MINUTES
of the
WATER RESOURCES COMMITTEE
Aloft Anchorage Hotel
Anchorage, Alaska
September 13, 2023

Table of Contents

MINUTES
of the
WATER RESOURCES COMMITTEE
Aloft Anchorage Hotel
Anchorage, Alaska
September 13, 2023

MEMBERS AND ALTERNATES PRESENT (*via zoom*)

ALASKA	Tom Barrett Randy Bates Julie Pack Emma Pokon
ARIZONA	Trevor Baggiore *Kelly Brown*
CALIFORNIA	Joaquin Esquivel
COLORADO	Jojo La
IDAHO	Jerry Rigby
KANSAS	Earl Lewis Connie Owen *Tom Stiles* Matt Unruh
MONTANA	*Anna Pakenham Stevenson* *Jay Weiner*
NEBRASKA	Justin Lavene Jim Macy Tom Riley
NEVADA	Jennifer Carr Melissa Flatley Adam Sullivan
NEW MEXICO	**--**
NORTH DAKOTA	Jennifer Verleger

OKLAHOMA	Sara Gibson
OREGON	**--**
SOUTH DAKOTA	Nakaila Steen
TEXAS	Jon Niermann
UTAH	Candice Hasenyager John Mackey Sarah Shechter Todd Stonely *Teresa Wilhelmsen*
WASHINGTON	Ria Berns Buck Smith
WYOMING	Jeff Cowley Jennifer Zygmunt

GUESTS

Brian Clark, U.S. Geological Survey
James Davenport, JHDavenport, LLC
Becci Anderson, U.S. Geological Survey
Timothy Stryker, U.S. Geological Survey
Christopher Estes, Instream Flow Council
Chad Abel, U.S. Fish and Wildlife Service
Michael Whitehead, Bureau of Indian Affairs
John Trawicki, U.S. Fish and Wildlife Service
Samantha Owen, McMillen Jacobs Associates
Megan Behnke, University of Alaska Southeast
Michael Winfree, U.S. Fish and Wildlife Service
Kevin Mayes, Texas Parks and Wildlife Department
Brian Frazer, U.S. Environmental Protection Agency
Nancy Wainwright, Wainwright Legal Services, LLC
Hannah Singleton, Southern Nevada Water Authority
Alex Petkanas, Northern Alaska Environmental Center
John Plaskett, Anchorage Water and Wastewater Utility
Jeff Axmann, Anchorage Water and Wastewater Utility
Jim Rizk, Texas Commission on Environmental Quality
Kevin Patrone, Alaska Department of Natural Resources
Tanya Trujillo, New Mexico Office of the State Engineer

David Persinger, Anchorage Water and Wastewater Utility
Sara Hisel-McCoy, U.S. Environmental Protection Agency
Mark Corsentino, Anchorage Water and Wastewater Utility
Sharon Ray, National Aeronautics and Space Administration
Rachel Clark, Montana Department of Environmental Quality
Courtney Osolnik, Yukon River Inter-Tribal Watershed Council
Mark Schimscheimer, Anchorage Water and Wastewater Utility
Kelly Pack, Alaska Department of Environmental Conservation
Kathy Alexander, Texas Commission on Environmental Quality
Jessica Cherry, National Oceanic and Atmospheric Administration
Robert Singletary, Oklahoma Department of Environmental Quality
Shannon Miller, Alaska Department of Environmental Conservation
Charley Palmer, Alaska Department of Environmental Conservation
Cari-Michel La Caille, Texas Commission on Environmental Quality
Christina Carpenter, Alaska Department of Environmental Conservation
Cathy Erskine, Nevada Department of Conservation and Natural Resources
Danika Holmes, Montana Department of Natural Resources and Conservation

WESTFAST

Lauren Dempsey, U.S. Air Force
Christopher Carlson, U.S. Forest Service
Madeline Franklin, Bureau of Reclamation
Stephen Bartell, U.S. Department of Justice
Paula Cutillo, Bureau of Land Management
Roger Gorke, U.S. Environmental Protection Agency
Heather Hofman, Natural Resources Conservation Service
Gretel Follingstad, National Oceanic and Atmospheric Administration

STAFF

Tony Willardson
Michelle Bushman
Elysse Campbell
Adel Abdallah
Ryan James
Andrew Campbell

WELCOME AND INTRODUCTIONS

Nakaila Steen called the meeting to order. Introductions were made around the room.

APPROVAL OF MINUTES

The minutes from the Spring meetings held in Reno, Nevada on May 24, 2023, were moved for approval. The motion was seconded, and the minutes were unanimously approved.

SUNSETTING POSITIONS

Position #455 – Supporting USDA Conservation Programs and Water Resources

The position was retained with only a minor grammatical edit on the second page. There were no comments. A motion to approve the position was offered and seconded. The position was unanimously approved.

ALASKA WATER RESOURCES

Tom Barrett, Chief of the Water Resources Section of the Alaska Department of Natural Resources (DNR) addressed the Committee and shared a powerpoint presentation.

DNR provides the legislature with an annual report that includes any recommended changes to water law. My predecessors took notes on needed water regulation changes, and my goal has been to get some changes initiated before another twenty years go by. One statute from 1966 (46.15) still required newspaper publication for certain water right applications. Applicants pay the advertising costs, which can exceed the cost of the water use permit. It also ties up staff time, and since the advent of the internet, reaches a limited number of people. The legislature proposed SB 68 in January, and by May other state agencies had piled on additional proposed changes to public notices and public hearings. At this point, the bill will need to wait to proceed until the second session of the legislature next year.

Another change has to do with closures of applications. We made it clear how we could close an application and we made some changes to temporary water use and DNR orders. The biggest attention getter was applications for reservations of water and who we would issue a reservation of water to. We received 376 comments from 376 different entities, largely reservation water changes. It took a lot of analysis and we opted to rethink what we were going to change.

We recently put out for agency notice a smaller set of changes to our regulations, which are basically for housekeeping purposes. We have learned that it is important to propose updates to the regulations more frequently.

In late 2021 a multi-year project was proposed to significantly reduce the backlog of 556 water right applications that span multiple decades. As you may know, Alaska follows the prior appropriation doctrine. In January 2022, DNR hired two long term non-permanent (LTNP) positions dedicated to adjudicating the backlogged applications. A third LTNP position was added

to scan older casefiles, so adjudicators have electronic access to files, speeding up the adjudication process. The backlog now stands at 251 casefiles in backlog. Thus, we are past the halfway point!

A question we are often asked is where is the water going? Hydrologists and water users (>30,000 gallons per day, gpd) input their water use into the Alaska Water Use Data system (AKWUDS). Currently, there are about 200 users reporting water use data. The pie chart on slide #5 shows the biggest use is public water supply at 43.72%. We use USGS categories. Mining puts to use 29.52%, and includes coal, oil and gas. Data is always interesting. What is not shown in the pie chart is users of less than 30,000 gpd. Notably, agriculture – crop irrigation and livestock – is not a big player presently.

