Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT)

Technical Proposal

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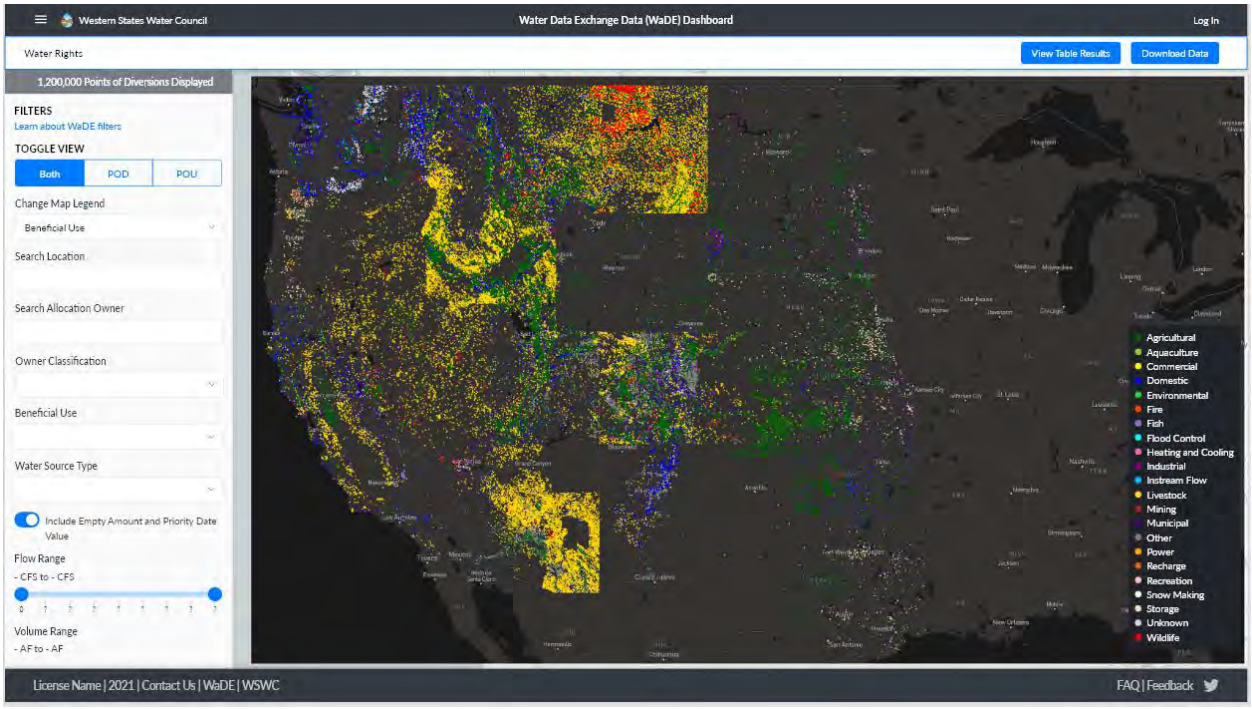

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WESTERN STATES WATER COUNCIL

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A. TECHNICAL PROPOSAL

1. Executive Summary

The Western States Water Council (WSWC) is a Category A applicant, qualified as a "regional authority whose members include one or more organizations with water or power delivery authority." The WSWC is a government entity, an instrumentality of each of its eighteen participating western states (the seventeen Reclamation States and Alaska), with members consisting of representatives appointed by the governors of each state. This proposal seeks $200,000 with about a 58% cost share over a 2-year period to stand up a Water Data Exchange Program (WaDE) dashboard called the Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT), moving from an existing and tested prototype, to full operational functionality.

The WSWC is uniquely positioned to provide streamlined and consistent access to state agency level water rights data for the western United States. The WSWC serves as a trusted forum for discussion and innovation among its eighteen member states and as an advisory body to western governors since its creation.

As part of this project, working with Reclamation, the WSWC will also help identify Reclamation's existing state-based water rights by state, basin and Reclamation project – incorporating that information into WaDE and presenting it via WestDAAT.

WestDAAT fits under Type 3 "Applied Science" projects which aim to "improve access to and use of water resources data, or to develop new types of data to inform water management decisions." The project intends to advance "the development of a decision support tool that resource managers can use to query or analyze data for the purposes of improving water management." Making water rights and aggregate water use information easily available will lead to more innovative applications that stretch scarce water supplies, improve drought management, facilitate state water rights administration, raise recognition of federal water right reservations, promote conservation and water marketing, highlight conjunctive ground and surface water use opportunities, and focus initiatives for watershed, fish and wildlife habitat, and endangered aquatic species protection.

