

**Water Supply Reserve Fund
Water Activity Summary Sheet
March 10-11, 2021
Consent Agenda Item 2(a)**

Applicant & Grantee: Northern Colorado Water Conservancy District

Water Activity Name: Colorado Airborne Snow Observatory Expansion Plan

Water Activity Purpose: Agricultural, Education/Outreach, Municipal/Industrial, Nonconsumptive (Environmental & Recreational) - Study

County: Multiple counties in listed Basins

Drainage Basin: Arkansas, Colorado, Gunnison, South Platte

Water Source: Multiple sources in each River Basin

Amount Requested: \$5,000 Arkansas Basin Account
\$5,000 Colorado Basin Account
\$5,000 Gunnison Basin Account
\$5,000 Metro Basin Account
\$5,000 South Platte Basin Account
\$20,000 Statewide Account
\$45,000 Total Request

Matching Funds: **Basin Account Match = \$25,000**

- 125% of statewide request (meets 10% min)

Applicant & 3rd Party Match (in-kind) = \$44,000

- 220% of the statewide request (meets 10% min)

Total Match (Basin request & Applicant Match) = \$69,000

- 347% of the statewide request (meets 50% min)

Staff Recommendation:
Staff recommends approval of up to \$5,000 from the Arkansas, Colorado, Gunnison, Metro & South Platte Basin Accounts and up to \$20,000 from the Statewide Account to help fund the project: Colorado Airborne Snow Observatory Expansion Plan

Water Activity Summary: Through pilot studies for Denver Water and in the Gunnison Basin, the Airborne Snow Observatories (ASO) has proven to be a powerful new tool for snowpack monitoring and operational water management decisions. To date, the ASO pilot projects in Colorado have been geographically scattered and lack consistent funding. A geographically expanded Colorado ASO program—with a consistent funding plan—will revolutionize water management in Colorado. There remain barriers, however, to widespread adoption and consistent funding of ASO. If approved, WSRF funds will assist in addressing those barriers and provide a roadmap to an expanded, collaborative Colorado ASO program that is independent of annually-variable project funds.

The applicant believes this project will demonstrate the value of an expanded ASO program, identify logical basin groups to fly each year and potential sustainable funding options, provide forecasted ASO costs, and provide presentation materials for reaching out to stakeholders to turn the roadmap into action. The applicants believes a detailed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

Discussion: This effort will assist meeting Basin Roundtable goals as well as aligning with actions identified in Section H of the Water Plan.

Issues/Additional Needs: No issues or additional needs have been identified.

Eligibility Requirements: The application meets requirements of all eligibility components.

Evaluation Criteria: Staff has determined this activity satisfies the Evaluation Criteria.

Funding Sources/Match	Cash	In-Kind	Total	Status
Northern Water	\$0	\$5,000	\$5,000	Secured
Denver Water	\$0	\$10,000	\$10,000	Secured
Airborne Snow Observatories, Inc.	\$0	\$5,000	\$5,000	Secured
Collaborative Workgroup (<i>Colorado Springs Utilities, City of Aspen, City of Fort Collins, Colorado River District, City of Boulder, City of Greeley, Thornton Water, Pueblo Water, Eagle River Water & Sanitation District, Aurora Water, City of Westminster, and the Ruedi Water and Power Authority</i>)	\$0	\$24,000	\$24,000	Secured
Sub Total Matching Funds	\$0	\$44,000	\$44,000	
WSRF Arkansas Basin Account	\$5,000	\$0	\$5,000	Secured
WSRF Colorado Basin Account	\$5,000	\$0	\$5,000	Secured
WSRF Gunnison Basin Account	\$5,000	\$0	\$5,000	Secured
WSRF Metro Basin Account	\$5,000	\$0	\$5,000	Secured
WSRF South Platte Basin Account	\$5,000	\$0	\$5,000	Secured
WSRF Statewide Account	\$20,000	\$0	\$20,000	
Sub Total WSRF Funds	\$45,000	\$0	\$45,000	
Total Project Costs	\$45,000	\$44,000	\$89,000	

CWCB Project Manager: Erik Skeie



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Colorado Water Conservation Board

Water Supply Reserve Fund Grant Application

Instructions

All WSRF grant applications shall conform to the current [2020 WSRF Criteria and Guidelines](#).

To receive funding from the WSRF, a proposed water activity must be recommended for approval by a Roundtable(s) **AND** the approved by the Colorado Water Conservation Board (CWCB). The process for roundtable consideration and recommendation is outlined in the 2020 WSRF Criteria and Guidelines. The CWCB meets bimonthly.

If you have questions, please contact the WSRF Grant Program Manager (for all Roundtables) or your Roundtable Liaison:

Ben Wade
ben.wade@state.co.us
303-866-3441 x3238 (office)

Sam Stein
Sam.stein@state.co.us
303-866-3441 (office)

WSRF Submittal Checklist (Required)

- YES ☒ NO ☐ This request was recommended for CWCB approval by the sponsoring roundtable.
- YES ☒ NO ☐ I have read and understand the [2020 WSRF Criteria and Guidelines](#).
- YES ☒ NO ☐ Grantee will be able to contract with CWCB using the [Standard Contract](#).¹

Application Documents included:

- YES ☒ NO ☐ Exhibit A: Statement of Work² (*Word – see Template*)
- YES ☒ NO ☐ Exhibit B: Budget & Schedule² (*Excel Spreadsheet – see Template*)
- YES ☒ NO ☐ Letters of Matching and/or Pending 3rd Party Commitments²
- YES ☒ NO ☐ Map²
- YES ☒ NO ☐ Photos/Drawings/Reports
- YES ☒ NO ☐ Letters of Support

Contracting Documents³

- YES ☐ NO ☐ Detailed/Itemized Budget³ (*Excel Spreadsheet – see Template*)
- YES ☐ NO ☐ Certificate of Insurance⁴ (*General, Auto, & Workers' Comp.*)
- YES ☐ NO ☐ Certificate of Good Standing⁽⁴⁾
- YES ☐ NO ☐ W-9 Form⁴
- YES ☐ NO ☐ Independent Contractor Form⁴ (*If applicant is individual, not company/organization*)
- YES ☐ NO ☐ Electronic Funds Transfer (ETF) Form⁴

¹Click "Grant Agreements". For reference only/do not fill out or submit/required for contracting

² Required with application if applicable.

³Additional documentation providing a Detailed/Itemized Budget maybe required for contracting. Applicants are encouraged to coordinate with the CWCB Project Manager to determine specifics.



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⁴ Required for contracting. While optional at the time of this application, submission can expedite contracting upon CWCB Board approval.

Schedule		
CWCB Meeting	Application Submittal Dates	Type of Request
January	October 1	Basin Account
March	December 1	Basin/Statewide Account/Water Plan Grant Match ¹
May	February 1	Basin Account
July	April 1	Basin Account
September	June 1	Basin/Statewide Account
November	August 1	Basin Account

¹ If either the basin or statewide match includes matching funds from a pending Water Plant Grant, both must be submitted by December 1st deadline for March Board meeting review.

Water Activity Summary		
Name of Applicant	Northern Colorado Water Conservancy District (NCWCD)	
Name of Water Activity	Colorado Airborne Snow Observatory Expansion Plan	
Approving Roundtable(s)		Basin Account Request(s) ¹
Arkansas Basin		\$5,000
Colorado Basin		\$5,000
Gunnison Basin		\$5,000
Metro Basin		\$5,000
South Platte Basin		\$5,000
Basin Account Request Subtotal		\$25,000
Basin Account Request Subtotal Approved by Roundtable		\$25,000
Statewide Account Request ⁽¹⁾		\$20,000
Total WSRF Funds Requested (Basin & Statewide)		\$45,000
Total Project Costs		\$89,000

¹ Please indicate the amount recommended for approval by the Roundtable(s)

Grantee and Applicant Information	
Name of Grantee(s)	Northern Colorado Water Conservancy District (NCWCD)



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Grantee and Applicant Information	
Mailing Address	220 Water Ave, Berthoud CO 80513
FEIN	84-6000204
Grantee's Organization Contact¹	Bradley D. Wind, P.E.
Position/Title	General Manager
Email	bwind@northernwater.org
Phone	970-622-2320
Grant Management Contact²	Emily Carbone
Position/Title	Water Resources Specialist
Email	ecarbone@northernwater.org
Phone	970-622-2224
Name of Applicant (if different than grantee)	Same as above
Mailing Address	
Position/Title	
Email	
Phone	

¹ Person with signatory authority

² Person responsible for creating reimbursement invoices (Invoice for Services) and corresponding with CWCB staff.

