022

Colorado Water Conservation Board

1313 Sherman St. Room 721

Denver, CO 80203

Dear Colorado Water Conservation Board Members,

Please accept this letter from the Town of Telluride supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures. The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand baseflow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

We believe that the SMWC's model of the San Miguel watershed will be particularly useful in the Town's future decision-making related to our water and wastewater operations along with planning of our wetland and ecological preservation efforts in particular and are thrilled to see the project move forward.

The Town of Telluride is committed to providing $10,000 in financial assistance to this important initiative as approved by the Telluride Town Council on June 14, 2022.

Sincerely,

Scott Robson

Scott Robson

Telluride Town Manager

P.O. Box 505
222 East Main St.
Naturita Co. 81422

Phone: (970) 865-2286
Fax: (970) 865-2815
Email: thnaturita@nntcwireless.com

June 20, 2022

Colorado Water Conservation Board

1313 Sherman St. Rm 721

Denver, CO 80203

Re: San Miguel Watershed Coalition Hydrologic Modeling

To Whom it May Concern;

The Town of Naturita, as a major stakeholder in the San Miguel River, is very excited to support the endeavors of The San Miguel Watershed Coalition in their project to use MIKE SHE as a method for modeling our river. This tool will be valuable for generations to come as it will help to preserve the health, environment and wetlands of our watershed as well as gaining valuable insight into drought and fire damage.

Studying the hydrology dynamics of one of the only untamed rivers in the country, will benefit everyone from the ranchers and farmers to the rafters, fishermen, and birders. The Town of Naturita most definitely has an interest in monitoring the climate changes, baseflow and understanding of our aquifer configurations. As we lean more to tourism for our revenue, the San Miguel is paramount in providing the basic water attraction. It goes without saying that our drinking water also comes from that river and to ensure our citizens are provided for, we must be informed on the water source.

Therefore, the Town of Naturita has committed $500 to SMWC as a partner in developing this powerful tool. We sincerely hope the CWCB will also become a partner in funding this hydrologic model of the San Miguel River.

Thank you and kind regards,

X

Eugene Greenwood
Mayor

NORWOOD WATER COMMISSION
1670 NATURITA STREET
P.O. BOX 528
NORWOOD, COLORADO 81423
(970) 327-4288 · (970) 327-0451 FAX

June 22, 2022

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

Dear Colorado Water Conservation Board Members,

Please accept this letter from Norwood Water Commission supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures. The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand base flow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

The Norwood Water Commission recognizes this project has the potential to assist those in the San Miguel Watershed Coalition to continue to make decisions that will foster wildlife restoration and will promote river and forest health.

Norwood Water Commission supports this project and foresees the completed model becoming a tool that will be very helpful in planning for the future of the Wrights Mesa area.

Sincerely,

Ronald Gabbett

Ronald Gabbett, Chairman
Norwood Water Commission

June 21, 2022

TOWN OF NORWOOD

P.O. Box 528
1670 Naturita Street
Norwood, Colorado 81423
www.norwoodtown.com

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

Dear Colorado Water Conservation Board Members,

Please accept this letter from Town of Norwood supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures. The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand base flow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

This project has the potential to unite the many water entities within our area and will provide information for strategic future planning and sustainable growth. The Norwood Board of Trustees is excited to be a partner by committing $2500.00 to the modeling project.

Sincerely,

Candy A. Meehan, Mayor
Town of Norwood

Kaitlin J. Mattos, Assistant Professor
Department of Environment and Sustainability
Fort Lewis College, Durango, CO
kjmattos@fortlewis.edu, office phone (970) 247-6055

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

June 28, 2022

Dear Colorado Water Conservation Board Members,

Please accept this letter from Fort Lewis College supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

As an environmental scientist working in the Southwest, it is clear that we need multi-faceted tools capable of simulating complex hydrologic scenarios to create conservation and water resource management plans. As a professor at Fort Lewis College (FLC), I am committed to fostering capable scientists to address current and future environmental issues. The SMWC proposal to develop an integrated hydrologic model of the San Miguel watershed, and run a workshop directly addresses the needs of our local stakeholders.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to quantify baseflow conditions under projected climate scenarios. SMWC's modeling tool will directly quantify water availability at a high temporal and spatial scale, providing the community with an advanced tool to make conservation and water resource management decisions. By partnering with universities across the state, and hosting a workshop at FLC, we will be continuing to build the skilled labor force needed to answer challenging questions and our remote communities will benefit by directing academic resources to the watershed. This proposal will also provide substantial benefits to FLC students and faculty by offering an opportunity for hands-on modeling training, networking opportunities, and real-world examples of how students can solve problems in water conservation and drought planning beyond the college classroom.

I am pleased to commit institutional and in-kind support from FLC if this proposal is funded in the amount of $2,500, including my time to assist with the workshop planning and attendance as the FLC liaison and other support as needed.

Thank you for considering this proposal.

Sincerely,

Kaitlin J Mattos

Kaitlin J. Mattos

SHAVANO CONSERVATION DISTRICT

102 Par Place Ste#4, Montrose, Colorado 81401 Office (970) 964-3584

May 31, 2022

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

Dear Colorado Water Conservation Board Members,

Please accept this letter from Shavano Conservation District supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures. The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand baseflow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

The Shavano Conservation District has recently merged with the San Miguel Conservation District and serves agricultural producers in San Miguel County and the lower reaches of the San Miguel watershed. It is the view of the Conservation District (board members) that by supporting the development of this modeling tool, we can then utilize data produced to provide more valuable and relevant support to the private landowners, concerning irrigation water management, soil health, and other natural resource concerns in our district. Our hope is that with technology like this, there will be an increase of efficiency and effectiveness as State and Federal dollars for cost-share programs, such as EQIP funding through NRCS, can be targeted and prioritized to help the most critical projects get accomplished on the ground. Some examples of projects we hope to encourage as a Conservation District, relative to water conservation would include: better diversion and on-farm delivery, piping and/or lining of ditches and canals, use of gated pipe, sprinklers, drip systems, and other water-saving irrigation techniques. In addition to

SHAVANO CONSERVATION DISTRICT

102 Par Place Ste#4, Montrose, Colorado 81401 Office (970) 964-3584

irrigation infrastructure, we also anticipate this technology will assist us in prioritizing lands that would benefit from soil health practices, increasing water-holding capacity and drought resilience.

The Shavano Conservation District offers this letter of support to the San Miguel Watershed Coalition's modeling project, and will look for opportunities, within our current program budgets and plans of work, to be active partners. We would welcome ideas for collaboration as the modeling tool is completed, and communication and implementation is desired with private agricultural producers.

Sincerely,

Ken Lipton

Ken Lipton
Board President
Shavano Conservation District

P.O. Box 505
222 East Main St.
Naturita Co. 81422

Phone: (970) 865-2286
Fax: (970) 865-2815
Email: thnaturita@nntcwireless.com

June 20, 2022

Colorado Water Conservation Board

1313 Sherman St. Rm 721

Denver, CO 80203

Re: San Miguel Watershed Coalition Hydrologic Modeling

To Whom it May Concern;

The Town of Naturita, as a major stakeholder in the San Miguel River, is very excited to support the endeavors of The San Miguel Watershed Coalition in their project to use MIKE SHE as a method for modeling our river. This tool will be valuable for generations to come as it will help to preserve the health, environment and wetlands of our watershed as well as gaining valuable insight into drought and fire damage.

Studying the hydrology dynamics of one of the only untamed rivers in the country, will benefit everyone from the ranchers and farmers to the rafters, fishermen, and birders. The Town of Naturita most definitely has an interest in monitoring the climate changes, baseflow and understanding of our aquifer configurations. As we lean more to tourism for our revenue, the San Miguel is paramount in providing the basic water attraction. It goes without saying that our drinking water also comes from that river and to ensure our citizens are provided for, we must be informed on the water source.