The WSWC will accomplish the following six tasks as part of this project: (1) complete the importation of available water rights data from WSWC member states to the WaDE data system; (2) working with Reclamation, classify Reclamation-related water rights data in the WaDE data system to (i) enhance Reclamation's internal water rights database project; (ii) support the discovery and visualization of Reclamation water rights by state and basin; and (iii) facilitate Reclamation's water rights and resource management; (3) develop WestDAAT as an online dashboard for data query and analysis and test its operation and function for visualizing water rights data; (4) develop five persona use cases creating a story map narrative for use to (i) focus on making water rights and related data available to a broad audience, (ii) demonstrate possible WestDAAT applications; and (iii) help improve water management across the western United States; (5) make WestDAAT and its data interoperable with Reclamation Information Sharing Environment (RISE), USGS, and EPA federal datasets through the Internet of Water

and USGS GeoConnnex and Network Linked-Data Indexed (NLDI) frameworks; and (6) organize virtual meetings and participate in conferences and outreach activities to share information and gather input.

Water rights in the West are administered separately by each state and thus water rights data, metadata, definitions and information regarding points of diversions and places of use vary across the states and within many state agencies. The proposed work will be based on the three existing and already developed elements of the WaDE data system: (1) a relational database hosted in Microsoft Azure that is built on a schema that has been agreed upon by our member states; (2) a generalized data loader that validates water rights data from our member states and then imports it into the WaDE database; and (3) an application programming interface (API) that provides secure access to the database. Our IT contractor has already designed a proof-of-concept prototype for WestDAAT and created a clickable mockup design.

We also envisioned public outreach to develop the tool will to support five categories of users: (1) Gary the Governor, who is concerned about the impacts of a prolonged drought on the economy and environment of his state, and is also interested in future water use trends and water banking and marketing policies; (2) Stan the State Engineer, who for example wants to identify existing senior downstream water rights that might be impacted by a new water rights application, change, or transfer; (3) Frank the Farmer, who is an individual water right and land owner that may be affected by a local water conservation or water transfer proposal and wants to learn more about his specific water rights; (4) Maggie the River Basin/Area Manager, who is responsible for developing a basin water plan, promoting water use, conservation, and salinity control plans and managing projects in the basin is interested in high level insights about water rights and their categories of owners; and (5) Ratibah the Researcher, who is interested in getting a large and preferably unprocessed dataset for analysis and modeling purposes.

WestDAAT has the potential to improve and advance private, public, state, and regional water planning and analysis, decision-making, and interstate compact administration and water management across the USBR's eight river basins identified in the SECURE Water Act.

2. Project Description

2.1 Project Objectives and Deliverables

The following are the proposed project tasks:

- Complete the importation of available water rights data from WSWC member states to the WaDE data system.
- Working with Reclamation, classify Reclamation-related water rights data in the WaDE data system to (i) enhance Reclamation's internal water rights database project; (ii) support the discovery and visualization of Reclamation water rights by state and basin; and (iii) facilitate Reclamation's water rights and resource management;
- Develop WestDAAT as an online dashboard for data query and analysis and test its operation and function for visualizing water rights data.
- Develop five persona use cases creating a story map narrative for use to (i) focus on making water rights and related data available to a broad audience, (ii) demonstrate possible WestDAAT applications; and (iii) help improve water management across the western United States.

- Make WestDAAT and its data interoperable with RISE, USGS, and EPA federal datasets through the Internet of Water and USGS GeoConnnex and Network Linked-Data Indexed (NLDI) frameworks.
- Organize virtual meetings and participate in conferences and outreach activities to share information and gather input.

2.2 Background About WaDE

Since its launch in late 2011, the Water Data Exchange (WaDE) Program has been on a mission to assist WSWC member states in sharing water rights administration and water use data with each other, federal agencies, and the public[1]. Each state has a unique system and data management method. Thus, water rights data, metadata, their points of diversions and places of use vary across the states and within many state agencies. Open water data and regional data sharing have been recognized by the Western States Water Council (WSWC), Western Governors Association (WGA),[2] and federal and state agencies and data managers as a prerequisite to better water resources planning and management [3]. Efficient, effective, and innovative management of limited water resources should be a critical public policy priority, especially in this fast-growing and dry region of the United States.