Description of Grantee	
Provide a brief description of the grantee's organization (100 words or less).	
<p>Northern Water is a conservancy district that delivers water to municipal and agricultural entities, providing water to over a million people in northern Colorado. Northern Water jointly operates and maintains the Colorado-Big Thompson Project, a federally owned water project that delivers supplemental water to northeastern Colorado, with the Bureau of Reclamation. Northern Water also manages a variety of other water projects and infrastructure. In addition, Northern Water provides regional leadership through data collection and delivery (including water supply forecasts), water efficiency programs, source water protection and interagency cooperation.</p>	
Type of Eligible Entity (check one)	
<input type="checkbox"/>	Public (Government): municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient.
<input checked="" type="checkbox"/>	Public (Districts): authorities, Title 32/special districts (conservancy, conservation, and irrigation districts), and water activity enterprises
<input type="checkbox"/>	Private Incorporated: mutual ditch companies, homeowners associations, corporations



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Type of Eligible Entity (check one)	
<input type="checkbox"/>	Private Individuals, Partnerships, and Sole Proprietors: are eligible for funding from the Basin Accounts but not for funding from the Statewide Account.
<input type="checkbox"/>	Non-governmental organizations: broadly, any organization that is not part of the government
<input type="checkbox"/>	Covered Entity: as defined in Section 37-60-126 Colorado Revised Statutes

Type of Water Activity (check one)	
<input checked="" type="checkbox"/>	Study
<input type="checkbox"/>	Implementation

Category of Water Activity (check all that apply)		
<input checked="" type="checkbox"/>	Nonconsumptive (Environmental)	
<input checked="" type="checkbox"/>	Nonconsumptive (Recreational)	
<input checked="" type="checkbox"/>	Agricultural	
<input checked="" type="checkbox"/>	Municipal/Industrial	
<input type="checkbox"/>	Needs Assessment	
<input checked="" type="checkbox"/>	Education & Outreach	
<input type="checkbox"/>	Other	Explain:

Location of Water Activity	
Please provide the general county and coordinates of the proposed activity below in decimal degrees . The Applicant shall also provide, in Exhibit C, a site map if applicable.	
County/Countries	Various, many along continental divide. See target watersheds here (map also included at end of document, Figure 1.): https://arcg.is/0XX0uC
Latitude	
Longitude	

Water Activity Overview
<p>Please provide a summary of the proposed water activity (200 words or less). Include a description of the activity and what the WSRF funding will be used for specifically (e.g. studies, permitting, construction). Provide a description of the water supply source to be utilized or the water body affected by the activity. Include details such as acres under irrigation, types of crops irrigated, number of residential and commercial taps, length of ditch improvements, length of pipe installed, area of habitat improvements. If this project addresses multiple purposes or spans multiple basins, please explain.</p> <p>The Applicant shall also provide, in Exhibit A, a detailed Statement of Work, Budget, and Schedule.</p>



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Water Activity Overview

Through pilot studies for Denver Water and in the Gunnison Basin, the Airborne Snow Observatories (ASO) has proven to be a powerful new tool for snowpack monitoring and operational water management decisions. To date, however, the ASO pilot projects in Colorado have been geographically scattered and lack consistent funding. A geographically expanded Colorado ASO program—with a consistent funding plan—will revolutionize water management in Colorado. There remain barriers, however, to widespread adoption and consistent funding of ASO. This project will address those barriers and provide a roadmap to an expanded, collaborative Colorado ASO program that is independent of annually-variable project funds.

Specifically, this project will demonstrate the value of an expanded ASO program, identify logical basin groups to fly each year and potential sustainable funding options, provide forecasted ASO costs, and provide presentation materials for reaching out to stakeholders to turn the roadmap into action. This detailed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

Measurable Results

To catalog measurable results achieved with WSRF funds please provide any of the following values.

		New Storage Created (acre-feet)
		New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive
		Existing Storage Preserved or Enhanced (acre-feet)
		Length of Stream Restored or Protected (linear feet)
		Efficiency Savings (indicate acre-feet/year OR dollars/year)
		Area of Restored or Preserved Habitat (acres)
		Length of Pipe/Canal Built or Improved (linear feet)
X	Other	Explain: Until an expanded ASO flight program begins, it will be difficult to justify an exact number of acre-feet preserved or dollars saved. This plan, and the resulting ASO flights, will allow municipalities to make more informed decisions about water management which will lead to quantifiable savings down the line.

Water Activity Justification

Provide a description of how this water activity supports the goals of [Colorado's Water Plan](#), the most recent [Statewide Water Supply Initiative](#), and the respective [roundtable Basin Implementation Plan and Education Action Plan](#) ⁽¹⁾. The Applicant is required to reference specific needs, goals, themes, or Identified Projects and Processes (IPPs), including citations (e.g. document, chapters, sections, or page numbers).

For applications that include a request for funds from the Statewide Account, the proposed water activity shall be evaluated based upon how well the proposal conforms to Colorado's Water Plan criteria for state support (CWP, Section 9.4, pp. 9-43 to 9-44;) (Also listed pp. 4-5 in [2020 WSRF Criteria and Guidelines](#)).



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Water Activity Justification

The Airborne Snow Observatories (ASO) uses paired airborne lidar and imaging spectrometer sensors coupled with a snow dynamics model to measure snow depth and albedo and retrieve Snow Water Equivalent (SWE, the liquid depth of water stored in the snowpack) across large river basins at a high spatial resolution (Figure 2). The resulting data provides high elevation snowpack measurements with detail, accuracy, and decision-support value unprecedented in water management (Figure 1). The added value of these measurements to the water community has been thoroughly demonstrated through a multitude of pilot flights in Colorado and California. For example, in a 2019 pilot flight series in the Blue River watershed with Denver Water—during a time when the SNOTEL stations in the watershed had melted out—ASO data provided an accurate volume estimate of 115,000AF of water remaining in the high elevations (Figure 3). This provided Denver Water’s operations manager the information needed to accurately reduce Dillon Reservoir levels to account for the incoming runoff, which in turn allowed downstream reservoir operators and other Colorado River reservoir operators to re-time outflows and cancel Coordinated Reservoir Operations (CROS) that could have otherwise led to downstream flooding and lost water supply.

Expanding ASO data collection to cover municipal source water basins on both sides of the continental divide, and throughout the state (see map in figure 3), would apply a proven value-added method to maximizing use of water supplies. Having accurate knowledge of the volume of the water stored in the snowpack in these headwaters provides water managers the information needed to remove much of the “guesswork” from operations decisions. This allows reservoir storage to be maximized, optimizes flood control preparations, and provides environmental and recreation managers and agricultural producers more accurate information on the quantity and timing of water that will be sent downstream. It will also allow operations managers to make more informed decisions regarding their management of transbasin diversions. The provision of detailed and accurate ASO snowpack data in the years to come will form the foundation for a future that optimizes the use of native supplies for the benefit of multiple parties throughout the state. Further, these data will be invaluable in the planning and operation of future water infrastructure projects.

Rather than building new mountain storage, this project aims to optimize the use and knowledge of existing supplies. This project promotes collaboration across municipal water providers and will provide a mutually beneficial data product. This project aligns with these actions identified in section H of the Colorado Water Plan (Summary of Actions).

6.1.3 Scenario Planning & Developing an Adaptive Water Strategy - Promote use of scenario planning and adaptive strategies

6.1.5 Scenario Planning & Developing an Adaptive Water Strategy - Support innovative and collaborative science.

6.2 Meeting Colorado’s Water Gaps through the development of municipal partnerships

6.5.7 Municipal, Industrial, and Agricultural Infrastructure Projects and Methods – Storage Opportunity Assessment.

7.1.10 Watershed Health and Management - Coordinate statewide watershed-coalition and partnership plans, projects, monitoring, and adaptive management strategies

¹ Access Basin Implementation Plans or Education Action Plans from Basin drop down menu.



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Matching Requirements: Basin Account Requests	
Basin (only) Account grant requests require a 25% match (cash and/or in-kind) from the Applicant or 3 rd party and shall be accompanied by a letter of commitment as described in the 2020 WSRF Criteria and Guidelines (submitted on the contributing entity's letterhead). Attach additional sheet if necessary.	
Contributing Entity	Amount and Form of Match (note cash or in-kind)
<i>See following Statewide account requests</i>	
Total Match	\$
If you requested a Waiver to the Basin Account matching requirements, indicate the percentage you wish waived.	

Matching Requirements: Statewide Account Requests	
Statewide Account grant requests require a 50% match as described in the 2020 WSRF Criteria and Guidelines . At least of 10% of the required Statewide Account Grant request match shall be cash from Basin Account funds whether that is from one or multiple basins; and the remaining 40% of the required match may be provided from any source, including other grants, cash from the Basin Account, or any combination of cash, in-kind services, or in-kind materials. and shall be accompanied by a letter of commitment . Attach additional sheet if necessary.	
Contributing Entity	Amount and Form of Match (note cash or in-kind):
Northern Water	\$5,000 (in kind)
Denver Water	\$10,000 (in kind)
Airborne Snow Observatories, Inc.	\$5,000 (in kind)
Collaborative Workgroup (Colorado Springs Utilities, City of Aspen, City of Fort Collins, Colorado River District, City of Boulder, City of Greeley, Thornton Water, Pueblo Water, Eagle River Water & Sanitation District, Aurora Water, City of Westminster, and the Ruedi Water and Power Authority)	\$24,000 (in kind)
WSRF - Arkansas Basin Account	\$5,000 (cash)
WSRF - Colorado Basin Account	\$5,000 (cash)
WSRF - South Platte Basin Account	\$5,000 (cash)



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Matching Requirements: Statewide Account Requests	
WSRF - Metro Basin Account	\$5,000 (cash)
WSRF – Gunnison Basin Account	\$5,000 (cash)
Total Match	\$69,000
If you requested a Waiver to the Statewide Account matching, indicate % you wish waived. (Max 50% reduction of requirement).	