Approximately 61% of Alaska is owned and managed by the U.S. federal government as public lands, including a multitude of national forests, national parks, and national wildlife refuges. Only about 28% of Alaska's total area is under State ownership. The graphic on slide #9 shows sites of USGS streamgaging stations. For the number of acres in the state, there are not many gages. USGS is, of course, probably our main source of groundwater data. Data is also collected by the Bureau of Land Management, National Park Service, Corps of Engineers, and the National Oceanic and Atmospheric Administration (NOAA). Several state and federal agencies collect climate and hydrologic data for different purposes. Although data is available, it is sparse.

Alaska has diverse climate zones with broad ranges in annual precipitation. Areas near Prudhoe Bay in northern Alaska receive less than eight inches of rain per year, so these are technically desert areas. The warm current of the Pacific blesses southern coastal Alaska with an oceanic or maritime climate. This includes southeastern Alaska, the south coast, and southwestern islands. Total annual precipitation is quite variable around the Juneau area, ranging around 54 inches annually at the airport, while over 90 inches downtown. Coastal mountain ranges in the southeastern Panhandle receive more than 200 inches per year, while totals drop to 60 inches south of the Alaska Range. The Interior of Alaska receives around 12 inches annually while the North Slope receives less than 6 inches of precipitation. Precipitation for Anchorage and nearly all southcentral Alaska was record-setting in 2022. Snowfall for the Anchorage area during the winter 2022-23 was among the 10 highest years ever recorded. Southcentral Alaska is tracking for another above average precipitation year in 2023.

While the Water Use Act is effective at managing the beneficial use of water, it does not address how to handle excess very well. Problem areas: (a) lower lying lots subject to inundation; (b) illegal diversions - passing the problem elsewhere; (c) pumping from your yard to your neighbor's yard; (d) municipal versus state jurisdiction of drainage systems; and (e) confusion and "gray area" issues between drainage ditches and waters of the state.

Questions

Question: Are you collecting the data from the various sources and making it available?

Tom Barrett: That is one of our challenges. So, we start getting into the IT world here. There are issues about one agency working with another. We are trying to make our website a little more of a resource that will follow on other datasets. You can go to the Alaska Hydrologic Services website to find the USGS data. But we find each entity is possessive of their own data. We have our own databases on water use and wells.

Question: Can you talk a little bit about what the wetlands look like, and how they form over that entire region that is the size of some states?

Tom Barrett: There is about 2,000 feet of permafrost or perhaps just less than that. So, there is no ground to drink the water -- at least that we recognize. There are not a lot of drainage systems. There are isolated expanses of water, some of which become lakes. I'm not sure I answered your question.

Adel: I just want to say thanks. I really appreciated the overview and your remarks with respect to the data. The Western States Water Council is trying to focus on how we can help you all become better decision makers through capturing data. Your point about the challenges even among our own states and state agencies is well stated. Each has different priorities. We are trying to encourage each agency to open their data sources so that they can be aggregated. We hope to adopt new technologies available from satellites and other data acquisition.

IMPLICATIONS OF "AI" TO WATER MANAGEMENT AND WATER LAW

Jim Davenport, Attorney at Law, JHDavenport, LLC addressed the Committee with a powerpoint presentation available here, and materials available in Tab H of the briefing book. Jim recommended that (1) the states create an index of the existing water data with links to original sites where the data is stored, enabling siloed data to be combined more easily; and (2) WSWC develop an artificial intelligence (AI) audit group.

He noted some of the historical work he has done with the WSWC and on his own relating to prior appropriations and state-federal relationships. He said we are now in the post-industrial phase of the technological age, and it may be time to amend some of our 19th century rules. AI is a tool that may be helpful.

I sent some questions to the AI program at Google relative to water management and data questions, and those are contained in the materials. I began to ask myself "what kinds of things could we do with AI?" Can we manage fishery resources? Could we use AI to analyze and determine forest management?

In October 2020, Tony Willardson gave a presentation at the American Water Resources Association conference. He called for "applied science to support decisionmaking, national and regional impact assessments, better, more robust forecasting models, watershed scale climate model outputs, agreed upon data standards and protocols, better understanding of climate drivers,

and an internet portal for public and decisionmakers." Another municipal climate-response consultant, a California "resiliency planner," recommends "portfolio approaches," "adaptive implementation," "system vulnerability and risk assessment," and "futurecasting of vision." I found it interesting to see what he was recommending.

Several different paradigms have been used by various cultures to manage water. I call the current Western paradigm the demand paradigm. Data on the Western States Water Council's website is a combination of the states' data and who owns water rights. But demand is basically the way the legal system is designed to work. One might also think of this as the supply paradigm. That is to say that once you know where all the water is, then you think about the best place to put it to be utilized to the maximum extent possible. Demand would not be the driving factor in that paradigm.

The Colorado River Basin has a scarcity paradigm. Over the last couple of years, they have been trying to figure out what to do with the old legal system given the scarcity of the resource.

Another is the beneficial use paradigm, as understood in the Northwest around 1930. During that particular timeframe, they defined beneficial use as putting water to work. In trying to make that term broader over the decades, legislatures have found ways to add uses to the definition of benefits. For instance, water left in the state of Washington is considered a benefit for us. The beneficial use paradigm is basically a work paradigm. Using AI's capabilities, one could ask the question, where do we get the most work with the least amount of water? You can say, here is a city which has a gross economic product of x, and there is another setting with y. How much water is used to produce x and y? Or you can ask, do we want the cotton to be grown or the wheat to be grown? Well, then we want the cows and the water, we want to find out where the biggest economic bang for the buck is.

Also at issue is marketing of the water rights. Who is interested in the market of buying the rights? Who has the most senior rights (which are worth the most)? Corporations want to grab more so that they can control the water resource funding paradigm.

I am interested in maximization of outcomes. The more data you have, the more you can maximize the outcome, because it permits you to look at the data streams and find out where the anomalies are. Then you can compare data streams to each other and find the correlations. AI can do that with the data that has been collected by the states and the federal government in water management today. You can begin to look at what combinations of data give you the best outcome. Once you know the combinations of data that give you the best outcome, you can then think about how to manage the resource so that it produces the outcomes you are seeking? Is this dream world thinking? Probably at this date, but I want to inspire you to dream and think about the potential ahead of us now that the AI and data resources are available. I recommend that you study these several slides to think about how the algorithms can be written so as to analyze more and more data. Machine leaning is teaching the computer to analyze data in iterative cases, becoming more

and more familiar with the dataset so that you can use the intuitive approach for truths or recommendations from the data.

