



COLORADO

Colorado Water Conservation Board

Department of Natural Resources
1313 Sherman Street, Room 718
Denver, CO 80203

March 30, 2023

COALITION FOR THE UPPER SO PLATTE
PO BOX 726
LAKE GEORGE, CO 80827-0726

RE: Official Notice to Proceed - WSRF GRANT – POGG1 2023-3284

Dear Grantee:

We are pleased to inform you that the Colorado Department of Natural Resources, Colorado Water Conservation Board (CWCB) has approved your request for funding for your project pursuant to the Grant Program(s) (“Program”). This letter authorizes you to proceed with the approved project in accordance with the terms of this Grant Award Letter.

Attached to this letter are the terms and conditions of your Grant. Please review these terms and conditions as they are requirements of this Grant to which you Grantee agree by accepting the Grant Funds.

If you have any questions regarding your grant award, contact Erik Skeie at 303-866-3441 or at Erik.Skeie@state.co.us. Please send all grant correspondence directly to the project manager.

Thank you.

Sincerely,

//s//

Doriann Vigil
Program Assistant II
O 303-866-3441 ext. 3250
1313 Sherman Street, Rm. 719, Denver, CO 80203
Dori.vigil@state.co.us / cwcb.state.co.us





STATE OF COLORADO
Department of Natural Resources

ORDER		*****IMPORTANT*****				
Number:	POGG1,PDAA,202300003284	The order number and line number must appear on all invoices, packing slips, cartons, and correspondence.				
Date:	3/30/23	BILL TO				
Description:	WSRF - CMS#182437Inaugural Airborne Snow Observations	COLORADO WATER BOARD CONSERVATION 1313 SHERMAN STREET, ROOM 718 DENVER, CO 80203				
Effective Date:	04/07/23	SHIP TO				
Expiration Date:	04/07/28	COLORADO WATER BOARD CONSERVATION 1313 SHERMAN STREET, ROOM 718 DENVER, CO 80203				
BUYER		SHIPPING INSTRUCTIONS				
Buyer:		Delivery/Install Date: -				
Email:		FOB:				
VENDOR						
COALITION FOR THE UPPER SO PLATTE PO BOX 726 LAKE GEORGE, CO 80827-0726						
Contact:	MARTHA CAMPBELL					
Phone:	7197480033					
VENDOR INSTRUCTIONS						
EXTENDED DESCRIPTION						
Grant for Inaugural Airborne Snow Observations Surveys in the Upper South Platte Basin Project per attached Exhibit A Scope of Work and Exhibit B Budget".						
Line Item	Commodity/Item Code	UOM	QTY	Unit Cost	Total Cost	MSDS Req.
1	G1000		0	0.00	\$40,000.00	<input type="checkbox"/>
Description: WSRF - CMS#182437Inaugural Airborne Snow Observations						
Service From: 04/07/23			Service To: 04/07/28			
Line Item	Commodity/Item Code	UOM	QTY	Unit Cost	Total Cost	MSDS Req.
2	G1000		0	0.00	\$101,070.35	<input type="checkbox"/>
Description: WSRF - CMS#182437Inaugural Airborne Snow Observations						
Service From: 04/07/23			Service To: 04/07/28			
TERMS AND CONDITIONS						
https://www.colorado.gov/osc/purchase-order-terms-conditions						
DOCUMENT TOTAL = \$141,070.35						



Colorado Water Conservation Board

Water Supply Reserve Fund

Exhibit A - Statement of Work

Date: 3/22/2023

Water Activity Name: Inaugural Airborne Snow Observatories Surveys in the Upper South Platte Basin

Grant Recipient: Coalition for the Upper South Platte

Funding Source: WSRF Metro Basin and Statewide accounts,

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).

This project would conduct two Airborne Snow Observatories (ASO) surveys in the Upper South Platte Basin in late winter/spring 2023 to measure the snowpack and provide water managers with decision-making insight in the South Platte Basin. ASO uses airborne lidar and imaging spectrometer sensors coupled with a snow dynamics model to measure snow depth and albedo and retrieve Snow Water Equivalent (SWE) across large river basins at high spatial resolution. The flights provide a spatially complete, accurate measurement of the volume and distribution of SWE for a watershed, thus providing decision-support value unprecedented in water management.

In addition to the direct benefit for current water year operations, these surveys will contribute to the continued development of CASM and thus play a role in developing a sustainable ASO program that aligns with Colorado's tradition of being an internationally recognized leader in water management.