Related Studies
Please provide a list of any related studies, including if the water activity is complimentary to or assists in the implementation of other CWCB programs.
<p>The ASO program has been active in Colorado since 2013, with numerous science, applied science, and operations support efforts. The following list details ASO activity in CO to-date and planned, along with funding source and application:</p> <ul style="list-style-type: none"> • Uncompahgre River above Ridgway Reservoir; 1-4 flights per year 2013-2017 NASA Terrestrial Hydrology Program, Science support • Grand Mesa; NASA Terrestrial Hydrology Program, Science support • Rio Grande and Conejos Rivers; 1-2 flights per year 2015-2016, 2 flights planned in Conejos 2021 CWCB Rio Grande Forecast Improvement Project; Applied science support • Upper Gunnison River (East and Taylor Rivers); 1-2 flights per year 2016, 2018-2019 Dept. of Energy East River Watershed Function Scientific Focus Area, Science support CWCB Project funds, Applied science • Blue River above Dillon Reservoir, 2 flights 2019, 2 flights planned 2021 Denver Water, Operations support • Animas River above Durango; 2 flights planned 2021 CWCB Project funds, Operations support • Pinos River above Vallecito Reservoir; 2 flights planned 2021 CWCB Project funds, Operations support • Dolores River above McPhee Reservoir; 2 flights planned 2021 CWCB Project funds, Operations support



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Previous CWCB Grants
List all previous or current CWCB grants (including WSRF) awarded to both the Applicant and Grantee. Include: 1) Applicant name; 2) Water activity name; 3) Approving RT(s); 4) CWCB board meeting date; 5) Contract number or purchase order
<p>Colorado River Connectivity Channel Project (previously called Windy Gap Bypass Project)</p> <ul style="list-style-type: none">• Applicant: Windy Gap Water Activity Enterprise (Municipal Subdistrict, Northern Colorado Water Conservancy District)• Water Plan Grant (CMS 162919, CTGG1 2021-2091) issued in July 2020.• The state legislature appropriated \$2.2 million from the severance tax perpetual base fund for the CWCB to make a grant to the Municipal Subdistrict for this Project (see §39-29-109(2)(a)(I.5)(XII) C.R.S.). <p>Species Trust Grant – To Help with 2013 Flood Damage for the Heyborne Project</p> <ul style="list-style-type: none">• Sub-award between Northern Colorado Water Conservancy District and Ducks Unlimited, Inc.• CMS 67152• Issued July 2014 <p>Emergency Flood Recovery Assessment, Design, and Recovery</p> <ul style="list-style-type: none">• Applicant: Northern Colorado Water Conservancy District• Funding Source: Water Supply Reserve Account, South Platte Basin Roundtable• CMS 62427• Issued in October 2013
Tax Payer Bill of Rights
The Tax Payer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect the applicant.
N/A

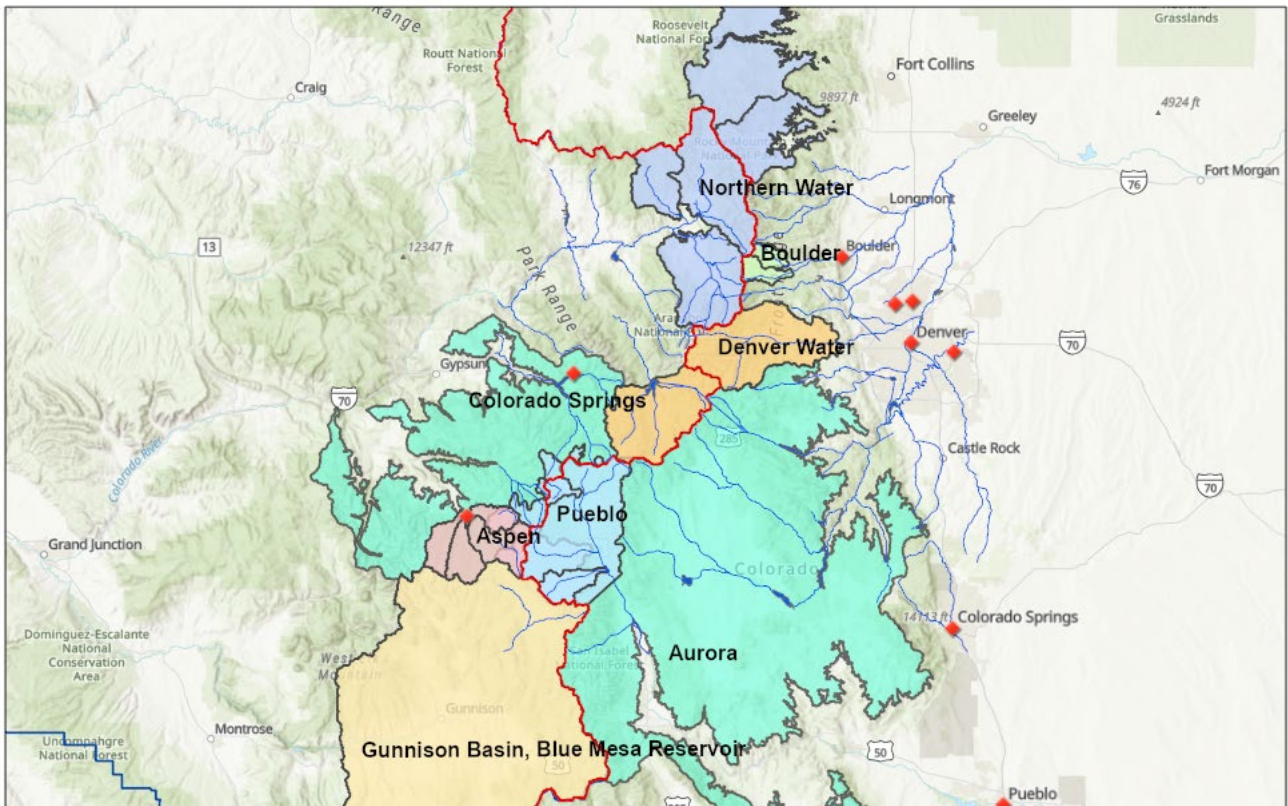


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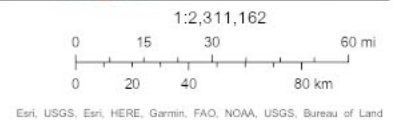
Figure 1. Map Showing Headwater basins of partner water providers throughout the South Platte, Colorado, and Arkansas basins. A phased implement plan will be developed to build-up to annual flights in these and other priority watersheds (For more information, please see Attachment A, Task 4). This map is available here:

<https://arcg.is/0XX0uC>

Colorado Airborne Snow Observatory Expansion Plan Target Watersheds

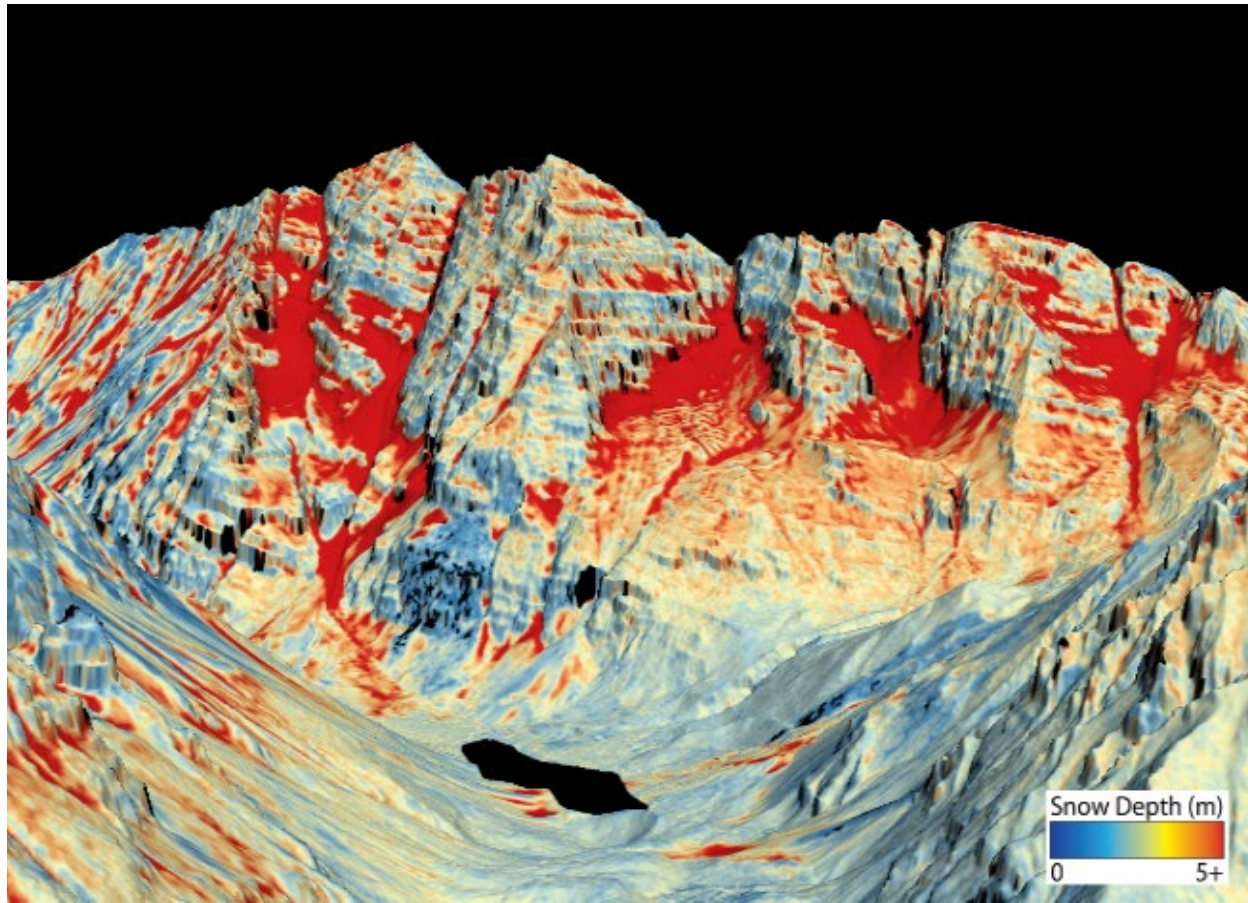


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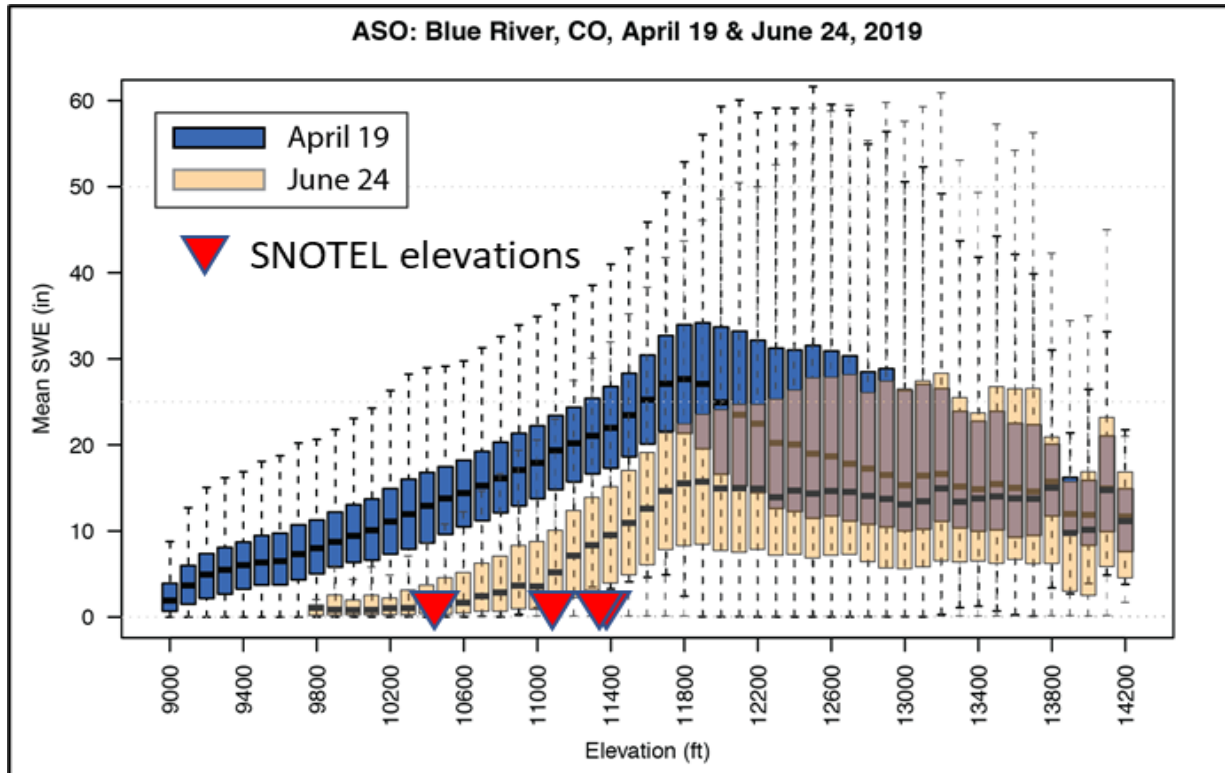
Figure 2. Lidar imagery of 3-meter resolution snow depth in the Maroon Bells.





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Figure 3. ASO snow water equivalent for April and June (2019) from 9000-14,200 ft. elevation for the Blue River watershed. The elevation of the SNOTEL stations demonstrates that ASO captures the high-elevation snowpack data that the SNOTELS miss.





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Colorado Water Conservation Board	
Water Supply Reserve Fund	
<u>Exhibit A - Statement of Work</u>	
Date:	10/20/20
Water Activity Name:	Colorado Airborne Snow Observatory Expansion Plan
Grant Recipient:	Northern Colorado Water Conservancy District
Funding Source:	State and Basin WSRF funds, as well as in-kind labor
Water Activity Overview: (Please provide brief description of the proposed water activity (no more than 200 words). Include a description of the overall water activity and specifically what the WSRF funding will be used for. (PLEASE DEFINE ALL ACRONYMS).)	
<p>ASO = Airborne Snow Observatories (https://www.airbornesnowobservatories.com/)</p> <p>Collaborative = This workgroup conceptualized the project and will be continuously engaged through monthly progress meetings, data sharing, interviews, project feedback, and vetting the approach to project tasks. Currently the Collaborative includes Colorado Springs Utilities, City of Aspen, City of Fort Collins, Colorado River District, City of Boulder, City of Greeley, Thornton Water, Pueblo Water, Eagle River Water & Sanitation District, Aurora Water, City of Westminster, the Ruedi Water and Power Authority, Denver Water, and Northern Water. We will work to expand the collaborative as the project progresses.</p> <p>Planning Team = The Planning Team will provide guidance and project management. It includes Denver Water, Northern Water, Lynker Technologies, LLC, and Airborne Snow Observatories, Inc.</p> <p>Project Team = The Project Team consists of Lynker Technologies, LLC staff and is the compensated team completing the work.</p> <p>This funding will be used to develop a planning document that will communicate the water-management value of Airborne Snow Observatories (ASO) flights and propose steps towards a statewide ASO program. The Planning Team will synthesize existing ASO case studies, clearly articulate ASO data products and flight costs, and propose optimal flight paths within Colorado that will provide ASO coverage for the most municipalities. The Planning Team will also conduct interviews with ASO staff and water providers in the workgroup collaborative to determine the operational value of ASO, as well as how to best integrate ASO data products with operational water management decisions. Additionally, this plan will determine the governance and procedures required for a multi-stakeholder partnership that allows for collaborative funding of ASO from various levels of government. The result of the project will be a comprehensive planning document that shows the costs and benefits of ASO, as well as a conceptual roadmap for available funding streams and how to make ASO sustainable over the long term. This plan, and the funding roadmap, will be presented at various outreach events including basin roundtables and water conferences. Implementation of the plan will begin upon project conclusion in late 2021.</p>	



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Objectives: (List the objectives of the project. (PLEASE DEFINE ACRONYMS)).

Our objectives are as follows:

- Understand the questions and concerns water managers have about ASO
- Prioritize ASO flights over Colorado for optimal coverage of water provider's water sources
- Understand and communicate the value of ASO for water management in Colorado
- Determine the most useful ASO data products and identify ancillary products that can be developed once ASO is flown
- Develop a preferred funding scheme that allows for cost sharing across multiple levels of government
- Create a sustainable flight and funding plan and schedule for ASO to be flown over Colorado each year
- Propose a potential governance structure to organize and coordinate a sustainable ASO program
- Create communication materials to build statewide interest and partnerships
- Develop an implementation plan to set the stage for new flights, funding, and governance beginning in 2022.

Tasks

Provide a detailed description of each task using the following format: (PLEASE DEFINE ACRONYMS)

Task 1 – Basin Flight Planning, Data Collection, and Analysis

Description of Task:

The project team will initially provide information on optimal ASO flight paths that benefit the most water stakeholders, as well as information regarding the data that these flights would provide. Due to the cost restrictions around the number of flights each year, it is important to understand the ASO flight zones and flight dates would provide the most benefit to the largest number of water providers/population centers. Additionally, it is important to understand the data products that result from ASO flights and to communicate the value of, as well as build upon, those data products. Specifically, we seek to answer the following questions:

Basin Flight Planning

- Which basins should be flown each year?
- What is the optimal time to do flights?
- How many flights/year/basin are helpful before diminishing returns?