Therefore, the Town of Naturita has committed $500 to SMWC as a partner in developing this powerful tool. We sincerely hope the CWCB will also become a partner in funding this hydrologic model of the San Miguel River.

Thank you and kind regards,

X

Eugene Greenwood
Mayor

NORWOOD WATER COMMISSION
1670 NATURITA STREET
P.O. BOX 528
NORWOOD, COLORADO 81423
(970) 327-4288 · (970) 327-0451 FAX

June 22, 2022

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

Dear Colorado Water Conservation Board Members,

Please accept this letter from Norwood Water Commission supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures. The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand base flow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

The Norwood Water Commission recognizes this project has the potential to assist those in the San Miguel Watershed Coalition to continue to make decisions that will foster wildlife restoration and will promote river and forest health.

Norwood Water Commission supports this project and foresees the completed model becoming a tool that will be very helpful in planning for the future of the Wrights Mesa area.

Sincerely,

Ronald Gabbett

Ronald Gabbett, Chairman
Norwood Water Commission

June 21, 2022

TOWN OF NORWOOD

P.O. Box 528
1670 Naturita Street
Norwood, Colorado 81423
www.norwoodtown.com

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

Dear Colorado Water Conservation Board Members,

Please accept this letter from Town of Norwood supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures. The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand base flow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

This project has the potential to unite the many water entities within our area and will provide information for strategic future planning and sustainable growth. The Norwood Board of Trustees is excited to be a partner by committing $2500.00 to the modeling project.

Sincerely,

Candy A. Meehan, Mayor
Town of Norwood

Kaitlin J. Mattos, Assistant Professor
Department of Environment and Sustainability
Fort Lewis College, Durango, CO
kjmattos@fortlewis.edu, office phone (970) 247-6055

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

June 28, 2022

Dear Colorado Water Conservation Board Members,

Please accept this letter from Fort Lewis College supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

As an environmental scientist working in the Southwest, it is clear that we need multi-faceted tools capable of simulating complex hydrologic scenarios to create conservation and water resource management plans. As a professor at Fort Lewis College (FLC), I am committed to fostering capable scientists to address current and future environmental issues. The SMWC proposal to develop an integrated hydrologic model of the San Miguel watershed, and run a workshop directly addresses the needs of our local stakeholders.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to quantify baseflow conditions under projected climate scenarios. SMWC's modeling tool will directly quantify water availability at a high temporal and spatial scale, providing the community with an advanced tool to make conservation and water resource management decisions. By partnering with universities across the state, and hosting a workshop at FLC, we will be continuing to build the skilled labor force needed to answer challenging questions and our remote communities will benefit by directing academic resources to the watershed. This proposal will also provide substantial benefits to FLC students and faculty by offering an opportunity for hands-on modeling training, networking opportunities, and real-world examples of how students can solve problems in water conservation and drought planning beyond the college classroom.

I am pleased to commit institutional and in-kind support from FLC if this proposal is funded, including my time to assist with the workshop planning and attendance as the FLC liaison and other support as needed.

Thank you for considering this proposal.

Sincerely,

Kaitlin J Mattos

Kaitlin J. Mattos

West Region Wildfire Council
160 S. Amelia Street
Ridgway, CO 81432
970-615-7300 / cowildfire.org

June 13th, 2022

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

Dear Colorado Water Conservation Board Members,

Please accept this letter from the staff of the West Region Wildfire Council in support of the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures. The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand baseflow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

As the Executive Director for the West Region Wildfire Council, a local nonprofit that works to promote and empower community wildfire adaptation while increasing resiliency to future

wildfire at a variety of scales, I happy to share this letter of support. We know that there are many urgent things that our community, land managers and many partners can and should be doing to mitigate the risks imposed by climate driven, uncharacteristic, high intensity and large-scale wildfire. Here in southwest Colorado, our watersheds are critical. Our hope is that with a better understanding of the hydrology within the San Miguel watershed, we can work with numerous partners and stakeholders to jointly set priorities regarding what exactly needs to be done, where that work needs to happen and how we can leverage resources, capacity, funding and skill sets to implement this very important work at a pace and scale that is commensurate with the problems and issues that we face

West Region Wildfire Council is committed to participating in this project, if and when grant funding is awarded to support the project moving forward, to whatever extent is possible for our staff. Furthermore, we are committed to continuing to bring together stakeholders and partners to collaboratively increase the pace and scale of projects and initiatives that serve to increase wildfire resilience for our communities and watershed.

On behalf of the staff and Board of Directors for the West Region Wildfire Council, we respectfully request the members of the Colorado Water Conservation Board to strongly consider the San Miguel Watershed Coalition's Colorado Water Plan Grant Application and urge those responsible for decision making to support this project to whatever extent possible.

Sincerely,

Jamie Gomez, Executive Director
West Region Wildfire Council

THE SOUTHWESTERN WATER CONSERVATION DISTRICT
Developing and Conserving the Waters of the
SAN JUAN AND DOLORES RIVERS AND THEIR TRIBUTARIES
IN SOUTHWESTERN COLORADO
West Building – 841 East Second Avenue
DURANGO, COLORADO 81301
(970) 247-1302

June 22, 2022

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

Dear Colorado Water Conservation Board Members,

On behalf of the Board of Directors of the Southwestern Water Conservation District (SWCD), I would like to express support for the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful water management tool that will improve the understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help to understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios.

The Environmental and Recreational Needs Assessment created for the San Miguel Stakeholders Group, which is the group working on the stream management plan, identified the need to understand baseflow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions.

We encourage you to give this funding request full and favorable consideration.

Sincerely,

Steve Wolff
General Manager

USDA United States Department of Agriculture
Forest Service
Norwood Ranger District
1150 Forest Street
P.O. Box 388
Norwood, CO 81423
970-327-4261
Fax: 970-327-4854

File Code: 2510
Date: June 17, 2022

Colorado Water Conservation Board
1313 Sherman Street, Room 718
Denver, CO 80203

Dear Colorado Water Conservation Board Members,

Please accept this letter from the Grand Mesa, Uncompahgre, and Gunnison National Forest supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed. SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool to improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. Identifying current conditions within the system will provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire. Results will allow for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures. The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand baseflow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

This project aligns with the GMUGs role to provide and support ecosystems critical services—such as clean water, clean air, and healthy soil—and multiple use opportunities. With more water-related special uses than any other national forest, the GMUG serves as critical headwaters. Protecting and sustaining these watersheds contributes a high-quality, local source of 1.9 million acre-feet of water that is consumed by the population of western Colorado and the southwestern part of the United States and sustains the region's ecosystems and wildlife habitat.

The Forest Service and stakeholders actively coordinate in sustaining ecological and hydrologic processes to continue to provide critical water supplies—including water quality—to

communities and water users. This project will provide a step towards identifying watershed conditions and that the integrity of public water supplies is maintained or improved.

Thank you for considering this request.

Sincerely,

MEGAN ENO

Digitally signed by MEGAN ENO
Date: 2022.06.17 13:26:01 -06'00'

cc: regina.rone@usda.gov, info@sanmiguelwatershed.org

SOUTHWEST BASINS ROUNDTABLE
C/O La Plata Archuleta Water District
PO Box 1377
Ignacio, Colorado 81137

May 5, 2022

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

Re: Colorado Water Plan Grant

Colorado Water Conservation Board,

The Southwest Basin Roundtable writes this letter to express support for San Miguel Watershed Coalition- as it requests funding for its San Miguel River Hydrologic Modeling Project. This project proposes to develop and calibrate a watershed-scale, integrated hydrologic model in order to improve the understanding of the fundamental hydrologic dynamics throughout the San Miguel watershed.

