Western States Water Data Access and Analysis Tool
Users Engagement Report

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Adel Abdallah: WaDE Program Manager
Ryan James: WaDE Data Analyst / Hydroinformatics Specialist
Tony Willardson: Western States Water Council Executive Director

Executive Summary

This report summarizes the Western States Water Council (WSWC) engagement campaign with users pre- and post-development of the Western States Water Data Access and Analysis Tool (WestDAAT),[1] mainly from September 2021 through September 2023. The engagement campaign reached out to dozens of stakeholders and organizations, drawing traffic and users to WestDAAT, who provided valuable feedback.

WestDAAT is the latest phase of the WSWC Water Data Exchange (WaDE) Program, which facilitates the sharing of member states' water-related data through a common platform.[2] WestDAAT provides user-friendly access to data available in a machine-readable format for over 2.5 million active water rights across eighteen western states. WestDAAT also catalogs the most common metadata and provides a direct link to each state's water rights database for further information. For a decade before WestDAAT's launch, the WaDE team worked on communicating the value of streamlining access to Western States' water data through the WaDE Program. Designing WestDAAT as the front-end tool has been a game-changer. WestDAAT is intended to be user-friendly, focusing on the user experience. It was developed using conceptual "personas," testing a prototype application, and creating detailed mockups of the designs. As a result, we feel confident most users can benefit from WestDAAT's capabilities with little instruction.

WestDAAT's main development period occurred from March 2021 through September 2021. It was publicly released in April 2023 through an Internet of Water

[1] WestDAAT: https://westdaat.westernstateswater.org
[2] WaDE Program: https://westernstateswater.org/wade

(IoW) Coalition webinar. An IoW Coalition blog post later in August highlighted its capabilities and applications.[3]

The engagement focused on six distinct categories of WestDAAT users as illustrative personas with different roles in managing or understanding water resources and varying water data needs.[4] WSWC staff held dozens of in-person workshops and virtual calls, including hundreds of diverse users and organizations that best represented the six identified personas. The six personas include: (1) Gary, the Governor; (2) Stan, the State Engineer; (3) Maggie, the River Basin Manager; (4) Laila, the Land Use Manager; (5) Frank, the Farmer/Irrigation Canal Company Manager; and (6) Ratibah the Researcher/Consultant.

The depth and breadth of the stakeholder engagement campaign pre-and post-WestDAAT's development was very useful to the WaDE team in: (1) testing its performance and user experience; (2) adjusting WestDAAT's design to be more user-friendly and addressing software bugs; and (3) soliciting users' feedback on how WestDAAT might be helpful and what additional features they would like to see to further support their own individual applications, or use cases. The most notable pre-design engagement was an in-person workshop that included multiple potential users and personas. It was held in Las Vegas on December 15, 2021, in cooperation with the Colorado River Water Users Association (CRWUA).[5]

<u>Engaged individuals recognized WestDAAT's potential value:</u>

- The WSWC, as an instrumentality of the states, has decades of experience coordinating efforts among its member states, which gives WestDAAT credibility and sustainability.

[3] Unveiling WestDAAT: https://internetofwater.org/blog/unveiling-westdaat-a-breakthrough-for-water-rights-data-management-in-the-western-united-states
[4] A document for focus groups to help the WaDE team refine, revise, and improve the designs of the upcoming WestDAAT: https://westernstateswater.org/wp-content/uploads/2021/09/WestDAAT-Persona-Use-Cases_-Focus-Group-Doc_09_01_2021.pdf
[5] CRWUA 2021 WestDAAT Pre-Design Engagement Workshop: https://westernstateswater.org/events/crwua-2021-westdaat-pre-design-engagement-workshop

- WestDAAT is a “one-stop” shop for publicly available data that is accessible through a web browser with a dozen filters to query data at regional and local scales.
- WestDAAT serves as a catalog of water rights with the ability to visit states-based webpages from the generated landing pages.
- WestDAAT provides data analytics through pie charts, summary tables, mass-data downloads, and a public Application Programming Interface (API) for large-scale data retrieval outside WestDAAT.
- WestDAAT offered a macro-region or basin-wide view of water rights and metadata as a reference and for comparison between states.
- WestDAAT offers common (along with state-based) terminology describing water rights metadata, which is particularly useful for the owner and beneficial for use classification.
- WestDAAT integrated the Hydro Network-Linked Data Index (NLDI) tool to query upstream and downstream water rights with U.S Geological Survey (USGS) streamgage and Environmental Protection Agency (EPA) water quality monitoring stations.

<u>Key recommendations from engaged state officials and stakeholders included:</u>

- Support for updating WestDAAT data more frequently to account for changes in the source data.
- Sharing reported water withdrawal, pumping, and use data in WaDE for existing water rights.
- Integrating OpenET mapping of net evapotranspiration (ET) data to estimate consumptive use, especially for voluntary, compensated, and temporary conservation actions.
- Showing data provided by states and the Bureau of Reclamation’s (USBR) active and historical water storage and streamflow (i.e., availability).

- Further fine-tune the NLDI tool to include specific search parameters such as measured variables (e.g., salinity, streamgage flow, etc.) and time range on active and inactive measuring sites.
- Expand WaDE and WestDAAT's capabilities to support metadata for groundwater wells, such as depth, capacity, aquifer name, and drill date.
- Support new water data filters to query: (1) the legal status of active water rights, such as vested or adjudicated water rights and pending applications in a given area; (2) the public or private legal basis of the water right (such as prior appropriation, riparian, reasonable use, and correlative rights, or absolute ownership, as well as uses exempt from permitting); (3) the water source name (e.g., Colorado River); and (4) by point of diversion and site type (e.g., dam, canal, weir, well, etc.).
- Expand WestDAAT's ability to query for water rights within an administrative or regulatory boundary with geospatial overlays to identify active management areas or areas with water rights conditions or water use restrictions.
- Similarly, support querying surface water rights within a known basin or groundwater wells within a known aquifer.
- Also, support querying water rights ownership based on a land management type boundary, such as for the U.S. Forest Service (USFS) or Bureau of Land Management (BLM).
- Support uploading a user-generated custom geospatial boundary into WestDAAT to query water rights within a user-defined area.

<u>WestDAAT now has a growing user base that will be a catalyst for further engagement and a growing potential to support sound decision-making across the West.</u>

Table of Contents

1. Introduction

This report summarizes the Western States Water Council (WSWC) staff engagement campaign with users pre- and post-the development of the Western States Water Data Access and Analysis Tool (WestDAAT) during the period of mainly September 2021 through September 2023. The engagement campaign reached out to dozens of stakeholders and organizations, drawing traffic and users to WestDAAT. WestDAAT development has been funded by the following grants: BHP Foundation through Duke University and the Internet of Water (IoW) Coalition, Applied Science Water Smart grant from the USBR, and the Water Foundation.

States allocate and administer rights to the use of water in the West and are therefore in the best position to provide water rights and water use data, but rights and uses and their data are managed separately and distinctly by each state. The WSWC and WaDE Program are unique in their services that streamline access to data for water rights and water use for the western states, with no other organization offering such service. WestDAAT, as a front-end application, is expected to drive innovation and improve water management in the West through its simple user interface and ability to provide access to often disparate regional data. WSWC's goal is to make water rights and water use information more findable, accessible, interoperable, and reusable (FAIR), leading to more innovative and drought-resilient applications. It is anticipated that WestDAAT will facilitate many of the following water management and conservation activities:

1. Prolong the use of scarce water supplies to ensure future water source reliability.
2. Improve drought and environmental risk management, building climate resiliency.
3. Highlight conjunctive groundwater and surface water use opportunities.
4. Facilitate state water rights administration and better define federal agency water rights.
5. Promote water conservation and efficiency.
6. Promote water marketing, transfers, leasing, and banking.

7. Focus initiatives for fish and wildlife habitat management and species protection.

2. Internet of Water publications and webinar publicizing WestDAAT

Below are two blog posts and a recorded webinar organized by the IoW Coalition that helped publicize WestDAAT.

- IoW Coalition Water Features article: Celebrating Ten Years of Western Water Data Sharing. February 17, 2022: https://internetofwater.org/blog/wade-celebrating-ten-years-of-western-water-data-sharing
- IoW Coalition Webinar: WestDAAT. April 25, 2023. https://internetofwater.org/events/western-states-water-data-access-and-analysis-tool-westdaat
- IoW Coalition Water Features article: Unveiling WestDAAT - A Breakthrough for Water Rights Data Management in the Western United. August 17, 2023: https://internetofwater.org/blog/unveiling-westdaat-a-breakthrough-for-water-rights-data-management-in-the-western-united-states

3. Metrics tracking WestDAAT use over time and engagement

Below is a summary of metrics tracking WestDAAT's users since it was rolled out of production in September 2022. Metrics include a general location of the user and the measured usage of how they utilized WestDAAT during their visit. In addition, WestDAAT allows a user to sign up and register for a WestDAAT account. WestDAAT account information is stored and tracked by the WaDE team for security reasons but is not released to the public. WestDAAT has been visited by 1,451 unique users across the U.S. (Figure 1). Most of the visitors are from the West and the D.C. area.

