MINUTES
of the
WATER RESOURCES COMMITTEE
Courtyard by Marriott
Lincoln, Nebraska

April 24, 2025

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MEMBERS AND ALTERNATES PRESENT (*via zoom*)

ALASKA	T*om Barrett* *Christina Carpenter*
ARIZONA	*Trevor Baggiore*
CALIFORNIA	Joaquin Esquivel Jeanine Jones
COLORADO	Jojo La *Jason Ullman*
IDAHO	Jery Rigby Mat Weaver
KANSAS	Earl Lewis Tom Stiles Matt Unruh
MONTANA	Trevor Watson *Jay Weiner*
NEBRASKA	Jesse Bradley Justin Lavene
NEVADA	*Jennifer Carr* *Cathy Erskine*
NEW MEXICO	T*anya Trujillo*
NORTH DAKOTA	*Reice Haase*
OKLAHOMA	Julie Cunningham Sara Gibson

OREGON	*Doug Woodcock*
SOUTH DAKOTA	Nakaila Steen
TEXAS	
UTAH	Candice Hasenyager *Teresa Wilhelmsen* Mark Stratford
WASHINGTON	*Ria Bearns* *Leslie Connelly*
WYOMING	*Chris Brown*

GUESTS

James Schneider, Olsson
Bill Udell, Don't Panic Labs
Levi Hagen, Don't Panic Labs
Charlie McGuigan, AGA-CWAG
Tom Riley, Riley Consulting LLC
Brian Clark, U.S. Geological Survey
Victoria Asbury, Kansas Water Office
Jennifer Verleger, State of South Dakota
Christopher Estes, Instream Flow Council
Connor Kelley, Houston Engineering, Inc.
Rick Allen, Evapotranspiration Plus, LLC
Conor Doherty, California State University
Ayse Kilic, University of Nebraska-Lincoln
Adel Abdallah, Utah Division of Water Rights
Forrest Melton, NASA Ames Research Center
Austin Davidson, Legislative Finance Committee
Matt Rakow, Washington Department of Ecology
Mark Svoboda, National Drought Mitigation Center
Hannah Singleton, Southern Nevada Water Authority
Dave Christensen, Washington Department of Ecology
Philip Blankenau, Idaho Department of Water Resources
Alexa Davis, Nebraska Department of Natural Resources
Sarita Nair, New Mexico Department of Workforce Solutions
Isabella Peterson, Nebraska Department of Natural Resources
Patrick Fridgen, North Dakota Department of Water Resources

Kathy Alexander, Texas Commission on Environmental Quality
Steven Goans, Nebraska Department of Environment and Energy
Andrew Dunkley, Nebraska Department of Environment and Energy
Patrick Kormos, USDA Natural Resources and Conservation Service

WESTFAST

Lauren Dempsey, U.S. Air Force
Chris Carlson, U.S. Forest Service
Chad Abel, U.S. Fish and Wildlife Service
Paula Cutillo, Bureau of Land Management
Roger Gorke, Environmental Protection Agency
Elizabeth Ossowski, National Oceanic and Atmospheric Administration

STAFF

Tony Willardson
Michelle Bushman
Elysse Campbell
Ryan James

WELCOME AND INTRODUCTIONS

Candice Hasenyager conducted the Water Resources Committee. She called the meeting to order and welcome those in attendance. Introductions were made around the room.

APPROVAL OF MINUTES

Candice called for a motion to approve the minutes from the meeting held on October 23, 2024, in Lawrence, Kansas. Earl Lewis made a motion, Mat Weaver seconded, and the minutes were unanimously passed.

SUNSETTING POSITIONS

Tony Willardson explained for those who are not familiar with our resolution process, they sunset after three years. That's in coordination with what the Western Governors' Association (WGA) does with their resolutions. When we send you the 30-Day Notice of the meeting with

any new proposed resolutions, as well as changes to any current sunsetting resolutions, we also send it to the Western Governors for their review. Every three years, we review and update them.

a. Position #478 - supporting Rural Water Infrastructure Needs and Projects

Tony Willardson noted that Position #478 was initially adopted in response to the Bureau of Reclamation Small Reclamation Projects Act, but it has also been broadened to recognize that USDA Farm Service Agency and others support rural programs.

Michelle Bushman reviewed some of the updates. One of the requests we received for all of our sunsetting and proposed positions going forward was to include the first two paragraphs, which outline what the Council is and our mission. If you recall, we had a discussion when we were in Kansas about rural water systems. We put some of that information in this position to acknowledge that Reclamation actually does have authority to do more than just their authorized rural water projects, which are in just a few of the states. The new language addresses the opportunities for regionalization of technical resources in addition to infrastructure consolidation. Because states use the terms regionalization and consolidation in different ways, do we need to define those terms? Hearing no concerns or questions, Michelle continued. Further, we added, "WHEREAS, Reclamation has in the past not requested funds for grants to undertake additional appraisal investigations or feasibility studies for new rural water projects, given the significant authorized backlog and lack of federal funding." That kind of closed that loop of what we were trying to accomplish when we talked in Kansas.

Candice: Thank you, Michelle. Any additional edits, concerns or comments that we want to incorporate into this sunsetting position?

Roger Gorke suggested adding financial to the technical and managerial regionalization.

Julie Cunningham: What Roger is talking about is the technical, managerial, and financial or TMF that is the term that EPA uses in the States, which is not necessarily infrastructure financing, but consolidation on financial management of their system.

Roger: Yes, shared billing and that kind of thing.

Michelle: Any objections to that? This position is directed at Reclamation, not EPA, but it's certainly transferrable language.

Candice: I'm good with it. Does anyone else have any concerns? Hearing none, she asked for a motion to recommend Position #478 to the Full Council. A motion was given, followed by a second and the motion was unanimously approved.

b. Position #479 - supporting Renewable Hydropower Development

Michelle: For this position, again, we added the first two paragraphs outlining what the Council is and our mission. Staff updated the Whereas clause that stated hydropower was the primary source of renewable electricity in the United States - it is no longer. I believe solar power is now the highest renewable energy source. We've noted that hydropower is still an important source, even if it's not the primary. Some of you have indicated that geothermal may overtake solar soon. We also added in some language that there are some hydropower projects that do require further environmental review because they are subject to the FERC process. The position notes that states still need to be involved in approving these projects regardless. Alaska added some language to this position as well.

Candice asked if anyone had any questions, or concerns? Hearing none, she asked for a motion to recommend Position #479 to the Full Council. A motion was given, followed by a second and the motion was unanimously approved.

NATIONAL DROUGHT MITIGATION CENTER

Tony introduced Mark Svoboda as the Director of the National Drought Mitigation Center (NDMC) here at the University of Nebraska. Mark and I both sit on the Executive Council for the National Integrated Drought Information System (NIDIS).

Mark Svoboda provided an overview of NDMC, founded by Dr. Donald Wilhite in 1995. I started on day one and have been the director for the last decade. We focus on translating drought science to various audiences, including policy makers, the public, and the media. Our primary goal is to make this scientific information accessible and usable for the stakeholders. As a boundary organization, we bridge the gap between scientific research and practical application. Our team consists of approximately 25 staff members and 12 students with diverse backgrounds. We aim to clarify how we analyze information and ensure its practical application in your decision-making processes. Our approach relies heavily on collaboration with various partners, including local, state, and federal partners. We also actively engage with international partners, including the United Nations and the World Bank, on a range of projects. In our 30-year history, we've had the privilege of working with nearly 100 countries. We're excited to be celebrating our 30th anniversary this June.

Droughts present a significant conundrum due to the wide range of factors involved across different spatial and temporal scales. As highlighted by the previous speaker, the concept of "flash drought," underscores the urgent need to recognize drought as a serious hazard. In fact, on a per capita basis in our country, drought has historically been the leading cause of economic loss, ranking just ahead of hurricanes and surpassing floods, tornadoes, earthquakes, and other natural disasters. This impact is often underestimated. Those familiar with the Western states understand the pervasive nature of drought, but it's crucial to remember that this is a nationwide concern.