In the presentation slides, I've included a list of datasets to recommend to Tony Willardson to put into a list with the location of where the data is, so that somebody could research it to make sure it is relevant to what they want to learn. Surface water, stormwater, groundwater, environmental data, water demand data, the rights, the economic interests, and so on. The market value of agricultural crop mixes is used to basically determine where to get the biggest economic bang for the buck and the water.

I am interested in looking for anomalies between databases. I asked the Google Bard what water resource data they have, and they showed me their databases. The report of my inquiries is in your briefing materials under Tab H. You can see the questions they asked of me and the responses.

So, one digression. I mentioned that I worked in nuclear waste earlier in my legal career. This was with respect to the Nevada Test Site or the Yucca Mountain site in Nevada. The political resistance which the State of Nevada pushed against that proposed nuclear waste repository for years was not well received on the part of the federal government. The NRC reached the point where they were thinking we may have the licenses, so they looked at the Department of Energy's database to see what data was going to be available to be presented for licensing. They said there was no overarching program that assures that this data was collected in the proper ways. Was the data maintained and preserved over the course of time leading up to licensing? In fact, it had not been. There were several contractors over time, and they did not all manage the research in the same way. Their dataset was weak. Ultimately, the data was a problem. So, data is important.

I believe the Western States Water Council should develop simulation models for our moving water systems -- a digital version of the natural system -- and accommodate more data variables in those systems. The current models provide the movement of a river. We should have the chemistry, the environmental implications, the public uses, those sorts of things in the datasets. We could then begin to populate the model with more data and ask the AI systems to look at the data and analyze where the cause-and-effect relationships are between the data streams. With the variables in the system, we could see that if changes were made to this line of data, we might get a different output in the data line over there. That is management modification. We could put economic benefit data into a water model to see who is prompting beneficial use from a societal perspective as opposed to individual views. That is my view of how AI could be used in the water management context.

There are a lot of fishery models in the system. There are a lot of volume supply and flow management issues on the Colorado system. There are some requirements on the Canadian border in the Columbia River Treaty, which is undergoing renegotiation. I would see the ultimate value of AI being in evaluating the hypothecated data into variations against design resources and performance data. I envision the Western States Water Council as the developer of the indexes for the data sets.

Secondly, I want to point out that we need to be cautious and suspect about what AI produces. I would recommend that the WSWC create a committee, an audit group, to look at AI proposals and decide if something is a good idea or not. Determine the shortcomings of AI. These are called out in the Kissinger book, and they are honest about what the risks are. There is an inability to generalize from specific examples and the actual situations. This is a course of thinking which is going to dominate our culture in the next generation, and we need to be on top of it in the water context.

Some interesting comments made in the Kissinger book follow. AI is not sentient. It is not rational in the sense that human beings are rational. AI can't feel a moral or philosophical compunction. AI does not overreact. With AI, you must define its organizing principles, its moral concepts, or its sense of aspirations or limitations. AI language has really developed because the information database is so huge. When Google started taking every book that has ever been written and putting it in digital format, it gave AI the capacity to know the proximity of words in language using semantic relationships. They even have the ability to translate between languages now, and the ability to divine the meaning of words when you put them together in certain orders. Thank you very much for listening.

Questions:

Timothy Stryker: Often state or federal governments are not the earliest adopters or effective users of these kinds of technologies relative to other citizenry, business, academia, research, nonprofits. How would you recommend we try to get ahead of that curve on such an important topic as water resource management?

Jim Davenport: It's a matter of hiring and the capacity to program the government's own AI.

Ryan James: I just want to comment on this topic of AI in the world of water. I do want to see its potential future use, particularly on unique elements of what we view as a useful component. Adel and I have spoken to individual groups who are using artificial intelligence models right now on prediction analysis for reservoir capacity and filling -- to surprising success. They have often been established groups, based on how successful they have been on their prediction ability for elements of looking at reservoirs.

I want to put a caveat on this topic that AI is kind of a buzzword. It may be better to think of them as prediction models where they have large sources of data for an intended use. For example, I was looking at the ability to predict flow to fill a reservoir. I don't want to scare anyone, but Jim is right. This is a great idea for where water and information can go. As caveats though, these models are not always as successful as we hope them to be. The reality is that they are data dependent. In the cases of the groups we have spoken to, these were very narrow niches of how they were able to work. Their data had to be essentially dynamically live in order for these prediction models to work, and the data was not fed through these models. They are very limited in their operation, even though they can produce some wonderful resources and outcomes.

Live dynamic services such as this can be expensive to run. Costs like these are coming down as technology improves. But in the example of Chat GPT, I think the operation costs are around $700,000/day. It took about eight years' worth of computing to produce such a prediction model. And this is not to mention the amount of infrastructure storage that it takes to support this type of data services. That is not to say it can't be done. It is just going to take time and resources for everyone to really understand what these water resources are really looking at.

Lastly, as Jim addressed quite well, these models are only going to be as good as the data that can be provided. A lot of the water rights and water resources data are becoming better. But there is a difference between quality assurance, which is making sure that the data is worth using in the first place, and quality control, which is making sure the data is accurate. In our case, we look at the differences between withdrawal information versus consumptive use information, but that would not be the same thing for a model prediction element. That would have to be something that someone would have to keep an eye on when you feed information like this to the model.

I just wanted to comment on the future that we're looking at with respect to prediction models and the capability that we will eventually see. We are not there yet, but it is something fun to dream about.

SEASONAL TO SUBSEASONAL FORECASTING WORKSHOP AND FOLLOW UP

Tony Willardson reported on behalf of Jeanine Jones who was unable to join the meeting. Briefing materials under Tab I include letters encouraging the Congress to appropriate funding in FY2024 to support a pilot for improving sub-seasonal to seasonal (S2S) precipitation forecasting in the western United States. The pilot project would seek to improve precipitation forecasting for water management. A letter was sent to House and Senate leadership and was written and signed by the WSWC as well as 30 different organizations.

NOAA's Climate Prediction Center (CPC) has been issuing S2S precipitation outlooks since the mid-1990s. Their skill for the western U.S. has been minimal, just slightly better than predicting average weather conditions, and has shown little improvement over time. A letter was sent to the House Appropriations Subcommittee on Commerce, Justice, and Science requesting a $15 million increase in the U.S. Weather Research Program line item within NOAA's Office of Oceanic and Atmospheric Research (OAR) to begin development of reliable forecasting with longer lead times to provide water managers with critical data to operate infrastructure more efficiently and allocate resources to mitigate and manage impacts of extreme wet and dry conditions.

Some of California's work to encourage statistical modeling has proved more valuable in predicting future precipitation out a few months to a year when compared to dynamical models of the Earth system. There are several variables involved which present a challenge, but there are opportunities to be able to improve predictions.