ASO Data/Analysis

- What data does ASO provide?
- How can we integrate ASO with other satellite products?
- Can we leverage ASO to build statistical or dynamical models? If so, how?
- Can we use ASO data to build mass balance models coupled with runoff? If so, how?
- How well can you correlate snowpack to yield within the water system? How can we use this information to predict runoff?
- How can we use this info to monitor/track climate metrics? Forest cover, forest density, type of vegetation (work with Forest Service), snow cover, etc.
- What ASO data/output formats are available and what formats are preferred?
- How can surrounding river forecast centers (e.g. Missouri) integrate this information with the snow products they use and inform runoff forecasts?



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Tasks
<p>Outcome from Task 1 will inform the sustainable flight plan and schedule, as well as the implementation plan.</p> <p>Notes:</p> <ul style="list-style-type: none">• Denver Water will provide the results of their 2019 ASO pilot study to help answer some of the questions.• ASO, Inc. has a grant submission in with the CWCB for possible flights in the Gunnison Basin for early 2021. If this project is funded, this task will begin early enough that it can inform the timing and flightpaths for the efforts of this proposed project.
<p>Method/Procedure:</p> <p>The Project Team will conduct research, mapping, data analysis and interviews to answer the above questions. With guidance from the Planning Team and Collaborative, the Project Team will complete the following steps:</p> <ul style="list-style-type: none">• Review previous ASO efforts including data products, flight costs, research projects, and relevant logistical details.• Collect and analyze data from other ASO programs as well as mapping information from the Collaborative to define the optimal location, frequency and timing of flights.• Review existing ASO data products and flight data to understand what data is available from a typical ASO flight.• Review cost information to determine the cost per flight of an ongoing ASO program.
<p>Grantee Deliverable: (Describe the deliverable the grantee expects from this task)</p> <p>Task memo on ASO data products and flight plans for optimal basin coverage.</p>
<p>CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)</p> <p>Task memo on ASO data products and flight plans for optimal basin coverage.</p>

Tasks
<p>Provide a detailed description of each task using the following format: (PLEASE DEFINE ACRONYMS)</p>
<p><u>Task 2 – Stakeholder Values Research</u></p>
<p>Description of Task:</p>



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<https://cwcb.colorado.gov/>

Tasks
<p>The data products that result from ASO flights are understandable in a technical sense, but it is not always clear how they are applicable to a specific municipal entity. Different water providers may have different needs in terms of spatial mapping coverage and ideal timing for snowpack measurement.</p> <p>The goal of this task is to answer these questions:</p> <ul style="list-style-type: none">• What is the value added from ASO to individual agencies and different types of stakeholders? There may be a well-understood benefit that is difficult to quantify• How have agencies have used ASO data to improve their decision-making?• What is the tipping point (number of users, recommendation by the State, a defined best practice) for when the use of ASO becomes a common practice? How do we most efficiently meet this metric? <p>Outcome from Task 2 will inform the communications materials and the implementation plan.</p>
Method/Procedure:
<p>The Project Team, with guidance and engagement of the Planning Team and Collaborative, will conduct interviews and background research to understand key components of water supply systems. Inquiries will include but are not limited to:</p> <ul style="list-style-type: none">• How is runoff forecasting is done (data sources, applications, decisions that can be made as a result)?• How might additional information improve operations?• What ancillary benefits are there for having available ASO data?• What data formats are used in planning and operations? <p>The Project Team will also interview current ASO users like the California Department of Water Resources (CA-DWR) and Colorado Basin River Forecast Center (CBRFC) to understand the utility of ASO within their agencies.</p>
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
A task memo detailing the findings around possible and current uses for ASO data.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
A task memo detailing the findings around possible and current uses for ASO data.

Tasks
Provide a detailed description of each task using the following format: (PLEASE DEFINE ACRONYMS)
<u>Task 3 – Funding Stream Review</u>
Description of Task:



Last Update: March 17, 2020

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Tasks
<p>There are two key goals for this task:</p> <ul style="list-style-type: none">• Identify key funding sources at the local, state, and federal levels that may be able to support some sort of cost-share around ASO, both now and in the future.• Develop a framework that Colorado municipal water providers can use to collaboratively fund ASO now and in the future <p>The success of this task depends on the estimated cost per flight and optimal number of flights per year, which will be determined from the previous two tasks.</p> <p>Additionally, the project team will identify other non-paying beneficiaries of ASO and how their needs can be balanced with those of the users that contribute directly to the cost of flights</p> <p>The funding framework we develop will include these considerations:</p> <ul style="list-style-type: none">• Definition of a “sustainable ASO program”• What are all the challenges with establishing a sustainable ASO program?• What are the most consistent/sustainable funding options and details (amount, timing, requirements)?• How can we expand to include the most stakeholders and make it equitable?• Can we influence federal funding?• Leaning on the survey data collected in the previous task, what is the overall cost/benefit? Many operational benefits are difficult to quantify in terms of water savings or cost savings. <p>Outcome from Task 3 will inform the sustainable funding plan, as well as the flight plan, schedule and implementation plan.</p>
Method/Procedure:
<p>This task will be conducted with the following key steps:</p> <p>Conduct research and interviews around existing funding programs for this type of work:</p> <ul style="list-style-type: none">• Federal funding pots• Statewide grant programs• Individual municipal providers and discretionary funds <p>Review existing processes that allow municipal providers to collaborate on funding. This will include identifying the required governance for a shared funding mechanism. There are programs with similar collaborative funding programs including a program coordinated by the California Department of Water Resources.</p> <p>A set of different funding schemes will be developed, including the pros and cons of each. The Collaborative will be interviewed as these potential funding schemes are being developed. A key outcome of Task 3 is to identify the Collaborative’s preferred funding plan for implementation.</p>
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
Task memo on findings



Last Update: March 17, 2020

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Tasks
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Task memo on findings

Tasks
Provide a detailed description of each task using the following format: (PLEASE DEFINE ACRONYMS)
<u>Task 4 – Governance Structure, Final Plans and Report</u>
Description of Task:
<p>The project team will develop a final report summarizing all research and findings. This will include specific recommendations for key components of a Colorado ASO initiative, including details on location and timing for future flights, recommendations for expansion of associated data products, a proposed structure for governance, a proposed funding plan, communication materials and an implementation plan.</p> <p>The review of governance options will attempt to answer these questions:</p> <ul style="list-style-type: none">• What will be the data management/owner structure and governance?• Should there be a centralized website?• Who benefits from/has access to the data?... Just people in this project, or all of Colorado? Beyond Colorado?• The Colorado Basin River Forecast Center, and the California DWR both have active ASO programs. What collaboration opportunities exist with these entities?• What areas are we not prioritizing by planning this way? Who might we have missed?• Does there need to be a primary actor to coordinate funding? If so, who will that be? <p>The communications materials will help onboard new partners, build broad interest in ASO, and be available in multiple formats (powerpoints, short papers, maps, etc.).</p>



Last Update: March 17, 2020

<https://cwcb.colorado.gov/>

Tasks
<p>The implementation plan will consist of an appropriately phased approach to statewide ASO. The plan will seek to maintain momentum while ensuring resources are available for successful program launch and maintenance.</p>
<p>Method/Procedure:</p> <p>The Project Team will synthesize the results from the previous tasks into a “Colorado ASO Plan” that will provide actionable steps to be taken by the Colorado ASO Collaborative to work towards a final sustainable ASO program in Colorado.</p> <p>These results will be presented in a final report. The report findings will be shared at various Colorado water conferences and basin roundtables.</p>
<p>Grantee Deliverable: (Describe the deliverable the grantee expects from this task)</p> <p>Final plan, report, and implementation plan including actionable recommendations for the next 1-5 years. Presentations to various stakeholder groups including basin roundtables and water conferences in Colorado</p>
<p>CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)</p> <p>Final plan, report, and implementation plan including actionable recommendations for the next 1-5 years</p>



Last Update: March 17, 2020

<https://cwcb.colorado.gov/>

Budget and Schedule

Exhibit B - 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. A separate excel formatted Budget is required for engineering costs to include rate and unit costs.

Reporting Requirements

Progress Reports: The grantee 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. The CWCB may withhold reimbursement until satisfactory progress reports have been submitted.

Final Report: At completion of the project, the grantee shall provide the CWCB a Final Report on the grantee'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.

Payments

Payment will be made based on actual expenditures, must include invoices for all work completed and must be on grantee's letterhead. 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.

The CWCB will pay the last 10% of the entire water activity 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 water activity and purchase order or contract will be closed without any further payment. Any entity that fails to complete a satisfactory Final Report and submit to CWCB within 90 days of the expiration of a purchase order or contract may be denied consideration for future funding of any type from CWCB.

Performance Requirements

Performance measures for this contract shall include the following:

(a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in Exhibit B. Per Grant Guidelines, the CWCB will pay out the last 10% of the budget when the final deliverable is completed to the satisfaction of CWCB staff. Once the final deliverable has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

(b) Accountability: Per the 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 the 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.