Droughts can manifest over periods ranging from a few days to many decades. We've observed prolonged, multi-decadal "mega-droughts," such as the one that began in the late 1990s in the southwest and west, significantly affecting the Colorado River system and reservoirs like Powell and Mead. Conversely, we also experience rapid onset "flash droughts" that can develop in a matter of weeks. These sudden droughts can severely impact crops, ecosystems, and grasslands, potentially exacerbating wildfire risks. Addressing the multifaceted challenge of drought requires considering its impacts across various timeframes and geographical areas.

When the drought center started, only three states in the country had drought plans. Now we have 47 states that have drought plans. Over half of those are purely response-oriented plans. We're trying to get to more of a proactive mitigation plan, taking a closer look at step that can be taken in advance of drought to reduce the impacts on the economy and communities. There is more planning occurring at the tribal, community, and individual scale. We receive a lot of requests for individual ranch and farm plans, and with the institutional knowledge we developed a guide, Managing Drought Risk on the Ranch, which shares best practices from ranchers and farmers with their colleagues and peers.

An early drought warning is not a forecast because we lack the strong forecasting skill needed to interpret ENSO and other events more than two weeks in advance. In 1999 they only had the Palmer Drought Index, which had a nine-month lag time on average across the country. At the time, email and internet were still getting started, and of the five resources available to gather drought assessment information, three of them had to be mailed, which was not a timely process. The Drought Monitor started as an experimental product that happened to coincide with a major drought on the East Coast, and the Secretaries of Commerce and Agriculture saw the product and wanted it to go from experimental to operational very quickly. The Drought Monitor tries to capture all the elements of the hydrologic cycle: precipitation, soil moisture, groundwater, stream reservoirs, vegetation stress through remote sensing. These are assessed with different tools to come up with a combined dry indicator bases on a percentile approach that gives us historical context. We started with 12 people providing feedback at the state and local level to help ground truth the information for us; we are now up to 450 people, in addition to state drought task forces that take a closer look. It really is a unique process to have that kind of engagement with folks in various states.

The Farm Bill in 2008 brought the Drought Monitor into the policy realm, using it as a trigger for certain programs, sometimes to the consternation of the ranchers, but that is a Farm Service Agency call which removes us from imposing our own bias. We are the repository for the data, but it is a collaborative effort with NOAA and USDA. We don't have a strong line item budget for the Drought Monitor, so we do this through cooperative agreements and contracts and ad hoc funding. We are generating 38,000 maps every week, broken down for HUC regions, tribes, just about any geopolitical boundary you can think of. We are losing people through retirement or other reasons, and there is some concern about how we keep this going. We are looking at the contemporary world of analyzing big data with machine learning approaches, dissecting different regional and seasonal issues, and finding ways to add higher spatial and temporal resolutions.

Drought issues aren't going away, and awareness of water quality and health issues tied to drought is increasing. It is an environmental stressor, and around the world it often leads to food and water insecurity, migration, civil unrest and potential conflicts. Our main objective is to plan and prepare for drought instead of just reacting to it, and our bottom line is whether we can get people to update their plans to be more proactive in nature. And our job is to make the science more digestible for you to use.

Questions:

Candice: We use this product quite heavily in Utah and are very greatful for the coordination and collaboration that we can offer into the product. It's been super useful so thank you.

Mark: You're welcome.

Doug Woodcock: Mark, you spoke about the concerns around funding. I'm wondering if you could touch on your program's vulnerabilities and our current climate of federal programs being taken down and access to data being restricted.

Mark: Yes, they're truly there. For the last several months we've been responding to the current Executive Orders as to what our data contingencies are. Fortunately, we can use models that are not just driven by our data here, but remotely sensed data information. Unless they turn off the key to a lot of the satellites for NASA. But we still have access to the European community for a lot of that. Data from federal agency feeds plays a vital role in our processes, especially considering how much indirect data contributes to the Drought Monitor. If we were to lose access to these feeds, we could still generate the map using the roughly 50 indicators we currently analyze (compared to the five used previously), but the accuracy would likely decrease significantly. This potential reduction in accuracy is concerning, particularly when these maps are used to trigger programs at the federal or state level, where precision is essential.

Going forward, we are closely monitoring what data we can download and archive. We are aware of other groups attempting to download and archive federal databases. While this might sound unusual, there's a significant effort underway to pre-position data to preserve the historical record. This historical archive is crucial as it forms the backbone of the Drought Monitor. To understand the current drought in context, we need to be able to compare it to historical drought patterns. Thank you for asking this important question. It is certainly a key concern as we move forward.

NWCC SNOW SURVEY & WATER SUPPLY FORECASTING PROGRAM

Patrick Kormos, Hydrologist, National Water and Climate Center, USDA Natural Resources and Conservation Service provided an overview of weather patterns, snow conditions, water supply forecasts, and some new products.

Looking at precipitation for the western United States, you can observe a general north-to-south gradient. We're looking at just under 100% of median water year precipitation in the Pacific Northwest Missouri, Great Basin and Upper Colorado River regions. Moving south, the Arkansas and Rio Grande regions, along with the Lower Colorado, have received precipitation in the upper 70s and 80s. The Lower Colorado region has received approximately 60% of the water year precipitation to date (as of April 2nd). Taking a closer look on a finer scale, the Klamath, Oregon, Lahontan, and Milk Basins have been getting more than 125% of normal water year precipitation. In contrast, the Little and Lower Colorado, Sal Pecos, Gila, and Rio Grande basins, particularly in New Mexico and Arizona, are under 75% of normal. Examining the precipitation on a timeline, the early season (October to the end of December) saw above-normal precipitation in Northern California, Oregon, and Nevada. February and March brought significant precipitation across much of the western United States. However, Arizona and New Mexico consistently received less than 50% of normal precipitation through the end of February, indicating a persistent deficit in these areas.

Regarding temperature, the anomaly map from the start of the water year (October 1, 2024) shows predominantly warmer conditions, with much of the western United States experiencing temperatures one to two degrees above normal.

Moving on to the snow conditions in relation to the water year precipitation. As you can see, there's a similar gradient from the Pacific Northwest down through the Rio Grande. The northwestern part of our region is currently in good shape, reporting 94% of normal snow conditions for this time of year, note that this reflects the current snow water equivalent, and we're already observing melt in many station locations across our network. If you examine the individual station data, you can gain a more detailed understanding of the areas that received significant snowfall versus those that did not. Looking at peak snow water equivalents at all our SNOTEL stations, the Pacific Northwest region and Northern California received substantial amounts of snow. Many locations there exceeded 150% of normal peak accumulation. This contrasts sharply with the lower Colorado and Rio Grande regions, indicated in orange, where many stations experienced less than 50% of normal. Here are a couple of time series plots illustrating these regional differences. The top plot shows the Pacific Northwest region as usual, there are stark contrasts between basins with the highest and lowest snow accumulation. The background shading. The Pacific Northwest has generally remained within the normal range for most of the year. In contrast, the lower Colorado region, as shown in the bottom plot, largely didn't begin significant snow accumulation until late February.

A quick overview of our water supply forecasting process at the National Water and Climate Center, which covers approximately 600 points across the western United States. As a reminder, we utilize an ensemble of six statistical and machine learning models. Our primary model is the multi-model machine learning meta-system, or M4. The forecasting framework's graphical user interface has been developed in collaboration with the University of Colorado over an extended period and has significantly enhanced our forecasters' ability to visualize data and

generate the most accurate forecasts possible. On the really large regional level, our water supply forecasts indicate higher expected runoff in the Pacific Northwest and Great Basin regions. The Missouri, Upper Colorado, and Arkansas regions are anticipated to experience below-average runoff volumes. The Lower Colorado and Rio Grande regions are projected to have much below-average water supply volumes this year. Drilling down to a more local level, our system allows you to select specific basins to view an overview of the expected water supply conditions for the year. In summary, a significant portion of the western United States is forecast to have near-to-above-normal runoff this season. However, Arizona and New Mexico Basins are expected to see below-to-much-below-normal runoff. Additionally, the northernmost Pacific Northwest Basins and parts of the Missouri River Basin, along with the Gunnison, Dolores, and San Juan basins, are forecast to have below-normal runoff this season.