The San Miguel Watershed Coalition (SMWC) and its partners propose to use MIKE SHE, a powerful, climate-driven, hydrologic/hydraulic software code developed by the Danish Hydrologic Institute (DHI), to construct a fully-integrated model of the entire San Miguel surface-subsurface watershed system. This robust, physics-based tool simulates a wide range of hydrologic issues, is FEMA approved, and provides detailed outputs for all system hydrologic processes, including wetlands/channel flows, soil moisture, complex aquifer flows, and discharge to streams, wetlands and springs. The tool can simulate irrigation diversions and applications, complex hydraulic structures and operations, evapotranspiration, and integrated water quality (i.e. stream temperatures, sediment, and metals). A MIKE SHE model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that a) improves understanding of fundamental integrated hydrologic system behavior and controlling factors, b) can predict a range of current and potential future impacts due to climate change, fires, floods, extended droughts, water quality degradation, and development, and c) can be used to help design and assess alternative engineering approaches that can achieve specific goals.

This project supports Colorado Water Plan actions 10F(3) - Develop stream management plans for priority streams: and (4) Develop common metrics for assessing the health and resiliency of watersheds, rivers and streams.

Sincerely,

Edward Tolen
Southwest Basins Roundtable Chair

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Uncompahgre Field Office
2465 South Townsend Ave
Montrose, CO 81401

May 13, 2022

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

Dear Colorado Water Conservation Board Members,

Please accept this letter from BLM-Uncompahgre field office supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures.The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand baseflow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

The BLM is specifically interested in model results quantifying the volume of water needed to maintain a warm water fishery below the CC-Highline Ditch diversion. The BLM has documented fish kills in this reach several times during drought conditions.

Thank you for your time and consideration.

Sincerely,

Jedd Sondergard
Hydrologist
Uncompahgre Field Office

TOWN OF MOUNTAIN VILLAGE
455 Mountain Village Blvd, Suite A,
Mountain Village, CO 81435
(970) 369-8236

August 2, 2022

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

Dear Colorado Water Conservation Board Members,

Please accept this letter from the Town of Mountain Village supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures. The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand baseflow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

The Town of Mountain Village supports this project and the regional benefits it will provide. Of particular interest to the Town is the model's ability to examine and forecast scenarios regarding snowpack levels, climate change impacts, and wildfire and mitigation efforts. Outdoor recreation, particularly from the ski industry, is critical to Mountain Village's economy. This

TOWN OF MOUNTAIN VILLAGE
455 Mountain Village Blvd, Suite A,
Mountain Village, CO 81435
(970) 369-8236

model may provide scenarios that can inform the Town's future policies and climate change mitigation strategies.

Additionally, the Town of Mountain Village commits to $10,000 in cash matching funds for SMWC's grant application as approved in the Mountain Village Town Council meeting on May 19, 2022.

Sincerely,

Laila Benitez
Mayor
Town of Mountain Village

July 25, 2022

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

Dear Colorado Water Conservation Board Members,

Please accept this letter from San Miguel County (County) supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on the impacts of climate change, drought and wildfire. It will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures. The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a significant asset to water users in the San Miguel Basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand baseflow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

San Miguel County supports the modeling proposal to increase understanding of current and future water resources, infrastructure and post-fire hazards. Some specific needs of the County that may be advanced by MIKE SHE modeling include:

- Irrigation infrastructure improvements on Wrights Mesa
- Modeling post-fire and flooding hazards to HWY 145 in the San Miguel Canyon and to infrastructure along Beaver Creek
- Optimizing the installation of water data monitoring stations
- Understanding long-term trends of existing water quality/quantity data within the county
- Increasing water efficiency through County PES programs
- Understanding the effect of changing climate on water supply and runoff timing

Additionally, the County is financially supporting the development of an in-house hydrological modeling tool by contributing $10,000. The modeling will greatly benefit San Miguel County and its communities by creating an economic and accessible planning resource to expedite and implement local water projects.

Sincerely,

Starr Jamison
Natural Resources and Special Projects Director
San Miguel County

MONTROSE COUNTY
949 N 2nd Street
Montrose, CO 81401
Phone: 970-249-7755
Fax: 970-249-7761

July 10, 2022

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

Dear Colorado Water Conservation Board Members,

Please accept this letter from Montrose County supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures. The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand baseflow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

Having data driven solutions to issues in the San Miguel watershed will have wide ranging ecological and economic implications. Colorado Water Plan Grant funds are critical to the development of models to prioritize limited conservation resources in the watershed. If awarded, Montrose County pledges to contribute $10,000 towards the grant match subject to budget and annual appropriation.

Sincerely,

Keith Caddy
Chairman

Sue Hansen
Vice-Chair

Roger Rash
Commissioner

Colorado Cooperative Company

P.O. Box 231 - Nucla, Colorado 81424

July 12, 2022

To Whom It May Concern:

The Colorado Cooperative Company was incorporated in 1894 and owns and maintains the Highline Canal for agricultural and municipal water for the Towns of Nucla and Naturita.

Please accept this letter from Colorado Cooperative Company supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

We believe the SMWC's model of the San Miguel watershed will provide the agricultural community with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed.

The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users.

We understand that the initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures.

We will consider support for any projects in the watershed that do not impede the operation of or require giving up any of the water rights on the Lower San Miguel River.

The agricultural community of the West End has been farming and ranching here since the water hit Tabeguache Park in 1904. The historical weather patterns and water usage learned over the generations of these pioneers should be continually solicited as an invaluable source for projects and studies in the Watershed.

We look forward to the progress of this model and appreciate the dedication it will take from the Watershed Coalition to accomplish such a great endeavor to gather and process the data.

Sincerely,

Aimee Tooker

Aimee Tooker, Secretary/Treasurer

Colorado Cooperative Company, 970-864-7131, cccditch1894@gmail.com

P.O. Box 231

Nucla, CO 81424

TELLURIDE FIRE PROTECTION DISTRICT

John Bennett, District Chief

Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, Colorado 80203

July 29th, 2022

To the Colorado Water Conservation Board Members,

I am writing this letter in support of the San Miguel Watershed Coalition (SMWC) and their effort in to secure a Colorado Water Plan grant to develop an integrated hydrologic model of the San Miguel watershed.

The grant request will provide SMWC with a model of the San Miguel watershed to provide stakeholders with management and planning tools to better understand and manage the San Miguel watershed. It will provide baseline data and offer information to develop best practices and process to best mitigate challenges with climate change, wildfire, and flooding. By understanding the current conditions and the potential impacts caused by natural and man-made events. It will provide quality direction on how to best manage those events to protect as necessary or restore to a health status after an event. This grant will assist with the development of scenario-based problem solving and organizational priorities via modeling, design to best serve water users of the San Miguel Watershed.

This project effects our organization and the decision processes needed when wildfire occurs in the area, it also will provide data on what water resources the fire district may need to utilize during emergency situations.

Please consider the San Miguel Water Coalition and their grant application submission. This grant will assist SMWC with continued relationship building, stakeholder education, while providing data and modeling capacity to assist with informed decision abilities to better serve the San Miguel Watershed users.

Kind regards,

John S. Bennett, District Chief

PO Box 1645 ~ 131 W. Columbia Ave., Telluride, CO 81435
Phone: (970) 728-3801x 7 Fax: (970) 728-3292 e-mail: jbennett@telluridefire.com
"Protecting life, property and the environment, by responding to the emergency needs of our community"

6/29/22

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

Dear Colorado Water Conservation Board Members,

Please accept this letter from Town of Ophir supporting the San Miguel Watershed Coalition's (SMWC) Colorado Water Plan Grant application to develop an integrated hydrologic model of the San Miguel watershed.