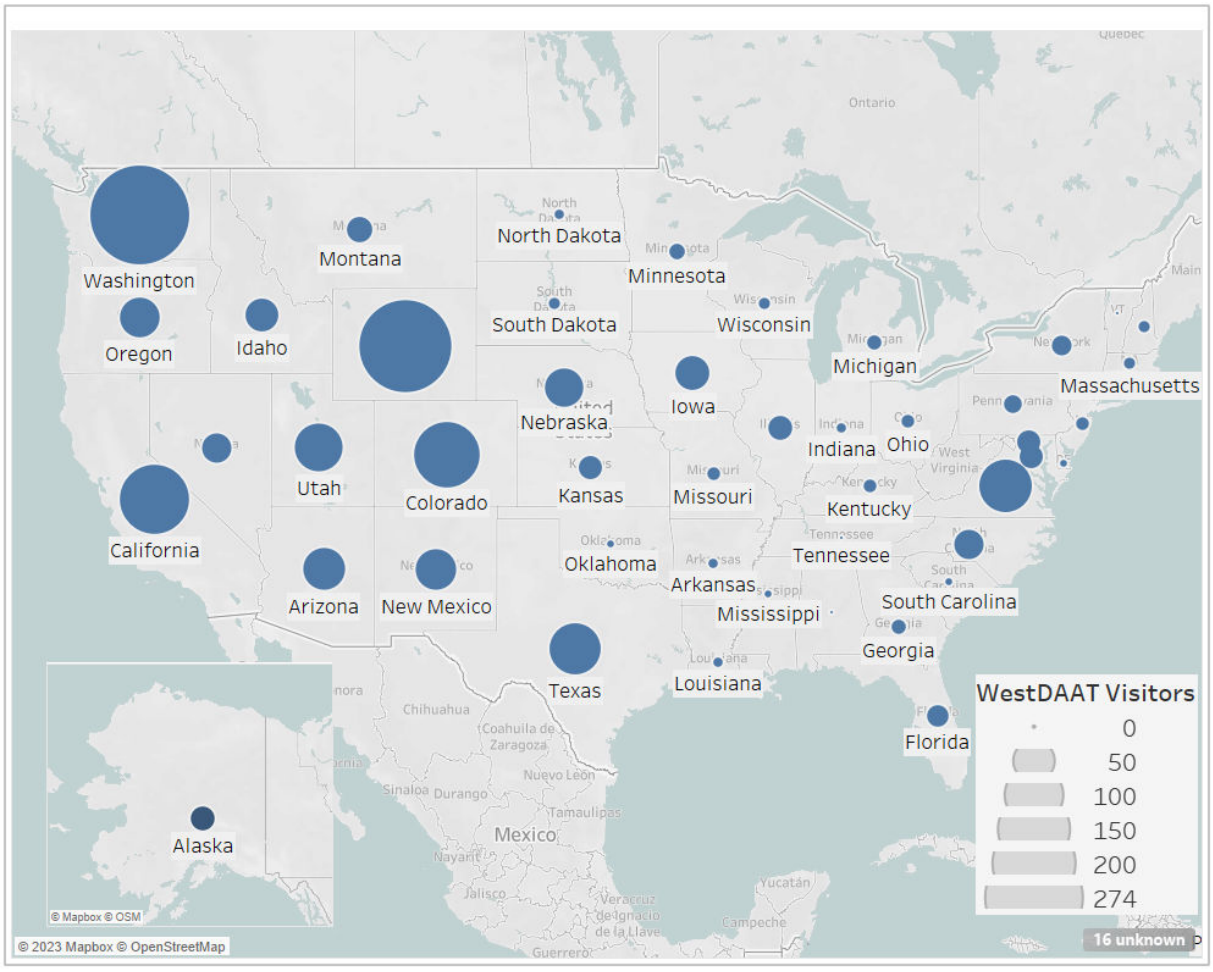

Figure 1: WestDAAT unique visitors across the U.S. from September 1, 2022, through September 30, 2023. A total of 1,494 unique visitors: 1,451 across the U.S. and 43 international visits.

Returning visitors to WestDAAT indicate a larger interest in its uses compared to a single one-time visit (Figure 2). Out of the 1,451 WestDAAT visitors noted, 343 are regularly active and returning users. Among those returning visitors, 35 created individual WestDAAT accounts, allowing them to further investigate the data via a download option. These users came from Arizona, California, Colorado, Maryland, Nebraska, New Mexico, New York, North Carolina, North Dakota, Oregon, Pennsylvania, Texas, Virginia, Washington, and West Virginia. They belong to these groups: city, consulting, federal, non-profit organizations, state, and university.

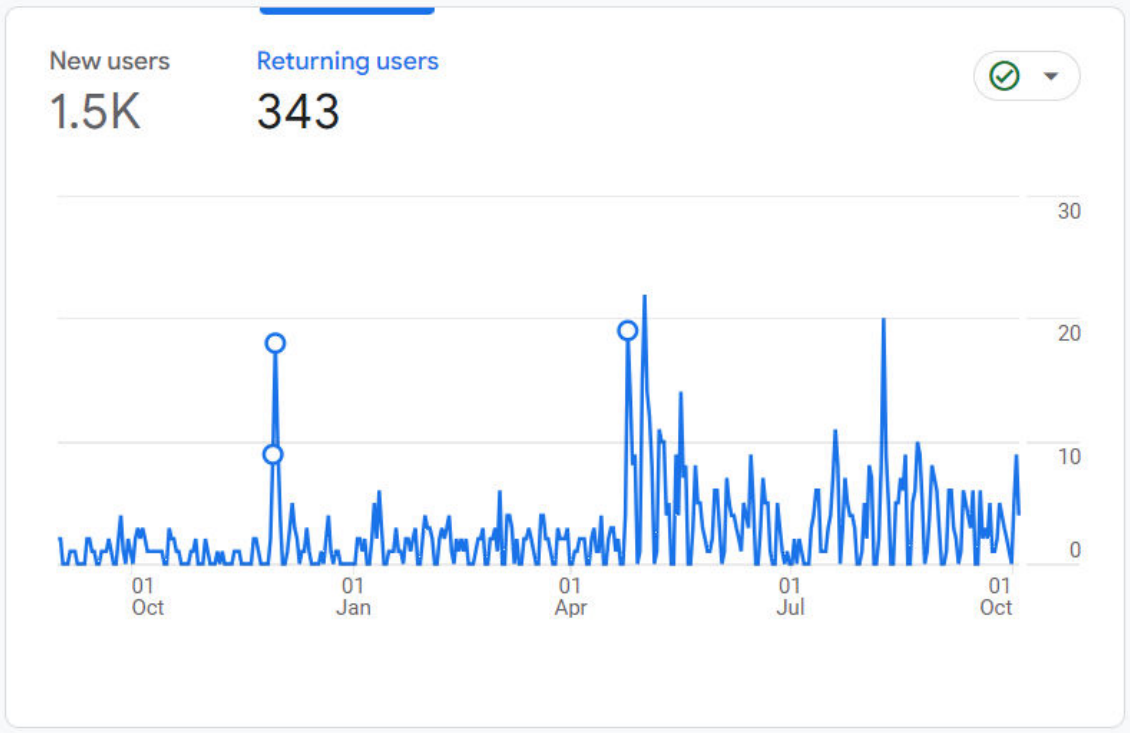

Figure 2: WestDAAT 343 unique daily returning visitors from September 1, 2022, through September 30, 2023

4. Summary of engagement events per persona

This section highlights the key engagement events for each persona. Users who do not directly belong to any of these personas are grouped together in a separate section as Other Users. Section 5 provides details and feedback reported on each engagement. The most notable pre-design engagement was an in-person WSWC workshop, in cooperation with CRWUA,[6] held in Las Vegas on December 15, 2021. The workshop included multiple varied users and personas.

4.1 Gary, the Governor

- The Western Governors were the key catalyst for WaDE since 2011, and thus, WSWC considered the Western Governors' Association (WGA) for this persona.

[6] Colorado River Water Users Association: https://www.crwua.org

- WSWC staff demonstrated WestDAAT to four WGA staff members through a virtual call on July 14, 2012.
- WestDAAT demoed to about 15 members of the WGA Staff Advisory Council (SAC) during their meeting in Denver, Colorado, on March 8, 2023.

4.2 Stan, the State Engineer / Director of the Natural Resources Department or Division

- WSWC consulted its members for this persona. Council members are appointed by each state governor, and most serve as the top leadership in each state, with responsibilities ranging from being a state engineer to directing the natural, or water resources department or division.[7]
- Presentation updates on pre- and post-design of WestDAAT during nine WSWC meetings.
- The State Engineer Persona Workshop, which included 16 virtual and 10 in-person attendees, was held on August 3, 2022.

4.3 Maggie, the River Basin Manager

- WSWC considered managers of the Colorado River Basin (CRB) for this persona. WSWC expanded this persona from the original description to include environmental conservation managers.
- In cooperation with the CRWUA and the IoW Coalition, WSWC held a workshop on December 15, 2021, as part of CRWUA's 2021 Annual Meeting in Las Vegas, Nevada. The workshop was the first pre-design engagement event that included multiple varied users in the CRB for the WestDAAT.

[7] Western States Water Council Members: https://westernstateswater.org/members

- WSWC staff visited the Upper Colorado River Commission (UCRC) headquarters in Salt Lake City on February 14, 2023, and demonstrated WestDAAT to the Executive Director and Deputy Director/Chief Engineer.
- WSWC staff demonstrated WestDAAT to the Great Salt Lake Commissioner on August 31, 2023.

4.4 Laila, the Land Use Manager/Planner

- WSWC considered the following audience for this persona: (1) the American Water Resources Association (AWRA) Land and Water Conference, which was held in 2021 and 2023; (2) the Economic Research Service of the U.S. Department of Agriculture (USDA); (3) staff at the Babbitt Center for Land and Water Policy; and (4) U.S. BLM, and USFS Regional Water Right Leads.
- Pre-design demonstration of WestDAAT prototype at the virtual AWRA conference on July 18, 2021, at a session: "Utilizing and Developing Open-Access Water Data Tools and Resources."
- A post-design demonstration during the AWRA in-person conference in Denver, Colorado, on July 18, 2023, at the Innovative Data Platforms and Tools for Western Water Session.
- Western States Planning Conference by Western Planning Resources, Inc.,[8] held in Phoenix, Arizona, on August 25, 2021.
- The USDA Economic Research Service call was held virtually on April 27, 2022.
- WestDAAT demonstration to staff at the Babbitt Center for Land and Water Policy on June 13, 2022.[9]

[8] Western Planning Resources, Inc.: https://www.westernplanner.org
[9] Babbitt Center for Land and Water Policy: https://www.lincolninst.edu/our-work/babbitt-center-land-water-policy

- WestDAAT demonstration to the BLM on March 23, 2023, to discuss the BLM Wells Database. The BLM "National Operations Center" has a "wells database" that tracks permitted wells on BLM.
- The WSWC team and Western States Federal Agency Support Team (WestFAST) liaison met with USFS Regional Water Rights and Uses Program Leaders on September 6, 2023.

4.5 Frank the Farmer

- The WSWC team engaged with two organizations that represent a mix of farmers, irrigation canal company or district managers, and utility and municipal managers for this persona: (1) staff at Water Strategies LLC and the National Water Resources Association (NWRA) and (2) the Family Farm Alliance.
- A WestDAAT demonstration to NWRA was held on October 7, 2022, at their headquarters in Washington, DC. NWRA staff concluded that WestDAAT is of interest to their membership and published an article about it in both the Irrigation Leader and Municipal Water Leader Magazines.
- On June 23, 2022, WSWC held a call with representatives from the Family Farm Alliance and provided a demo of WestDAAT's capabilities. On January 10, 2023, the WSWC organized a one-hour webinar for the Family Farm Alliance, attended by twenty participants besides WSWC staff, including Alliance directors, advisory committee members, and contractors.

4.6 Ratibah the Researcher

- WSWC invited a dozen professors and researchers with active research in water policy, hydrology, water management, and water markets, primarily in the CRB. WSWC expanded this persona to include consulting firms interested in water data and water markets.

- Professors and researchers in focus group calls on June 9, 2022, and September 27, 2022.
- WestWater Research, February 9, 2023.
- Stratecon Inc., March 6, 2023.
- Upstream Tech, July 21, 2023.
- Deloitte, July 27, 2023.
- Aspect Consulting LLC, now part of Geosyntec Consultants, August 29, 2023.
- METER Group

4.7 Other Users

- The WSWC staff engaged with a variety of other following organizations not directly covered under the above personas.
- Association of Fish & Wildlife Agencies webinar, August 10, 2020.
- Nature Conservancy, Director of Water Scarcity and Markets, Global Freshwater Program, April 9, 2021
- Western Regional Partnership Water Security Data webinar, May 12, 2021.
- Bureau Reclamation, June 8, 2021, June 21, 2022
- Southeast Aquatic Resources Partnership, July 28, 2021, May 19, 2022, and May 8, 2023.
- 2022 Nevada Water Resources Association Annual Conference, February 3, 2022.
- The 2022 National Water Use Data Workshop, August 16-18, 2022.
- National Integrated Drought Information System Executive Council Meeting, October 6, 2022.