We're always trying to put out better products for you guys to look at water supply forecasts, and this year we've introduced forecast evolution plots. For those familiar with the National Weather Service River Forecast Center's water supply forecasts, this new plot is modeled after their popular presentation style. You can find these plots on our website. Navigate to the IMAP, and under the "Water Supply" drop down, you'll see a column dedicated to forecast evolution plots. Simply click on your state and use the interface to locate the plot you need. Essentially, it's a time series graph showing time on the x-axis and water volume on the y-axis. This illustrates the water supply forecast between two specific times. For example, we're currently looking at the Lake Powell inflow forecast for runoff from April to the end of July. This allows you to view the forecast in a probabilistic way. The black line represents the most probable forecast, but it also gives you exceedance values for some risk planning. We typically provide about five-volume exceedance values. So there's 90% probability that you will see at least 2.8-million-acre feet, but there's only a 10% chance that you're going to see more than 6.7 million acre feet this year. Currently, the most probable forecast for Lake Powell is 4.5 million acre-feet. This is how you can interpret and use the data presented in this plot. Since this is a new product, it's still under rapid development. Here's a sneak peek at the next iteration, which includes some simple visual changes like using boxes instead of dots for data presentation. In this example, we're looking at the Upper Klamath Lake forecast between April and September, where the most probable forecast is 635,000 acre-feet. We're kind of developing the idea that you can look at preliminary forecasts. While not yet operational, you can see an example here showing forecasts for Missouri, Williston, and North Dakota, with a most probable forecast of 84,000 acre-feet. This is an area of ongoing development.

Furthermore, we're actively working on ways to provide more frequent forecast updates. We're currently considering two approaches: First, Guidance Model Approach: daily example; can be any interval; each update is a different model; and forecasts made with current conditions. Second, One Model Approach: daily updates; model trained on peak SWE and WY precipitation; and forecasts made with future weather possibilities (similar to ESP).

In summary for the 2025 water year, we anticipate near-normal water supplies across much of the western United States. However, below-normal runoff is expected in the lower Colorado

region, as well as the Gunnison, Dolores, and San Juan Basins. You can expect to see a updated forecast from NRCS around May 6th.

Questions:

Tony: Patrick, this is really a question for Heather, but regarding the cuts that you've seen to the budget, my understanding is that you're at about 60% staffing for the National Water and Climate Center and I think the cuts to the provisional employees affect you in particular, because you use some of that during the summer season to visit and maintain these SNOTEL sites.

Patrick: Yes, that's correct. I'll ask Heather to follow up with you to provide more details, but the state offices have experienced varying levels of cuts and the loss of provisional employees. These are the offices responsible for maintaining the SNOTEL network. Currently, at the National Water and Climate Center, the forecasting team, which I am a part of hasn't seen any departures and so we anticipate being able to release the May forecast as usual.

WORKFORCE DEVELOPMENT

Michelle: For a bit of background, several of our states connected during the pandemic to discuss workforce development challenges. Our conversations centered on two key areas: first, how to cultivate a pipeline of qualified individuals with some background in water to address upcoming job openings? Second, how to effectively retain the people we have invested in training? Also, how do we effectively communicate with potential applicants? Last year we reached out to Sarita who has significant experience with this topic. We wanted to revisit this issue as we know our states continue to grapple with these workforce challenges. With that, I will turn the time over to Sarita.

Sarita Nair, Secretary, New Mexico Department of Workforce Solutions - In today's presentation, I'll be covering data insights followed by recruitment and retention strategies. Typically, when I give this type of talk, I focus on New Mexico or a specific region within the State, allowing for a detailed exploration of the data. However, given the diverse group of individuals and occupations represented here, a slightly different approach is necessary. Therefore, I will share a brief overview of relevant data points. Following that, I will guide you on how to conduct your own data analysis using publicly accessible labor market information specific to your state.

In looking at the United States overall, the water job market consists of a variety of different occupations. I put together an Occupational Outlook Handbook, that can be found at the New Mexico Bureau of Labor Statistics, which offers a wealth of fundamental information about various occupations. I thought it might be valuable for this group to get a snapshot of certain aspects, such as median pay, typical entry-level education, the number of jobs available, and the overall job outlook in the water industry. I've included some information that highlights an area

(indicated by the blue line) that projects a decline between 2022 and 2033. Interestingly, this area also appears to have the lowest median pay. Given the tight job markets, I'm sure you're likely experiencing in your respective states, where the demand for workers significantly outweighs the supply. That's why it seems that these lower-paying occupations are particularly challenging to fill and then employers are gradually fading them out because they just can't fill them.

Looking at the job outlook forecast between 2023 and 2033, the gray lines in the middle of the pack indicate a typical growth rate of 3-5%, which aligns with expected salary ranges. It's worth noting the strong correlation between earning potential and the level of formal education. The three occupations showing above-average growth are plumbers, pipe feeders, and steam fitters - roles that many individuals in water infrastructure likely fall under. Additionally, environmental science and protection technicians only require an associate's degree. Environmental engineers - where the Bureau of Labor Statistics typically anticipates a bachelor's degree for this entry-level position - are experiencing the most significant growth. Consequently, we can anticipate the most competitive job market in these areas, particularly for the lower-paid roles, which may be the most challenging to fill. Every state has a Labor Market Information Office, which is usually nestled within your Department of Labor, although some put it in their Department of Commerce. Regardless, it is their job to work with businesses, the public, and other governments to provide this information, and usually for free. If you need help connecting with your local office, feel free to message me, and I'm happy to share my contact information.

This is a brief overview of demand and supply analysis. Regarding demand within your specific water sector, the available information includes both current and projected employment figures. While the projected employment numbers are provided, it's important to note that they are generally based on economic activity and are updated every two years. You can find information regarding typical entry-level education requirements and their correlation with earnings. Additionally, you can gain insights into advertised job openings across different industries, which can help you gauge the competitive landscape. For instance, if you're in the public sector, you can see the number of advertised openings in the private sector. We also find it helpful to look at trends in neighboring states like Colorado, Arizona, and Texas. Comparing their experiences to our own can reveal potential recruitment opportunities if they are not facing the same challenges. That's how you can kind of put together the demand side of your analysis. Regarding the supply side of the analysis, your Department of Labor holds valuable information. Unemployment claimants are required to be available and actively seeking work. We can provide data about their industry, occupation, and highest level of education.

One approach is an educational pipeline analysis. By utilizing standard occupational classifications (SOC), and the standardized program (SIP) codes used by educational institutions, we can effectively link educational pathways and curricula to the specific occupations you are aiming to fill. This process allows us to trace the supply of professionals from their training origins within the state. Additionally, we can conduct other assessments to provide further insights. For instance, we utilize a standard assessment called WorkKeys, which evaluates essential soft skills, basic math, and reading abilities. We also have data on the average WorkKeys scores for various

occupations, enabling us to compare these benchmarks with the scores in your region. This comparison can highlight potential mismatches and inform strategies, such as considering recruitment beyond your immediate area. We have successfully applied these methods in the past. For example, we conducted a targeted analysis for our environment department to assess the availability of professionals in the uranium remediation industry for a specific grant. While this overview is a simplified explanation, I believe these tools could be valuable, especially for understanding workforce challenges in niche professions.

The workforce issues within the water industry mirror broader national trends. Much like the broader economy, the water sector faces an aging workforce. We observe a rising median age in many water and environmental professions, without a corresponding influx of new professionals to replace retirees. This can lead to limited opportunities for advancement, a challenge potentially exacerbated in government sectors with regimented classification systems where upward mobility often depends on retirements. Furthermore, organizations that can offer advancement may draw talent away from those that cannot. There's also a significant lack of awareness regarding career paths in the water workforce, coupled with strong competition for talent. In more technical roles, such as water utility operation and wastewater management, the limited transferability of skills between different localities due to varying systems and technologies further constrains the labor market. Beyond these industry-specific challenges, larger global trends will undoubtedly impact the water workforce. For instance, it's projected that 65% of children entering primary school will work in completely new job types that do not currently exist, and roughly a billion people worldwide will need to be reskilled.