SMWC's model of the San Miguel watershed will provide stakeholders with a powerful, living water management tool that will improve our understanding of fundamental hydrologic dynamics throughout the San Miguel watershed. The modeling tool will help us understand current conditions within the system and provide the results needed to visualize and plan for a range of possible future climate and development scenarios. The initial effort will focus on impacts from climate change, drought and wildfire and will present opportunities for examining scenarios related to agricultural water needs, water quality, ecological flows, restoration, flooding, infrastructure, land use, differing water management approaches, and the degree of success of proposed mitigation measures.The modeling tool's ability to help design and assess alternative engineering approaches to achieve specific goals will be a major asset to water users in the San Miguel basin.

The Environmental and Recreational Needs Assessment created for the San Miguel Partnership identified the need to understand baseflow conditions in the river and the role of groundwater in creating effective and resilient projects in the long run. SMWC's modeling tool will aid in this understanding and inform stakeholders and partners where more data are needed to inform future

water management decisions. Partnering with universities across the state will benefit our remote communities by directing academic resources to the watershed.

The Town of Ophir is committed to conservation and advocating for the health of the forests and rivers that surround our community. Ophir has partnered with EPA and Forest Service in identifying contaminated mines and encourages work to remediate pollutants to the watershed. The Howard Fork river in Ophir valley was awarded Outstanding Waters designation this year by the Colorado Department of Public Health and Environment. Additionally, Town of Ophir has surface springs used for municipal water with a Source Water Protection Plan in place. We are currently lacking in fundamental information about the long term viability of the springs used for our town. The information that will be obtained from SMWC's modeling will provide our municipality a more in depth understanding of the changing hydrologic conditions.

The Town of Ophir annually supports the San Miguel Watershed Coalition's Water Quality Monitoring and will additionally fund $1000 in 2023 towards the grant from Colorado Water Conservation Board to develop an integrated hydrologic model of the San Miguel watershed.

Sincerely,

Jacey Anne DePriest
Chair of Ophir Environmental Commission
Town of Ophir

APPENDICES to Integrated Hydrological Modeling of the San Miguel Watershed: A modern tool for water resource evaluations CWCB Colorado Water Plan Grant Application

APPENDIX A: References Cited in Proposal

APPENDIX B: List of San Miguel Partnership Stakeholders

Appendix C: San Miguel Partnership *Strategies and Initiatives for Meeting San Miguel Water Use Needs*

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APPENDIX B: LIST OF SAN MIGUEL PARTNERSHIP STAKEHOLDERS

Name	Affiliation
Adrian Bergere	San Miguel Watershed Coalition
Amber Clark	Dolores River Boating Advocates
April Montgomery	American Whitewater
Blake Mamich	Colorado Water Trust
Bob Gleeson	Far Flung Adventures Rafting, Dolores River Boating Advocates
Bobby Starks	Farmers Water
Brecks Richards	Tri Park Ranch
Candy Meehan	Town of Norwood
Carmen Warfield	San Miguel County Commission
Cary Denison	Trout Unlimited
Celene Hawkins	Co-Chair, The Nature Conservancy
Charlene Starks	Lone Cone Ditch
Cherri Cooper	CCC Ditch
Chris Hazen	San Miguel Conservation Foundation
Dan Cammack	Colorado Parks and Wildlife
Dave Alexander	Farmers Water
Dean Naslund	CCC Ditch
Devon Horchat	Legacy Site Management, Idarado
Earl Reams	Reams Ranch, SMWC, BCD Ditch
Adrian Bergere	San Miguel Watershed Coalition
Eric Gardunio	Colorado Parks and Wildlife
Fay Hartman	American Rivers
Finn Kjome	Norwood Water Commission
Garrett Smith	Telluride Institute
George Glasier	Silverhawk Ranch- Direct Diverter
Gwen Harris	Colorado Parks and Wildlife
Hattie Johnson	American Whitewater
Hilary Cooper	San Miguel County Commission
Jackie Brown	Tri-State Energy and Transmission
Jackie Carter	Mustang Water
Jake Kurzweil	Mountain Studies Institute
Jedd Sondergard	Bureau of Land Management
Jeff Proteau	Telluride Ski and Golf

Jesse Dudley	Backcountry Hunters and Anglers
Jim Wells	Norwood Water Commission
Joan May	American Whitewater
John Duncan	Telluride Outside
Justin Musser	Montrose County
Karen Guglielmone	Town of Telluride
Karissa Mielke	Eco Action Partners
Kate Ryan	Colorado Water Trust
Kathy Cooper	Town of Naturita
Keith Caddy	Montrose County Commission
Kenny Heldman	Co-Chair, CCC Ditch, Farmers Ditch
Kestral Kunz	American Whitewater
Kris Holstrom	San Miguel County Commission
Lance Waring	San Miguel County Commission
Laura Spann	Southwestern Water Conservation District
Linda Luther-Broderick	Landowner
Marci Demmy Bidwell	Mountain Studies Institute
Mark Caddy	Colorado Parks and Wildlife
Mark Ragsdale	Division of Water Resources
Marshall Pendergrass	Trout Unlimited, Montrose Chapter
Mason Osgood	Sheep Mountain Alliance
Megan Eno	USFS District Ranger, Norwood
Mely Whiting	Trout Unlimited, SW Basin Roundtable
Mike Grafmyer	Norwood Water Commission
Mike Fiebig	American Rivers
Mike Preston	SW Basin Roundtable, Dolores Water Conservation District
Mikey O'Hara	The Nature Conservancy
Montana Cohn	RiversEdge West
Monte Naslund	Southwestern Colorado Conservation District
Randy Harris	Norwood Water Commission
Rusty Lloyd	RiversEdge West
Ruthie Boyd	Sheep Mountain Alliance
Ryan Unterreiner	Colorado Parks and Wildlife
Sandy Ragsdale	Division of Water Resources
Sara Bachman	Town of Nucla, Town of Naturita
Sarah Carlisle	Tri-State Energy and Transmission
Seth Mason	Lotic
Shannon Wadas	RiversEdge West
Stacy Beaugh	Strategic By Nature

Stan Garvey	CCC Ditch
Starr Jamison	San Miguel County Natural Resources Director
Steve Wolff	Southwestern Water Conservation District
Wilton Barrett	Farmers Ditch
Zandon Bray	Lilylands CO Farm Bureau

APPENDIX C: San Miguel Partnership *Strategies and Initiatives for Meeting San Miguel Water Use Needs*

Key:

Listed projects the San Miguel Partnership felt could be advanced by SMWC integrated MIKESHE modeling

Integrated Hydrological Modeling of the San Miguel Watershed: A modern tool for water resource evaluations

Strategies and Initiatives for Meeting San Miguel Water Use Needs

Notes reflecting recent stakeholder discussions from 2019-2022

Compiled by Lotic Hydrological

Finalized by the San Miguel River Partnership on June 16, 2022.

Table of Contents

Abbreviations

AW	American Whitewater
BLM	Bureau of Land Management
CDWR	Colorado Division of Water Resources
CPW	Colorado Parks and Wildlife
CWCB	Colorado Water Conservation Board
CWT	Colorado Water Trust
SMWC	San Miguel Watershed Coalition
TNC	The Nature Conservancy
Tri-State	Tri-State Generation and Transmission Association, Inc
TU	Trout Unlimited
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WEEDC	West End Economic Development Corporation
WQCD	Water Quality Control Division

Background

The Southwest Basin's Roundtable's 2015 Basin Implementation Plan (BIP) identified municipal, industrial and agricultural water supply needs across the southwest basins and identifies projects aimed at addressing those needs. With respect to environmental and recreational water supply needs, the BIP acknowledged a lack of information and proposes a process to (1) develop environmental and water supply needs information, and (2) evaluate opportunities to address identified needs, if any, in a cooperative manner. The San Miguel Basin was selected for a pilot project to begin implementation of this two-step process. In 2017, a draft analysis was undertaken to evaluate environmental and recreational water supply needs in the San Miguel basin. The draft was completed in April 2017. Based on feedback from public meetings, it was made clear that a more thorough stakeholder process with leadership and robust participation from agricultural water users needed to occur in order to meet the goals of having a locally supported and finalized analysis.

