

Colorado Airborne Snow Measurement (CASM) Expedited Expansion

November 2022 CWCB Board Meeting

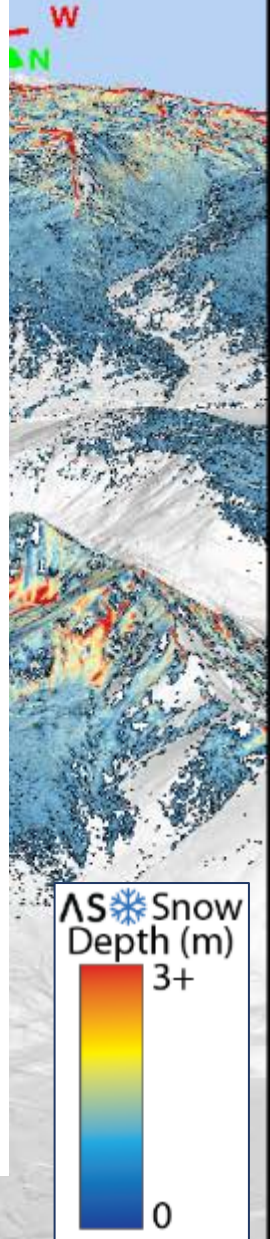
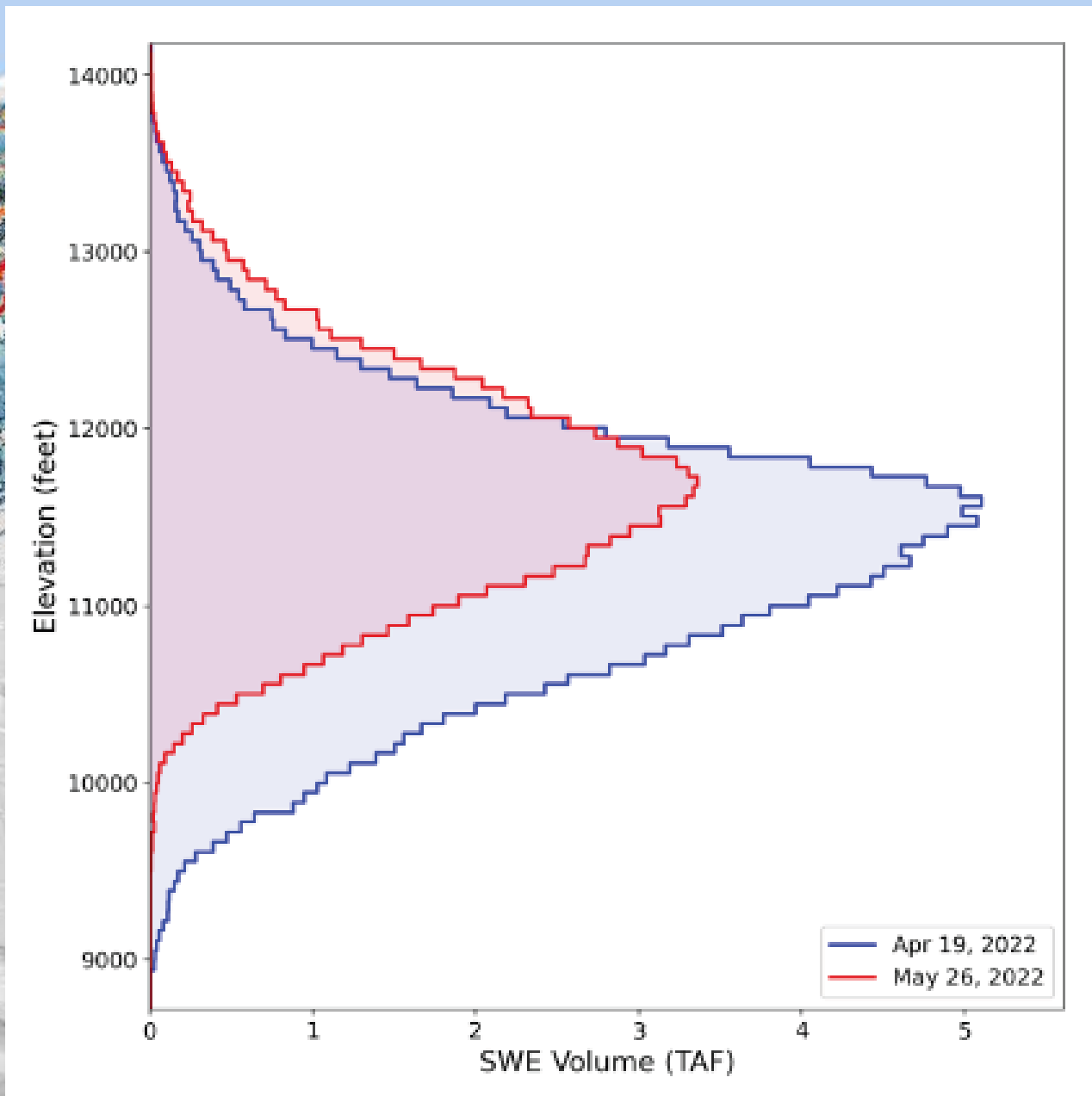
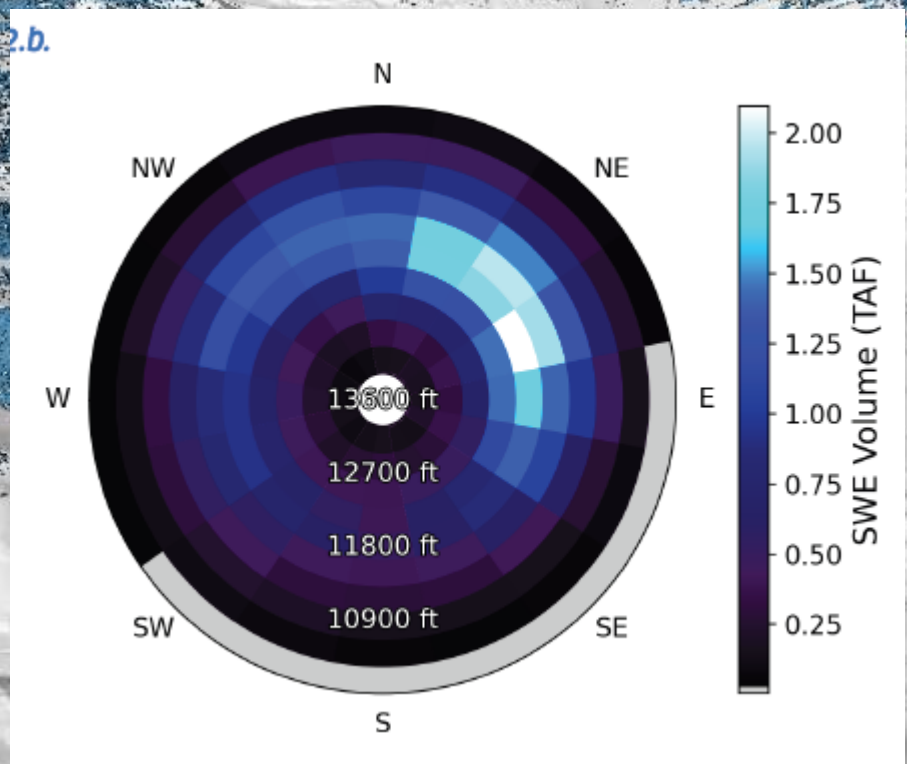