I encourage you to look at the materials under Tab I and to be aware that the WSWC is involved in trying to encourage Congress to fund more research so that we can improve our predictive models.

NIDIS CLIMATE ADAPTIVE DROUGHT PLANNING PLATFORM

Gretel Follingstad, Coordinator/Drought Planning Lead, Intermountain West Drought EarlyWarning System, NOAA – National Integrated Drought Information System (NIDIS) addressed the group and shared a powerpoint presentation.

The 2006 National Integrated Drought Information System Act (P.L. 109-430) called for an interagency approach to information sharing so that communities are better prepared for water management decisions in drought circumstances. There are eight different drought early warning regions across the United States. NIDIS has three main mission areas or roles: (1) to convene and coordinate among stakeholders at different scales – providing on the ground and integrated local connections with stakeholders, while also having the ability to coordinate across the federal and state governments; (2) to deliver the best in science and information about drought, with Drought.gov as our main portal for dissemination of information; and (3) advancing and integrating research into action.

Drought is a very complex hazard in which it is difficult to determine the onset and amelioration, so its improvement generally is not as easy to define as other hazards such as hurricanes, earthquakes, or flooding. The prediction, forecasting, and data conversations that you have heard about today are the same kinds of complications we struggle with as well. We don't necessarily have all the answers, and the answers that we do have do not necessarily follow jurisdictional boundaries. The Integrated Information Systems (IIS) brings a whole-systems approach to the data produced at the federal, state, local, and tribal levels, at different timescales across different sectors. Similar systems and programs include the National Integrated Heat Information System, the National Integrated Flood Information System, theTribal Drought Resilience program. AI machine learning, data processing, and summarization are used to provide drought indicators and triggers.

The Climate Adaptive Drought Planning (CADP) Platform is being developed in partnership with the Bureau of Reclamation and their Drought Contingency Planning and Drought Resiliency Project. Both are WaterSMART programs. The platform also incorporates state data through partnerships, initially with the 17 Reclamation states. We plan to bring the entire program to a national scale, including other federal agencies, local entities, and philanthropic institutions.

Part of the program is really meant to support communities that have lower capacity to handle large and disparate data sets. We integrate large datasets to enable communities to create their own risk and vulnerability assessments of flooding, drought, wildfire, and other hazards, and to use those assessments for decision making. Individual communities can prioritize what is most at risk for them, take a look at the data scaled to their level, and look at coordination of state, local,

and federal dollars tailored to meet specific risks, build resilience, make land use decisions, develop climate adaptation plans, and improve the infrastructure. CADP is intended to provide much-needed technical assistance to help communities prepare for weather extremes, such as the ongoing precipitation in Alaska, or continued drought across the Colorado River Basin, or the 16 atmospheric rivers last year.

We put together a working group on what it takes to build drought resilience to climate extremes and non-stationarity, and we found that the focus is on adaptation. To incorporate non-stationarity effects into drought assessment we should: (1) consider changes in variability of climate and what that means for drought assessment; (2) conceptualize drought and redefine the context by looking closely at an aridifying (trending-drier) or a humidifying (trending-wetter) climate; and (3) define drought in terms of risk or likelihood of event. The vision here is that we help communities plan and prepare for drought and water challenges in the context of climate extremes and impacts.

The CADP mission hopes to help provide communities with trusted and targeted communication and help them understand what the data is and where it comes from. The results from any one of these things is only as good as the data that goes into it. We want to vet that data so that states and local communities feel confident in what they see in their own risk profile. The platform also contains the drought resilience toolbox with best management practices at the global scale, from landuse planning to growth management, using green infrastructure or technological solutions. Different risk profiles call for different response strategies, and we hope to provide sector-relevant information, so if irrigation district managers are navigating the platform, for example, they can easily access the data most relevant to them.

Looping back to machine learning and AI, CADP uses a cloud-based drought monitoring application known as Climate Engine (see https://www.climateengine.org/). Climate Engine is built on the Google Earth Engine which uses machine learning AI. It crafts a large dataset of climate and earth observation data and uses algorithms to update the datasets so that a user can pick between datasets and summarize for an area of interest, such as economic development, population growth, out-migration, or aging infrastructure. The very important work that Western States Water Council is doing with water data will become important to this type of platform to include water supply and demand in the portfolio.

CADP fills two major gaps: (1) technical assistance with drought risk assessment; and (2) the integration of multiple scientific data sets specific to drought assessment and land use management planning, with climate change projections and impacts into drought risk and vulnerability assessments. The project timeline is included on slide #25. CADP will strengthen the ability of communities, ecosystems, and economies to anticipate, absorb, accommodate or recover from the effects of drought quickly and efficiently by ensuring the preservation, restoration or improvement of natural capital and community assets and investments.

Questions

Question: Do you have a stakeholder process that you're going to implement?

Gretel Follingstad: The whole project will be kicked off with a needs assessment survey to determine what approach is most beneficial for each state or region. Some states have a very interactive stakeholder group whereas other states may not. Each of our drought early warning system regions has a coordinator we will work with to determine how best to disseminate the information. We are also asking states if they would like to be part of the development, if some states would like to be part of the pilot program. We want to build this to meet actual needs rather than assumptions of needs.

Tom Riley: I have been with the state during the drought planning for about seven or eight years and in several different basins. Some are a little bit further along and have engaged a number of stakeholders including the cities of Omaha and Lincoln, a number of irrigators, and a lot of folks impacted by drought. One of the things we run up against is the concept of data. You know, we talk about data all the time. Sometimes we have too much, sometimes we have too little, other times we don't have the right kind of data. I'm wondering, as you go through your survey, if that is the kind of information you're going to ask about and seek out because that has been the struggle for us in a predictive mode. We never know, and we're right next door to the Drought Mitigation Center and have access to all those tools. In 2019, Nebraska had a devastating flood. Three years later, the drought is significant. The pendulum swings hard and fast. Trying to make decisions with the datasets we have is really important.

Gretel Follingstad: We are trying to create coordination and partnership across federal agencies that are involved in drought in one way or another, so that the science and information that they're collecting could be integrated into this platform at various scales such that the platform would be more accessible to states, counties, local governments, and irrigation districts. The data will include different types of extremes so that you can understand your risk. That risk may look very different in northwest Nebraska versus southeast Nebraska. Then, depending on the skill of the user, they'll be able to make better decisions. The needs assessment survey will ask if there is state-level data that you would like to see integrated here. One thing that I have been working on is that the user will be able to bring in their own datasets privately on the platform and utilize them. Climate Engine has that technology. So, for example, if the dataset wasn't one that is available for all states, or available at the federal scale, the user themselves can upload a dataset in order to improve their own risk profile.