Nearly half of the global workforce is currently in mobile or hybrid work arrangements, which presents both advantages and disadvantages that I'm sure you've all experienced. However, a significant challenge across all industries, and particularly for the water workforce, is how we prepare individuals for jobs that will likely evolve in ways we can't fully predict. Many believe the key lies in fostering enduring skills such as problem-solving, teamwork, communication, and customer interaction. These are abilities that will likely remain essential regardless of technological advancements or work environment (in-person, hybrid, or remote). We also strongly encourage embracing the future of work, even though I understand from my years in government that this can be difficult.

One initiative we're excited about is our "Be Pro Be Proud" pilot program. This program uses virtual reality career experiences that we bring throughout the state to help young people envision potential careers in trades and healthcare. These types of initiatives, we believe, are crucial for generating excitement about our industries.

During preparation for this presentation, a thought struck me. As a Gen Xer, I vividly remember being labeled as "slackers" without a strong work ethic or job loyalty. It's disheartening to hear similar sentiments expressed about Millennials or Gen Z without recalling that we faced similar stereotypes not long ago. That being said, there are undeniably shifting expectations in the workplace regarding what employees value. While this may be more apparent with younger

generations, it seems to be influencing expectations across all age groups, perhaps due to the inherent wisdom in some of these desires. In the past, employees primarily sought financial security, perhaps some flexibility, and job stability. Today, the workforce is looking for a broader range of fulfillment. While compensation remains important, employees also desire opportunities to engage their creativity, flexible work arrangements (including remote and hybrid options, as well as alternative schedules and even bringing children or pets to work), continuous learning opportunities, and that often-discussed but perhaps differently defined concept of work-life balance. They also seek personal growth, which extends beyond promotions to feeling like they are continually developing, and a sense of purpose in their work.

Our sector offers intrinsic value that can be leveraged in recruitment and retention. My primary piece of advice is that we must prioritize people in our hiring and recruitment strategies. The Air Force used to have a mantra that was "mission first, people always." A few years ago, they switched it to "people first, mission always," highlighting the critical importance of valuing people. Every organization is essentially operating in two realms: the core work it performs and talent management. Success in one is dependent on success in the other. Especially in more traditional environments, which many in the water sector are, our systems for hiring, promotion, and retention may not always be people centric. We need to adapt these systems to effectively compete for the best talent.

Here are a few strategies to center on mission, which I believe is a significant asset for the water world in attracting and retaining talent:

• Tours of Duty: Similar to practices in some tech companies and public entities, offer employees opportunities for short-term assignments (e.g., six months to a year) in different divisions, even those outside their immediate area. This can provide a "lily pad" experience internally.

• Purpose Learning: Instead of focusing solely on skill-based training for career advancement, frame learning around the organization's mission. If our goal is to achieve a specific impact, what are the key things individuals need to learn to contribute to that purpose?

• Mission Mentors: Beyond traditional career mentorships, pair individuals with colleagues who share their passions and motivations for working in the organization. I found this incredibly valuable early in my career.

• Highlighting Impact: Ensure all employees, regardless of their role, understand the tangible impact of their work. For example, bringing fiscal staff to community events to see the individuals who benefit from their efforts can be very powerful.

Given the importance of continuous learning in providing those "lily pad" opportunities, it's also crucial to be aware of available training and education resources within your state. Here are a few that are generally available:

• Eligible Training Provider List (ETPL): This list, often associated with the Workforce Innovation and Opportunity Act (WIOA), includes training providers that meet certain quality standards. Individuals eligible for WIOA funding can use these funds for training from listed providers. This can be a valuable resource for recruitment, ongoing training, and connecting with a broader pool of potential employees.

• Pre-Apprenticeships and Apprenticeships: While most are familiar with apprenticeships (earn-while-you-learn programs), pre-apprenticeship programs prepare individuals to enter apprenticeships or directly into careers. Both models demonstrate impressive retention rates due to the strong relationships developed during the training period. Most states have apprenticeship programs, and many are developing pre-apprenticeship initiatives.

• State Revolving Funds (Drinking Water and Clean Water): In our state, these funds can be used for training and education for water sector employees. This was a significant discovery for me and highlights a potentially underutilized resource for both retaining current employees through professional development and upskilling new hires who may have the right values and work ethic but require specific training.

I know that was a lot of content at once. Because I'm on Zoom, it's hard for me to gage what's going on, but I would love to take any questions or hear any comments that anyone may have.

Questions:

Candice: I had a question regarding the challenges you mentioned related to the aging workforce: limited opportunities, limited transferability of skills, awareness, and competition. In the water sector, the educational requirements and the associated costs immediately made me think about other factors that influence hiring, such as housing. I was curious if we also consider these related areas when addressing workforce challenges?

Sarita: Yes. You've hit on some critical points regarding the challenges in specific disciplines and parts of the industry. The high cost of education, the availability and accessibility of training programs, particularly in rural areas, are significant hurdles. As you mentioned, these issues have a ripple effect, impacting broadband access and the availability of support services necessary for individuals to pursue educational opportunities. Interestingly, we're seeing a trend where employers are more open to hiring individuals who might not meet traditional minimum qualifications. This shift allows them to provide stability to these individuals, enabling them to gain the necessary training on the job.

It's a complex landscape, but there are initiatives aimed at addressing these challenges. Here in New Mexico, for instance, we have tuition-free college for most residents, along with subsidies for non-credit courses and industry-recognized credentials. Many other states have similar

programs in place. Additionally, the Workforce Innovation and Opportunity Act (WIOA) is a valuable resource that can fund training opportunities.

I strongly encourage everyone to connect with your state's equivalent of our department. Our primary mission is to help organizations like yours connect with the workforce you need and to provide insights into available opportunities and existing gaps. Please don't hesitate to reach out – we're here to assist you.

Joaquin Esquivel: Thank you so much for the insightful presentation and discussion. I know many of us are facing similar workforce challenges within our own agencies and across the water sector in our respective states. I had two quick questions. First, are you aware of any state-level drinking water or wastewater organizations that are currently allocating funds to workforce development or perhaps aggregating available job opportunities and creating related resources? Secondly, have you observed any innovations or changes within state agencies that administer operator certifications that are making the process of getting certified easier or more accessible?

Sarita: Great questions. To answer your first question, we are starting to see a growing willingness to invest beyond individual roles. A great example is the New Mexico Rural Water Association, which started the first water sector apprenticeship program – it has been a real success. Each state develops a three- to four-year statewide workforce plan, guiding our collective efforts. Based on that plan, we integrate natural resource management and climate resilience as key sectors within our plan, which allows us to allocate workforce development funds specifically to these areas. We are currently engaged in sector planning initiatives, exploring ways to aggregate job opportunities and relevant data for widespread access. We're also hosting a series of statewide summits focused on energy, water, and disaster response, all within the broader context of climate resilience. Your state might have similar initiatives underway. We are also seeing positive interest from our legislature in making investments. For instance, they are allocating funds to develop a water awareness curriculum aimed at students starting in elementary school. A key objective is to introduce young people to the diverse career paths available within the water sector.

Regarding industry standardization of credentials, I haven't encountered much activity in this area. I would be very interested to learn if other states are making progress on this front. As I mentioned, particularly for operators in rural New Mexico, the lack of standardization, coupled with aging infrastructure and limited capital and expertise for upgrades, presents a significant challenge. The extensive on-the-job training required, often around a year, before an individual becomes fully proficient, highlights this barrier.

SEASONAL TO SUBSEASONAL FORECASTING

Jeanine Jones provided an update on recent efforts. In the last session of Congress we made significant progress in sub-seasonal to seasonal (S2S) precipitation forecasting. Basically, we are looking for the research funding necessary to enable NOAA to do the pilot projects mentioned in

their 2020 report. We had the Weather Act Reauthorization Bill that passed out of the House with our language in it for the two research pilot projects with a massive authorization by NOAA standards. NOAA normally spends maybe a million a year on the subject area and so it was a significant increase authorizing $45 million for five fiscal years. We also had a spot bill sponsored by a Nevada Senator that was introduced in the Senate, but the Senate did not take up the Weather Act Reauthorization and so that was not covered in the last session of Congress.