In 2019, the San Miguel River Partnership was convened to engage local stakeholders to review and finalize the analysis. As an additional purpose, the stakeholder group identified voluntary, multi-purpose or multi-benefit project opportunities, positioning the San Miguel stakeholders to obtain state funding for those projects.

Process

The planning process was supported from by a project team that provided leadership, facilitation, coordination and technical support. The process was funding through the Colorado Water Conservation Board, Southwest Water Conservancy District and The Nature Conservancy. The stakeholder group, self-titled the San Miguel River Partnership, was comprised of diverse water interests from throughout the San Miguel River region including agricultural water users, local, state and federal government representatives, recreational interests, conservation experts, and industry representatives. Stakeholders spent a total of three years, 12 meetings, two field trips and multiple one-on-one conversations developing a shared understanding of their watershed, sharing their diverse values and discussing possible win-win project opportunities that could address the needs outlined in the assessment.

Outcomes

Substantial outcomes to the process include:

- Finalization of the San Miguel River Non-consumptive Needs Assessment[1] in March 2021.
- Consensus on strategy areas and project opportunities (this document) in June 2022.
- Conclusion of this phase of the stakeholder process in June 2022.

Additional outcomes, as identified by stakeholders, include:

- Increase in their collective understanding of the upper and lower watershed, including the needs and dynamics of the river.
- Growth in relationships among stakeholders including a broad understanding of the diverse stakeholder values represented in the process.
- Shared interest in supporting projects that support the multi-benefit needs of the river and its users, and a continued interest in working collaboratively to support those efforts.

Moving forward, the San Miguel Watershed Coalition agreed to coordinate the activities of the stakeholder group. Goals include:

- Maintain this projects list, supporting edits or expansion as stakeholders see fit into the future.
- Help to identify project sponsors.
- Ensure projects with project sponsors are listed within the Southwest Basin Roundtable Projects List/Database.
- Provide semi-annual updates to the stakeholder group as to any progress or changes to the list.
- Maintain the stakeholder email list.
- Convene the San Miguel River Partnership stakeholder group as needed.

SMWC will be seeking funding to play this role will be assessing the relationship between the Coalition's stakeholder group and the San Miguel River Partnership stakeholders to ensure no undue overlap/confusion in the watershed while maintaining active engagement from stakeholders.

[1] https://waterinfo.org/resources/southwest-basin-roundtable/#1618327039974-dbefec6d-3beb
Click on San Miguel Basin Needs Assessment.

Strategy Areas

A. Work across user groups and interests to increase water supply resiliency for all water uses.

West-end communities desire increased water security and resiliency for municipal supplies and irrigated acreages. Large-scale options to address drought resilience concerns in the vicinity of Norwood, Nucla, and Naturita have included additional reservoir development (e.g. 'Straw Dam', Big Bucktail Reservoir), improvements to the Gurley system, and new municipal supply diversions of water from the San Miguel River. These various projects have individual advantages/disadvantages and benefits/impacts that will accrue both locally and, potentially, elsewhere in the lower San Miguel watershed.

B. Support whitewater boating and float fishing activities on the San Miguel River

Local residents and visitors to the San Miguel watershed recreate on numerous stream and river segments. Some segments are preferred by whitewater enthusiasts while others are more often used by anglers. Several navigational hazards limit or deter use of the lower San Miguel River mainstem between the Ledges Campgrounds and the Town of Naturita. Use of the lower San Miguel River by boaters and float fishermen is also limited by the lack of developed river access facilities. Increased river use in this portion of the watershed is expected to help realize the economic and local social benefits of river recreation in west-end communities.

C. Support environmental data collection and assessment efforts critical for understanding evolving stream and river health conditions

Ongoing environmental data collection and analysis efforts are critical for ensuring that stakeholders and water managers can react to changing streamflow and water quality conditions over time, and better understand how those conditions may be altered under a warming climate future.

D. Improve agricultural water conveyance and irrigation water application efficiencies.

Improving water infrastructure and use efficiency enhances resiliency for water users during periods of scarcity and may increase flexibility for and openness to multi-use/benefit water management decision-making. Recent actions by the federal government make financial support for infrastructure improvements more likely than in previous years.

E. Improve floodplain connectivity and promote riparian ecosystem health on the mainstem San Miguel River and in tributary streams.

Floodplains provide valuable ecosystems services including flood peak attenuation, baseflow regulation and groundwater recharge, infrastructure protection, key seasonal aquatic wildlife habitat, terrestrial habitat, and water temperature modulation, etc. Historical impacts to the San Miguel River geomorphology include localized disconnection and fragmentation of river floodplains from railroad or road creation, diking on agricultural and residential lands, and other activities. Reconnecting floodplains with stream channels can increase stream health and ecosystem function and improve resiliency to climate change. The health of vegetation communities on floodplains can be further enhanced by controlling and/or removing invasive species.

F. Protect and expand habitat range for native fish throughout the watershed.

Habitat range for native fish in the San Miguel watershed has decreased due to water diversions, stocking of non-natives, infrastructure development and legacy mining effects. Vulnerability to

critical population declines persists. Native cutthroat population resiliency may be improved by increasing occupied range, reducing entrainment in water diversion infrastructure, improving habitat quality and reducing competition and hybridization by non-native species in headwaters streams. Warm-water fish range may be protected or enhanced by improving aquatic organism passage and reducing dry-up points on the San Miguel River mainstem and on the lower portions of tributary streams in the western half of the watershed.

Potential Initiatives and Projects

1. Wrights Mesa Drought Contingency Planning

Strategy Areas: A

Champions: WEEDC

Stakeholders: Montrose County, Farmers Water Development Company, CDWR, Town of Norwood, TU, SMWC, AW, all west-end water users

Opportunities: WEEDC is working with a coalition of 8 organizations developing a water plan leading toward a sustainable water future for the Wright's Mesa Region. The parties recognize that by collaborating, sharing information, and supporting the needs of individual entities they are more likely to effectively, efficiently and affordably implement much needed water projects to benefit agriculture, municipal, fire-fighting/wildland mitigation, and environmental water supplies. This effort was recently awarded funding by the CWCB. The greatest benefit of this project is in its focus on bringing multiple stakeholders together to achieve a common goal. This type of cooperation and strategic approach reduces competition for limited financial support resources.

Issues for Consideration: With the recent drought, a changing climate, the need for housing and new development, as well as the realization that current infrastructure is aging and needs repairs and upgrades to accommodate growth, there is interest by the owners and managers of water resources on Wright's Mesa in collaborating to prepare for an uncertain climate and water future. With the support of long-standing stakeholders that include the Town of Norwood, San Miguel County, Norwood Water Commission, Farmers Water, the Lone Cone Ditch Company, the San Miguel Water Conservancy District, the Norwood Fire District, and the San Miguel Watershed Coalition the need for an overarching planning effort for Wright's Mesa water has been identified as the key element for creating an efficient, synergistic and organized approach to our regional water future. Successful execution of this project will depend, largely, on the ability of the project proponents to keep all stakeholders engaged and motivated. Failure to do so may limit the planning effort's ability to yield a broad set of beneficial outcomes.

2. Discussion of Montrose County Conditional Water Storage Rights

Strategy Areas: A

Champions: _____

Stakeholders: CDWR, Town of Nucla, Town of Naturita, Town of Norwood, TU, SMWC, AW, TNC, CPW, CWCB, all west-end water users, BLM.