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

1. Improve confidence in water management decisions of the South Platte Basin (SPB) through conducting Airborne Snow Observatories (ASO) surveys that provide accurate and complete snowpack measurements of the Upper South Platte watershed.
2. Improve coordination amongst water managers and stakeholders of the South Platte Basin through broadly sharing the ASO survey information and hosting data review workshops with members of the municipal, environmental, recreational, agricultural, and industrial sectors.
3. Advance hydrologic and snowpack science in the Upper South Platte Basin through introducing a new approach to measuring watershed-scale snowpack that is more accurate than other existing technologies.
4. Contribute to the continued development of the Colorado Airborne Snow Measurement (CASM) program through conducting ASO surveys in a basin that has never had these surveys and communicating this information to a diverse group of water stakeholders.

Tasks

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

Task 1 – Airborne Snow Observatories Surveys



Tasks

Description of Task:

Task 1 will conduct two Airborne Snow Observatories (ASO) surveys in the Upper South Platte Basin (figure 1 for survey domain) in Water Year 2023, with the first timed to capture the basin's peak snow water equivalent (SWE) and the second during melt season as SNOTEL stations melt out. These ASO surveys will provide highly accurate estimates of the volume of water available in the snowpack of the Upper South Platte Basin. This SWE estimate will be discretized by elevation, as well as discretized into the "North Fork," "South Fork," "Middle Fork," and "Tarryall Creek" watersheds of the Upper South Platte Basin (figure 2). The data from the ASO surveys will be assimilated into the iSnoPal snowpack model, which models the state of the snowpack throughout the basin domain. The model tracks snowpack evolution between and after the ASO surveys (i.e. how the snowpack is melting and also how late season storms influence the snowpack), with the data from the ASO surveys setting an accurate foundation and constraint for the model. All of this information (the ASO survey data and the iSnoPal model output) will be distributed to interested stakeholders in the Basin and there will be a data review workshop following each ASO survey to discuss the results.

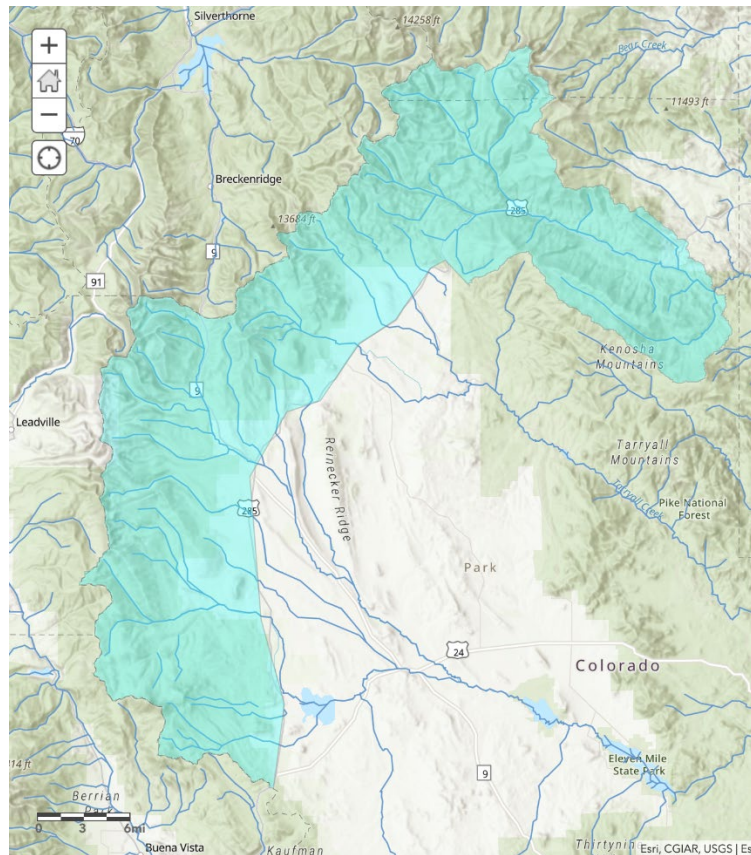


Figure 1: The blue highlighted area of the Upper South Platte Basin comprises the bulk of seasonal snow accumulation and will be the domain for the Airborne Snow Observatories surveys and iSnoPal snowpack evolution modeling