Last Update: December 17, 2019



COLORADO

Colorado Water
Conservation Board

Department of Natural Resources

Colorado Water Conservation Board

Water Supply Reserve Fund

EXHIBIT B - BUDGET AND SCHEDULE - Direct & Indirect (Administrative) Costs

Date: 10/22/20

Water Activity Name: Colorado Airborne Snow Observatory Expansion Plan

Grantee Name: Northern Colorado Water Conservancy District

<u>Task No.</u> ⁽¹⁾	<u>Description</u>	<u>Start Date</u> ⁽²⁾	<u>End Date</u>	<u>Matching Funds</u> (cash & in-kind) ⁽³⁾	<u>WSRF Funds</u> (Basin & Statewide combined) ⁽³⁾	<u>Total</u>
1	Basin Flight Planning, Data Collection and Analysis	4/15/2021	6/1/2021	\$9,000	\$9,000	\$18,000
2	Stakeholder Values Research	6/2/2021	8/1/2021	\$15,000	\$12,000	\$27,000
3	Funding Stream Review	8/2/2021	9/30/2021	\$10,000	\$12,000	\$22,000
4	Governance Structure, Final Plans and Report	10/1/2021	11/15/2021	\$10,000	\$12,000	\$22,000
Total				\$44,000	\$45,000	\$89,000

(1) The single task that include costs for Grant Administration must provide a labor breakdown (see Indirect Costs tab below) where the total WSRF Grant contribution towards that task does not exceed 15% of the total WSRF Grant amount.

(2) Round values up to the nearest hundred dollars.

• Additional documentation providing a Detailed/Itemized Budget may be required for contracting. Applicants are encouraged to coordinate with the CWCB Project Manager to determine specifics.

The CWCB will pay the last 10% of the entire water activity budget when the Final Report is completed to the satisfaction of the CWCB staff project manager. Once the Final Report has been accepted, the final payment has been issued, the water activity and purchase order (PO) or contract will be closed without any further payment. Any entity that fails to complete a satisfactory Final Report and submit to the CWCB with 90 days of the expiration of the PO or contract may be denied consideration for future funding of any type from the CWCB.

• Additionally, the applicant shall provide a progress report every 6 months, beginning from the date of contract execution

Arkansas Basin Roundtable

November 20, 2020

Via Electronic Mail: sam.stein@state.co.us

Mr. Sam Stein
Colorado Water Conservation
Board 1313 Sherman Street,
Room 721
Denver, CO 80203

Re: Water Supply Reserve Fund Grant Application: Northern Colorado Water Conservancy District (NCWCD) Colorado Airborne Snow Observatory (ASO) Expansion Plan

Dear Sam:

At its November 11, 2020 meeting, the Arkansas Basin Roundtable (ABRT) approved support of the Northern Colorado Water Conservancy District (NCWCD) Colorado Airborne Snow Observatory Expansion Plan grant application for \$5,000 of Arkansas Basin Roundtable funding to support this multi-basin water supply project.

The Airborne Snow Observatory (ASO) has proven to be a powerful new tool for snowpack monitoring and operational water management decision support. A geographically expanded Colorado ASO program will revolutionize water management in Colorado. This project will address barriers, provide a roadmap to an expanded, collaborative Colorado ASO program independent of annually-variable project funds, identify logical basin groups to fly each year and potential sustainable funding options, and unite water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

This project fully supports the Colorado Water Plan and aligns with actions identified in multiple parts of section H of the Colorado Water Plan: 6.1.3 Scenario Planning & Developing an Adaptive Water Strategy - Promote use of scenario planning and adaptive strategies; 6.1.5 Scenario Planning & Developing an Adaptive Water Strategy - Support innovative and collaborative science; 6.2 Meeting Colorado's Water Gaps through the development of municipal partnerships; 6.5.7 Municipal, Industrial, and Agricultural Infrastructure Projects and Methods – Storage Opportunity Assessment; and 7.1.10 Watershed Health and Management - Coordinate statewide watershed-coalition and partnership plans, projects, monitoring, and adaptive management strategies.

The ABRT approved supporting this application by consensus and there were no dissenting views. Should you have any questions or concerns, please feel free to contact me either by telephone, 719-668-8028, or by email, mshea@csu.org.

MD Shea

Mark Shea,
Chair

Copy via email: Applicant; Abby Ortega, Needs Assessment Chair

THE COLORADO BASIN ROUNDTABLE
C/O P.O. BOX 1120
GLENWOOD SPRINGS, COLORADO 81602

November 23, 2020

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

Re: Colorado Basin Roundtable support for WSRF Basin and WSRF State grants for Northern Water's *Colorado Airborne Snow Observatory Expansion Plan Project*

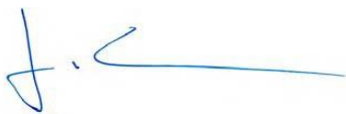
Dear Ben,

At our November 23rd meeting, the Colorado Basin Roundtable voted to approve a Colorado Basin Roundtable WSRF Grant of \$5,000 and to support a State WSRF Grant for Northern Water's *Colorado Airborne Snow Observatory Expansion Plan Project*. This project will develop a roadmap for creating a sustainable Airborne Snow Observatory (ASO) flight program in Colorado that would ultimately benefit multiple basins and a diverse group of water stakeholders. The result of the project will be a comprehensive planning document that shows the costs and benefits of ASO, as well as a conceptual roadmap for available funding streams and how to make ASO sustainable over the long term. This plan, and the funding roadmap, will be presented at various outreach events including basin roundtables and water conferences.

Northern Water's WSRF application meets the Colorado Basin Roundtable WSRF Guidelines and WSRF Grant Program Criteria. Additionally, this project will help advance the Colorado Basin Implementation Plan. Having accurate knowledge of the volume of the water stored in the snowpack in the Colorado Basin and neighboring basins provides water managers the information needed to remove much of the "guesswork" from operations decisions. The provision of detailed and accurate ASO snowpack data in the years to come will form the foundation for a future that optimizes the use of Colorado Basin supplies for the benefit of multiple parties in the basin. Further, these data will be invaluable in the planning and operation of future water infrastructure projects in the Basin.

Upon review and consideration of Northern Water's proposal, the Colorado Basin Roundtable unanimously voted to approve the full \$5,000 of Colorado Basin WSRF funds requested by the applicant and to support their State WSRF Grant application.

Regards,



Jason V. Turner, Chair

November 20, 2020

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

Re: Gunnison Basin Roundtable support for WSRF Basin and WSRF State grants for Northern Water's *Colorado Airborne Snow Observatory Expansion Plan Project*

Dear Kevin,

At our November 16th meeting, the Gunnison Basin Roundtable voted to approve a Gunnison Basin Roundtable WSRF Grant of \$5,000 and to support a State WSRF Grant for Northern Water's *Colorado Airborne Snow Observatory Expansion Plan Project*. This project will develop a roadmap for creating a sustainable Airborne Snow Observatory (ASO) flight program in Colorado that would ultimately benefit multiple basins and a diverse group of water stakeholders. The project team has assembled a unique water stakeholder workgroup from across Colorado to provide a range of valuable perspectives for how to best establish a sustainable Colorado ASO program and to plan optimal data collection zones throughout Colorado. The result of the project will be a comprehensive planning document that shows the costs and benefits of ASO, as well as a conceptual roadmap for available funding streams and how to make ASO sustainable over the long term. This plan, and the funding roadmap, will be presented at various outreach events including basin roundtables and water conferences.

Northern Water's WSRF application fully meets the Gunnison Basin Roundtable WSRF Guidelines and WSRF Grant Program Criteria. Additionally, this project will help advance the Gunnison Basin Implementation Plan. Having accurate knowledge of the volume of the water stored in the snowpack in the Gunnison Basin and neighboring basins provides water managers the information needed to remove much of the "guesswork" from operations decisions. The provision of detailed and accurate ASO snowpack data in the years to come will form the foundation for a future that optimizes the use of Gunnison Basin supplies for the benefit of multiple parties in the basin. Further, these data will be invaluable in the planning and operation of future water infrastructure projects in the Basin.

Upon review and consideration of Northern Water's proposal, the Gunnison Basin Roundtable unanimously voted to approve the full \$5,000 of Gunnison Basin WSRF funds requested by the applicant and to support their State WSRF Grant application.

Sincerely,

Kathleen Curry

Kathleen Curry, Chair

Gunnison Basin Roundtable

November 18, 2020

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

Re: Metro Basin Roundtable support for WSRF Basin and WSRF State grants for Northern Water's
Colorado Airborne Snow Observatory Expansion Plan Project

Dear Ben,

At our November 12th meeting, the Metro Roundtable voted to approve a Metro Basin Roundtable WSRF Grant of \$5,000 and to support a State WSRF Grant of \$20,000 for Northern Water's *Colorado Airborne Snow Observatory Expansion Plan Project*. This project will develop a roadmap for creating a sustainable Airborne Snow Observatory (ASO) flight program in Colorado that would ultimately benefit multiple basins and a diverse group of water stakeholders. The project team has assembled a unique water stakeholder workgroup from across Colorado to provide a range of valuable perspectives for how to best establish a sustainable Colorado ASO program and to plan optimal data collection zones throughout Colorado. The result of the project will be a comprehensive planning document that shows the costs and benefits of ASO, as well as a conceptual roadmap for available funding streams and how to make ASO sustainable over the long term. This plan, and the funding roadmap, will be presented at various outreach events including basin roundtables and water conferences.

