

Rapporteur Shareout ~ Igniting the way forward

Table 2 - Water A

Title: How Can Uncertainties Associated with Snowpack, Streamflow, and Climate Inputs Be Quantified and Communicated for Drought Resilience in the Colorado River Basin?

What	Why	How	Who	When	Where
Quantify uncertainty in snowpack, streamflow, and climate inputs, track how it propagates to water supply forecasts, and communicate it clearly	Uncertain forecasts drive allocations and shortage declarations; quantifying that uncertainty enables risk-informed, fair, and anticipatory water policy	Use Bayesian/AI-ML models to combine snow, streamflow, and climate data into probable ranges of future water supply, then present them as simple visuals for decision makers	Scientists build the models, agencies like CBRFC and Reclamation apply them, and tribes, farmers, cities, and the public use and are affected by them	Implement in 1 to 2 years, operational in 3 to 5 years	Upper Basin snowy headwaters, through Lake Powell and Lake Mead, to Lower Basin water users

Image Source: Western Landowners Alliance

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Table 3 - Environmental Data Science A

Title: Make Data Believable Again

What	Why	How	Who	When	Where
Increase trust from the public in scientific data by making data tangible - particularly in K-12 schools	Increase scientific literacy and help the public make informed decisions and potential solutions. Engage future scientists in data stewardship	Involve people in citizen science project - drought/air quality/ weather extremes are obvious choices for Colorado. Public input leads to feedback regarding the measurements	Connect with CoCoRAS and local schools provide multiple rain gauges per school	Whenever - or start October 1. Develop a prediction/forecast game for the year with	underserved areas from the CoCoRAS Local tours of NCAR, CU etc

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Table 5 - Changes in Polar Regions A

Title: Community and tools for data users

What	Why	How	Who	When	Where
The CIRES Data Discovery Tool is a unified knowledge database designed to streamline environmental data discovery. It aggregates and indexes dataset links from existing distributed repositories, focusing initially on Arctic region data to enhance regional and polar research accessibility.	To streamline cross-disciplinary search and foster interdisciplinary collaboration by enhancing metadata development.	To launch this initiative, CIRES will distribute an expertise-mapping survey to identify researcher domains, subsequently establishing targeted working groups to catalog existing datasets—including CIRES-issued Digital Object Identifiers (DOIs)—and act as data brokers to streamline cross-disciplinary access.	CIRES researchers, a nucleus -NSIDC (large data collection), Snow and Ice center, data providers. AI experts for developing connections, Future - database developers	Next Month: Kick off team assembly and align key data and AI stakeholders. Q1 2027: Apply to the CIRES Innovative Research Program (IRP) to fund pilot scoping. July 2027: Secure scalable funding pathways at the turn of the new fiscal year.	CIRES-wide data system

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Table 6 - Air Quality and Atmospheric Chemistry A

Title: A bridge between modelers and data collectors

What	Why	How	Who	When	Where
How to improve the disconnect between modelers and data collectors?	Lack of communication Lack of data from the Gobar South (help them develop affordable instrumentations, etc.) Funding challenges for lab and field studies	Small workshops Guides on how to use models/data Find new funding sources: NGOs, states (CDPHE), or others	Do we need to hire someone to be that liaison? From data repositories User database when you upload/download the data to create a link. Alert system with updates AI could be useful on some aspects (data analysis, but not data quality)	Annual workshop Updates as needed	Could start a local workshop with early and mid-career scientists

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Table 7 - Natural Hazards A

Title: Communicating risk as a rapid response - "Strike Force Haznet"

What	Why	How	Who	When	Where
-To combined current efforts to communicate about current hazard events to specific audiences (unique products for unique audiences) -To further understand how to effectively communicate about hazard events	-Major hazard events create buy-in/awareness -Larger events span boundaries -Balancing information coming from trusted/credible source, while valuing local perspectives -To provide clear action steps dependent on the hazard	-How to combine efforts? -How to assess gaps/successes in communications (past, present, and future) -How do we communicate severity/probability/uncertainty in ways that are informative, not fearful -How do we develop creative/innovative ways to communicate? (ex-stickers that change color with temperature)	Audience -Scientific communities -Local communities -Specific sectors (Ag, energy, etc) -Responders (local, state, fed) Contributors NWS, WWA, NIDIS, WWR, state/fed agency	-After a hazard event, coordinate a group to create the communications. -Have a "pot" of hours to spend on creating communications	-Focus on events within the United States and those that align our international work -Work can be done/coordinated remotely