Tasks

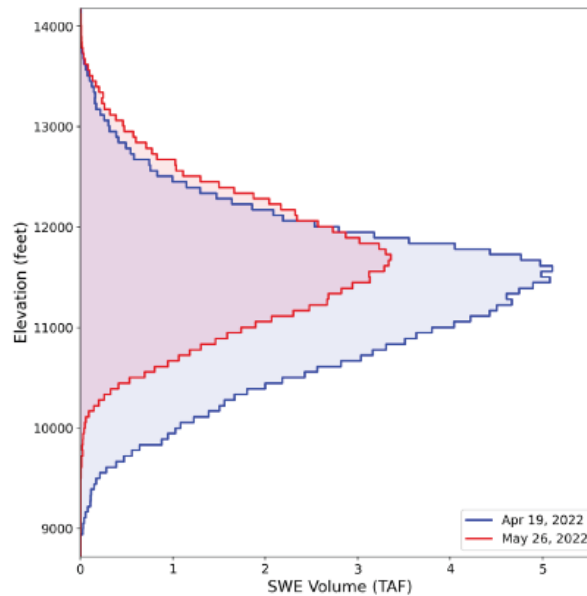


Figure 2: Snow Water Equivalent (SWE) by elevation for two Airborne Snow Observatories surveys in the Blue River Basin in 2022

Basin	Estimated SWE (TAF)	
	April 19	May 26
Full Basin	150	92
Uncertainty range	146 - 154	84-100
Main Stem	51	31
Snake River	27	20
Ten Mile Creek	57	34
Dillon	15	6

Figure 3: Snow Water Equivalent (SWE) discretized by sub-watersheds in the Blue River Basin for the two Airborne Snow Observatories surveys in that basin in 2022. Similar discretation by sub-watershed for the "Middle Fork," "South Fork," "North Fork," and "Tarryall Creek" will happen for the Upper South Platte Basin surveys

Method/Procedure

1. In coordination with interested stakeholders, identify optimal timing of flights as snow season evolves (notionally, the two flight surveys will occur near peak SWE and during the middle of the snowmelt season).
2. When these determinations are made or anticipated, conduct an Airborne Snow Observatories (ASO) survey as close as possible to the two targeted survey dates.
3. Post-process data from each ASO survey and create a survey report following each flight.
4. Assimilate data from the ASO survey into the iSnobal snowpack model to update the snowpack state.
5. Continue to update the iSnobal model throughout the rest of the 2023 snowmelt season with subsequent ASO surveys and ongoing precipitation, temperature, and other physically based parameters.



Tasks	
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)	<ol style="list-style-type: none"> 1. Two ASO survey reports documenting and explaining the results of each ASO flight survey 2. Initial iSnobal model report as well as update reports throughout the remainder of the snowpack season, for a total of four iSnobal reports (the first update report will be delivered before the second ASO survey occurs, the second update report will be delivered after the second ASO survey is conducted and the model is updated with the new survey data, and the third update report will be delivered near the end of the snowmelt season) 3. Two data review workshops organized by the ASO team to go over the results of each ASO survey.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)	<ol style="list-style-type: none"> 1. The grantee will provide a memo summarizing the ASO survey results as well as the iSnobal model results and how this information was integrating into the 2023 water management of the Upper South Platte Basin 2. The grantee will also provide the ASO survey report for both surveys and the four iSnobal snowpack modeling reports generated throughout the course of the project

Tasks	
Provide a detailed description of each task using the following format: (PLEASE DEFINE ACRONYMS)	
<u>Task 2 – Project Administration</u>	
Description of Task:	
Task 2 will focus on project administration. The Grantee will lead the contract administration, and another project partner will lead the overall project management and coordination.	
Method/Procedure	
<ol style="list-style-type: none"> 1. Administer contract, including processing invoices and ensuring the proper documentation is being processed and upheld throughout the project. 2. Manage and coordinate the project, including coordinating between the project partners: Airborne Snow Observatories, the Coalition for the Upper South Platte, Denver Water, Aurora Water, the Chatfield Mitigation Reservoir Company, and additional South Platte Basin partners that will utilize the Airborne Snow Observatories survey data. 	
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)	Not applicable
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)	Invoices and contracting reporting



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.



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

Date: 3/22/2023

Water Activity Name: Inaugural Airborne Snow Observatories Surveys in the Upper South Platte Basin

Grantee Name: Coalition for the Upper South Platte

<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</u> <u>Funds</u>	<u>Total</u>
1	Airborne Snow Observatories Surveys	4/7/2023	4/7/2028	\$146,747.40	\$137,070.35	\$283,817.75
2	Project Administration	4/7/2023	4/7/2028	\$7,100.00	\$4,000.00	\$11,100.00
Total				\$153,847.40	\$141,070.35	\$294,917.75