Opportunities: Montrose County holds conditional water rights for reservoir development in the western portion of the watershed. An initial investigation of a 5,000 acre foot reservoir on Big Bucktail Creek fed by diversions through the CC-Highline Ditch has been completed. Another investigation explored an 8,400-9,100 acre foot reservoir on Maverick Draw, fed largely by irrigation return flows from the Gurley system. To the extent that new storage is developed in the western portion of the watershed, opportunities exist for discussing how stored water can beneficially impact multiple water uses.

Issues for Consideration: Montrose County has expressed interest in this concept but these are big, expensive projects. The challenges associated with implementation of this action make it a low-priority among stakeholders. Strong, multi-interest coalitions and a high level of trust between all stakeholders is required to make such a potentially-contentious conversation productive.

3. Improve/enhance seasonal boat passage and aquatic organism passage between Norwood Bridge and Calamity Draw by modifying or reconstructing water diversion systems between Cottonwood Creek and the Town of Naturita.

Strategy Areas: B, F

Champions: _____

Stakeholders: Town of Naturita (Reed-Chatfield Ditch), SMWC, AW, CPW, BLM, interested owners/water users on other diversions in the reach

Opportunities: Numerous irrigation water diversion structures on the San Miguel River between Cottonwood Creek and the Town of Naturita present navigational hazards. Previous work completed at the CC-Highline Ditch diversion may serve as an example for addressing hazards without negatively impacting water users. The Town of Naturita is currently interested in reducing maintenance burdens associated with the Reed-Chatfield Ditch system. Opportunity may exist to include boat/fish passage enhancements alongside other engineering plans for the ditch system. Stakeholders are generally supportive of this idea. It may be possible to reduce navigation hazards by simply creating a ramp of large angular stone on the downstream side of the concrete dam. If this was the initial configuration of the diversion structure, work to recreate that condition might not necessitate any additional permitting from the Army Corps of Engineers. Similar work could be considered at the other diversions in the reach if there is landowner interest. This project can be coupled with fish passage enhancements to achieve multiple benefits.

Issues for Consideration: Existing estimated costs for reducing maintenance burdens on the Reed-Chatfield Ditch are near $500K. Work to enhance boater and fish passage at the diversion dam may add tens of thousands of dollars to this total (or much more, depending on the availability of materials and the final engineering design for the work). Any preliminary design work would need to be coordinated closely with the Town of Naturita and Colorado Parks and Wildlife. The overall recreational use value of the improvements to the Reed-Chatfield Ditch diversion can only be realized after navigation hazards associated with upstream diversions are also addressed. This project is expected to somewhat expand habitat ranges for native warm-water fish species. Landowner/water user interest in pursuing similar projects on structures upstream of the Reed-Chatfield diversion is uncertain. Project costs at these locations may be higher than at the Reed-Chatfield Ditch as a result of access constraints, permitting requirements, etc. Stakeholders recently identified a need to engage in conversations with Tri-State to explore opportunities regarding the Power Plant diversion. Similar exploration opportunities with other diversion may exist for other structures on this reach.

4. Create River Maps and/or Electronic Resources.

Strategy Areas: B

Champions: _____

Stakeholders: Recreational users, outfitters, local tourism boards, Chamber of Commerce, city governments, USFS, BLM, Montrose County, San Miguel County

Opportunities: Currently, and in some locations of the lower watershed, access issues and river hazards (unpassable diversion structures, river-spanning fences) limit the potential for communities to advertise and realize the full potential of the river for social and economic benefits. Although much local river knowledge exists regarding access, private vs. public property bounds, river hazards, and navigation challenges at various flow levels, etc.; little is documented in published material or it is hard to find/access by visitors. User knowledge of the San Miguel may be enhanced locally via production of electronic or printed maps.

Issues for Consideration: Generation of an electronic map can be a relatively low-cost endeavor (~$5-15K, depending on the level of detail and amount of "new" information collected) but may be limited in its utility to users once they embark on a river trip. An electronic map may be hosted by a local government or NGO, on a publicly available website, or provided via a mobile phone app. Large-format printed maps posted at river access locations may be helpful but are not suitable for on-river navigation. Paper maps are generally more suitable for time on-river. Production of Folded maps or small guidebooks for segments of the San Miguel River and its tributaries frequented by boaters and anglers may be well received and heavily utilized by local residents and visitors. Folded maps or guidebooks may cost $5-$30 per copy, depending on development costs, page count and total number printed.

5. Post River Property Ownership and Navigational Hazard Signage

Strategy Areas: B

Champions: _____

Stakeholders: Town of Naturita, AW, SMWC, BLM, Montrose County

Opportunities: The safety of river recreation on the lower San Miguel between BLM Ledges Campground and Uravan may be enhanced with signage at river access points and along the riverbank immediately above diversion dams. This signage can alert users to downstream navigation hazards an improve river safety. Users may also benefit from posted signage along riverbanks alerting them to private and public property boundaries. This action may help reduce trespassing issues and conflicts between river users and property owners. Developing appropriate signage for hazard notification and property boundaries is relatively easy.

Issues for Consideration: Most diversions with boater passage issues in the lower watershed occur on private lands. Posting signage immediately upstream of hazards will require landowner permissions. Hazard identification via signage immediately upstream of hazards is only helpful if/when there is an opportunity to safely avoid the hazard. Several channel spanning structures on the San Miguel River are unavoidable by floating craft. There may be a more immediate need to explore opportunities with landowners for designated portage routes around such hazards. However, creation of designated portage routes may be infeasible due to concerns of trespass, liability, property damage, right of ways, non-interference with infrastructure operation, etc.

6. River Access Improvements at Uravan

Strategy Areas: B

Champions: WEEDC

Stakeholders: AW, Montrose County, Town of Naturita, Town of Nucla

Opportunities: Communities in the lower San Miguel Region are interested in diversifying their local economies by encouraging recreational uses for the San Miguel River. Recreational boating activities below Naturita are currently hampered by the limited number and/or condition of river access points. Improvements to the existing river access point at Uravan, including creation of a designated trailer accessible ramp and formation of an eddy to facilitate launch and take-out of boats will facilitate trips originating upstream at Naturita and finishing in Uravan, or trips originating in Uravan and headed downstream to the Dolores River confluence. Improvements of this access point will also reduce the potential for conflicts between river users and guests at the Uravan campground.

Issues for Consideration: Significant water diversions in the late summer of most years represent the primary constraint on boating use of the San Miguel River below the CC-Highline Ditch. Return flows at Calamity Draw may not be sufficient to support recreational uses of this river segment for much of the late summer and fall months. Costs for development of an access facility at Uravan will depend on the final engineering design but may be in the range of tens of thousands to low hundreds of thousands of dollars. Multiple use benefits of this project are not yet identified.

7. Cottonwood Creek (Pinyon Bridge) River Access Improvements

Strategy Areas: B

Champions: _____

Stakeholders: Town of Naturita, AW, Montrose County

Opportunities: Improved public river access near the Cottonwood Creek confluence, including a designated and maintained hand-launch site or trailer-accessible boat ramp at will enhance opportunities for trips originating at this location and finishing in the Town of Naturita. River access improvements at this location will also provide take-out options for trips originating upstream from Ledges/Stonehouse or from the Beaver Creek Campground/Sanborn Park Road area.

Issues for Consideration: This location is located on private property and nearby public lands are not suitable for access point development. The presence of several water diversion structures on the reach between Cottonwood Creek and the Town of Naturita make boat passage through the section difficult under some conditions. Significant water diversions in the late summer of most years represent the primary constraint on boating use below the CC-Highline Ditch. Costs for development of an access facility at this site will depend on the engineering design but may be in the range of tens of thousands to low hundreds of thousands of dollars. Multiple use benefits of this project are not yet identified. Stakeholders identified this action as a low-priority but elected to keep it on the list as a long-term aspirational or opportunistic project.