- 2022 American Water Resources Association Annual Water Resources Conference, November 79, 2022.
- Western States Federal Agency Support Team webinars, November 29, 2022, and January 11, 2023.
- United States Geological Survey Water-Use Data and Research program forum, November 30, 2022.
- U.S. Geological Survey's Associate Director for Water Resources, February 24, 2023.
- Trout Unlimited, Utah Water and Habitat Program Director, April 12, 2023.
- New Mexico Water Data Initiative Meeting, May 4, 2023.
- The Western States Water Council and Native American Rights Fund Symposium, August 8-9, 2023
- National Audubon Society, Director of the Saline Lakes Program, October 16, 2023

5. Detailed engagement reporting per persona

Detailed accounts of the engagement events are provided below. No stakeholders' names are shared.

5.1 Gary the Governor

The Western Governors were the key catalyst for WaDE since 2011, and thus, WSWC considered the Western Governors' Association (WGA)[10] for this persona. On July 14, 2022, WSWC demonstrated WestDAAT to four WGA staff members over a Zoom call. The WSWC team introduced WaDE and demonstrated WestDAAT with a focus on the CRB and how WestDAAT can be helpful in showing water rights with

[10] Western Governors' Association (WGA): https://westgov.org

priority dates before the Colorado River Compact of 1922. Such senior water rights can inform the governors on how they are going to meet potential water cuts. WGA staff were interested in interbrain transfer and suggested WestDAAT can offer a roadmap to users, such as the major water users. They suggested that WestDAAT will empower the water rights owners to know about water near them and in the region. They valued the connection between Points of Diversion (PODs) and Place of Use (POUs). WSWC mentioned the legitimate concern about the privacy and security of water supply locations and treatment plants. WGA staff suggested that locations of water treatment plants are already public.

After the NLDI demo, WGA staff asked if the upstream search capability allows the user to see the steam levels and if water is going to get to the owner. The WSWC team responded that the NLDI tool could show upstream USGS streamgages that can help in answering such questions, but it is difficult to measure upstream consumptive use. WGA staff suggested that WestDAAT is a "huge capacity enhancer and decision-making tool: this is so cool but also terrifying. This is the next generation tool." WGA staff suggested that WestDAAT showing the lack of data in one state, or another can draw governors' attention to support providing such data. WGA staff suggested demonstrating WestDAAT to a broader range of staff members during the next WGA SAC meeting in March 2023.

On March 7, WSWC staff demonstrated WestDAAT at the Denver, Colorado SAC Meeting. Two WSWC staff members joined remotely, and a third attended in person. Besides the general demo of WestDAAT, the WSWC team also demonstrated water rights for geothermal beneficial use across Colorado, Montana, New Mexico, South Dakota, and Oregon. Geothermal water use has been of interest to WGA since Colorado State Governor Jared Polis launched "The Heat Beneath Our Feet" Initiative.[11]

There was a question of whether WestDAAT was shared with entities in Arizona. WSWC staff responded positively with the Arizona Department of Water Resources, CRWUA, Family Farm Alliance, and the NWRA.

[11] The Heat Beneath Our Feet: https://westgov.org/initiatives/overview/the-heat-beneath-our-feet

WGA staff asked about the privacy of individual water rights owners. WSWC staff answered that WSWC works with all the Western States water resources departments, and WestDAAT provides streamlined access to already public data. One WGA staff member mentioned that Colorado State has privacy laws that may have prohibited sharing water rights owner names in a machine-readable format. Another WGA staff member suggested that WestDAAT and its data are not proprietary, and if any user is worried, they can voice their concern to their legislature.

5.2 Stan, the State Engineer / Director of the Natural Resources Department or Division

WSWC consulted its members for this persona.[12] Each state governor appoints Council members where most serve as the top leadership in each state with responsibilities ranging from being a state engineer to directing the natural and water resources department or division. WSWC staff demonstrated WestDAAT pre- and post-designs during the WSWC Meetings from 2022-2023 (Table 1).

Table 1: WestDAAT updates during WSWC Meetings 2022-2023

#	Group	Engagement	Date
1	WSWC Fall 2020 (194th) Meetings	Virtual (pre-design)	October 13-15, 2020.
2	WSWC Spring 2021 (195th) Meetings	Virtual (pre-design)	March 23-25, 2021
3	WSWC Summer 2021 (196th) Meetings - Cody, Wyoming	Hybrid	June 23-25, 2021
4	WSWC Fall 2021 (197th) Meetings - Deadwood, South Dakota	Hybrid (pre-design)	September 14 – 16, 2021.
5	WSWC 2022 Spring (198th) Meetings and Washington Roundtable - Crystal City, Virginia	Hybrid (pre-design)	April 5-7, 2022
6	WSWC 2002 Summer (199th) Meetings and Workshop - Polson, Montana	Hybrid (post-design)	August 2-5, 2022
7	2022 WSWC Fall (200th) Meetings - Sulphur, Oklahoma	Hybrid (post-design)	October 19-21, 2022
8	WSWC 2023 Spring (201st) Meetings - Reno, Nevada	Hybrid (post-design)	May 22-24, 2023
9	WSWC 2023 Fall (202nd) Meetings - Anchorage, Alaska	Hybrid (post-design)	September 12-14, 2023

[12] WSWC membership: https://westernstateswater.org/members

WSWC also held a dedicated workshop for WestDAAT in conjunction with the WSWC 2022 Summer Meetings on August 3, 2022, in Polson, Montana. The workshop was attended by over thirty in-person and online participants from WSWC Member states engineers, state water rights administrators, WestFAST members, and others.[13] The participants tested WestDAAT and provided feedback to improve the tool. The following are highlights of the workshop discussion:

- Overall, there is an agreement that WestDAAT is a valuable and useful online tool to access WaDE's data, especially for interstate regional water analyses and comparisons.
- One of the most valuable features of WestDAAT, related to a state engineer's permitting efforts, is the ability to search for water rights upstream of a certain point of interest. Additional functionality is still needed to effectively evaluate available annual water supply or historic use through gage stations and reservoirs upstream to meet existing or future water rights.
- It was noted that working with water data usually takes "a lot of time and effort to inform decisions." This regional data analysis of WestDAAT will help identify new insights related to data gaps where data is not collected continuously. Such data analysis can inform future data collection decisions. This process will become more robust over time.
- There is a consensus that landing pages for water rights through WestDAAT are useful but require additional features, such as adding a web link that directs to the original state website water rights certificate for further information. This feature was added to WestDAAT before its public release.
- Water rights data in WestDAAT could be used to show what water rights might be available and their historical use to inform a market transaction for water banks and leasing. For example, the Idaho Department of Water Resources can put storage in

[13] WestDAAT State Engineer Persona Workshop https://westernstateswater.org/events/westdaat-state-engineer-persona-workshop

the water district rental pool and have it either rented out or distributed to other individual stakeholders within that area.

- There was a question on the accuracy of water rights owner classification in WestDAAT, especially regarding tribal and federally recognized water use. For example, the McCarran adjudication in Idaho likely completed both federal and tribal rights adjudication, and they should be recognized individually or as storage rights. WestDAAT did not seem to show the expected tribal rights in many areas of the State. The WaDE team is reviewing this issue. WestDAAT does have tribal water rights as recognized and recorded by member states. However, tribal rights are not necessarily individual rights, may not have a defined point of diversion or place of use, and, in many cases, they are not yet quantified. It would still be valuable to users to know what the tribal rights are in a watershed.
- It could be valuable to a number of the western states if the WaDE Data System is expanded to include the Canadian part of the Colombia River Basin.

5.3 Maggie, the River Basin Manager

WSWC mainly considered managers of the CRB for this persona and participants of a CRWUA workshop.

WestDAAT Pre-design

5.3.1 Colorado River Water Users Association Workshop

In cooperation with the CRWUA[14] and the IoW Coalition, WSWC held a workshop on December 15, 2021, as part of CRWUA's 2021 Annual Meeting in Las Vegas, Nevada. The workshop was the first pre-design engagement event that included multiple varied users and personas for the WestDAAT. The workshop goals were: (1) closely familiarize and engage participants with the prototyped dashboard that provides access to water rights and aggregate water use data for eighteen western states as part

[14] Colorado River Water Users Association: https://www.crwua.org

of the WSWC's WaDE Program and (2) solicit feedback as to the usability and functions that would help participants address questions and challenges in the CRB specifically and the West in general. This pre-design engagement event was an essential step towards WSWC completing the design for and building the WestDAAT dashboard by Fall 2022. During the workshop, WSWC staff and collaborators from the IoW Coalition guided the workshop participants in using the prototype WestDAAT to answer water rights and water use questions related to the CRB. The workshop was attended by twenty-eight policy and technical level experts, including federal, state, and local water managers, irrigation and water districts, tribes, environmental organizations, and others. The participants appreciated the WestDAAT prototype's value in providing consistent access to water rights data, especially for states other than their own, thus providing a regional perspective. Questions raised and suggestions by the participants regarding water rights data issues with the prototype were provided. We note that water rights in the West are complex, and WaDE represents common metadata among the states. Generally, a water right establishes a priority date and defines a specific water amount (as flow and/or volume) that can be put to beneficial use from the point of diversion to a place of use. A water right may have multiple beneficial uses, multiple points of diversion, and, in some rare cases, multiple priority dates and amounts. A few comments did hit on such complexities. The WaDE team relied on this valuable feedback to resolve some of those issues. WSWC published a report that summarized the discussion, which is available online.[15]

WestDAAT post-design

5.3.2 Upper Colorado River Commission

WSWC staff visited the UCRC), headquarters in Salt Lake City, Utah on February 14, 2023, demonstrating WestDAAT to the Executive Director and Deputy Director/Chief Engineer. UCRC staff appreciated WestDAAT's capabilities as it streamlines and standardizes access to water rights data for their member states of

[15] CRWUA 2021 WestDAAT pre-design engagement workshop report: https://westernstateswater.org/events/crwua-2021-westdaat-pre-design-engagement-workshop/

Colorado, New Mexico, Utah, and Wyoming. UCRC was in the midst of soliciting applications to their 2023 System Conservation Pilot Program (SCPP).[16] The USBR offered compensation for water-saving measures. The process requires sharing water rights data and geospatial information, estimating their existing and potential consumptive water use and savings, using OpenET, and determining fair compensation. UCRC staff suggested that a WestDAAT integration with OpenET could facilitate their SCPP process and evaluation. WSWC staff subsequently met virtually three times with UCRC to scope a potential Water Conservation Tool extension to WestDAAT to meet UCRC SCPP's future needs. WSWC hired an I.T. contractor to help in scoping the Water Conservation Tool user experience, which, if funded, will be scalable to support conservation programs westwide. On October 17, 2023, WSWC submitted a grant application to the WaterSMART Applied Science Grants of the USBR to build the tool.

5.3.3 Great Salt Lake Commissioner

On August 31, 2023, the WSWC team presented a WestDAAT demo to the Great Salt Lake Commissioner. Brian suggested WestDAAT is a "Fascinating tool, and it can be useful," especially if integrated with OpenET to support voluntary, compensated, and temporary conservation actions in the Great Salt Lake Basin. Brian suggested setting up a follow-up call with his team in Fall 2023.

5.4 Laila, the Land Use Manager/Planner

WSWC selected the following audience: (1) the American Water Resources Association (AWRA) Land and Water Conference, which was held in 2021 and 2023 for this persona; (2) the Economic Research Service of the USDA; (3) staff at the Babbitt Center for Land and Water Policy; and (4) national BLM, and USFS Regional Water Right Leads.