The big focus in this session is to try and continue this process. Although the landscape has changed substantially. I should mention that the Weather Act Reauthorization covers many other things besides just S2S forecasting. The NIDIS program, which I know you're all familiar with, is an example. However, technically that is now deauthorized because its authorization expired when the Weather Act expired last year. This work is really being supported and sponsored by the S2S Precipitation Coalition. We at CDWR are funding the lobbying resources to support this at roughly $100k a year or so. Part of the support for that activity is to build visibility for things like the WSWC's S2S Workshop, which is coming up next month in San Diego. However, due to the federal restrictions on travel, we will not have any of our federal participants in person at that workshop. We will have our NOAA folks participating virtually. With the current proposed cuts to NOAA's FY26 budget, this is now under a fairly major cloud of uncertainty. Just to touch on those cuts right now, OMB's FY26 passback for the Department of Commerce provides $171M for Office of Atmospheric Research (OAR) programs, a $484M reduction from the enacted 2024 appropriations. The passback eliminates all funding for climate, weather, and ocean labs and cooperative institutes. It also does not fund Regional Climate Data and Information, Climate Competitive Research, Sea Grant (College and Aquaculture), or the National Oceanographic Partnership Program. OMB's pass back is what is normally used to set the baseline for the President's budget request to Congress, which is expected to come out next month. The OMB baseline essentially eliminates OAR within NOAA, which would wipe out the work that we're trying to do. It would also wipe out a number of other things, like NIDIS, which is already not authorized, and a number of other data programs that states rely on. I should note that the passback for the National Weather Service (NWS) does not make any overt cuts to the weather service budget. Instead, the NWS has been instructed to achieve significant cost savings. Right now they are working on something that looks like a 25% budget cut, which would include the elimination of the river forecast centers. For those of you who are familiar with the Western Water Assessment, a federally-funded research and outreach group that covers the Upper Colorado River Basin, they sent out a notice to their stakeholders about the impacts of these cuts. It is a NOAA-funded program, and is one of those that would be cut by what's proposed in the OMB passback. While we're continuing to push ahead to seek funding for the needed research to support the improved precipitation forecasting, it will be a challenge in this Congress. I frankly don't expect to get anything in the appropriations process for FY26, but we will continue to see if it's feasible to support the Weather Act Reauthorization. At our upcoming workshop in San Diego, we will have the lead consultant for the House Science Committee joining us to give his take on that.

Also, for those of you that don't know, the California River Forecast Center (CRFC), and the California-Nevada RFC, which has been co-located with our flood emergency center for many

decades, has been instructed by their management to begin shutting down the center. As we understand, they plan to take all 13 nationwide RFC's websites offline by October 1. That would include, for example, the Colorado Basin RFC, which obviously supports the operation of Reclamations activities on the Colorado River here in California. Because we have the staff capacity and the long relationship with the RFC, we are now scrambling to set up a process to hire a large number of new staff and completely port the website to our servers, which will certainly not be cheap, but we plan by October 1 to have fully functional state capability to replace what CEFC does, because their products are so interwoven with our state products, and frankly, are the support for much of our water operations in California.

Candice: I had not heard that, Jeanine. That is very troubling to hear about those the river basin forecast centers.

Jeanine: Yeah, the Weather Service has had a long-time structural budget deficit. For many years the weather service leadership had pushed the closure of the RFCs. Their solution was the National Water Center in Alabama. The plan right now for when the RFC websites go dark, is that people will be directed to the website in Alabama, but that will only serve national level products, not state specific products. Since our CRFC is hugely focused on state specific products, that's why we're in the middle of this drill to essentially relocate all that capacity elsewhere, because the NWC will not serve that material.

Candice: I'm glad that the WSWC has the opportunity to report next week to Congress on the importance. Maybe you guys can highlight the importance of the RFC.

Questions:

Mat Weaver: I would agree that this is troubling if those programs were to go away. They're very important to forecasting, water operations and water management in Idaho. Has there been specific communication for the Columbia River Basin? I don't know that I've seen anything like that.

Candice: I personally haven't seen any for the Colorado Basin Forecast Center. Jeanine, do you want to speak more on how you know this?

Jeanine: As we know, there are two things going on: (1) the formal budget process for FY26; and (2) the Department of Government Efficiency (DOGE) process, which has been, as we know, cutting staff from a wide variety of federal agencies. NOAA is particularly vulnerable as is the Weather Service because they have this large structural deficit unrelated to anything DOGE was doing. Now DOGE is coming in on top of that. They are not making those cuts public at this point, but there is a lot of chat going on in the community that works with the RFCs, and we are hearing interesting questions constantly.

Candice: It might be best to check in with your local RFC and see what the impact would be and how to maybe best support them.

Jeanine: It is certainly fair for the WSWC to send a letter to the management of the NWS. Maybe saying something like, "We understand that you have plans for the RFC, or plans for the National Water Center in Alabama. We're very concerned about this. What can you share with us?"

Candice: That's a great idea. I agree.

OPENET AUTOMATED METHODOLOGY FOR COMPUTING EFFECTIVE PRECIPITATION

Forrest Melton, NASA Ames Research Center and Conor Doherty, Cal State University Monterey Bay, provided an update on Open ET. Forrest Melton expressed appreciation for the ongoing support from our partners in Utah and California, as well as the State support from New Mexico, Oregon, Montana, and Nebraska. The collaborative spirit and contributions from all our state partners have been essential to the continued development of OpenET.

OpenET is a system that utilizes satellite data to map evapotranspiration at the scale of individual fields, or 30 meters squared. That spatial resolution that Landsat provides us is truly the foundation of this work. OpenET wouldn't be possible without Landsat's daily, monthly, and annual data intervals. Currently, our publicly accessible data archive extends back to 1999. We're in the final stages of review to expand this archive back to 1984, and this data has already been produced and is now available. We have multiple data services in place to integrate this information into various state-level platforms and water data information systems. We also have pre-computed summaries for millions of publicly available field boundaries throughout the West.

OpenET currently provides total actual evapotranspiration (ET). This encompasses ET from all available water sources, including applied water precipitation, access to shallow groundwater, and water stored in the root zone from previous winter or rainy seasons. OpenET is supporting the implementation of the Sustainable Groundwater Management Act in California, the Colorado River Authority of Utah to develop the Utah Colorado River accounting and forecasting system. Here in the Twin Platte, Jim Snyder and Olson are spearheading innovative efforts to integrate OpenET data into groundwater management and accounting platforms, which has become a significant use case for us. Next month we're launching a project with partners in Kansas, Oklahoma, and Texas to utilize OpenET in efforts to stabilize the Ogallala Aquifer. We're also working on expanding OpenET coverage, including to the Eastern U.S. and Hawaii.

In addition to total actual ET, we've heard from many partners, especially in California and Utah, about the need for data on the ET of applied water and the ability to automatically calculate effective precipitation, making it easier to derive the ET of applied water by subtracting effective precipitation from the total actual ET. We're pleased to announce that we have developed a fully automated methodology to address this need. Connor will walk you through those details. There's a white paper that describes the methods. We would like to invite all of our state partners and all members of the Council to review it over the next few months. We want to ensure your

technical staff has ample opportunity to thoroughly review these methods, ask any questions they may have, and explore the sample data we can provide. Your input is highly valued before we proceed with the full implementation. We believe this collaborative approach will be beneficial for all.

Last month, we released the OpenET Farm and Ranch Management Support Interface. This is a graphical user interface was designed to meet the needs expressed by our agricultural partners. However, its utility extends beyond agriculture, making it suitable for rangelands, burn scars, wetlands, and any location across the western US. Users can easily upload shape files to define specific regions of interest and receive automated recurring reports.

Finally, I wanted to highlight the Western Conservation and Assessment Tool (WestCAT). The Council's focus on advancing this tool, particularly the calculation of effective precipitation, is a significant aspect. The ability to easily and reliably compute the evapotranspiration (ET) of applied water and the consumptive use of water for irrigation will be instrumental in this effort.