8. Further Develop Town of Naturita River Access

Strategy Areas: B

Champions: _____

Stakeholders: Town of Naturita, AW, Montrose County, CPW

Opportunities: The Town of Naturita is interested in diversifying their local economy by encouraging recreational uses for the San Miguel River near town. Improvements to an existing river access point in Town, including a designated trailer-accessible ramp and an eddy feature will ease access by multiple craft types and, presumably, increase opportunities for trips originating upstream and finishing in town, or trips originating in town and headed downstream.

Issues for Consideration: This action would benefit from concurrent river access development at upstream (e.g. Cottonwood Creek) and downstream (e.g. Uravan) locations. However, the presence of several water diversion structures on the reach upstream from Naturita make boat passage through that section difficult under some conditions. Significant water diversions in the late summer of most years represent the primary constraint on boating use of the San Miguel River below the CC-Highline Ditch. Costs for development of an access facility at this site will depend on project configuration but may be in the range of tens of thousands to low hundreds of thousands of dollars. Multiple use benefits of this project are not yet identified. However, enhancements for fishing (e.g., habitat structures, ADA angling access) may increase the likelihood of securing CPW Fishing Is Fun grants.

9. Recreational User Flow Preference Validation

Strategy Areas: B

Champions: _____

Stakeholders: AW, SMWC, USFS, BLM

Opportunities: A Boatable Days analysis conducted on the San Miguel River used community surveys to identify recreational flow preferences for many stream reaches. However, a low number of survey responses on some reaches may bias results. Collection of new data or collation of additional existing data sources could facilitate an update to the existing analysis results. Potential data sources include BLM user sign-in data from river access points; review of outfitter permit/user day data reported to agencies like CPW, USFS, or BLM; and distribution of paper or web surveys. Opportunity also exists to combine an update of the Boatable Days analysis with American Whitewater's ongoing economic impact study of river recreation activities in Colorado.

Issues for Consideration: It is unclear how better characterization of recreational user preferences will result in different consideration of recreational use needs by water users or water administration/management authorities. Limited historical use on some reaches of the San Miguel River may constrain efforts to collect additional user input. This project does not have multiple use benefits. Stakeholders suggested that this this effort is a low priority.

10. Streamflow Gauge Network Support

Strategy Areas: C

Champions: _____

Stakeholders: USGS, SMWC, San Miguel County, Montrose County, lower San Miguel municipalities and agricultural water users, CWCB, CPW, CDWR

Opportunities: Streamflow monitoring provides important social, economic, and ecological benefits for all stakeholders including agricultural water administration functions, flood warning, tracking of hydrologic change and trends, recreational user safety. Streamflow gauging also plays a crucial role in strategic water planning and fisheries management. Ensuring that existing gauging stations in the San Miguel watershed continue operation is critical. Stream gauging priority should be given to locations critical for administration of water rights, including instream flow rights, on the mainstem San Miguel River and on tributary streams. Stakeholders indicated that this is a very high-priority initiative.

Issues for Consideration: Most USGS gauges in Colorado rely on a combination of federal, state, and local partner funding for continued operation. Changes in agency budgets and priorities can result in disruption or discontinuation of gauging in some locations. Where federal funding for gauging stations is reduced or eliminated, local communities may need to provide annual financial contributions or petition CDWR to replace USGS gauges with stations operated by the State of Colorado. Annual O&M costs for a single gauging station (without match support from USGS) can reach ~$16K.

11. Real-time Water Temperature Monitoring Program

Strategy Areas: C

Champions: _____

Stakeholders: CPW, TU, SMWC

Opportunities: Water temperature regimes on the San Miguel River are affected by rising air temperatures and seasonal water diversions. Installation of a network of real-time water temperature sensors along the mainstem San Miguel River below Leopard Creek may yield important insights regarding the spatial extent of suitable thermal habitat for various fisheries species of interest. Real-time data may be used to alert anglers to the onset of stressful conditions for fish. Collected data may also aid in the development of predictive models that relate air temperature and streamflow to water temperature at various locations along the river. Stakeholders indicated that this is a high-priority initiative.

Issues for Consideration: Cold water fisheries in the headwaters and middle watershed rely on continued maintenance of existing temperature regimes for health and survival. The upper San Miguel River exhibits relatively little alteration to natural flow regimes. Alteration of summer temperature regimes in most streams in the eastern portion of the watershed is also expected to be small. An exception exists on the South Fork San Miguel River below Trout Lake. Data generated in the western portion of the watershed where water management is expected to influence water temperature regimes more strongly may yield valuable insights into the frequency, magnitude and duration of conditions that are problematic for native aquatic biota and sport fish. Notably, collection of data and establishing relationships between streamflow and water temperature is not likely to affect local conditions or water management actions because water supplies in this portion of the watershed are so limited.

12. Integrated Hydrological Modeling of the San Miguel Watershed

Strategy Areas: C

Champions: SMWC

Stakeholders: Montrose County, San Miguel County, CWCB, CDWR, Town of Telluride, Town of Mountain Village

Opportunities: The San Miguel Watershed Coalition (SMWC) and its partners propose to use MIKE-SHE to construct a fully-distributed hydrological model of the San Miguel surface-subsurface watershed system. This robust, physics-based tool simulates a wide range of hydrologic issues, is FEMA approved, and provides detailed outputs for all hydrological processes, including wetlands/channel flows, soil moisture, complex aquifer flows, and discharge to streams, wetlands and springs. The tool can simulate irrigation diversions and applications, complex hydraulic structures and operations, evapotranspiration, and integrated water quality. The model will provide stakeholders with a powerful, living water management tool that: a) improves understanding of fundamental integrated hydrologic system behavior and controlling factors, b) can predict a range of current and potential future impacts due to climate change, fires, floods, extended droughts, water quality degradation, and development, and c) can be used to help design and assess alternative engineering approaches that can achieve specific goals. A successfully calibrated and validated model may help local water users and land managers identify important source areas for salinity and evaluate potential benefits of various salinity control measures. Use of the tool in this way may help identify local projects suitable for funding by the Colorado River Basin Salinity Control Program (Note: CWCB provides technical assistance grants for groups pursuing federal salinity control funding). This modeling effort may further support Actions 13 and 14 discussed below.

Issues for Consideration: Calibration of fully distributed watershed models is a difficult and time-consuming task. The availability or quality of various input data sets may constrain the accuracy and utility of modeling outputs. If the model is intended to be used in a predictive manner, it is unclear how water rights administration will be represented and accommodated.

13. CC-Highline Ditch Infrastructure Improvements

Strategy Areas: A, D

Champions: _____

Stakeholders: CDWR, CWCB, CWT, TNC, SMWC, CC-Ditch Company

Opportunities: The CC-Highline Ditch is an earthen structure that loses some non-trivial fraction of diverted water to infiltration or evaporation between the headgate and the point of use. Ditch lining or piping projects may significantly reduce water losses. Water users could contemplate leaving some portion of the 'saved' water in the river at the point of diversion during certain times of year or for a short period of time when conditions are deemed particularly problematic for aquatic life. Recent increases in federal spending on infrastructure and specific allocation of funds for water-projects may improve the likelihood of completing high-dollar projects like this one. If salinity control benefits can be expected from efficiency improvements on the ditch system, funding may be available from the Colorado River Basin Salinity Control Program. CWCB provides technical assistance grants for groups pursuing federal salinity control funding. Work completed by the Uncompahgre Valley Water Users Association may serve as a useful example for this project.

Issues for Consideration: Efforts to reduce leakage out of the ditch will impact cottonwood and willows that exist on hillslopes along and below the ditch in many locations. Any agreement with the CC-Highline is subject to approval by the Board of Directors. Piping is preferred to ditch lining to the rockfall hazards present above many portions of the ditch. Therefore, efficiency projects the affect the entire ditch system are likely to be extremely expensive. Costs for ongoing maintenance of a long pipeline are uncertain. This action must be seen as a global benefit to CC-Highline Ditch shareholders. There may be other locations in the watershed where efficiency improvements meet similar objectives and have a lower cost barrier.