[16] SCPP: http://www.ucrcommission.com/system-conservation-pilot-program-for-2023

Pre-design

5.4.1 2021 American Water Resources Association Land and Water Conference

The WaDE team demonstrated a pre-design prototype of WestDAAT at the session's July 18, 2021, virtual presentation: "Utilizing and Developing Open-Access Water Data Tools and Resources." The conference led to discussions with the staff from the Babbitt Center for Land and Water Policy.

5.4.2 2021 Western States Planning Conference

Western States Planning Conference by Western Planning Resources, Inc.,[17] held in Phoenix, Arizona, on August 25, 2021. WRP's mission is that "Western planner brings together communities and planners from across the Western U.S. to create and share unique planning solutions that improve life in the West." The WaDE program manager presented remotely at the session: "Water Data and Mapping for Sound Planning."

Post-design engagement activities

5.4.3 Economic Research Service - U.S. Department of Agriculture

WSWC also engaged virtually on April 27, 2022, with a USDA Economic Research Service team. The team is working on a project to evaluate the economic impacts of reduced snowpack on agriculture. They shared how accessing water rights from different agencies has been challenging. The team is very interested in WestDAAT data because it provides access to water rights across western states and has priority dates. Their models use priority dates (when available) to simulate which farmers will be affected by water scarcity. The team plans to relate Snowpack Telemetry (SNOTEL) data to actual irrigated land. The team is interested in a bulk data download that was being supported in WestDAAT.

[17] Western Planning Resources, Inc.: https://www.westernplanner.org

5.4.4 Babbitt Center for Land and Water Policy

The WSWC staff also engaged with the Babbitt Center for Land and Water Policy staff.[18] On June 13, 2022, WSWC demonstrated a beta version of WestDAAT, and the Babbitt Center team shared the following insights and feedback: WestDAAT would be useful for communities interested in scenario planning for urban areas' growth and its impact on agriculture and water use. WestDAAT can also be useful in comparing water rights and water use in different areas. Further, Babbitt Center's staff also shared that could be useful to the following contexts: (1) agriculture water markets and keeping high-value crops; (2) exploring the socio-demographic question of the Walker Basin in Nevada in whether children are thinking about growing up and farming; (3) understanding what water rights are there at the county or municipal level which also can be helpful for administrators to compare with other counties (4) identify where pre-compact senior water right holders and their permitted places of use in an interstate River Basin; and (5) identify the water right owner classifications such as federal projects in each river basin. The Babbitt Center suggested that adding a capability to upload a shapefile of a custom boundary would be very helpful as a dynamic feature.

5.4.5 Bureau of Land Management

WSWC staff demonstrated WestDAAT to staff at the Bureau of Land Management (BLM) on March 23, 2023. The BLM "National Operations Center" has a "wells database" that tracks permitted wells on BLM. The database used "Geocortex" software, and it is being phased out. The BLM manager is considering removing Personal Identifiable Information (PII) from the database and sharing it with BLM staff internally and potentially with the public. Their well's database includes the following metadata whenever available: location, screen intervals, hydrograph over time, well log, well name, water right number, links for various attachments, water quality data, and pump test data. The BLM manager asked for advice on how to gain confidence in their data. The WaDE Program Manager pointed to Quality Assurance (QA) and Quality

[18] Babbitt Center for Land and Water Policy: https://www.lincolninst.edu/our-work/babbitt-center-land-water-policy

Control (QC) WaDE requires certain metadata for the water rights data, such as water source type and location. He also pointed to visual inspection of the data to check if the location for a state happens to exist in other states, whether by accident or intentionally. Occasionally, some sites in WaDE showed up deep into Canada, and the WaDE team flagged them as erroneous, while other locations for Texas showed up in New Mexico, which was correct. The BLM Manager suggested that he must verify if wells in the database exist outside (either nearby or far away) BLM land. The two teams met again through a follow-up call on September 6, 2023. The BLM Manager recognized that his focus is on groundwater wells. Other colleagues work on surface water rights. He shared that he is working on QA/QC for the data and removing PII, and once done, they will likely make it public. She shared that a consulting firm reached out to BLM, suggesting they could help update the database. Peter mentioned two use cases for the database: (1) see the existence of or lack thereof wells in an area and to get an idea of water levels in an area of a proposed project to find out if water is fairly shallow to the surface or 1000 feet deep and (2) answer questions about wells if they are BLM wells or not. He shared an example of a rural community in New Mexico using an artesian well with miles of pipes. The question is how much longer this well can be artesian if the water level continues to decline. The BLM manager appreciated WestDAAT's capabilities to visualize well data across the West, especially with a web link that points to the public state database for a water right. Both teams agreed on a follow-up call later in the Fall of 2023.

5.4.6 2023 American Water Resources Association Land and Water Conference

The WaDE Program Manager demonstrated WestDAAT at the American Water Resources Association (AWRA) Land and Water Conference on July 18, 2023, in Denver, Colorado, at the Innovative Data Platforms and Tools for Western Water session.

5.4.7 U.S. Forest Service

WSWC staff and WestFAST liaison met with USFS Regional Water Rights and Uses Program Leaders on September 6, 2023, to review and discuss recognized Forest Service water rights in WestDAAT. The participants shared that there is a National Forest Service (NFS) database and geospatial layer for water rights, and they keep track of water use on forest land. They appreciated the call, which can help in addressing management challenges on or off forest land. They shared that there are significant PODs on NFS land, but their POUs are outside. They noted that not all “map green areas” inside forest service are managed by NFS. There is an approved boundary vs a managed boundary. Participants mentioned the special use permit to access NFS land (pipe/canal) and what is needed to maintain that ditch and canal. Participants suggested the following useful features: (1) Allow users to import a custom geospatial layer (boundary) into WestDAAT so they can query/filter water rights within it; (2) show boundaries where there are unquantified water rights; (3) show a geospatial layer of forests and their names; (4) “It would be super helpful to” share water allocation type as whether it’s a permit, well drill log, or prior appropriation right; (5) filtering by legal status, especially if a right is pending or established, shows water rights and metadata describing adjudication; and (6) having access to groundwater wells information such as well capacity, depth, and aquifer name. They are interested in how the water depth of wells changes over time in an aquifer. The participants asked for time to review water rights in WestDAAT and then potentially follow up with each region to discuss more specifics.

5.5 Frank the Farmer

The WSWC team engaged with two organizations representing a mix of farmers, irrigation districts, and municipal members: staff at Water Strategies LLC working for the National Water Resources Association (NWRA) and the Family Farm Alliance.

5.5.1 National Water Resources Association

The WSWC team visited with staff at the NWRA at their headquarters in Washington, DC, and demonstrated WestDAAT through a hybrid meeting over Zoom on October 7, 2022. NWRA staff asked if farmers or irrigation districts will use WestDAAT. NWRA raised the challenge of land fallowing and loss of farmland. NWRA staff appreciated WestDAAT and shared, "This is really exciting," as it provides transparency for everyone and helps state agencies shepherd conserved water. NWRA staff concluded that WestDAAT is useful to their membership and suggested promoting it as an article in both Irrigation Leader Magazine[19] and Municipal Water Leader Magazine.[20] The article "A New Dashboard for Western Water Data" was published in both magazines, distributed to their audiences, and available online (Figures 4 & 5).

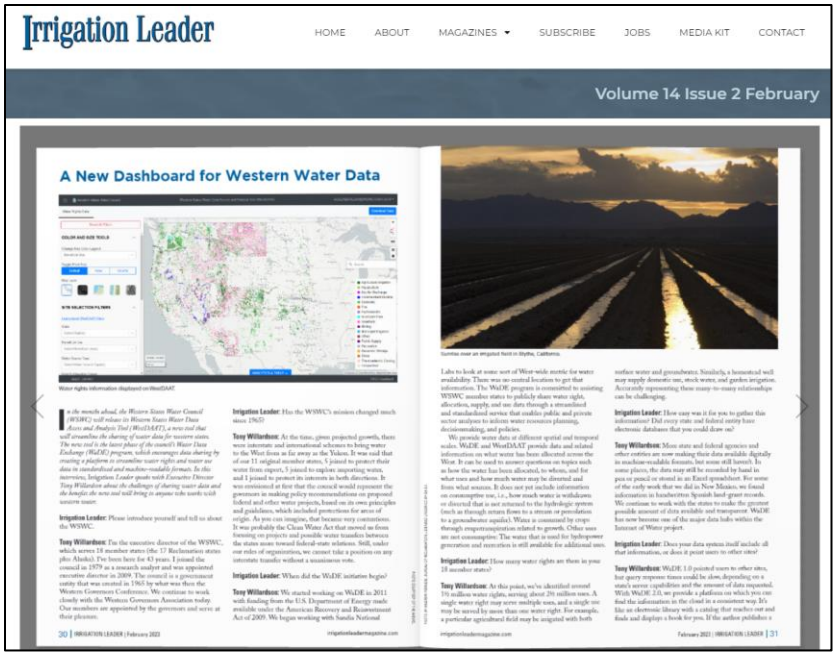

Figure 4: Irrigation Leader Magazine publication on WestDAAT, Feb 2023 edition: https://irrigationleadermagazine.com/volume-14-issue-2-february/#dearflip-df_13483/31

[19] Irrigation Leader Magazine: "is dedicated to the men and women providing water to irrigators in the 17 western states and beyond. Our interviews with irrigation district managers and personnel; supplier representatives; and leading local, state, and federal government officials distill the issues of the day and offer real-world perspectives and insight." https://irrigationleadermagazine.com

[20] Municipal Water Leader: "is dedicated to the men and women providing water to consumers and businesses across the United States." https://municipalwaterleader.com

Figure 5: Municipal Leader Magazine publication on WestDAAT. Feb 2023 edition: https://municipalwaterleader.com/volume-10-issue-1-february/#dearflip-df_14197/21

5.5.2 Family Farm Alliance

To address the possible needs of farmers, ranchers, irrigation districts, and other related agriculture users, on June 23, 2022, WSWC held a call with staff and representatives from the Family Farm Alliance and provided a demo of WestDAAT capabilities. The staff commented that publicizing water rights and use data may put the landowners in a position to defend themselves and their water use. However, the representatives agreed on the importance of making water rights data more accessible to the water rights owners, as opposed to others, especially given the unprecedented drought. Such data will also give water rights holders better information to value their water rights and assess the potential impact of future changes that may affect their water use. Alliance's staff also mentioned that irrigated agriculture in the West has more benefits than just producing food for wildlife and aquifer research. The participants

suggested we set up a follow-up call later in the fall for about 50 irrigation managers to demonstrate WestDAAT's features.

On January 10, 2023, the WSWC organized a one-hour webinar for the Family Farm Alliance, attended by twenty participants besides WSWC staff, including Alliance directors, advisory committee members, and contractors. This is a summary report of the webinar and key takeaways and highlights of the discussion. We are thankful to the Alliance members for their time and welcome any further feedback. The webinar was part of WSWC stakeholder engagement events for different potential users of WestDAAT, which was publicly released on April 25, 2023. WestDAAT now provides user-friendly and standardized access to 2.5 million water rights for seventeen Western States.