Conor Doherty discussed their methodology for calculating the ET of applied water and effective precipitation. When precipitation occurs, not all of it reaches the root zone. Some becomes runoff, and some contribute to deep percolation, which we will consider non-effective for this discussion. To clarify a few terms: effective precipitation is the portion of precipitation that is retained within the root zone and is available for transpiration. We will define the root zone in more detail later. Total applied water is simply all the water that is applied to the field. I've included this definition to differentiate it from the ET of applied water, which is the portion of the applied water that subsequently evaporates over a specific aggregation period. It's important to note that these two are generally not the same, as some applied water can become runoff, contribute to deep percolation, or remain in the root zone during the aggregation period. We are not the first to address this challenge. Several methods exist for estimating effective precipitation. Common approaches include empirical methods that assume a certain percentage of precipitation, such as 80%, is retained in the root zone. These percentages can be aggregated over different time periods. The Bureau of Reclamation's methods based on monthly precipitation is an example of this.

There have also been water balance approaches which have been previously shown to be a little more accurate. I want to highlight two such models developed by our OpenET colleagues, including Rick Allen, who is with us today. The first is the ET demands model, or method, which is widely utilized in the Western U.S. by researchers at the Desert Research Institute for various state-level studies. The second is VegET, a model developed by Gabriel Senay of the USGS. These models share similarities in their methodology, both employing a crop coefficient to estimate daily evapotranspiration (ET) partially based in the root zone. However, they differ in their approach to crop coefficients; ET demands use crop-specific coefficients, while VegET adopts a more generalized phenology-based approach. Another key distinction is that ET demands simulate irrigation based on root zone depletion, whereas VegET does not. Additionally, these models can be applied at different scales. ET demands are typically run at the resolution of the meteorological data.

All these approaches, including the one I will present shortly, face several challenges and limitations. The primary challenge is the difficulty in conducting thorough validation. Even with well-instrumented fields. Even with accurate pumping data, it may not perfectly align with actual water use. The accuracy of these models is inherently dependent on the reliability of input data, particularly meteorological data such as precipitation, where spatial interpolation poses a significant challenge.

The soils data we utilize varies, and our methodology also incorporates ET data from OpenET. The datasets fall within a single meteorological data grid cell from GridMET, which covers a four-kilometer by four-kilometer area. This highlights the differences in scale among the various input datasets we work with. Our model employs a significantly simplified physical representation. The movement of water through soil is a highly complex physical process, and we utilize a much more basic approach. Our focus is irrigation practices, and the amount and timing of water application. This information is generally unknown. This is why I previously differentiated between total applied water and the ET of applied water. We emphasize providing the best possible estimate of the ET of applied water, rather than attempting to quantify the total amount of water applied.

The water balance model we've implemented is named "Otter." For those familiar with the FAO methodology, our model essentially focuses on water depletion. It tracks the inflow of water from precipitation or irrigation and its subsequent use, noting that depletion is inversely related to soil water storage. When depletion reaches zero, the root zone is at field capacity. The key difference between the Otter model and previous methodologies, is on Otter, ET serves as a direct input. Unlike other approaches that estimate ET externally, Otter utilizes ET data, specifically from OpenET (which we refer to as actual ET), to drive the model. As the model tracks moisture depletion in the root zone, it doesn't aim to provide a precise reflection of the true water level, primarily because we lack information on irrigation amounts. It solely monitors depletion based on precipitation. However, given that ET still occurs, that water must originate from somewhere, and we attribute this to irrigation. We utilize an equation to represent this. For simplicity, let me illustrate with a basic example: Consider a day with no precipitation. Consequently, there will be no percolation between reservoirs, no runoff, and no deep percolation. Now, let's say the ET for that day exceeds the observed depletion in the root zone. The difference between the actual ET and the measured change in depletion is then attributed to applied water.

Conor illustrated with examples in California and Oregon. Imagine a broccoli field in Salinas Valley, California, where it's raining, and then the broccoli is planted. After planting, the rain essentially stops, except for one small event. While we perform calculations using depletion, it's often easier to visualize this in terms of soil water storage. Initially, the soil water storage is high. As the crop grows, this storage is depleted, eventually reaching zero. However, ET doesn't cease at this point, as you can see in the ET time series. When the available soil water is depleted, the ongoing ET starts to be accounted for as ET from applied water, in contrast to the period before depletion when ET was attributed to precipitation. We've run this model in a number of different locations, including for the State of Oregon. There are lower fractions of effective precipitation

divided by total precipitation in the western part of the state, particularly west of the Cascades. This makes sense given the considerably higher overall precipitation in the west, leading to a larger proportion going towards deep percolation or runoff as it exceeds ET and the root zone's water storage capacity. Conversely, in the eastern part of the state, where precipitation is much less, we observe higher average fractions of effective precipitation. This indicates that a greater proportion of the available water is retained due to the drier conditions. Interestingly, in the northeastern part of the state, where center pivot irrigation is prevalent, nearly all precipitation appears to be effective. In contrast, the Willamette Valley shows smaller-scale variations in effective precipitation likely driven by field-level differences in ET, soil properties, and crop types, which influence ET differently.

I think it is really important that we're estimating effective precipitation and ET of applied water without simulating irrigation. Because ET is an input to the model, we don't need to make assumptions about when and how much irrigation water is being applied. Our validation work is ongoing, and we would like you to provide feedback, either in the white paper we've drafted or by emailing me.

Forrest noted that this will enable the development of incentive-based water conservation programs by allowing us to calculate field-scale effective precipitation and consequently, field-scale ET of applied water. This data will be crucial in supporting states as they advance these incentive-based programs through tools like WestCAT. Plus, it will contribute to improved water accounting and more accurate assessments of total net withdrawals from both groundwater and surface water sources. We would greatly appreciate it if you could share this information with your technical staff. We are eager to receive input from all of our state agency partners and Council members before moving forward with full implementation.

Questions:

Candice: I think I had it wrong in my head. At first it seemed counterintuitive that a drier part would be 100% and a wetter part would be less. But if I'm now thinking of it correctly. It means that 100% of the water was used, that's what makes it effective.

Connor: Yes, that figure illustrates the fraction of precipitation, with one being the highest possible value. While the absolute effective precipitation is likely still higher in the area you mentioned, this figure indicates that a smaller proportion of the total precipitation was retained within the root zone. This is likely because, with very high levels of precipitation, the root zone, while reaching field capacity, eventually becomes unable to hold any additional water. In contrast, regions like Northeastern Oregon, which receive considerably less rainfall, allow the root zone to retain most, if not all, of the precipitation that occurs. Of course, the actual effective precipitation would depend on factors like soil type and evapotranspiration.

Jesse Bradley: Thank you for your presentation. I found the information very interesting. I have two questions. First, regarding uncertainty in the open ET products, you mentioned ensemble

models are currently available to provide a sense of prediction uncertainty. Could you elaborate on how you plan to address and present uncertainty, particularly within the pumping estimates? Secondly, I recall hearing concerns from the Family Farm Alliance about the "openness" of OpenET data during a meeting in DC approximately a year ago. Could you provide an update on the plans for data management and how the states will be engaged in this process to address such concerns?

Forrest: The answer to your first question, regarding accuracy for effective precipitation, that's always a challenge for effective precipitation, because we don't have anything equivalent to a weighing lysimeter or an ET covariance tower. I think the best we can do is to compare against pumping records, where we have good and careful alignment between the pumping record and the place of use boundary to perform the types of plots of the common we're showing, where we can look at that scatter and assess the reasonableness of it, given what we know about irrigation efficiencies in the recent region. The answer to your next question, a challenge with open data is that you have to make it open. That's actually mandated by our supporting partners - to have that data be freely and openly available. We'll continue to work with our agricultural partners, both to demonstrate value for their constituencies, and to demonstrate value for their content constituencies and find ways to address their concerns around data privacy.

Earl Lewis: I want to go back to your graphic that showed the effective application of water versus the meter application. I think one of the key benefits of this could be more educational and conservation initiative, that we're losing effective precipitation because you have essentially a full soil profile, and therefore we're over watering. The other thing I wonder about is, as time goes on, if there is a thought or a plan to kind of continue to revisit that and see if those numbers kind of tighten up so that if I read that correctly, it seems like there's a number of places that are essentially watering more than necessary to meet the crop demand, or what's needed in the soil and over time, we would hope that those would increase. Just another comment, if you're using this approach to say, what is water use in a given area, wouldn't this essentially say that it's underestimating how much is actually being diverted?