14. Floodplain Restoration Opportunity Inventory

Strategy Areas: C, E

Champions: SMWC

Stakeholders: USFS, BLM, CPW, TU, TNC, Ducks Unlimited, Audubon Society, American Rivers, SMWC

Opportunities: Work to reconnect the San Miguel River with the historical floodplain on the valley floor near Telluride is ongoing. Additional opportunity exists to reconnect smaller tributary streams with floodplains and enhance the functional characteristics of wet meadows. Numerous low-cost approaches (e.g., beaver dam analogs) exist for remediating incised channels in these settings. Inventorying locations of disconnected floodplains can occur via a combination of desktop exercises (GIS topography analysis, etc.) and field visits. A combination of desktop exercises and rapid field visits can also be used to identify positions along stream and river corridors that exhibit low slopes, a relatively wide floodplain, and adequate access of high streamflows to overbank areas. These areas (a.k.a. Response Zones) may be critical areas for attenuating flood waves and debris flows that follow catastrophic wildfire. Protecting intact Response Zones from alteration and remediating degraded Response Zones on tributary streams across the watershed may help protect downstream communities and river segments from the worst effects of wildfire.

Issues for Consideration: Field visits may require landowner permission. While inventorying itself is a relatively low-cost exercise, physical restoration projects to actually address connectivity can face landowner permission issues and may be costly, varying widely in level of engineering analysis and design required.

15. Invasive Riparian Vegetation Control

Strategy Areas: E

Champions: _____

Stakeholders: RiversEdge West, TNC, San Miguel County, Montrose County, BLM, USFS, CPW

Opportunities: Significant work by local governments and conservation organizations to eradicate invasive riparian vegetation from river/stream corridors led to significant declines in the presence of those species in many locations around Naturita and Uravan. Despite these successes, communities of invasive woody and herbaceous plants persist, particularly in the western watershed. Removal of these species and replacement with native species can benefit terrestrial and aquatic animals and insects—generally improving the ecological function of riparian areas and floodplains.

Issues for Consideration: Widespread eradication of invasive woody plants in the western portion of the San Miguel watershed will require close coordination with private landowners and town governments. The value of some species (e.g. Russian olive) as shade trees may complicate efforts to remove them. Small, persistent pockets of invasive plants can provide an abundant seed source for colonization of upstream and downstream areas and necessitate ongoing control and removal efforts. Invasive herbaceous species will be the most difficult to control.

16. Investigate Creative Water Use Agreements to Protect Fish

Strategy Areas: A, F

Champions: _____

Stakeholders: Water rights holders, CWCB, CDWR, TNC, Montrose County, BLM, USFS, CPW, CWT

Opportunities: No instream flow water right exists on the San Miguel River between the CC-Highline Ditch diversion and Calamity Draw. This area of river is regularly dewatered—a condition that can be stressful or fatal for native and sport fish. Managing flows to protect aquatic life in this reach by administering existing instream flow water rights on upstream and downstream reaches is not possible. Water management by other means may, therefore, be a critical strategy in the lower San Miguel River for supporting the health of the native warm water fishery and the sport fishery enjoyed by anglers. Options that may be explored by local stakeholders include incentivized bypass of water past headgates or formal water leasing for environmental uses. Opportunity exists to work with CPW aquatic biologists to test the beneficial effects of late summer 24-hour (or longer) pulse flows that provide fish stranded in pools in the dewatered reach with an opportunity to move upstream, downstream, or into tributary habitats. Ensuring that native warm-water species do not become listed as Threatened or Endangered will help retain local control and limit the potential for involvement by federal agencies in water use and management conversations and decision-making. Stakeholders noted that this is a very important initiative.

Issues for Consideration: Water availability in this section of river, especially in below-average water years, is very limited. Identifying and implementing creative, voluntary, and incentivized approaches for leaving some amount of water in the stream will require functional personal relationships that enjoy a high level of trust between parties. The lack of an instream flow water right and the unique water administration/delivery approaches used on this section of river may complicate or limit downstream shepherding of water. The reach of the San Miguel River between CC-Highline Ditch and the Town of Naturita loses ~30 cfs of flow during dry, late-summer conditions. Any water left in the river would, presumably be affected by these characteristic losses. The degree to which losses to groundwater affect water delivered to or left in the channel will depend on location.

17. Enhance Connectivity to Tributary Streams

Strategy Areas: F

Champions: _____

Stakeholders: SMWC, TU, CPW, USFS, TU, CPW, TNC, BLM, Montrose County, San Miguel County, municipalities, private land owners and water users, CDWR

Opportunities: The ability of wild native warm-water fish to survive, reproduce, and thrive without additional interventions (e.g., population stocking) requires that those fish have access to a variety of habitats suitable for different life stages. Warm-water fish native to the San Miguel and Dolores watersheds utilize the lower portions of perennial and ephemeral tributaries for spawning and juvenile growth/rearing. Hydrological disconnection of tributary streams occurs seasonally on several tributaries to the lower San Miguel River due to water diversion. Transportation infrastructure and irrigation infrastructure present physical barriers to aquatic organism passage on other tributaries. Upgrading or reconstructing culverts and ditch infrastructure to include aquatic organism passage (AOP) features can help improve regional fishery resiliency in the face of changing watershed conditions. Physical changes to infrastructure can be leveraged with periodic/temporary changes in water management that ensure that water is

available for spawning/rearing in connected reaches during critical periods in the late spring and early summer (April-June).

Issues for Consideration: The expected range of the warm-water fishery in the San Miguel mainstem extends up to approximately the CC-Highline Ditch, although these species are known to range widely and have been observed as far upstream as the mouth of Beaver Creek in some years. Several channel spanning structures on the river between the CC-Highline and the Town of Naturita likely present barriers to upstream travel by native fish during some or most times of the year. Therefore, the greatest opportunities for improving hydrological and/or physical connectivity between the mainstem and tributaries likely exist downstream from the CC-Highline diversion point. Lessons-learned and successes from previous projects to improve aquatic organism passage on lower Tabeguache Creek may be instructive for similar efforts on other streams. Opportunities upstream of the CC-Highline may present themselves after mainstem barriers to passage are addressed. Formal water leasing from senior water users on lower Naturita Creek or scheduled releases of water from Miramonte Reservoir may achieve desired outcomes on Naturita Creek but the willingness of water rights owners to participate in such strategies is uncertain.

18. Expand Cutthroat Trout Range

Strategy Areas: F

Champions: _____

Stakeholders: SMWC, TU, CNHP, USFWS, CPW, USFS, BLM

Opportunities: The San Miguel watershed provides many opportunities for cutthroat trout population restoration and/or habitat enhancement due to the prevalence of low-order (small), high-elevation, snowmelt-fed streams. Cutthroat migrate to small perennial streams for spawning after spring runoff. Movement between adult feeding/residential habitats and spawning habitats is dictated by stream network connectivity. Road culverts on some USFS, BLM, and County Road stream crossings may create barriers to upstream movement by cutthroat trout. Surface water diversions may cause entrainment and increase mortality of fish as they move downstream. Targeted aquatic organism passage (AOP) projects combined with installation of fish screens on water diversion structures and the strategic removal of non-native species and replacement with native trout on stream reaches below existing cutthroat trout populations may increase occupied habitat and ensure long term population resiliency in the watershed. Increasing the total stream miles occupied by healthy native trout populations increases the likelihood that those populations can persist following large wildfire, debris flows, localized non-native species invasions, or some other watershed-scale event.

Issues for Consideration: Any work to improve stream network connectivity should proceed in close coordination with CPW and other resource management agencies (BLM, USFS, USFWS). Poorly contemplated AOP projects have the potential to inadvertently promote new access by non-native species into productive existing native trout habitat.