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Table 8 - Water B – Title: Guiding efficient investments in water monitoring

What	Why	How	Who, When, and Where
- Known gaps in hydrologic monitoring that, if filled, would provide improved skill in our water resource monitoring and forecasting - Evaluate what approaches/observation investments would have the greatest benefits for water cycle monitoring - Prioritize and provide advisory assessment	-Limited water resources require better constraint of current observations -Skill gap is related to amount of observations and in the current era of AI, the skill of these new approaches is limited by the comprehensiveness of data - Help prioritize where investments should go when opportunities arise	-Identify and collate existing monitoring networks (state, fed, local sites stored in different locations) -Conduct experiments with existing monitoring (like NRCS) to evaluate what observations are giving the most skill/added value -Require the large data end users to invest in more monitoring to improve baseline knowledge (AI for example) -Survey the science and practice communities on what information they are away of needs for prioritizations	-Who:CIRES scientists have extensive expertise -Surveying across CIRES/partner networks could help to identify networks of observations and priorities/needs -When: Now? As soon as possible? Having knowledge of observational gaps and assessment of priorities/costs could help funding flow when opportunities arise - -Where: US, west-wide? North America?

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Table 9 - Science Communication B

Title: Making science relatable

What	Why	How	Who	When	Where
Make science more personal. We want people to ask questions. Provide context for facts Remember immediacy bias.	People don't care unless it impacts them directly. Educate the public so they can support legislators that do the best for the planet A lot of rhetoric gets repeated and people are not encouraged to question.	Challenge the narrative Avoid putting someone on the defense Simplify the science to invite discussion Encourage curiosity Learn to have a conversation: • What do you hope to get out of the conversation • Where does your confidence come from? • I am not understanding your question, Good trustworthy records management Understand your audience	Neighbors, friends, and family. Best chance at having these conversations. In the end they vote.	You should be ready to communicate all of the time. Make it relatable all the time.	Plain language summary in journals Public spaces Conf talks Media Living room conversations

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Table 10 - Observational Tools and Methods A

Title: FAIR data for AI and humans

What	Why	How	Who	When	Where
Communicating instrumental uncertainty, methodology, and data value to end users (humans and AI)	Data without metadata is meaningless.	Moving data to the cloud.	Data Providers And users	Now!	Leadership of data providing organizations
Observational Data 'FAIR'-ness: Findable, accessible, interoperable, and reusable	AI without data is meaningless	Using AI to improve data search, documentation	AI model Developers / Prompt engineers		Data archival centers
	Stakeholders (public, policy makers, scientists) and providers need to understand each other	Make UI more informative Better data visualization	Leadership		
		Funding for proper data documentation, metadata, archival			

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Table 11 - Ocean Science A

Title: Increasing access, availability, and understanding of deep ocean data.

What	Why	How	Who	When	Where
-Understanding of the importance of deep ocean data. -Greater availability and access of deep ocean data.	-There is a lack of understanding of deep ocean processes and interest among students. -Deep ocean is interconnected with surface, which is interconnected with atmosphere. -The deep ocean stores large amounts of heat and carbon.	-Provide more students with the knowledge and skill set to work with deep ocean data. -Provide a more positive outlook on ocean analysis rather than doom and gloom outlook. -Acquire more deep ocean data.	-Grad students in the earth sciences who work with other types of data. -Undergrads and grade school students that could go into earth sciences in the future.	-Soon!	-Earth sciences research institutions such as CU and CIRES. -Coastal institutions where there is more interest in this topic. -The bottom of the ocean!