Roger Gorke: The CADP doesn't take the data and tell you exactly what to do. It helps you find the right tool to be able to import the necessary data to meet your local needs. So, for example, we have been participating with Ignite as our tool for climate evaluation and assessment through green, resilient water utilities tool. So that will be a tool on the platform which will allow folks in Nebraska to pull the data for Nebraska – and it will be different from Nevada or California. But it does not say: "Here is the answer, Nebraska." It helps you identify which tool might be most

appropriate, and then allows you to pull the data and information specific to that area so you can make a much better-informed decision.

Gretel Follingstad: Roger, that is exactly right. We will not create a plan for you. And one answer won't work for everyone. The CADP platform will guide you towards what is best for you. So, if your risk profile guides you towards a post drought flood hazard with infrastructural needs, then that might guide you towards the FEMA in building resilient infrastructure and communities grant program. It basically helps you understand the different levels of bureaucracy that include funding for local communities, or localized projects.

LANDSAT NEXT

Tim Stryker, Chief, National Land Imaging Program's Outreach and Collaboration Branch, U.S. Geological Survey (USGS) expressed gratitude for the WSWC's strong support for our observations program, and Landsat in particular.

I also want to say how much I appreciated our Alaskan colleagues and government leadership's session this morning on cooperative federalism. Their stated interest in the federal and state governments collaboratively gathering and analyzing data together to support better local, state, and federal decision making and rulemaking activities really struck me. I think that speaks to a lot of what we at USGS are trying to do within our programs. It is an honor to be here following Gretel, Brian, and Becky and look at CADP and NIDIS, or what's going on in the US, given the Water Census dashboard, the 3-D elevation program, and the 3-D hydrology program, including the USGS' national imaging program. We try to assess user needs and meet those needs -- not trying to come up with our own preset solutions, ideas, and approaches.

USGS is co-developing and often co-founding science information and solutions for local, state, and federal decision making. In terms of Jim's presentation on artificial intelligence and machine learning protocols, I think we are all trying to implement these technologies and use them in a better way, given the accurate data that we have. One of USGS' strengths is the stringent science approach we have towards data authenticity, data curation, and data availability. USGS leadership is talking with NASA and NOAA leadership with respect to future remote sensing systems and how to make data more accessible and discoverable and usable, and not just replicating existing silos in the cloud.

He provided an update on Landsat, remote sensing data, and data from other USGS mission areas. NASA provides funds for land processes and data from their MODIS dataset. We also have external partnerships and international partnerships to retrieve data from European and commercial remote sensing satellites. We operate the Landsat missions once they are launched by NASA. USGS maintains the data and we fund research and applications at universities. A couple of government-wide studies concluded that Landsat is the second most impactful observation data source across the federal government in terms of federal uses and applications. That shows how valuable these data are decade after decade, especially as the data becomes more freely available.

As computer technology, data processing, and science algorithms become more powerful, we can see the value of that data over large geographic regions. The Sustainable Land Imaging program is a partnership between DOI, USGS, and NASA for ensuring that the US has its own long term, high quality, stable operational source of land imaging measurements. This has been a great partnership. We are currently upgrading Landsats 8 and 9, following NASA's development launch to check out our missions and our development of the ground system and ongoing operations. Landsat 7, which is an old satellite, is a leading contender for a potential NASA refueling mission demonstration.

Landsat data is important, even with other weather satellite and commercial data available, because it really is in the sweet spot at the landscape scale for local to regional decision making. It provides global coverage of very high quality, highly calibrated, highly valuable, highly validated data over the long term that can work well in science and decision support and modeling from local to regional to global. We now have the capability to analyze and interpret the datasets more broadly. We are hoping that Landsat 8 and 9 will continue to be operational.

Landsat Next is the culmination of an architectural study team between NASA and the USGS designed to meet emerging user needs. We work closely with a university consortium, with international partners, and with stakeholders, such as the Western States Water Council. Data users across all domains would like more frequent coverage to analyze the phenomenology in support their resource management decisions. The current satellites provide six-day revisit coverage.

Landsat Next was designed to provide more than twice as many spectral bands as the Landsat 8 satellite, with increased temporal coverage, spatial resolution, and spectral bands. Improvements include more frequent observations, better spectrum finishing, and evapotransportation (ET) measurements. Applications include agriculture, forestry, water resources, water quality, crytosphere, public health, and wildfire. Landsat Next will assist with cryosphere detections for snow and water availability issues. With Landsats 8 and 9, and moving on through Next, we will have improved detection for water quality with respect to organisms that cause harmful algal blooms. We are working very closely with our European colleagues and the central team on thermal infrared missions to share that data as broadly as we can.

Water consumption is such an important issue across the American West. Landsat-derived ET has helped in Southern California with food and almond growers. Landsat has been a very important contributor to OpenET. We expect the Landsat Next module to help fill in some of the data gaps that we know exist. Landsat retrieves snow cover and helps water managers determine what that means for coming weeks. We expect improved capabilities of Landsat Next to help model snow hydrology. Harmful algal blooms (HABs) have tremendous economic impacts in terms of recreational activities, fishing, tourism, and other activities. We are looking at operating additional products with spectral capabilities that would detect organisms that cause HABs to advance the science.

There is a rapidly growing commercial space industry expanding the number of Earth observation satellite systems. There are a lot of good commercial datasets now available. USGS

is accessing those through contracts with our defense agency colleagues. However, commercial satellites fill a niche leaning towards understanding the movement of people and other things. Currently, commercial satellites do not collect the highly calibrated science data at high resolution using a stabilized platform with the accuracy needed to conduct land use science and the many related applications. Thus, commercial data is important to complement and augment Landsat full-spectrum data, but we do not see it as replacing the data the federal agencies provide for free and open to public use and application.

With Landsat Next, we will have what is called "superspectral" imaging capabilities to meet users' needs for richer spectral information and improved spatial and temporal resolution. A huge challenge for USGS is ground system data development. Landsat Next will generate about 15 times the data volume of Landsat 9. Given the increased space to ground data volume, Landsat Next requires more robust communications systems to transmit imagery data to the ground. In turn, this requires additional ground stations and more data processing and storage.

While we think the program has been very successful, it is a bit complicated in terms of federal government activities. Landsat Next is a joint effort of NASA and the USGS and full funding is acquired from two different congressional committees. Each entity requests and receives our funding separately, although we coordinate as closely as we can. Further, USGS has to allocate that funding for a separate system in the ground segment development by NASA and by USGS. Slide #17 provides a snapshot of the National Land Imaging (NLI) program budget. A Satellite Operations increase to the USGS NLI base of $12 million in FY24 is critically needed to allow the USGS to meet its Sustainable Land Imaging Landsat Next ground system development obligations. If we don't succeed in getting the funding, it will be a huge blow to the program, and would likely result in delays. It is a delicate balancing act. We are working to ensure that Congress recognizes these Earth observation systems as a priority for continuity of Landsat data for the nation.