Forrest: Correct. Yes, we would expect, in many cases it could underestimate. I mean, again, we would expect applied water to exceed ET of applied water by some percent in most cases, right? And that's what we saw in that scatter plot. To your first point about an easy way to track and compute irrigation efficiency and track changes over time. Yeah, 100% and that's one of the main focuses of the project that Susan Metzger is leading at Kansas State University. This USDA NIFA funded sustainable ag systems program. So that's one of the things they want to do, is track that information, share it with producers, and then track changes over the course of the five-year project, as new tools are implemented to support data driven irrigation management.

Rick Allen: I'd like to add that in addition to its value for calculating ET of irrigation water applied water, this type of spatial information on effective precipitation should be quite useful to the groundwater modeling community for estimating recharge with a spatial texture. You know, it's just one minus this ratio that Connor showed is the fraction of recharge, if you make some estimates

on surface runoff, which is often not so great that it's real. But anyway, having this kind of spatial information at the you know, say, four-kilometer scale should be that is spatially variable and variable in time should be quite useful.

Forrest: We have implemented this as an API endpoint and so any states interested in retrieving data for their regions, please contact us. We're happy to work with you or provide access to that API endpoint for your staff. We can make it available on a provisional basis now for limited regions, and then we will wait till we hear back from the states to decide how quickly we can proceed. We definitely don't want to move ahead without getting feedback from our state partners.

Connor: Yes, look at the white paper and give us comments. The sooner you comment on the white paper, the sooner the data will be available.

WADE/WESTDAAT/WESTCAT UPDATE

Ryan James provided updates made to the Western States Water Data Access and Analysis Tool (WestDAAT), in addition to the new Western Water Conservation Application Tool (WestCAT).

WestDAAT, or WestDAAT 2.0, is the front-end mapping data exploration tool used by the Water Data Exchange Program (WaDE). WaDE is part of the WSWC and has been around since 2011. It has become the leader on water right information in a single hub. It is committed to assisting public members and sharing information in a standardized days format, in a cross regional, high-level information format, to better help inform water resource planning and policy creation across the west.

One of the new data types that we have been including in WestDAAT is called overlay data. It is composed of boundaries, names, types of overlays, and water source types. This is geospatial information data paired with sites and water sources based on that type of information. These are mostly applied to administration and regulatory boundaries tied to water rights of a groundwater or surface water type. Right now, we are differentiating administration boundaries, which we consider to be anything that is boundaries of district, or offices with authority over water rights, from regulatory boundaries, which is a geographic area that may follow a basin or an aquifer boundary, where there are specific rules or requirements for water use. A good example would be the HUC units and any other watershed, or even a state-based line, like a county. Those are the two overlay boundaries we have focused on. We're obviously in a good position to expand upon that definition to include other boundaries.

In addition, we've begun incorporating time series data, which includes site-specific historical information provided by the states. Currently, we are focusing on two primary categories: (1) Water supply time series data, which encompasses data such as reservoir releases, stream gage flows, groundwater pumping and levels, and related elements; and (2) water use

records, which we define these as site-specific historical withdrawals associated with an existing water right. This category can also include public water supply usage within a specific geographic area. We've expanded our filtering capabilities for water right data on WestDAAT. We've introduced three new filters focused on the legal aspects of a water right: (1) allocation type describes the nature and intended uses of the water right, with examples including federally reserved rights and instream flow claims; (2) legal status - we are categorizing the legal standing of the water right, reflecting its state recognition and lawful use. Examples include perfected rights and adjudicated rights; and (3) site type, which simply describes the physical nature of the water right's source, such as a well, a spring, or a river diversion.

In addition to these new data types and filters, we've made some updates to our drawing tools. Beyond the standard square search boundary, you can now also use circle and custom polygon selections to define your search area. We've introduced a new custom boundary tool that allows WestDAAT users to upload their own shape files or geospatial data. This means you can now actively search for data within very specific geographic regions. For instance, you can easily find all water rights sites within the Greater Salt Lake Basin by uploading a simple shape file (shp) or geojsonfile. This functionality is also available for time series sites.

In the water rights section, we've enhanced our analytic visuals. While pie charts are still available, you can now also choose to display the data in bar charts. Additionally, we've expanded the ways you can group these analytics. Previously, we primarily focused on beneficial use, but we now include other WaDE categories such as owner, site type, and water source type, along with new filters for allocation and legal source type.

Finally, regarding data delivery on WestDAAT and WaDE, we've expanded our WaDE API services. Specifically, we have been following the Open Geospatial Consortium (OGC) API feature standards to provide a more modern, restful, and modular approach to accessing and sharing geospatial data. For example, you can now search for all water rights sites in a specific area using an API, with a polygon defined in well-known text format, and the results are returned in GeoJSON format. This allows for a more flexible and programmatic way to interact with the data compared to using the WestDAAT tool directly. These are all the updates that we have done for WestDAAT.

Ryan introduced the new Western Water Conservation Application Tool (WestCAT). This application is built upon WestDAAT and functions as a digital tracking service for water conservation applications. WestCAT integrates water right data from WestDAAT with selectively accessed OpenET data. OpenET utilizes satellite-based imagery to estimate the total water transferred from land, surfaces, and vegetation to the atmosphere, providing ET values. The primary purpose of WestCAT is to facilitate voluntary, temporary, in-state conservation programs that offer compensation for efficiency upgrades or switching to less water-intensive crops. To achieve this, WestCAT determines the consumptive use within a specific area. Consumptive use will be estimated using OpenET data, specifically through a metric we are calling NetET, or total ET. From our perspective, Western water law and rights are based on the principle of reasonable

beneficial use for public interest, as defined by each state. This includes both consumptive and non-consumptive uses to prevent waste. Therefore, the derived Net ET value, which represents the difference between the OpenET evapotranspiration value, and the effective precipitation record of the area, will be used to estimate consumptive use. Essentially, NetET focuses on the water right and the irrigation needs, rather than the overall weather conditions in the area.

The operational flow of WestCAT begins with a conservation organization – such as a funding body, commission, or state agency – that wishes to administer a conservation program. Their first step will be to contact the WSWC to register their interest in using the WestCAT service. At this stage, the organization will identify the most suitable model for determining ET in their specific area. They will also establish their desired reimbursement value and the methodology for its calculation. Following this, the conservation organization will conduct outreach to water right holders within their designated area. These include farmers and canal companies meeting specific criteria related to their water source and type of service (e.g., groundwater wells). These identified water right holders are considered potential applicants for the WestCAT tool. They will be instructed to use the service to locate their water right and subsequently employ the WestCAT tool to submit their water conservation plan as part of an application. Once submitted, the application is forwarded to a technical reviewer. This can be an in-house employee of the conservation organization or an external consultant, depending on their preference. The reviewer's role is to ensure the application is complete and accurate. Additionally, they will perform the necessary NetET calculations to validate the actual NetET value for the applicant's proposed conservation plan. Upon completion of the technical review, the application is then returned to the conservation organization for their final approval. At this point, the organization will decide whether to approve the applicant. Ryan provided a live demonstration of both WestDAAT and WestCAT services.

Questions:

Candice: Who do you envision being the technical reviewer?

Ryan: That would be up to the conservation organization or whoever is providing the funding for that specific reimbursement program. In our view, this would most likely involve staff members within the conservation organization. These individuals would ideally have the capacity to verify the water right's eligibility and confirm that the selected model provides a reliable estimate of consumptive use, among other relevant factors. Alternatively, a third-party consultant with the necessary technical expertise could also be involved in reviewing this information, particularly if the conservation organization lacks the internal resources to do so.