Northern Water's WSRF application fully meets the Metro Basin Roundtable WSRF Guidelines and the CWCB's WSRF Grant Program Criteria. Additionally, this project will help advance the South Platte Basin Implementation Plan. Having accurate knowledge of the volume of the water stored in the snowpack in the South Platte Basin and neighboring basins provides water managers the information needed to remove much of the "guesswork" from operations decisions. The provision of detailed and accurate ASO snowpack data in the years to come will form the foundation for a future that optimizes the use of native South Plate Basin supplies for the benefit of multiple parties in the basin. Further, these data will be invaluable in the planning and operation of future water infrastructure projects in the Basin.

Upon review and consideration of Northern Water's proposal, the Metro Roundtable unanimously voted to approve the full \$5,000 of Metro Basin WSRF funds requested by the applicant and to support their \$20,000 State WSRF Grant application.

Sincerely,



Barbara Biggs, Chair
Metro Roundtable

November 23, 2020

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

Re: South Platte Basin Roundtable support for WSRF Basin and WSRF State grants for Northern Water's *Colorado Airborne Snow Observatory Expansion Plan Project*

Dear Ben,

At our November 10th meeting, the South Platte Basin Roundtable unanimously voted to approve a South Platte Basin Roundtable WSRF Grant of \$5,000 and to support a State WSRF Grant for Northern Water's *Colorado Airborne Snow Observatory Expansion Plan Project*. This project will develop a roadmap for creating a sustainable Airborne Snow Observatory (ASO) flight program in Colorado that would ultimately benefit multiple basins and a diverse group of water stakeholders. The project team has assembled a unique water stakeholder workgroup from across Colorado to provide a range of valuable perspectives for how to best establish a sustainable Colorado ASO program and to plan optimal data collection zones throughout Colorado. The result of the project will be a comprehensive planning document that shows the costs and benefits of ASO, as well as a conceptual roadmap for available funding streams and how to make ASO sustainable over the long term. This plan, and the funding roadmap, will be presented at various outreach events including basin roundtables and water conferences.

Northern Water's WSRF application fully meets the South Platte Basin Roundtable WSRF Guidelines and WSRF Grant Program Criteria. Additionally, this project will help advance the South Platte Basin Implementation Plan. Having accurate knowledge of the volume of the water stored in the snowpack in the South Platte Basin and neighboring basins provides water managers the information needed to remove much of the "guesswork" from operations decisions. The provision of detailed and accurate ASO snowpack data in the years to come will form the foundation for a future that optimizes the use of native South Plate Basin supplies for the benefit of multiple parties in the basin. Further, these data will be invaluable in the planning and operation of future water infrastructure projects in the Basin.

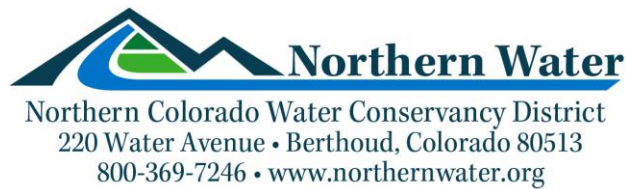
Upon review and consideration of Northern Water's proposal, the South Platte Basin Roundtable unanimously voted to approve the full \$5,000 of South Platte Basin WSRF funds requested by the applicant and to support their State WSRF Grant application.

Sincerely,



Garrett Varra, Chair

South Platte Basin Roundtable



October 23, 2020

Dear Colorado Water Conservation Board:

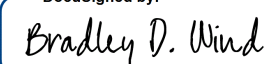
Thank you for considering this collaborative Colorado Airborne Snow Observatory (ASO) Expansion Plan proposal. This project was conceptualized by a large group of water agencies that span across multiple basins and both sides of the Continental Divide. In this proposal, we are requesting \$20,000 of State WSRF funds and \$25,000 of Basin WSRF funds to combine with \$44,000 of in-kind support.

The goal of this project is to develop a roadmap for creating a sustainable ASO flight program in Colorado that would ultimately benefit multiple basins and a diverse group of water stakeholders. This multi-basin project approach inspired the project planning team to seek equal funding from five different roundtables (\$5,000 each from the Arkansas BRT, Metro BRT, South Platte BRT, Colorado BRT, and Gunnison BRT, for a total of \$25,000 in roundtable funding). The project planning team will keep the State informed as we hear back from each of these Basin Roundtables.

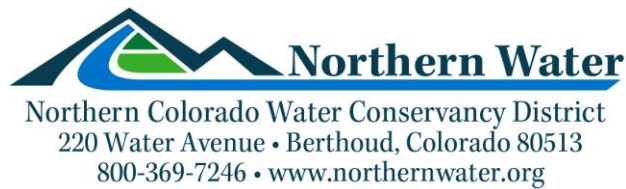
In-kind support will occur through regular engagement with the group that conceptualized this project, as well as project management, administration, and technical guidance. Workgroup activities will include monthly progress meetings, data sharing, interviews, project feedback, and vetting the approach to project tasks. The \$44,000 of in-kind contributions is the sum of \$5,000 from Northern Water (fiscal agent, workgroup contributions), \$10,000 from Denver Water (project management, workgroup coordination, technical guidance and review), \$5,000 from Airborne Snow Observatories, Inc. (strategic and technical advising), and \$24,000 from the larger workgroup collaborative of organizations that have pledged support for this project. In addition to the organizations listed above, the workgroup collaborative currently includes: Colorado Springs Utilities, City of Aspen, City of Fort Collins, Colorado River District, City of Boulder, City of Greeley, Thornton Water, Pueblo Water, Eagle River Water & Sanitation District, Aurora Water, City of Westminster, and the Ruedi Water and Power Authority. We will continue to expand the collaborative through expanded engagement in the project implementation process.

Please reach out if you have any questions regarding the project and/or the proposed funding approach.

Sincerely,

DocuSigned by:

FC0471B7832F49C...
Bradley D. Wind, P.E.
General Manager
Northern Water

CC: Project Planning Team - Denver Water, Lynker Technologies, LLC, and Airborne Snow Observatories, Inc.



October 22, 2020

The proposed Colorado Airborne Snow Observatory (ASO) Expansion Plan roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

Additionally, we recognize that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreation, environmental, and industrial sectors will all see benefits from the added accuracy of snowpack measurement from ASO.

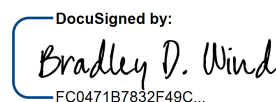
This project is a relatively low-cost project yet has the potential for substantial water management benefits. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins, and this project will provide a roadmap to make such a program a reality.

Northern Water, like many water providers and other stakeholders, will benefit greatly from this project. ASO data will increase the accuracy of water supply forecasts that water managers depend on. This will result in more efficient water use in the Colorado-Big Thompson Project and in water systems statewide.

Notably, the in-kind municipal partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building.

Northern Water will contribute \$5,000 of in-kind support to the ASO Expansion Plan project if funding is awarded by CWCB. Our participation will include activities such as contracting, assisting with project coordination, participating in monthly stakeholder meetings and providing GIS data.

Sincerely,

DocuSigned by:

FC0471B7832F49C...

Bradley D. Wind, P.E.
General Manager
Northern Water

October 15, 2020

RE: Letter of In-Kind Support for Coordinated ASO

Denver Water would like to express our support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application being submitted to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program. This project is relatively low-cost, yet has the potential for substantial water management benefits. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins, and this project will provide a roadmap to make such a program a reality.

The proposed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management. Additionally, we recognize that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreation, environmental, and industrial sectors will all see benefits from the added accuracy of snowpack measurement from ASO.

Notably, the in-kind municipal partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building.

We fully support this plan and will offer in-kind support of \$10,000. Our participation will include activities such as project coordination, organizing and participating in monthly stakeholder meetings, providing and analyzing GIS data, and developing and synthesizing stakeholder input. If you have any questions, please contact me at 303-880-6636 or laurna.kaatz@denverwater.org.

Sincerely,



Laurna Kaatz
Climate Program Manager
Denver Water



PO Box 1844
Boulder, CO 80306 USA

October 15, 2020

RE: Letter of In-Kind Support for Coordinated ASO

Airborne Snow Observatories, Inc. would like to express our support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application being submitted to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program. This project is relatively low-cost, yet has the potential for substantial water management benefits. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins, and this project will provide a roadmap to make such a program a reality.

The proposed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management. Additionally, we recognize that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreation, environmental, and industrial sectors will all see benefits from the highly accurate snowpack measurements from ASO.

Notably, the in-kind municipal partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building.