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Table 13 - Science Policy A

Title: A continuous and independent Science Policy organization

What	Why	How	Who	When	Where
How do we maintain an unbiased science policy organization with stable/continuous resource support?	Gap between scientific knowledge and the knowledge/priorities of the public Link science to policy/action that isn't at risk of being lobbied against or dissolved	Obtain reliable continuous funding to support science policy initiatives (funding source: university general budget, nonprofits, consortiums)	Universities are a likely place to retain independent reliable science policy organizations	Now, or next budget planning cycle	Appropriate planning groups at the university, and Wash. DC (connections to federal government)

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Table 14 - Science Communication C

Title: Utilizing CIRES Communications Expertise for Training and Collaborations with Researchers

What	Why	How	Who	When	Where
Providing different levels of training on how to improve our science communication at CIRES (e.g., providing opportunities for practice, direct collaboration, training, cohort style)	Improved collaboration across disciplines; lack of formal training on how to communicate our work; different levels of awareness about Comms Teams increasing public interest in climate change / science advocacy; increasing opportunities to engage with public	Examples: increasing awareness on skills/projects of Comms team, workshoping content for audiences, unit/department-specific seminars, science communication cohort (deeper-level training)	Depends on context ECR Mid-level Senior-level	Depends on context: Centered around CIRES engagements to increase opportunities for scientists to engage Beginning of programs Monthly cohort meetings	Depends on where you're presenting your work (e.g., practicing conference talks in person; offering virtual/hybrid workshops for units, in-person cohort meetings)

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Table 15 - Environmental Education A

Title: Creating a catalog of SMEs to enable effective environmental education

What	Why	How	Who	When	Where
A catalog of researchers who have scientific expertise (SMEs) and are willing and able to communicate this expertise internally in CIRES for networking, proposal development and connections and externally to share the science with the larger community.	Environmental education is meant to empower people to understand why scientific research is important and needed and to make informed decisions in the world. Creating effective environmental education programs means understanding your pool of resources and the scientists are the resource.	Create a culture where environmental education is treated as a valued activity and given the funding, time and capacity needed to inspire people to participate. Then, survey the CIRES population to populate a catalog of researchers who are willing and able. Identify champions of the initiative to carry it forward and be sustainable.	Scientists within CIRES who are identified as subject matter experts who are also willing to share their expertise internally to CIRES and/or externally to the larger community (CU/public).	When scientists feel that their efforts towards environmental education are appreciated, and given adequate time, capacity and support. Starting now and going indefinitely.	The catalog would be an internal to CIRES. Would this be housed in the ACI program or in CEEE? Funding and duration would potentially determine it's home.

POKEMON SNOW



What	Why	How	Who	When	Where
Citizen science app for measuring snow depth	Observations of snow depth are sparse and funding for observations is lacking Water after snowmelt is valuable Spatial extents of snow depth Encouraging people to contribute to the coverage (similar to how people are aware that “only X amount of the ocean has been discovered” , % unknown)	1) At areas of high interest/high traffic, place orange measuring sticks w/ signs explaining project 2) Have participants take photos measuring snow depth 3) Upload to app, geolocation and time stamp. Gamify; partner with Strava. Show time series of obs at that point. 4) Gamify analyzing data 5) Server space to store photos, make accessible and findable. Metrics for science engagement. 6) Determine type of snow, aka density 7) Calculate w/ temp and precip 8) Science side: interpolation techniques for sparse data, finding best locations -Partner with existing apps to reduce “app exhaustion” (Ski apps, trail apps, Strava, All Trails, POKEMON SNOW days/activations) -Upload to the app with geolocation and time stamp	-Snow removal field (existing interests in snowfall measurements) -At locations like hospitals that require frequent snow removal -Geocaching apps -Pokemon Go stops -Science enthusiasts -Hunters, fishermen, backcountry skiers, birders, hikers, water utility services, skiing clubs, outdoor clubs, emergency managers -Partner with existing apps for frontend and build server for backend access to scientists	Test run within NOAA/CIRES for 1 season Give 20 people yardsticks to test methodology Create server backend to store data and analyze first season to determine suitability After test run, write proposal or approach existing apps to discuss integration	-outdoor holiday festivals (christmas tree farms) -ski resorts -hospitals and urban centers -if you provide your own measurement stick, you can map your own backyard -state parks -dog parks -co-locate with hydraulic data stations for increased observations > runoff etc -museums, science and art -schools -highway rest stops -QR code that allows the scanning of a sign to contribute to the database from anywhere

Photo credit: <https://www.pokemon.com/us/pokedex/sandshrew>