Agenda

- Program overview
- 2023 activities
- Priorities for Expediting Program Expansion



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





Water Management

Snow Science

Funding

Governance

Ongoing Activities

2022
"Phase 1"

- Experimental streamflow forecasts integrating ASO data
- Capture specific application case studies

- Forecast integration pilot development
- High density flight pilot development
- Further snow-free area prep

- Local agency match
- Water Plan Grant
- Understand local/state/federal interrelationship and funding sources

- Help the CWCB take over program management and coordination
- Test of the flight planning coordination

- Continuous stakeholder engagement & state partners

2023
Program Expansion

- Forecast product improvement
- Adoption by broader stakeholder group
- Economic case studies

- Clearly establish pilot basins with multiple flights
- 2 flights per year in all other basins unless better funded
- Complete all snow-free prep

- Fund pooling from state and local partners
- State-level exploratory funding

- Formal adoption of the program by CWCB
- Formal state-led facilitation process for flight planning

- Streamflow forecast improvements

5 Years
"Widespread Adoption"

- Regional forecasting efforts (NRCS/CBRFC) are improved using ASO data
- Regular use by stakeholders

- Widespread snow surveys
- Multiple years completed of high-density pilot basins
- 2 flights per year in all high elevation basins
- Well understood program to offset flight emissions

- State-level permanent funding
- Identify and engage with a Federal partner (USBR)
- Funding coordination and payment

- Multiple committees established (e.g. flight planning, data management)
- CWCB well organized around managing program

- Continuous incorporation of data into CBRFC/NRCS
- Engage with Upper/Lower basin partners so ASO can be linked to CRB goals

10 Years
"Program Buildout"

- ASO data is integrated with regional forecasting efforts (NRCS/CBRFC)
- Published article(s) demonstrating forecast improvement

- ASO Inc – expansion of number of planes
- Determine truly "necessary frequency" of flights
- Climate change tracking of snow characteristics