In conclusion, please feel free to check out the state-specific fact sheets produced by the USGS NLI Program. These fact sheets contain critical environmental information about your states.

Questions

Question: You mentioned, Landsat 7 may be refueled. How will that happen?

Timothy Stryker: NASA is testing and has done a test demonstration of refueling of a satellite in low Earth orbit. Landsat 7 was never meant to be refueled, but it is a very expensive asset. If successful, refueling could prove valuable in the future for extending the life of these large and expensive science missions. There is no current expectation though, that it will be refilled and reused. In the meantime, NASA has funded USGS to continue operating Landsat 7 as scientists are still finding use for it. We're continuing as best we can.

NATIONAL WATER ASSESSMENT

Brian Clark, Program Coordinator, Water Availability and Use Science Program for USGS discussed the Water Resources Availability Portfolio (WRAP) using a powerpoint presentation.

USGS has three priority products informed by the SECURE Water Act: (1) the National Water Census which contains routinely updated on-line information on water availability in the United States. The Census houses modeling applications or software development, the code, and AI. It is used to investigate different types of water prediction, water quality aspects, drought prediction, and others.; (2) the Regional Water Availability Assessments which include detailed assessments of water availability in ten representative basins.; and (3) the National Water Availability Assessments. Through the SECURE Water Act of 2009, USGS was requested to develop an assessment of water availability and use. We are trying to determine how much water we have, where it is located, and the quality of that water. We have collected water use for a long time and have differing ways to try to account for it. We are trying to determine the vulnerability and resilience of humans and ecosystems to water shortages, surpluses, and degradation of water quality. How do we do that? The core indicators we are focusing on include: (1) auditing the quantity of water, (2) the quality of that water; (3) withdrawal and consumption – water use; and (4) aquatic ecosystems.

The USGS has been directed to produce a report every five years. The report is broken into two pieces. The 2024 Cycle 1 report is in draft right now and provides a snapshot of water availability in the United States looking from about 2010 to 2020. The initial report has been split into a couple of parts: Cycle 1a and Cycle 1b. We will have a follow up in 2026, which would include more historical trends, looking back several decades, instead of just a single decade. Then we want to move toward larger trends, future trends, projections, and scenarios. This will be the Cycle 2 version which will be out in 2030. There are a lot of models building and software development with respect to data collection. Thus, every five years we "rinse and repeat." However, we want to improve as we go out to 2035 and 2040.

For the structure of the report, we're taking a snapshot of a 10-year period, assessing water availability in the US. The structure of that assessment would include sections that would focus on: national water supply, water quality, and use; putting what we what we have for that 10-year period in context for future water resources, which includes where the snapshot falls within historical climate change; comparing supply with demand; and a section focusing on highlights and regional synopses.

In the water supply (quantity) section, it will present estimates of the hydrologic fluxes and storage terms based on an ensemble of model outputs. It will show water moving in and out of groundwater, for example, and the decadal variability within components. Multiple models will be used as none of them will be perfect. So, we will take a couple of examples and see what certainty looks like using various model sources such as CONUS404ba, which is a climatic forcing dataset developed in partnership with NCAR. We also use the national hydrologic modeling (NHM) system.

Of course, we recognize limitations in the assessments -- the difficulty in the data, the resolution, and information. The resolution may not be quite what we would like at this point. You may notice that the maps are focused on the contiguous 48 states, but we are working on remedying that. Some limitations of the current effort are incomplete coupling of surface water and groundwater systems in model applications, which are often mined separately. We do not consider those separate systems but pulling that information together in software can be a bit of a challenge. Reservoir operations is another area where getting information on all the reservoirs and how they are operated and impact flows is difficult. We try to boil down the resolution on the various models to create a national summary. In some cases, you might lose fidelity, or in other cases, the data might be opposing fidelity, or they might not have been there originally. Thus, these circumstances create challenges.

The next section will describe the quality of the nation's water resources with respect to salinity, nutrients, temperature, geogenic contaminants, and other constituents such as PFAS, HABs, and pesticides. Additionally, we'll place water quality in the context of how it relates to water availability for ecosystem and human health needs. There are limitations on the water quality assessments. Not all these constituents have been assessed nationally, although there is a lot of regional and local work. In many cases on a national scale, the models are static and represent a long-term average concentration. The benchmarks or thresholds are not well integrated into water quality information. Further, constituent mixtures, or multiple exceedances are not well studied.

We've been expanding and improving our efforts in how USGS produces water use estimates across the nation. Historically, they have been done in five-year increments to account for water use estimates using modeled coverage of three water use categories: public supply, thermoelectric, and irrigation. Of course, irrigation is a big one using physics based on watershed modeling to inform the estimates of the data sets. We are also exploring the use of statistical and machine learning or AI methods to refine and expand on the models to produce the water use more accurately, and at higher temporal resolution. Some of the limitations are that we cannot get an estimate for demand. With irrigation, it's difficult to know what the source is, especially if the irrigator is near a river. How do you determine if the supply is surface water or ground water through modeling? Is there enough information to model or at least get probabilities to account for movement of water between basins that affects the supply and demand issues? Currently, interbasin transfers are not represented in our water budget calculation. There is also no consideration for water quality limitations on availability.

We are starting to ramp up modeling aspects for more detailed categories such as livestock, aquaculture, and mining so that in the next section of the report, we'll be putting this information in the context of climate change. We will discuss the current state as well as future predictions for how that falls within a climate record, or what we might be projecting for future climate issues. For example, if we have a drought within the first quarter of a ten-year period, what does that look like in short-term contexts and in the longer term? What does it look like within a 50-year period? Or perhaps some paleo record? So, it's getting the synopses in context with respect to the longer-

term period of water availability. We are trying to reconcile that type of information so we can make better informed projections on impacts to ecosystems based on water availability.

The regional synopsis will look at plans for ten studies, although some additional studies are underway. Some are planned in terms of our efforts on integrated water basins: the Delaware River, Willamette, and the Trinity San Jacinto. We have had congressional interest to focus on the Mississippi Alluvial Plain and the Klamath. We want to use as much of the information to inform our national work.

There has been some discussion on the AI impacts to the data. The models are data hungry, and more intense information can hopefully inform the models more. A challenge and limitation there, of course, is coordination across the platforms and how to form a concise picture in an assessment across the differing issues and concerns. Another issue is coordination with outside agencies.

Questions

Christopher Estes: One of the challenges and recommendations the Association of Fish and Wildlife Agencies made was that USGS would benefit by allowing states to report water use relating to legally requiring a portion of water be left in a river, lake, or reservoir so that it was legally accounted for, and you could actually do a water budget. You talked about ecological flow. How are you planning on integrating the amount of water that is legally set aside that allows it as a legitimate water use?