Tony: The Upper Colorado River Commission (UCRC) utilized Wilson Water Group, a third party for their review process. Incorporating a similar approach could potentially streamline the review as well. It's also important to consider the possibility of involving multiple reviewing agencies. For example, the Utah State Engineer could review the application to ensure the water rights align with their records. Interestingly, the initial round of UCRC applications did not undergo review by the State Engineer. This was likely due to the temporary, one-year nature of those applications,

which mitigated concerns about forfeiture or abandonment. I also want to acknowledge the significant coding efforts of Bill and Levi, without whom this would not be possible. To address some of the questions raised, we have implemented additional controls. As Ryan mentioned, while a conservation organization could freely use this tool, they would be required to register with us. To ensure clarity in the review process, we would outline the steps involved, identify the reviewers, and address any water rights considerations. This information would be particularly beneficial in areas facing groundwater decline, closed or fully appropriated basins. Further, we could explore the possibility of state or conservation organizations offering incentives for compensated water reductions. The Audubon Society's involvement in the Great Salt Lake initiative, aiming to incentivize conservation for raising lake levels, serves as a valuable example.

Regarding the determination of effective precipitation, we could potentially utilize an OpenET model or other methods. Currently, lacking a universally accepted NetET model, we use data from a non-irrigated point to estimate effective precipitation, which is then subtracted from the total ET. Once a refined model is available, we can update the tool to provide applicants with more detailed information. This would address potential surprises, such as those experienced with the UCRC, where compensation was based on net rather than total ET.

Another aspect of the tool we've discussed is having the conservation organization establish eligibility criteria upfront. This could include factors like minimum acreage (as seen in the second round of the UCRC) or set limits on the initial payment amounts, potentially categorized by the type of conservation application.

To maintain confidentiality, application details would only be accessible to the reviewer or the relevant conservation organization, ensuring that neighboring applicants cannot view each other's proposals. We want to clarify our approach regarding the concerns raised by the Farm Bureau about accessing everyone's water use data. Just to reiterate the discussion from our last meeting, our intention is not to apply this to all two and a half million water rights in our database. Instead, we are focusing on a specific number of applications.

Bill or Levi, do you have any additional comments, perhaps regarding the technology we're using? I believe we're utilizing some very advanced tools in this work.

Bill Udell: Tony overstates my involvement in this. They haven't let me write software in decades, but our team has genuinely enjoyed contributing to this platform and we're currently engaged in some exciting, innovative work. We're particularly looking forward to gaining access to the actual ET calculations, as that will provide us with a clearer understanding of the figures. Beyond that, I don't have much more specific feedback on the platform at this moment. However, we are enthusiastic about seeing it grow and be adopted more widely.

Michelle: I understand that different states have varying preferences regarding the oversight of small conservation groups. Some may allow them to operate more independently, while others might prefer to have more direct involvement. To accommodate these differences, could we

explore the possibility of adjusting the application process on our website, on our WaDE/WestCAT? Specifically, could we implement a feature that allows us to designate the state as a recipient in the application workflow. This way, if a state wishes to be involved, they would automatically be included at the appropriate stage.

Tony: Yes.

Julie Cunningham: Is there an ability to turn off that compensation piece if there are other incentives?

Tony: I think at this point that it could be part of the application process. You could simply put it as zero and then explain the other incentives that are being provided.

Candice: What is the time frame for the tool?

Tony: It is functional now in a staging environment. We've reached out to technical folks to provide one or two demonstrations and will continue to do so. Essentially, we expect DPLs work to be finished by the end of this month. Then we'll have gone from development to staging, and the next is production, where we would actually have the tool. Obviously, we assume as people begin to use it, we'll deal with whatever bugs come up.

USGS WATER USE AVAILABILITY

Brian Clark, Deputy Program Coordinator, Water Availability and Use Science Program, U.S. Geological Survey (USGS) provided an update on the water use availability assessment report. Historically, the USGS has released water use data at the county level every five years, primarily in paper format. While some of this data has been available for download online for years, over the past five to six years, we have focused on translating this information into more advanced model development, particularly in the areas of irrigation, public supply, and thermoelectric power generation. I'm going to talk about some of our current products on data related to water use: (1) National Water Availability Assessment Report; and (2) Water Use Models and Data.

The National Water Availability Assessment Report is a comprehensive, scientific assessment of water availability in the United States, integrating water quantity, quality, and use. It provides new water availability information, including potential imbalance between water supply and demand. It's complementary to forthcoming Regional Water Availability Assessments. The assessment report is updated every five years, with version 1.1 including trend information and regional perspectives. The reports provide the synthesis and interpretation of water availability in the past, present, and future; explore the modeled water availability data in the data companion. You can learn about the key takeaways on the Vizlab website, which uses data visualization to communicate water science and data to non-technical audiences (see QR code on slide 3).

The National Water Data Companion (NWDC) is a centralized website that provides water availability, supply, and use information that underlies the National Water Availability Assessment (see QR code on slide 12). The NWDC and associated report can be used by scientists, policymakers, resource managers, private companies, environmental advocates, media sources, and the general public to better understand the status of water systems across the Nation. The NWDC also complements the Water Data for the Nation (WDFN), which serves real-time and historical observed water data at surface and groundwater monitoring locations across the Nation. The NWDC also extends WDFN's publicly available water data by providing modeled data that are spatially and temporally continuous, filling in spatial gaps between monitoring stations and temporal gaps between periodic samples at these stations. These continuous and nationally consistent NWDC datasets are available at the monthly timescale and sub-watershed spatial scale (12-digit hydrologic unit codes, or HUC12s; tracts of 10,000-40,000 acres). Because of assumptions embedded in the underlying models, NWDC datasets may have greater uncertainties compared to observations delivered via WDFN.

This year we are focused on delivering output from three areas: human water use (outputs include thermoelectric, public supply, irrigation water withdrawals and consumptive use); natural water quantity (outputs include soil moisture, evapotranspiration, snow water equivalent, baseflow, and more); and integrated water availability (outputs include total water supply, total water use, water supply and use index, and more).

You can also access historical maps of all variables in the data companion from the interactive data catalog. Once you've looked through the data catalog and decided on the outputs you want to download, you can then access this subset and download tool page from either the data catalog page, a model or variable information page, or the main menu. This tool lets you specify the model, variable or variables, temporal resolution, time period, spatial extent, and file formats you want in a guided step by step process. Once you have selected your desired options, you can download the data from this webpage directly or copy the generated URL into your code. Eventually, we hope to have a button that would generate an R or Python code snippet that you could use to download the data. We also provide comprehensive, but easily understandable documentation for our web services for those who want to see the details of everything they can do with our API. For experienced API users or developers, we also provide standard swagger and redoc documentation.

I understand that I went through this overview quite quickly. My main goal was to show you what resources are available and provide the QR codes for easy access to the information. Please don't hesitate to reach out if you have any questions about the assessment report or the data itself. I'm also happy to connect you with the appropriate individuals who can provide more detailed answers.

Questions:

Candice: Thank you, Brian. I'll ask if you have any questions, maybe touch base with Brian. I know I'm super interested in water use and so I appreciate all your guys work on that.

Tony: I just wanted to mention that I know that a lot of the work on water use is now modeling, but we've also worked with USGS closely with the development of WaDE. In fact, USGS adopted the WaDE standard for states to report their water use.

FY2025-2026 COMMITTEE WORK PLAN

Candice noted that the draft FY25-26 committee work plan will be reviewed and looking to adopt it at our summer meeting in Utah and so please review it and provide any edits or changes to Michelle.

SUNSETTING POSITIONS FOR SUMMER 2025 MEETINGS

The Committee has three sunsetting positions to review during our summer meeting:

Position #482- Preservation of Radio Frequencies necessary for Weather forecasting and Water Management; Position #483 - supporting Strengthening Resiliency of Our Nation to the Impacts of Extreme Weather Events; and Position #485 - urging the Administration and Congress to Support Water Research and Development Programs at the Department of Energy National Laboratories.

OTHER MATTERS

Tony mentioned that WSWC received a request from the House Natural Resources Subcommittee on Water, Wildlife, and Fisheries to testify on hydropower next Wednesday. We do quite often get called upon on short notice to testify. I think that at least recognizes the relationship that the Council has with some of the staff on both the House and the Senate side.

Michelle noted that she tried to volunteer one of our members to testify, but they were looking for a broad bipartisan western view. They also opened the opportunity to testify about NOAA data and other issues.

Candice asked Michelle if she would mind sending out the information on when that hearing is and links.

There being no other matters, the meeting was adjourned.