- Federal match for state funding
- Lower basin states contributing
- Sustainable funding established, local partners contributing in-kind not funding

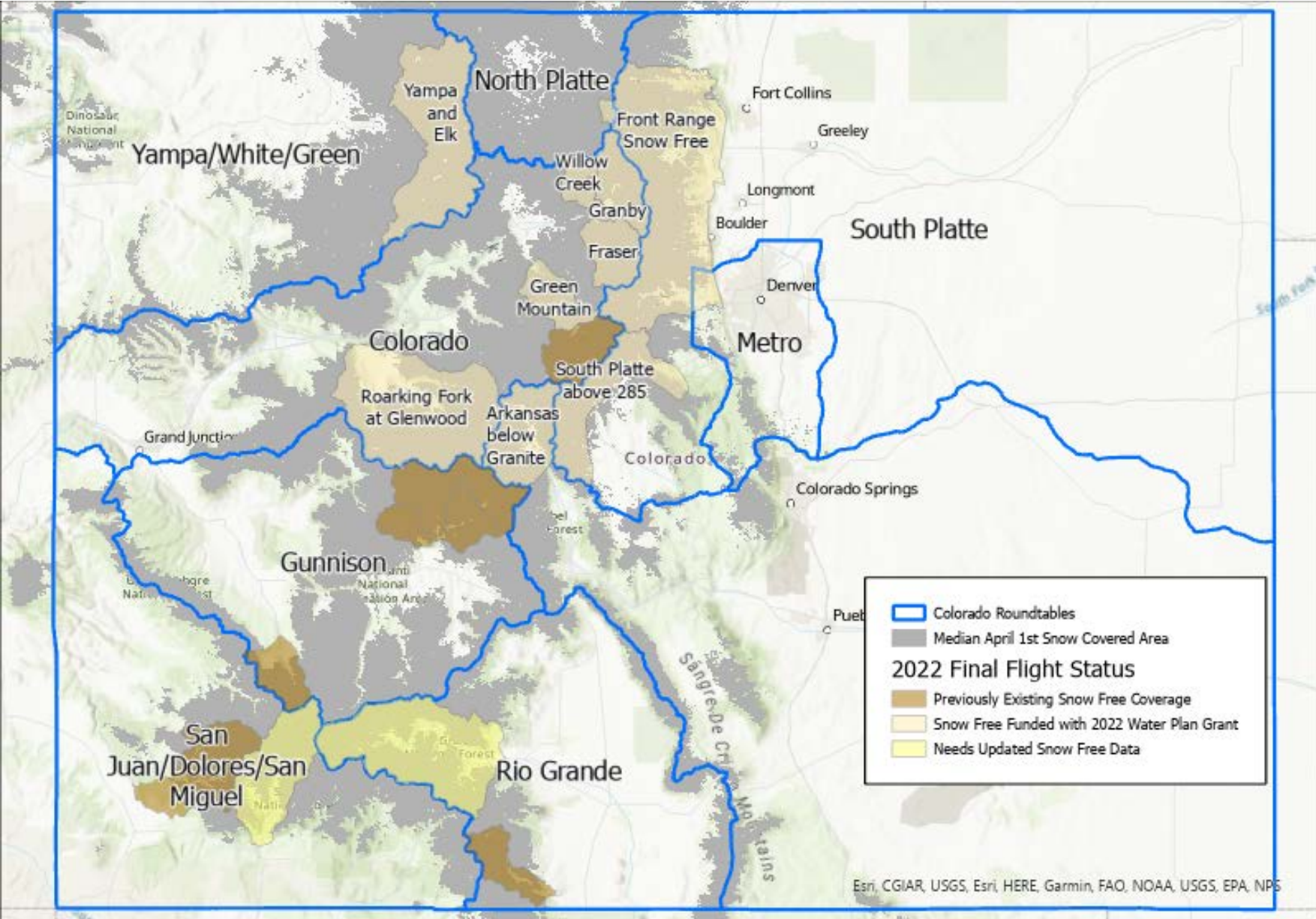
- Widespread advocacy by the CWCB
- Replication into other states throughout CRB

2023 “Program Expansion”

- Targeting 24 flights across 11 basins
- Improved streamflow forecasting
- Increase engagement with water users from different sectors