Brian Clark: One aspect, I believe, is to see that as water use, right? Right now, we have categories of use for things like livestock, irrigation, public supply, things like that. One way to attack that might be to approach it as a water use for an ecosystem, to include it as the water budget component. Now that varies. I'm not a biologist by any means. But that is going to vary a lot by where you are – spatially, temporally, or seasonally – the types of species in your area of concern.

Within our models, we hope to account for all the water, and then additionally there are metrics that also help inform the water availability. It is going to depend on what the use is. You mentioned this feeds into water rights. What we are getting at is both the quantity of water and the quality of that water. Here are the different uses of that water. The USGS would not dictate what the actual availability is. We want to be able to provide enough information so that managers can make those decisions.

Christopher Estes: What you were just describing is really important when you're talking about a water budget and a legal requirement that a portion of available water is actually used one way or another. What I was referring to is one of the elements is that in many jurisdictions you can have a legal use that requires leaving a portion of water in a river, lake, or reservoir for fish and wildlife and other related uses, and it wasn't given parity to the other withdrawal, diversion, and impoundments, so you don't have a water budget knowing how much is available for use. It sounds like you are also talking about the natural variability of issues to deal with. That is a

different assessment of the ecological merits of a certain amount of water versus a legal requirement for the use of water. I really think it is important to distinguish this in the report.

Brian Clark: Let's talk more after. I may have more questions for you.

FOLLOW THE WATER: NHDPLUS HR AND 3DHP

Becci Anderson, Chief of User Engagement for the USGS National Geospatial Program, noted that until a year and a half ago, she was the Hydrography Planning and Management Lead and spent a lot of time planning for the 3D Hydrography Program (3DHP). The USGS National Geospatial Program manages the National Hydrography Dataset (NHD), Watershed Boundary Dataset (WBD), and NHDPlus High Resolution (NHDPlus HR). These geospatial datasets represent the surface water of the United States for mapping and modeling applications.

The NHD represents the water drainage network of the United States with features such as rivers, streams, canals, lakes, ponds, coastline, dams, and streamgages. To date, we have 9.4 million miles of stream network, 8 million waterbodies, and over 130,000 nested hydrologic units mapped. These data were updated and maintained through Stewardship partnerships with the States and other collaborative bodies. States were the ones doing all the hard work when it came to hydrography mapping. However, as you can imagine, when things are done state-by-state, there is often not a uniform standard used. Thus, some areas were very strong and highly updated while others were not.

The NHD data started with our topographic maps. Some of the original NHD remain from 40 or more years ago. The NHD surface water mapping does not match well with the new elevation data we have collected through the 3D Elevation Program. And if the line work and elevation data do not match, you miss a huge opportunity to do modeling.

The implementation of 3DHP marks the start of a new era of water data - the first systematic remapping of the Nation's hydrography since the original USGS 1:24,000-scale topographic mapping program was active (between 1947 and 1992). Community-wide coordinated investments will contribute toward a consistent set of national water data to answer the most demanding water resource questions. All of this is nested in an even larger concept called the 3D National Topography model. The fundamental principle is integrating elevation and hydrography data sets to model the nation's topography.

We are moving forward on two tracks. One is the next generation of 3D Elevation Program (3DEP) where we have collected high-quality topographic data using Light Detection and Ranging (LiDAR) and a wide range of other 3D representations of the Nation's natural and constructed features. There is a draft of the call for action for the program fundamentals out for review. Testing is being done with the 3D Hydrography Program to get this future 3D model integrated.

Another segment of the 3DHP is the Advanced Water Mapping and Analytics Initiative – an interagency workgroup partnering to align the U.S. Environmental Protection Agency and the Department of the Army's water resource interests with the U.S. Department of Interior's (DOI) authoritative and ever-improving inland water mapping datasets and extensive expertise in hydrologic modeling. This is a collaborative effort between the EPA, USGS, U.S. Fish and Wildlife Service (FWS), Army, DOI, and NOAA. The federal partners proposed the Initiative to accelerate improvements to hydrographic data through the 3DHP and the FWS National Wetlands Inventory (NWI). The impetus for this was the regulatory back and forth over defining Waters of the United States (WOTUS). It focuses on integrating the different datasets, building them for multi-use, especially being able to integrate data and to work together between wetlands mapping and stream mapping, and then creating the data in a way that can support next generation modeling.

Collaboration and cooperation are core components of the 3DHP, the 3DHP infrastructure, and the Internet of Water. While the USGS and partner agencies will provide the overarching structure and functionality of the 3DHP infrastructure, the data searchable through it will be managed by the datasets' authoritative producers. This federated structure gives data producers control over their information while sharing it with the broader community. In turn, the community of users can efficiently search and access the most authoritative data.

In 2016, we did a giant study on modernization which included participation from federal agencies, all 50 states, tribal governments, local governments, national associations, private companies, and nonprofit organizations. We learned that a modernized 3D hydrography program could provide up to $1.14 billion annually in benefits. The study results identified many requirements for hydrography data, including better linkage to other water datasets, such as the FWS NWI, better positional accuracy, better alignment to elevation data, and more frequent updates, among other findings.

The number one goal or idea is to align the datasets of the 3D Elevation Program with the LiDAR data. The data and system are being built for hydrologic applications. The NHD was built as a cartographic mapping tool. The 3D National Topography Model (3DNTM) is built as a modeling tool for every reach people follow with the 3DEP best practices, which is to ensure a governance system, including specifications and data validation.

The USGS vision is to contract data acquisition through the USGS Geospatial Products and Services contract, and allowing for cooperative data acquisition, community-wide efforts over nine years. For the proposed operational program to be fully realized, a similar community-wide investment of $685 million will be required between FY 2024 and FY 2032. The nine-year timeframe includes one year preparation, six years of delineating hydrography data, and two additional years to complete the data inspection or validation.

When we first started designing a modernized program, we considered and compared three program scenarios. The first was the status quo and the annual benefits for that scenario totaled $658 million. The second scenario considers deriving data from one-meter data elevation models (DEMs). This scenario would include improvements such as improved accuracy, accounting for

more components of the hydrologic cycle, and more effective maintenance of data. Ultimately, the USGS vision for 3DHP is based on the second scenario which would meet most mission-critical activity needs identified in the study and has the potential to achieve more than $1.047 billion in annual benefits. A third scenario is like scenario two, except the data would be derived from 0.5-meter DEMs and would yield $1.12B in annual benefits.