The Executive Director of Family Farm Alliance thanked everyone for attending. WSWC Executive Director introduced the WSWC and how it was created by Western Governors in 1965 to advise them on water policy issues. He noted the impetus of the WaDE Program was the need for consistent water use, supply, and availability of data across the Western States. He suggested that WestDAAT standardization and transparency, based on states' public data, can be used to inform voluntary in-state water rights transfers and water markets. It can also be used by owners to protect their rights and acquire further water in the area. WSWC's Executive Director noted that this effort would not have happened without the support of the governors and the states. The following are the key takeaways and highlights of the discussion:

- A participant asked about the legal status of water rights in WestDAAT and if they include pending rights going through adjudication. WSWC staff answered that the legal status of water rights is available through the landing page of each right, and currently, there is no way to filter rights based on their legal status as this is ongoing work. The participant suggested it would be useful if WestDAAT shows pending rights in an adjudication area of interest. Adding a legal status filter would be helpful.
- The WSWC Executive Director acknowledged that states' water rights data may include applications that were rejected or that the application may still be pending in the water use or priority. He also stated that there's still a lot of data out there that is

not yet machine-readable. The WaDE Program Manager noted the value in supporting a filter that looks at the different legal statuses of water rights, where users can choose which one or many water rights statuses to query. Because funding is not available to support such a filter, WSWC staff removed any water rights with a legal status indicating incomplete or inactive. He also mentioned that the WSWC Legal Counsel is working on classifying the legal status terms and will share the basis of such classification.

- Does WestDAAT show the POUs for irrigation-based water rights? Yes, but only nine states currently have digitized datasets shared in WestDAAT.
- How does WSWC see WestDAAT connecting or relating with OpenET data? WSWC Executive Director noted that the WSWC supported Landsat thermal imagery. Relating WestDAAT's data with OpenET requires the availability of digitized field boundaries, which are not available for all the states. WSWC Executive Director noted that the recent UCRB Commission used one of the OpenET models (eeMetric) to estimate consumptive use.[21]
- "It is helpful to have a central repository of this water rights data because it's public information, and the states track it very closely. The participant recognized that "these things [i.e., such as WestDAAT] can be controversial." He suggested keeping the states in charge of the data and ensuring the data is accurate. He emphasized the importance of recognizing the differences in states' methodologies and how they administer water rights and considering the ramifications of such differences.
- A participant recognized that water rights are complicated as they differ between states as far as how they administer them and use different terms and definitions. He asked if WSWC is concerned about misusing this information by people who may not know such differences. He wondered if WSWC is providing parameters that explain, for example, the status of an ongoing adjudication. He shared that it is

[21] OpenET: Upper Colorado River Commission and Bureau of Reclamation move to satellite-based ET for consistent consumptive water use measurements: http://www.ucrcommission.com/openet-upper-colorado-river-commission-and-bureau-of-reclamation-move-to-satellite-based-et-for-consistent-consumptive-water-use-measurements/

probably one of our biggest concerns, not necessarily this WestDAAT tool. The concerns are definitely about OpenET, where users may not be friendly to irrigated agriculture, misuse OpenET, or they may cherry-pick or misinterpret the data.

5.6 Ratibah, the Researcher / Consultant

Researchers are always looking for data to support modeling efforts that improve the understanding and management of natural resources. Engineers and staff at consulting firms also use water data to model water systems or inform water rights marketing transactions.

5.6.1 Researchers focus group call in 2022

The WSWC team invited a dozen professors and researchers into focus group calls. The invited group has active research in water policy, hydrology, water management, and water markets, primarily in the CRB. On June 9, 2022, and September 27, 2022, WSWC held two virtual calls with five researchers from the Woods Institute for the Environment at Stanford,[22] Virginia Tech, Water Resources Research Center at the University of Arizona, Colorado Water Center at Colorado State University, and Utah Water Research Lab at Utah State University. WSWC staff demonstrated a beta version of WestDAAT and solicited comments and questions from the researchers.

The participants applauded WestDAAT and suggested continuing WaDE's work, especially supporting a data download feature for further analysis and modeling. A few notable positive comments expressed amazement and appreciation for how the WSWC staff got the states to share their data and the value of visualizing basin-wide and regionwide data. There was a recognition that the WSWC is the only entity that could do this work due to the sensitivity of this information. There was a suggestion that this work

[22] Woods Institute for the Environment at Stanford https://woods.stanford.edu/

may require substantial long-term maintenance commitment and support. The following are the key takeaway and highlights of the call:

- One participant shared the following positive points: “I’m amazed that you’ve gotten the states to work with you on all this. It looks like an unbelievable amount of integration with each state system.” “WSWC is the only entity that could possibly pull this off given the sensitivity of all this information.” “Clearly, there’s a need for huge long-term maintenance and support of this project. This effort is not a one-off work that can be finished and turned over. This effort is lifelong employment for somebody.” He shared his experience with a previous project working on Colorado’s data, where it was overwhelming to make sense of the data because it lacked metadata and was not organized or visualized. He suggested that it is often difficult to envision how a new tool would be used, and the best users of WestDAAT are likely the states themselves and federal agencies. The researcher applauded the WaDE APIs, allowing researchers to write code and access water rights data.
- Another researcher suggested clarifying what water rights include and mean and if WestDAAT includes federal reserve water rights, prior appropriation, and correlative rights. There was also a discussion about the inclusion of tribal water rights in WestDAAT. There was a discussion on how Texas and California do not administer groundwater rights as they are considered private property rights. There was a question about how WestDAAT distinguishes between regular water rights and groundwater permits. WestDAAT has an “Availability of Priority Date and Amounts” filter that would show permits with no priority date or amounts. Depending on the availability of funds, the WaDE team will add metadata for the water allocation type, which should help in this regard, such as prior appropriation rights and correlative rights.
- There was a question about trans-basin water rights and where the point of diversion shows up, whether at the point of origin or place of use. Another question is if WestDAAT would support water transaction data.

- Another question is how WestDAAT grouped beneficial uses to consumptive and non-consumptive and whether return flow is accounted for. The answer is that the WaDE team grouped and categorized beneficial uses based on their experience with how the states describe beneficial uses, and beneficial use is deemed consumptive if most of its water is depleted, as in the case of agriculture and non-consumptive as in the case of hydropower.
- Another researcher shared that they are working with USGS to determine the water source type as groundwater or surface water for each 30-meter by 30-meter irrigated parcel across the entire U.S. irrigated lands. They applauded that WestDAAT shows the land use of geospatial areas along with diversion points. They asked why, for example, in Idaho, livestock was used along the stream in squares. The answer was how the states digitized the place of use, and it was likely because it was based on quarter-quarter section areas based on the Public Land Survey System (PLSS).
- There was a question about the legal status of water rights and whether WestDAAT supports filtering them. The answer was that WestDAAT provides the legal status shared by the state, and the WSWC team is working on classifying those terms into groups to facilitate data queries of similar terms across states.
- The WaDE team demonstrated the “River Basin” filter for the CRB. There was a question on where the boundaries came from because it looks like it does include the Imperial Irrigation District. The WaDE team answered that this is a shapefile from the USGS. Another researcher agreed that there is no official agreement on what is included in the CRB map, such as the Salton Sea.
- A researcher suggested that the basin-wide and regional data availability through WestDAAT open research opportunities and is super interesting.
- There was a question on whether the data download feature is for the current view of the data or the entire dataset. The answer was that for the current view and filtered data. There was a request for a state-by-state summary showing how complete each state’s data is and what is missing.

- There was a question about how states and potential legislatures could use this tool to protect their interstate water.
- The WaDE team then demonstrated the NLDI tool to show USGS and EPA monitoring locations. A researcher valued the connection between PODs and POUs and asked how complete this dataset is across the West, especially in Colorado.
- A researcher said: “This is a huge amount of work. I want to congratulate you for everything that you’ve done here. This is hugely exciting. And I think it will be really helpful for folks like us, as well as folks in the policy space.” He also asked if there are additional data sources that WestDAAT could support.
- Then, there was a discussion on water rights transfers and the need to know the legal status as adjudicated and quantified.
- Another discussion was about the historic water rights that were transferred or forfeited and if they show in WestDAAT. The answer was that it depends on the state. WestDAAT needs a legal status filter to show such “inactive” water rights.
- There was a question of whether states have records of “calls” due to water shortages on certain water bodies.
- Researchers shared the following links in the chat regarding tribal water rights and data.
  - https://iopscience.iop.org/article/10.1088/1748-9326/ab94ea/meta
  - https://www.minneapolisfed.org/research/cicd-working-paper-series/the-long-term-outcomes-of-recognizing-indigenous-property-rights-to-water
  - https://www.science.org/doi/abs/10.1126/science.aat6041
  - http://www.naturalresourcespolicy.org/publications/policy-brief-4-final-4.9.21-.pdf

5.6.2 2023 CIROH Annual Training and Developers Conference

The WaDE Program Manager presented a lightning talk on WestDAAT and engaged with attendees at the Annual Training and Developers Conference of the Cooperative Institute for Research to Operations in Hydrology (CIROH) held on May 16-

19, 2023, in Salt Lake City, Utah. Further information is available here https://ciroh.ua.edu/devconference/

5.6.3 Pacific Northwest National Laboratory

On July 28, 2022, the WSWC team held a virtual call with two members of the Pacific Northwest National Laboratory (PNNL) working on a project that looks at water and energy interdependencies. They asked about WestDAAT users, interbasin transfers, and whether our data maps POUs and PODs.

5.6.4 Marston Research Group

On January 27, 2023, WSWC staff met with the Marston Research Group at Virginia Tech[23] and discussed matching water rights to irrigated croplands.

5.6.5 WestWater Research

On February 9, 2023, the WaDE team met with the WestWater Research staff.[24] WestWater tracks water rights transactions within states, especially in Colorado. The staff asked about Geoconnex, who is behind it and hosting it, how often the data is updated, and the update frequency and public supply water data in the Front Range in Colorado. The WestWater staff appreciated the NLDI feature in WestDAAT that allows them to look at an area, map upstream and downstream rights, and then export data to a comma-separated values (CSV) table.

5.6.6 Stratecon Inc.

On March 6, 2023, the WaDE team met with the president of Stratecon Inc.[25] He appreciated WestDAAT's westwide capabilities and the ability to zoom in on a water right

[23] Marston Research Group: https://marstonresearchgroup.com
[24] WestWater Research: https://waterexchange.com
[25] Stratecon Inc provide advisory services in the acquisition of water rights throughout the western United States and in the sale and leasing of water rights and water supplies to public and private sector water

point of diversion and its place of use. He mentioned the California Irrigation Management Information System (CIMIS) as an example of monetized data services.[26] CIMIS offers data for decision-making and irrigation scheduling to increase yield. He asked if federal contracts for water are available in WestDAAT. The WaDE team responded that it's a project in progress with the USBR staff. The president pointed out that the priority dates in WestDAAT for the Imperial Irrigation District were incorrect. He suggested the Quantification Settlement Agreement (QSA) is the reference in this regard.[27] The president discussed that state datasets need more frequent updates, and efforts such as WestDAAT can help in pointing out outdated datasets. He shared: "I think the visualization is essential" and "Sunshine is the best disinfectant" for data.