Status of 2022 Snow-Free Flights

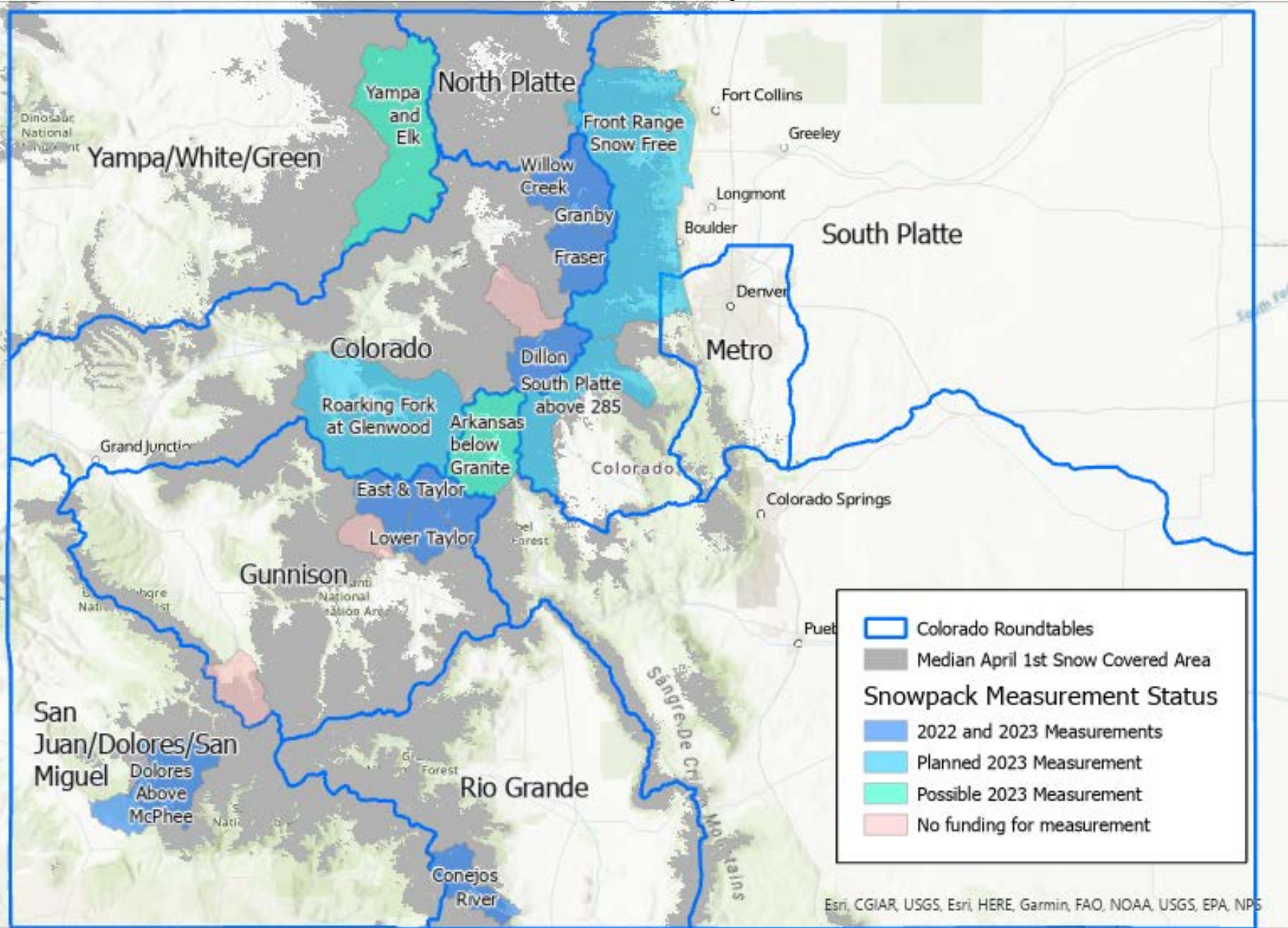


Snow-Free Flights made possible by 2022 CWCB Water Plan Grant

Multiple benefits of snow-free data including post wildfire canopy monitoring, land cover change

Esri, CGIAR, USGS, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS

Current and Future Snowpack Measurements



Many basins are ready for flights but lack funding

- Yampa and Elk
- Fraser
- Green Mountain Reservoir
- Lower Taylor
- Uncompahgre
- Animas
- Rio Grande at Del Norte

Priorities for Expediting Program Expansion



- **Funding**

- 2023 Committed & Potential: \$2.4 million
 - Local Agencies: 23 agencies giving from \$1K to \$250K totaling over \$1 million
 - State Funding Pools: \$1.13 million
 - Federal Partners: \$250K
- Full Program Expansion: \$6.3 million
- Widespread Adoption: \$8.6 million
- Full Statewide Coverage: \$26.6 million

- **Simplified Contracting Mechanism**

- **Expanding Snow Free Coverage**

- 10.3M Acres of 25.5M Acres completed (Estimated cost from ASO, Inc.)

Challenges in Front Range Funding (St. Vrain)



Final WSRF Planning Report

Complete and Shared here:

[ColoradoSnow.org](https://coloradosnow.org)

Full Report

Executive summary/FAQ Doc

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