USGS has made some major changes to the data model. A major focus is on increased data interoperability. The 3DHP datasets will include new attributes and links to other data such as the NWI, groundwater, and engineered hydrologic systems, such as stormwater networks. This is based on an OGC standard that was created by a hydrologist. We are putting hydrology first and supporting multi-scale products. Again, this builds on the Internet of Water idea.

Within the 3D Hydrography Program, partnerships are critical. NHD cannot do this without the states. USGS has something called a data collaboration announcement DCA, which includes an expansion of processes previously used. This is the first time that USGS will have a standardized process for collaborative data acquisition for hydrography.

In general, the federal agencies working group tracks priorities to see what large projects they can begin to pull together. USGS has worked with FEMA and NRCS on projects since they have contributed a lot of funds. States present project submissions which are assessed for overlap with the federal agencies' priorities, and then we endeavor to build projects. There are a couple of different ways that a project can be executed. Contractors are making the data, and the specifications are strict. They need to be strict to ensure the dataset is consistent. AI can work well for modeling in steeper elevations. Humans tend to want to engineer the water and move it all over the place which makes it difficult to model.

Every state has a geospatial information officer that coordinates with USGS, so please get to know them. We are coordinating a project known as 3DHP for the Nation which is dashboard of state, regional and national projects and activities. You may wish to check that out. I lead the National Geospatial Program network of National Map Liaisons. There is a National Map Liaison in your area. The National Map is reliant on partnerships and working together with state, local, and federal groups. There are 17 liaisons across the country and their job is to work with you to help you understand the data, help you use the data, and help you partner with USGS to get new data.

The need to support better water-resources decisions cannot be overstated. Together, we can achieve the 3D Hydrography Program.

Questions

Michelle: Can you talk a little bit about the continued accessibility of NHD? Tim Stryker mentioned that sometimes federal and state governments are late adopters to new innovations. I remember when the announcement made that NHD would no longer be accessible. Some of our

states felt like deer in the headlights, like what are we going to do now? I know states have expressed concerns about that as they are working towards adopting these new innovations.

Becci Anderson: I'm glad you asked that question. The NHD is now frozen. The last version will be coming out soon. We would love to be able to keep working on both at the same time, but we literally do not have the resources. And we will never move forward with something new unless we take the approach of starting to move forward. But as I said, the data will be read from the NHD into the new data model. I think we are going to need to hold a series of workshops to get people trained on the new data model and how to use it. The data is going to be there however, it will be in a different format. We need to get over that hump to in using and adopting the new format. Then as new data comes in, you will be ready to go with it.

Joaquin Esquivel: Thank you for this update. My staff was panicking about NHD. You said a lot of this work was rooted in discussions like those we have been having over the years. One of the challenges we have in Silicon Valley is the fact that the topography might tell you that water should be somewhere, but there actually is no water, particularly for things like ephemeral breaks. How is this going to be smart enough to know that there is or should be water in an area? How will it handle those sorts of things?

Becci Anderson: I'm not claiming that it's going to be perfect. But what you see right now in the NHD is probably off when we start talking about periodicity or streamflow permanence. There are a couple of ways that we have talked about handling these situations, and I'm not sure it has been completely settled on. One thought deals with work going on in Pacific Northwest on streamflow permanence and how to measure it and estimate how to model it, as well as modeling streamflow permanence. I think the most critical part for the states is the ability to submit markups or corrections to the data. Anyone in the country could do that. It is open to anyone to submit. USGS will go through and look at the submissions and talk to people about them for validation. States will have some stewardship. However, we want to encourage local input as well.

WADE, WESTDAAT AND OPENET CONSERVATION TOOL

Adel Abdallah thanked Jim Davenport for setting a foundation for the whole meeting in his presentation on AI. It is exciting to imagine water resources in the next ten years and what Landsat Next and 3DHP will look like.

As many of you know, we have been working on sharing water rights, allocation, supply, and use data through a common streamlined and standardized service. WestDAAT was released publicly this past April which is Stage 1 of our efforts. We're hoping to work on stage two over the next couple of years. We are making data findable, operable, accessible and reusable (FAIR).

Adel noted work that contractors Andrew Campbell and Joseph Wirthlin have been doing, including identifying the regulatory and administrative boundaries across the West. He mentioned website metrics, with 1,300 unique visitors and 300 returning users.

We are working with the Lincoln Institute Center for Geospatial Solutions on a proposal to the Bureau of Reclamation to build an interoperable data hub for Western water data and the State's water rights. In that hub, we can integrate federal agencies' data to support water supply modeling -- for surface water, streamgages that states operate, and groundwater pumping. This work parallels the USGS' efforts on the Hydro Network-Linked Data Index (NLDI) system that offers a search service to discover indexed information.

We have been working very hard on scoping a conservation tool extension to WestDAAT. It would help users estimate potential water savings from alternative agricultural water conservation measures using OpenET. This tool maps evapotranspiration and calculates consumptive water use at the field scale and relies on technology and data developed by NASA. The tool will mainly extend WestDAAT capabilities to support: (1) an integration with OpenET to estimate total consumptive historical water use for any selected field; and (2) multiple user access and secured user accounts. The tool will rely on Microsoft's state-of-the-art cloud security identity and access management.

The conceptual model for this tool was built with our IT contractors and funding from the Upper Colorado River Commission. It allows farmers to apply for compensation for temporary and voluntary conservation actions. The tool integrates with OpenET and allows farmers across the West, and specifically for Colorado River Basin states. The process requires sharing water rights data and geospatial information and estimating their existing and potential consumptive water use and savings, using OpenET, as well as determining fair compensation. A summary of how a water user (e.g., a farmer) may use the tool to submit an application, and for the conservation organization to evaluate it, is included in the briefing materials under Tab N.

The second stage of development will support user-friendly access through WestDAAT to the following data types: (1) regulatory overlays; (2) site-specific time series; and (3) the Water Conservation Tool. These data types and the conservation tool are essential in informing water use planning and management across the West. The figure on slide #17 summarizes the key tasks of this second stage of development of WestDAAT and the estimated IT contracting costs.

DRAFT FY2023-2024 COMMITTEE WORK PLAN

Tony Willardson noted that the Committee's marked up and updated draft work plan for FY2023-2024 is included in the briefing materials under Tab O. As always with our work plans, we are constrained by staff time. We would appreciate any further input that you might have regarding what you see as priorities for the Committee's work. Many of the topics discussed during today's meeting are included as areas in the work plan.

Nakaila Steen called for a motion to approve the Water Resources Committee work plan for fiscal year 2023-2024. The motion was seconded and unanimously approved.

SUNSETTING POSITIONS FOR SPRING 2024 MEETINGS

Please note the sunsetting positions in your briefing materials under Tab XYZ, which include Positions #459-#464. These will be taken up at our next meeting which will be held in March 2024 in Washington, D.C.

OTHER MATTERS

There being no other matters, the meeting was adjourned.