5.6.7 Upstream Tech

On July 21, 2023, the WSWC team had a Zoom call with staff from Upstream Tech.[28] Upstream Tech developed the HydroForecast tool based on machine learning and physical models to forecast instream flow for hydropower utilities, water utilities, and government agencies. The Upstream Tech staff recognized the value of historical water use data and storage in state reservoirs that could be offered in WestDAAT to better inform their forecasting of water availability. They will reach out with questions later.

users, as well as provide proprietary research services, and expert testimony. Stratecon brings together the disciplines of economics, finance, natural resource management and policy to develop innovative solutions to commercial and public water policy issues: https://www.stratwater.com

[26] The California Irrigation Management Information System (CIMIS) is a program unit in the Water Use and Efficiency Branch, Division of Regional Assistance, California Department of Water Resources (DWR) that manages a network of over 145 automated weather stations in California. CIMIS was developed in 1982 by DWR and the University of California, Davis (UC Davis). It was designed to assist irrigators in managing their water resources more efficiently. Efficient use of water resources benefits Californians by saving water, energy, and money: https://cimis.water.ca.gov

[27] Quantification Settlement Agreement: https://www.iid.com/water/library/qsa-water-transfer

[28] UpstreamTech: https://www.upstream.tech

5.6.8 Deloitte

On July 27, 2023, the WSWC team met over a Zoom call with a team from Deloitte[29] who were interested in learning about WaDE's experience and perspective in managing water data. Deloitte was hired by the California State Water Resources Control Board to modernize the State water data system: Updating Water Rights Data for California (UPWARD) Project.[30] The WSWC team demonstrated WestDAAT capabilities and answered questions about the metadata and QA/QC process the WaDE team established. Deloitte team asked about best practices to manage water data. The WSWC team shared documents related to WaDE's beneficial use, required and optional metadata for WestDAAT, and a summary of issues the team found in California's water rights data. One major additional need for data for California is a digitized place-of-use layer for water rights. The Deloitte team will review the documents and get back to the WSWC team for any questions.

5.6.9 Aspect Consulting LLC, now part of Geosyntec Consultants

On August 29, 2023, the WaDE Program Manager met with a staff member from Aspect Consulting LLC.[31] The discussion focused on how WestDAAT can be helpful to the consulting firm, especially in Washington and the Columbia River Basin. The firm built an internal GIS dashboard for Washington water rights with a plan to update it once every six months. The firm has worked on looking at trends of water rights on the regional scale, understanding which aquifer the water right belongs to, and showing the well-log whenever the Washinton Department of Ecology wants to review the water rights to see if the well was installed correctly. Static water level and hydrogeologic review are also essential to change applications. Finding groundwater well logs in the Washington database can be difficult because they are not digitized. The firm wished WestDAAT would support an irrigation district layer where they could

[29] Deloitte: https://www2.deloitte.com
[30] Updating Water Rights Data for California (UPWARD): https://www.waterboards.ca.gov/upward
[31] Aspect Consulting LLC: https://www.aspectconsulting.com

show water rights within it. Consumptive use estimates would be valuable for baking and instream flow benefits.

5.6.10 METER Group

The WSWC team shared background about WaDE and demonstrated WestDAAT to the METER Group,[32] an instrument company based in Eastern Washington. They are a sister company of Campbell Scientific located in Logan, Utah. They have been working with scientists at BYU and Utah State University on reducing irrigation while maintaining yield in potatoes monitoring water content, ET, soil water tension, and other parameters. They have had the most success in working with vertically integrated food production facilities that use measurements to closely monitor yield, as well as the timing of harvest to optimize production to save water. The METER Group's focus is on farm water use, and they were interested in how irrigation districts influence the adoption of technology to save water.

5.7 Other Users

Pre-design engagement activities

5.7.1 The Nature Conservancy

On April 9, 2021, the WSWC team met virtually with the Director of Water Scarcity and Markets, Global Freshwater Program at the Nature Conservancy. The WSWC team shared an update about WaDE and its plans to develop WestDAAT. They demonstrated a prototype of WestDAAT and how it will enable the query of water rights based westwide, especially with priority dates. The Director applauded the WSWC team for the "amazing progress" since the initial WaDE work. He asked about the potential users and applications. He appreciated the personas WSWC developed. He shared that it is better to have data ready for decision-making rather than responding to an ad-hoc

[32] METER Group: METER Group: https://www.metergroup.com

crisis. The Director agreed to write a support letter for a grant application to develop WestDAAT.

5.7.2 Association of Fish & Wildlife Agencies Webinar

The WSWC team participated in a 2- hour "Water Data Webinar" on August 10, 2020, for the Subcommittee on Water, Fisheries and Water and Resources Policy Committee (FWRPC), Association of Fish & Wildlife Agencies (AFWA).[33] The team presented WaDE and demonstrated a prototype of WestDAAT with a focus on showing which states recognize in-stream flow beneficial use. The webinar's other speakers were the IoW Coalition, the AFWA Crucial Habitat Assessment Tool (CHAT), the National Fish Habitat Partnership (NFHP) Data Assessment, the USGS, and the Interstate Council on Water Policy (ICWP). The webinar organizers brought all these presenters together for the first time to improve collaboration and synergy towards making water data more widely available and increasing consideration of fish, wildlife, and habitat water needs and uses. It also brought awareness that fish and wildlife agencies also generate water quality and quantity data. There were a few questions and comments at the end. Will WaDE allow users to focus on the watershed level across state boundaries? The answer was yes, and that's WaDE's biggest strength in enabling regional water data analysis across states through a common data system. There was a comment that WaDE's metadata vocabulary harvesting from states' websites is similar to CHAT's efforts. How does the WSWC incorporate ecological river flow needs into the overall vision of Western water use? WSWC Executive Director answered by referring to WSWC's vision principles. WSWC recognizes the importance of looking at water and developing a Western conservation ethic in all of our uses and the need to be as efficient as possible, which obviously leaves water for other uses, including the environment. As WSWC looks at a sustainable future, it's not just economics, but it also is our environment and quality of life. WSWC recognizes that agriculture is the predominant use of water in the West but that land is also important for fish and wildlife. In most cases, those farmers and ranchers also fish and hunt, so they have a vested

[33] AFWA: https://www.fishwildlife.org

interest in conservation as well, which is to the people's benefit. There are some instances where senior water rights holders may forgo their use and limit diversions to protect different reaches. The WSWC Executive Director shared an example of previous WSWC work for the Blackfoot Challenge in Montana that brought together forestry interests for ranchers and the fish and game to protect a stretch of river on the Blackfoot that was important for both bull trout. Much of that was done through regulatory or voluntary actions instead of regulatory mandates.

5.7.3 Western Regional Partnership Water Security Data Webinar

The WSWC team presented at a webinar focused on the water data part of the WRP, which focuses on water security.[34] The pre-design demo was on May 12, 2021, with a focus on water rights with owner classification for military and tribal owners in the West. Participants asked the following questions: Is there a website where I can study this further? How does WaDE work with the IoW (any overlap; how is it complementary)? How is the data reviewed by the states? A participant commented: "This is so valuable. Tell us when you go live with WaDE." The WSWC team also contributed to the WRP December 2022 report "Building Resilience in the West for America's Defense, Energy, Environment and Infrastructure through Enhanced Collaboration among Federal, State and Tribal Entities."[35]

Post Design engagement activities

[34] Western Regional Partnership (WRP) mission is to provide a proactive and collaborative framework for senior-policy level Federal, State and Tribal leadership to identify common goals and emerging issues in the states of Arizona, California, Colorado, Nevada, New Mexico, and Utah and to develop solutions that support WRP Partners and protect natural and cultural resources while promoting sustainability, homeland security, and military readiness. https://wrpinfo.org

[35] Report: Building Resilience in the West for America's Defense, Energy, Environment, and Infrastructure through
Enhanced Collaboration among Federal, State, and Tribal Entities:
https://wrpinfo.org/media/1839/building-resilience_2022-wrp-report_final.pdf?utm_medium=email&utm_source=govdelivery

5.7.4 2022 Nevada Water Resources Association Annual Conference

The WaDE Program Manager presented a live demo of the WestDAAT prototype during the New 2022 Nevada Water Resources Association (NV WRA) Annual Conference held in Las Vegas, Nevada, on February 3, 2022, as a part of a panel "Making Water Data Useful for You: Nevada Water Web Apps." The NV WRA organizers followed up with a 2-hour webinar, "Making Water Data Useful for You," on April 12, 2022.

5.7.5 Southeast Aquatic Resources Partnership

WSWC staff demonstrated WestDAAT to staff at the Southeast Aquatic Resources Partnership (SARP) on July 28, 2021, May 19, 2022, and May 8, 2023. SARP developed the National Aquatic Barrier Inventory & Prioritization Tool to improve aquatic connectivity by prioritizing aquatic barriers for removal using the best available data.[36] The SARP team is using PODs to identify infrastructure and small dams that affect stream connectivity. The SARP team shared this feedback on WestDAAT: "WestDAAT has been extremely useful for us. It is currently used in our tool when PODs have a diversion structure present." We use the data to find undocumented diversion structures that block habitat to aquatic species by manually reviewing those that map to streams. Sometimes, they find hundreds of additional dams we previously did not have in our inventory. In addition, we are working on aligning WestDAAT data to existing structures to identify the water rights and beneficial use information so that it can be used as filters in our prioritization tool." The SARP team suggested that having a "site type" (e.g., dam, canal, weir, well, etc.) filter in WestDAAT would be very helpful to their efforts.

[36] National Aquatic Barrier Inventory & Prioritization Tool: https://aquaticbarriers.org

5.7.6 Bureau Reclamation

WSWC staff is closely coordinating with USBR staff, leading the Water Rights Information Management System (WRIMS).[37] WRIMS is relying on WestDAAT as a source for state water rights where Reclamation is recognized as an owner. Below is a summary of the engagement calls:

- On March 24, 2022, WSWC staff held a virtual meeting with Reclamation staff working on the USBR Water Rights Project and shared a preliminary file that included water rights for which member states recognized Reclamation as the owner. During that meeting, a demonstration of an early version of WestDAAT under development was provided. There was also a discussion about the challenges related to identifying water rights for irrigation districts that receive water from Reclamation projects. This challenge stems from the fact that the boundaries of irrigation districts are not always digitized, and there is no central location for such data within Reclamation. Reclamation staff suggested additional follow-up in Fall 2022 after the WestDAAT development is complete.

- On June 8, 2021, the WSWC team presented about WaDE and WestDAAT to a Reclamation-wide webinar. The webinar addressed the following questions: What is WaDE? How do I access it? What data is available? What can I do with it right now? What is planned for WaDE data and features in the future? What will I be able to do with WaDE in the future that I can't do now?

- On June 21, 2022, the Executive Director of the Internet of Water Coalition (IoW), moderated a virtual meeting between the WSWC and top Bureau of Reclamation staff, including Commissioner Camille Touton. During the call, the WSWC Executive Director briefed the participants on the WaDE program and provided a demonstration of the upcoming WestDAAT. We advocated for further Reclamation support for the WaDE's

[37] WRIMS is "a centralized repository of information on Reclamation's interests in water rights to ensure they are inventoried and protected in order to avoid litigation processes on authorized Reclamation projects. Developing this water rights information management system will streamline data collection and maintenance of Reclamation's water rights, improve data quality and data integrity, and ensures consistency. Improved data management, integration, and consistency in business practices will result in significant resource saving with regards to funding, time, and staff."
https://www.usbr.gov/research/projects/detail.cfm?id=20088

program, which aligns well with Reclamation's mission of supporting drought resilience in the West. Reclamation's staff agreed to have a follow-up call to discuss potential future collaboration with the WSWC.