We fully support this plan and will offer in-kind support of \$5,000. Our participation will include providing strategic and technical advising, as well as sample data and existing case studies. If you have any questions, please contact me at 206-465-8783 or jeffrey.s.deems@airbornesnowobservatories.com

Sincerely,

A handwritten signature in blue ink, appearing to read 'J. Deems', is written over a light blue horizontal line.

Jeffrey S Deems

Co-Founder | Chief Technical Officer-Hardware | Formulation Lead
Airborne Snow Observatories, Inc.

**Utilities**

electric · stormwater · wastewater · water
PO Box 580
Fort Collins, CO 80522

970.221-6700

970.221.6619 fax · V/TDD: 711

utilities@fcgov.com

fcgov.com/utilities

October 19, 2020

Fort Collins Utilities would like to express our support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application being submitted to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program. This project is relatively low-cost, yet has the potential for substantial water management benefits. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins, and this project will provide a roadmap to make such a program a reality.

The proposed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

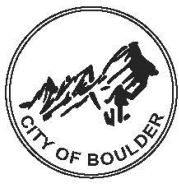
Additionally, we recognize that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreation, environmental, and industrial sectors will all see benefits from the added accuracy of snowpack measurement from ASO.

Notably, the in-kind municipal partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building.

We fully support this plan and will offer in-kind support to help the implementing group gather the information they need and answer the questions we have.

Sincerely,

Meagan Smith
Water Resources Engineer
Water Resources Division
Fort Collins Utilities



City of Boulder Public Works

October 21, 2020

To whom it may concern:

City of Boulder would like to express its support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application being submitted to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program. This project is relatively low-cost yet has the potential for substantial water management benefits. As a specific example, the City of Boulder is investigating tools such as snowpack measurement and ASO data to incorporate into its annual water supply assessment and drought response. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins, and this project will provide a roadmap to make such a program a reality.

The proposed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

Additionally, we recognize that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreation, environmental, and industrial sectors will all see benefits from the added accuracy of snowpack measurement from ASO.

Notably, the in-kind municipal partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building.

We fully support this plan and will offer in-kind support to help the implementing group gather the information they need and answer the questions we have.

Sincerely,

Kim Hutton
Water Resources Manager
City of Boulder



WESTMINSTER

October 14, 2020

To Whom It May Concern:

The City of Westminster would like to express our support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application being submitted to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program. This project is relatively low-cost, yet has the potential for substantial water management benefits. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins, and this project will provide a roadmap to make such a program a reality.

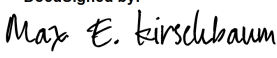
The proposed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

Additionally, we recognize that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreation, environmental, and industrial sectors will all see benefits from the added accuracy of snowpack measurement from ASO.

Notably, the in-kind municipal partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building.

We fully support this plan and will offer in-kind support to help the implementing group gather the information they need and answer the questions we have.

Sincerely,

DocuSigned by:

59330DBBF0B7466...

Max E. Kirschbaum
Director of Public Works and Utilities



Water Resources
15151 E. Alameda Pkwy., Ste3600
Aurora, CO 80022
303-739-7370

Worth Discovering • auroragov.org

October 19, 2020

To Whom it May Concern:

Aurora Water would like to express our support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application being submitted to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program. This project is relatively low-cost yet has the potential for substantial water management benefits. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins, and this project will provide a roadmap to make such a program a reality.

The proposed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

Additionally, we recognize that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreation, environmental, and industrial sectors will all see benefits from the added accuracy of snowpack measurement from ASO.

Notably, the in-kind municipal partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building.

We fully support this plan and will offer in-kind support to help the implementing group gather the information they need and answer the questions we have.

Sincerely,

Richard Vidmar

Richard A. Vidmar, P.E.
Integrated Basin and Ecosystems Services Manager
Aurora Water
rvidmar@auroragov.org



October 19, 2020

Colorado Springs Utilities would like to express our support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application being submitted to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program. This project is relatively low-cost, yet has the potential for substantial water management benefits. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins, and this project will provide a roadmap to make such a program a reality.

The proposed ASO expansion roadmap is key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

Additionally, we recognize that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreational, environmental, and industrial sectors will all see planning benefits from the added accuracy of snowpack measurement from ASO.

Notably, the in-kind municipal partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building.

We fully support this plan and will offer in-kind support to help the implementing group gather the information they need and answer the questions we have.

Sincerely,

Kalsoum Abbasi, P.E.
Planning Supervisor, Water Conveyance
Colorado Springs Utilities



Board of Water Works of Pueblo, Colorado

P.O. Box 400 - Pueblo, CO 81002-400 - 719/584-0250 - www.pueblowater.org

October 15, 2020

The Board of Water Works of Pueblo (Pueblo Water) would like to express our support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application being submitted to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program. This project is relatively low-cost yet has the potential for substantial water management benefits. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins, and this project will provide a roadmap to make such a program a reality.

The proposed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management. Additionally, we recognize that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreation, environmental, and industrial sectors will all see benefits from the added accuracy of snowpack measurement from ASO. Notably, the in-kind partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building.

We fully support this plan and will offer in-kind support to help the implementing group gather the information they need to implement the program.

Sincerely,

Seth J. Clayton
Executive Director



Infrastructure Maintenance Center
12450 Washington Street
Thornton, CO 80241-2405

Water Resources Division
720-977-6600
FAX 720-977-6202
www.thorntonco.gov

October 16, 2020

The city of Thornton would like to express its support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application submittal to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program.

This project is relatively low-cost, yet has the potential for substantial water management benefits. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins and this project will provide a roadmap to make such a program a reality.

The proposed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

Additionally, Thornton recognizes that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreation, environmental, and industrial sectors will all see benefits from the added accuracy of snowpack measurement from ASO.

Notably, the in-kind municipal partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building.

Thornton fully supports this plan and will offer in-kind support to help the implementing group gather the information they need.

Sincerely,

DocuSigned by:

E 07988F48881DA7E...
Emily Hunt

Deputy Infrastructure Director, City of Thornton

EH/sl

October 15, 2020



The City of Aspen Water Department would like to express our support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application being submitted to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program. This project is relatively low-cost, yet has the potential for substantial water management benefits. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins, and this project will provide a roadmap to make such a program a reality.

The proposed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

Additionally, we recognize that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreation, environmental, and industrial sectors will all see benefits from the added accuracy of snowpack measurement from ASO.

Notably, the in-kind municipal partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building.

We fully support this plan and will offer in-kind support to help the implementing group gather the information they need and answer the questions we have.

Sincerely,

Steve Hunter, PE, PH
Utility Resource Manager
City of Aspen Water Department
steve.hunter@cityofaspen.com



City of Greeley
1001 11th Avenue
Greeley, CO 80631

October 15, 2020

To Whom It May Concern,

The City of Greeley would like to express our support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application being submitted to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program. This project is relatively low-cost, yet has the potential for substantial water management benefits. Developing a sustainable and geographically expansive ASO program in Colorado will have mutual benefits across multiple basins, and this project will provide a roadmap to make such a program a reality.

The proposed ASO expansion roadmap is the key to overcoming challenges in uniting water partners throughout Colorado to develop a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

Additionally, we recognize that a robust and financially sustainable ASO program will have benefits far beyond the municipal sector. The agricultural, recreation, environmental, and industrial sectors will all see benefits from the added accuracy of snowpack measurement from ASO.

Notably, the in-kind municipal partners on this project represent multiple basins and span both sides of the Continental Divide, which demonstrates that this project will contribute to statewide relationship building. We fully support this plan and will offer in-kind support to help the implementing group gather the information they need and answer the questions we have.

Sincerely,

A handwritten signature in blue ink, appearing to read "Sean P. Chambers".

Sean Chambers
Water and Sewer Director



COLORADO RIVER DISTRICT

PROTECTING WESTERN COLORADO WATER SINCE 1937

October 20, 2020

To whom it may concern:

The Colorado River District is providing this letter as a sign of support for the Colorado Airborne Snow Observatory (ASO) Expansion Plan application being submitted to various basin roundtables for funding under the Water Supply Reserve Fund (WSRF) grant program.

We believe this proposal will provide significant water management benefits by developing a sustainable, high resolution data collection program that could extend across multiple basins. This proposal will develop a roadmap to help bring this initiative to fruition.

Development of new data and tools is the key to overcoming water supply and demand challenges in Colorado. Additionally, this will help unite water managers throughout Colorado while developing a state-of-the-art system that is consistent with Colorado's approach of being a leader in natural resource management.

To successfully provide multi-sector benefits, it is recognized that a regional data collection effort, like ASO, is expensive and therefore requires robust funding support. This proposed investment will support modeling and forecasting tools that benefit agricultural, recreational, environmental, and industrial sectors, spanning both sides of the Continental Divide, further contributing to statewide relationship building.

In conclusion, the Colorado River District supports the ASO Expansion Plan proposal. To the extent possible, we will provide in-kind support to the project through participation in the steering and implementing group and by providing technical assistance.

Sincerely,

Andrew A. Mueller
General Manager