- On December 7, 2022, WSWC staff held a virtual meeting with Reclamation staff working on their Water Rights Project. Reclamation staff shared a demonstration of their WRIMS and how it relied on WestDAAT. Reclamation staff suggested that WSWC revisit the idea of classifying irrigation district owners in a few months after they have the chance to talk to their Regional Offices. Site-specific historical withdrawal and diversions data shared through WaDE would be useful to reclamation efforts to estimate historical loss and evaporation.
- A coordination call with the WRIMS team was held on April 28, 2023. WSWC and WRIMS teams met to share progress and identify more areas of collaboration. The WRIMS demonstrated their tool and showed how it references WestDAAT's Reclamation water rights data. WRIMS tool will allow internal Reclamation users to view water rights and edit them. Both teams agreed that adding a web link in WRIMS pointing to the WestDAAT landing pages is feasible and helpful to Reclamation users. WRIMS focuses on PODs, and its developers suggested they may add POU layers. They applauded WestDAAT for "making their life easier." The WRIMS team shared that they are holding their first meeting in the Upper Colorado Basin (UCB) Region later in mid-May 2023 to get Reclamation staff feedback on the tool.

The two teams also discussed the current WSWC approach in classifying water rights owner names into USBR, where the WSWC algorithm searches for the following terms: "Bureau Reclamation (USBR)," "bor," "bureau of reclam," "bureau of reclamation," "bureau reclamation." Reclamation staff suggested expanding the term search to include these three additional terms: "usbor," "usbr," "usdoi bureau of reclamation." The two teams also discussed the next step of classifying contractors, such as canal companies and irrigation districts, who receive water from Reclamation projects. Reclamation staff shared they have 456 contractors in their

system but need approval before sharing them with the WSWC team. The two teams agreed to hold a follow-up call in August.

- Bureau of Reclamation UCB Group, May 31, 2023.
  Based on the WRIMS teams' meeting with the UCB Region, many UCB staff were interested in learning more about WestDAAT. The WSWC staff demonstrated WestDAAT to them. The UCB staff appreciated WestDAAT and shared that it is "a fantastic tool," especially its geographic information system (GIS) interactive and query capabilities and how it streamlines access to water rights for the UCB Region. The UCB Region staff suggested spending more time using WestDAAT, and they will get back to the WSWC if they have questions.

- USBR Enterprise System staff, August 3, 2023. The WSWC and WRIMS teams met again to discuss integrating the two tools, especially adding the weblink from WRIMS to WestDAAT. WRIMS decided to use WestDAAT persistent Universally Unique Identifiers (UUDs) to link WRIMS with WestDAAT landing pages. The two teams discussed the next step of classifying Reclamation contractors, which still needed approval before sharing with WSWC.

- Reclamation's consumptive use estimates for the UCRB Region, September 1, 2023. WSWC staff met with the Research and Modeling Group in the UCB Region. WSWC demonstrated WestDAAT to Reclamation staff and discussed the potential WestDAAT integration with OpenET to streamline conservation applications for voluntary, in-state, compensated, and temporary measures that the USBR funds. The Reclamation team described their work in estimating consumptive use for the UCB Region based on Google Earth Engine implementation of the Mapping Evapotranspiration at high Resolution with Internalized Calibration model (eeMETRIC). They pointed out the Lower CRB adopted the Operational Simplified Surface Energy Balance (SSEBop). Reclamation staff shared that they use "depletion demand" when referring to the future and "consumptive use" when referring to historical use. The two teams agreed to meet again later in the fall to share updates on their progress.

The collaboration progress is described below in these two areas: (I) classifying water rights with the USBR recognized by Western States as the water rights owner. WSWC staff completed this work and shared the results with the Reclamation team. The WSWC team developed a script that scanned the 2.5 million water rights ownership data and classified Reclamation as an owner if the owner's name included these words or letters ["usbr," "bureau of reclam," "bureau of reclamation," "bureau reclamation"]. The scan found 2,411 water rights with Reclamation listed as an owner (Figure 3). The WSWC team found 86 unique terms and conventions, including Reclamation, that were often listed along with canal companies and irrigation districts. The Reclamation team is using this data as part of their WRIMS system, which now includes the WestDAAT unique identifier for their water rights data.

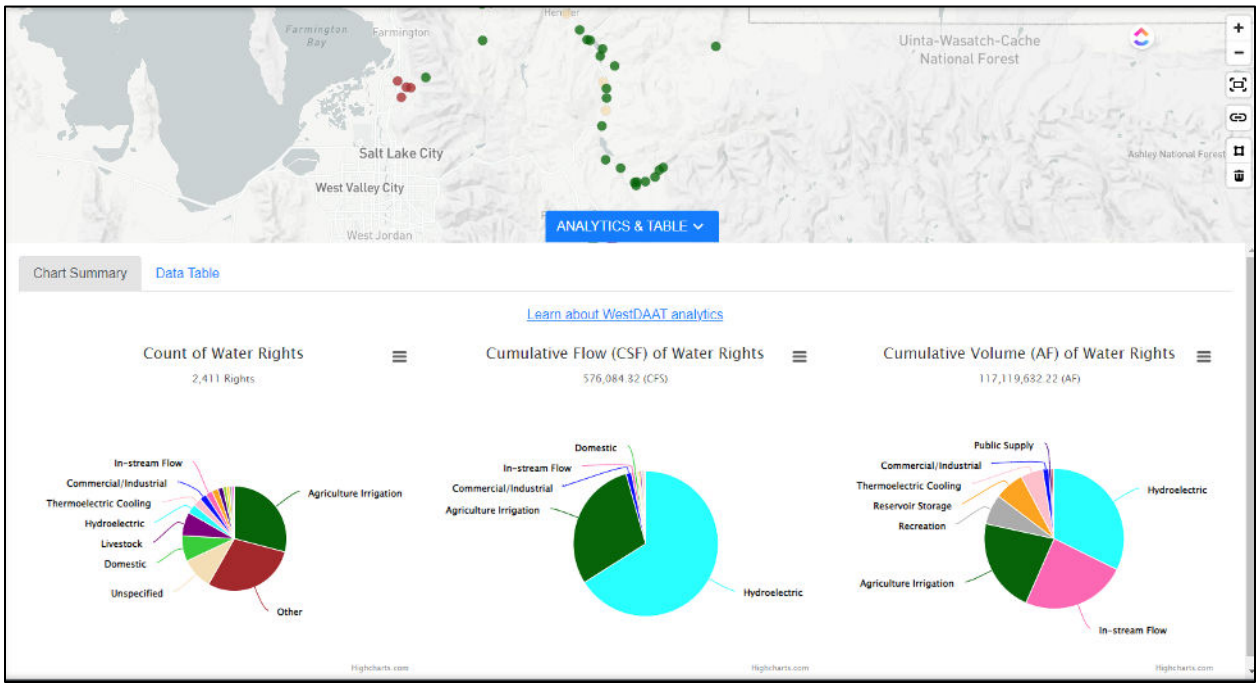

Figure 3: Pie chart summary in WestDAAT showing 2,411 water rights with Reclamation classified as the water right owner along with designated beneficial uses. The chart also shows the cumulative permitted flow in cubic feet per second (CFS) and cumulative volume in acre-feet (AF). This data query and analytics summary is available and can be reproduced in WestDAAT at https://tinyurl.com/jrnf5r2k

(II) classifying contractors who receive water from USBR projects. Besides classifying recognized Reclamation water rights ownership, WSWC staff are attempting, as a next step, to classify water rights owners such as canal companies and irrigation districts who receive water from Reclamation projects. Reclamation provides one out of five western farmers, or about 140,000, with irrigation water for ten million acres.[38] The WSWC staff wrote software code that harvested all the publicly shared Reclamation projects online. The database is called "Projects and Facilities Database Reclamation's Portal for Information on Dams, Powerplants, and Projects."[39] The code and summary Excel sheets are available on GitHub.[40] Reclamation's database includes 585 dams and projects. The code retrieved 239 unique identified Reclamation Contractor names. An "exact match" attempt between these contractor names and WestDAAT water rights owners resulted in identifying 63 owners that receive water from Reclamation. However, WSWC staff still needs to manually verify each match because some contractor names are not unique.

5.7.7 The 2022 National Water Use Data Workshop

The WaDE Program Manager presented about WaDE and WestDAAT during the 2022 National Water Use Data Workshop in Salt Lake City, Utah, on August 16-18, 2022.[41] This Workshop was held in collaboration with the WSWC Water Information Management Systems (WIMS) workgroup, the USGS, the ICWP, and the IoW Coalition. The workshop was attended by roughly 100 participants (half in-person and half virtually), representing state, federal, private sector, non-profit, academic agencies, and organizations.

[38] The Bureau of Reclamation: https://www.usbr.gov/main/about/fact.html
[39] Projects and Facilities Database Reclamation's Portal: https://www.usbr.gov/projects/
[40] https://github.com/WSWCWaterDataExchange/WaDE-Side-Projects/tree/main/20230406%20Bureau%20Contractors
[41] The 2022 National Water Use Data Workshop: https://westernstateswater.org/events/2022-national-water-use-data-workshop

5.7.8 National Integrated Drought Information System Executive Council Meeting

WSWC Executive Director serves as the Co-Chair of the National Integrated Drought Information System (NIDIS.)[42] On October 6, 2022, the WSWC team presented on WestDAAT at the 2022 Fall NIDS Executive Council Meeting held in Washington, D.C. as part of a panel "Paradigm Shifts Part 2: How does better water data - Does management build the foundation for next-gen products for drought and climate decisions?" After presenting a background about WaDE and WestDAAT, the WaDE team demonstrated WestDAAT capabilities through a Teams call. The attendees appreciated WestDAAT as a one-stop shop for water rights data. The major question was if WestDAAT supports real-time upstream water use data to see the actual flows upstream/drought status. The WaDE team then demonstrated the NLDI tool, which shows USGS gage stations upstream of any point of interest across the West.

5.7.9 2022 American Water Resources Association Annual Water Resources Conference

The WaDE Program Manager presented a live demo on WestDAAT at the 2022 AWRA Annual Water Resources Conference held on November 7-9, 2022, in Seattle, Washington. The presentation was part of two sessions titled: "Tool Time! - Water Data Improvements," which included speakers from USGS, USBR, Duke University, New Mexico Water Data Initiative, and others. The session was highly attended by roughly 100 participants with questions on WestDAAT.

5.7.10 Western States Federal Agency Support Team

The WaDE team provided background about WaDE, demonstrated WestDAAT capabilities, and answered questions during two webinars held on November 29, 2022, and January 11, 2023. It was attended by 38 participants in the first webinar and 16 in

[42] National Integrated Drought Information System (NIDIS): https://www.drought.gov

the second webinar, mostly from the staff from federal government agencies that are part of WestFAST.

Below is a summary of the questions and their answers.

- Could you give some examples of states or others that have used this data and for what purposes? The WSWC team answered that WestDAAT is soon to be made public, and they are working on use cases to demonstrate its application and hope that “If you build it, they will come.” The WSWC team is excited to see how our states and federal government may use this data. The WSWC team is working on classifying water rights that are state-recognized, with the USBR as the owner. The team also mentioned that the states benefit from the WaDE data as a benchmark to compare their data and metadata availability against other states.
- How could this data help identify optimal canal alterations, lining, or piping and pressurizing to reduce losses? Do the National Aeronautics and Space Administration (NASA) and USGS use thermal infrared imagery? The WSWC team answered that remote-sensing-based consumptive use estimates could complement WestDAAT’s data to identify losses through consumptive use along a canal connecting PODs and POUs. WestDAAT can help identify senior water rights with large amounts. There was a discussion on identifying water rights for potential groundwater storage during high flows.
- Is the data current from the states? The WaDE team answered that the data is a copy from the states’ data systems through their online public services, and there could be a few months lag. The team commented that the water rights data is relatively static and does not change often.
- Could WestDAAT be used by a water user in case they are not getting enough water because of a drought and see who’s upstream of them who might have a senior right either up from them or below from them in a waterway? That potentially could help facilitate a transfer by approaching that person or that entity.
  The WSWC team answered positively that WestDAAT users can use the NLDI

feature to query upstream or downstream water rights based on a specific priority date. WestDAAT shows such water rights and allows data download.

- How do you rank water rights in a query based on their seniority?
- The WSWC team suggested downloading the data and using a spreadsheet to sort them based on priority dates.
- Can WestDAAT show water rights in the Salton Sea from the Colorado River?
- The WSWC team answered positively, especially through the NLDI tool. It seems that it would be useful to visualize PODs with a circle size depending on the priority date, such as the older the water right, the bigger the circle.
- Is there a way that I can drop a shapefile to delineate administrative boundaries, such as a field office?
- The WSWC answered that it is not possible at the moment, but it can be supported in the future based on the availability of funding. Such a feature can be supported by the regulatory and administrative overlay filter.

5.7.11 United States Geological Survey Water-Use Data and Research program forum

The webinar was held on November 30, 2022, and attended by 65 people, mostly from state water use staff across the U.S. The WaDE team presented on WaDE, demonstrated WestDAAT capabilities and answered questions. Below is a summary of the questions and their answers.

- What is the meaning of “diversion” in WestDAAT, and if the PODs include surface water and groundwater sources? Another related question was about any legal issues related to sharing locations of withdrawal points and if there is sensitivity related to sharing longitude and latitude locations of large intake structures. The answer defined diversion as a point of withdrawal, which can include structures on surface water bodies or groundwater wells. The answer on coordinate location

focused on the already public data, but just being shared in a standardized way. Some locations, as shared by the states, are approximate.

- Does WestDAAT share water quality data? The answer was that water quality data are not directly shared in WestDAAT because the EPA collects and shares water quality data for the states. WestDAAT, however, supports the query of water quality data upstream or downstream of PODs through the Geoconnex and NLID integration.
- There was a question about the technical aspects of WestDAAT and what databases and software are being used. Another question about the GitHub repositories and how they are organized. The WaDE team gave an overview of the underlying technical aspects of WestDAAT and shared the GitHub repository that has the details: https://github.com/WSWCWaterDataExchange
- How many states delineate the boundaries of irrigated cropland served by a water right? The answer is nine states, with the caveat that some states define the place of use as the centroid of the quarter section.
- Do the states estimate water use, or do they rely on water use reporting requirements? The answer was generic: most states rely on reporting requirements while others use proxy methods such as satellite-based models. The WaDE team mentioned the following report, which provides updates on the states' capabilities to collect and report water use data: https://westernstateswater.org/wade-reports-and-papers/2022/western-state-water-program-capabilities-assessment-update-report-2022/
- Is it possible to download data in CSV format and shapefile data in WestDAAT? The answer is that WestDAAT supports downloading CSV but not through shapefile, which would require more I.T. work. The WaDE team noted the support of shapefile download as a GitHub issue for future work when funding allows.
- How do we deal with overlapping irrigation polygons and identify water rights for the top or bottom polygon? The WaDE team recognized the challenge and mentioned that the overlapping polygons are how they were shared by the State. They

suggested different ways to deal with them: (1) use filters such as priority date to exclude either senior or junior water rights viewing on the screen and possibly reduce overlap; and (2) click at a polygon to view its card and click on arrows within the card to switch between different water rights that could be connected to a water right.

- Could WestDAAT share raster water data for reported distributed water use data with an example of 30 by 30-meter pixels? The WaDE team answered that could be future work of WaDE, which depends on the availability of such data by the states.

5.7.12 U.S. Geological Survey's Associate Director for Water Resources

On February 24, 2023, WSWC staff met with the USGS Associate Director for Water Resources and demonstrated WestDAAT for him and his staff. The WSWC Executive Director and the IoW Coalition Executive Director visited the USGS team at their Washington DC Office, while the WaDE team joined remotely. USGS Associate Director asked if WestDAAT includes historical reported water use data or just "paper rights," permissions, or use. He also asked about the role of WSWC states in approving WestDAAT's data sharing. He suggested that WSWC's effort is "symbiotic" to the USGS Waer Mission Area's efforts. The two teams agreed to follow up and continue the coordination.

5.7.13 Trout Unlimited

On April 12, 2023, the WSWC team met virtually with the Utah Water and Habitat Program Director at Trout Unlimited. For context, "Trout Unlimited strives to promote water conservation through partnerships between landowners, agencies, non-profits, municipalities, and other stakeholders." Trout Unlimited supported farmers and ranchers last year in applying for funds under the UCRC's SCPP. The Director appreciated WestDAAT's ability to show the POUs layer along with a satellite view of the irrigated fields. He shared that further information on land ownership is often needed from county

records. He shared a software service that he uses for that purpose called BaseMap.[43] Land ownership is needed because water rights ownership may be outdated. Water rights in canal companies or irrigation districts don't show the shareholders' names. Farmers within a canal company own their land and have a water right share. Participation in a conservation measure requires the canal company's approval. The Director suggested that "a lot of measurements are needed to shepherd conserved water downstream. He appreciated the NLDI tool that shows upstream and downstream PODs. He said that the tool is a technical solution that can inform policy discussions. He liked WestDAAT and said it offers "so much information that can help inform decisions." He will share it with his team.

5.7.14 New Mexico Water Data Initiative Meeting

The WaDE Program Manager presented a live demo on WestDAAT during the New Mexico Water Data Initiative Meeting held in Socorro, New Mexico on May 4, 2023.

5.7.15 The Western States Water Council and Native American Rights Fund Symposium

The WSWC team presented a demo on WestDAAT during the two-day virtual Symposium on the Settlement of Indian Reserved Water Rights Claims that was held on August 8-9, 2023[44] Their presentation was part of the "Water Management Tools for Drought" session, which 54 participants attended. The WaDE team provided background on WaDE, demonstrated WestDAAT capabilities, and answered questions. Below is a summary of the questions and their answers. The Symposium included several topics addressed by experts and participants regarding completed and ongoing negotiated settlements. Successful symposia have been held since 1991. The agenda included presenters who have been involved in negotiated settlements representing

[43] BaseMap: https://www.basemap.com
[44] WSWC-NARF 18th Biennial Indian Reserved Water Rights Symposium: https://westernstateswater.org/events/wswc-narf-18th-biennial-indian-reserved-water-rights-symposium

tribal, state, local, and federal governments, interest groups, congressional staff, and others.

WSWC Executive Director provided an overview of the WSWC's mission and challenges facing western states. He reminded everyone that states and tribes are not stakeholders but sovereign entities responsible for managing their water resources. He introduced data resources available to decision-makers, including Landsat thermal imaging, the WSWC's WaDE Program, and WestDAAT. He also emphasized a need for investment by federal agencies in drought forecasting and touched on the creation of the IoW to encourage change by building sustainable networks and developing modern data infrastructure to support decision-making. The WaDE Program Manager demonstrated online navigation of WestDAAT and explained WaDE's operational principles for data management. Data sharing should be FAIR. He introduced the WaDE Water Right Landing Pages, a tool that links WestDAAT water rights objects to state data. He also introduced a tool under development that allows users to view up or downstream water rights, USGS streamgages, EPA monitoring stations, and water quality data from any given point on a river or stream. He further demonstrated how WestDAAT can query state-recognized tribal water rights data across the West.

There was a question: When you look at the chart summary tool, does it only describe the data for points shown on the map at that moment? Or will it describe data for all points corresponding to the entity you've entered in the "search allocation owner" search bar? The answer is that the chart summary is for the data for points shown on the map at that moment based on the selected filters, including the search allocation owner name. Another question is whether the data is for only surface water systems, or whether interconnected groundwater systems should be included. The answer was both surface water and groundwater are included in WestDAAT wherever the states make them available in a machine-readable format. WestDAAT has a filter called "change Map legend color," which allows users to show water rights based on surface water and groundwater. Another attendee asked what if you don't know the area very well and want to turn on a layer to show a reservation boundary to find out what the water basin is? The WaDE team is considering adding a geospatial filter layer developed by the

Bureau of Indian Affairs (BIA) to show U.S. Domestic Sovereign Nations: Land Areas of Federally Recognized Tribes. Once that layer is supported, users can query all water rights within any sovereign nation boundary that may intersect with a river basin. For example, show all water rights within the Navajo Nation and the CRB. One attendee cautioned that sometimes BIA's overlays for reservation boundaries are inaccurate. The WaDE team recognized this issue and offered to share a disclaimer about the accuracy of these boundaries. Two attendees uploaded the tool, saying it is an "amazing resource," and asked about a tutorial. The WaDE team offered the WestDAAT-Filter-Documentation page, which describes how the tool works.[45]

5.7.16 National Audubon Society

On October 16, 2023, the WSWC team met with the Director of the Saline Lakes Program for the National Audubon Society (Audubon) over a Zoom call. The WSWC team shared a background about WaDE and demonstrated WestDAAT capabilities, focusing on the Great Salt Lake area. She appreciated WestDAAT and asked about the frequency of data state data updates to WestDAAT. She mentioned that wetlands, such as in the Bear River Migratory Bird Refuge, often have the beneficial use of "irrigation." The WSWC team presented mockups of the proposed Water Conservation Tool that will integrate WestDAAT with OpenET to streamline applications for voluntary, compensated, and temporary conservation actions across the West. The Director shared her experience with difficulties in communicating and implementing conservation measures.

In some cases, she shared concerns about OpenET, showing more consumptive use than could've been.[46] The WSWC team shared the OpenET study "Model Intercomparison and Accuracy Assessment."[47] She shared their experience with a canal

[45] WestDAAT-Filter-Documentation: https://westernstateswater.org/wade/westdaat-filter-documentation
[46] Consumptive water use is a component of reasonable beneficial use, and includes evaporation, evapotranspiration, and other irrecoverable losses of water not available for immediate use. For our purposes, it does not include carriage losses or storage losses. Evapotranspiration (ET) from plants that consume water often serves as a useful proxy for consumptive water use on irrigated lands because it is easier to measure.
[47] OpenET Model Intercomparison and Accuracy Assessment: https://openetdata.org/accuracy

company where they were interested in seasonal water leases. The Audubon went through analysis and estimated the depletion (also known as consumptive use) from switching to a less intensive water-use crop. The canal company disagreed with the Audubon estimate because the company's estimate was higher. She shared that often, there is confusion in understanding the water right amount of water as a diversion vs depletion. The WSWC team pointed out that the proposed Water Conservation Tool can help with transparency and communicate consumptive use to farmers and conservation organizations. The Director asked if the UCRC shepherds conserved water downstream. The WSWC team answered that SCPP does not shepherd water. She recognized that shepherding conserved water downstream is needed to restore natural flow and saline lakes but is challenging to implement.