The WaDE Program has progressed from its initial concept and creation phase (2011-2018) and has establish working relationships with states agencies and created data sharing protocols while building and populating a collaborative data management system in response to interest and funding from the WSWC States, federal agencies (DOE and EPA), and philanthropic groups. In its second phase (2019-2021), WaDE has created a template for transforming disparate state water-related data systems into a functional regional and cloud-based data system with standards and metadata that helps streamline access to water rights and water use data. A WaDE metadata dictionary includes controlled vocabularies and is being considered as the standard method for sharing state agency water use data between WaDE and the U.S. Geological Survey (USGS) Water Use Data Research (WUDR) Program.

The current WaDE 2.0 system has a collection of water rights data imported from dozens of complex and disparate datasets for all the western eighteen states. We have imported water rights data along with their points of diversion (POD) geospatially referenced for the seventeen western states in addition to Alaska. Figure 1 (and the cover) shows a preliminary map of all the points of diversions for the water rights data in the WaDE database. Colors on the map represent beneficial use categories as classified by the WaDE team. We note that these datasets are still incomplete and the reasons why for the following states.

The Texas Commission on Environmental Quality (TCEQ) is working on improving the quality of water rights data, especially their amounts and priority dates. TCEQ staff are expecting to complete their data quality improvements by early Fall 2021. New Mexico water rights data are lacking priority dates as they are not yet available in a machine-readable format.

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[1] Larsen, S. G. and D. Young, 2014. WaDE: An Interoperable Data Exchange Network for Sharing Water Planning and Use Data. *Journal of Contemporary Water Research & Education* 153:33-41.

[2] Western Governors' Association Policy Resolution 2018-08.

[3] Doherty, T., R. Smith, A. Schempp, B. Aylward, C. Corbin, E. Hanak, J. D. Wiener, M. Myers, M. Pifher, P. Nichols, R. Watson and W. Hasencamp, 2012. Water Transfers in the West: Projects, Trends, and Leading Practices in Voluntary Water Trading. *In,* Editor (Editor)^(Editors). Western Governors Association and Western States Water Council.

Wyoming's water rights data in WaDE represents a subset of the State Engineer's Office data, mainly the rights with larger amounts. We will continue to work with the New Mexico, Texas and Wyoming to import their data once publicly available.

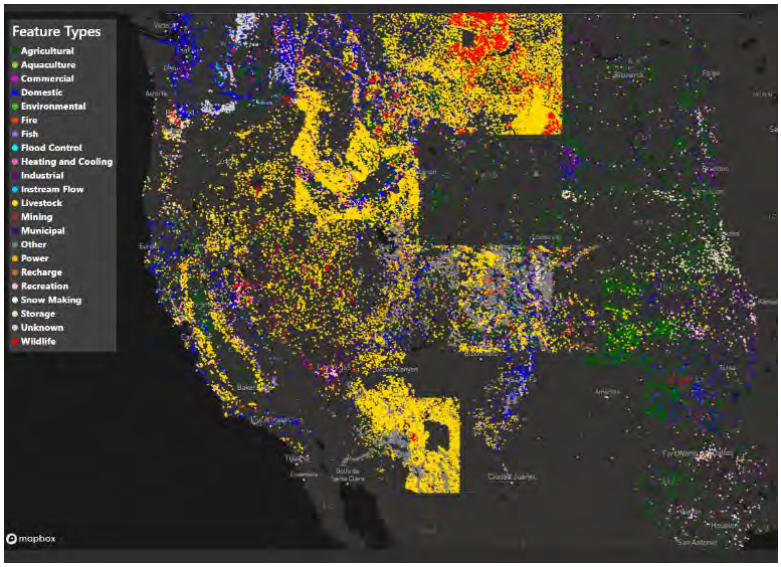

Figure 1: Point of Diversions for Water Rights Data Already Imported to WaDE.

The proposal will launch the third phase (2022-2026) of WaDE by building an online data query and analysis tool (WestDAAT) and support use cases to assist water planning and management efforts. WestDAAT will allow WaDE data services to present a consistent picture of regional water data that enable better analysis and identification of trends (Figure 2).

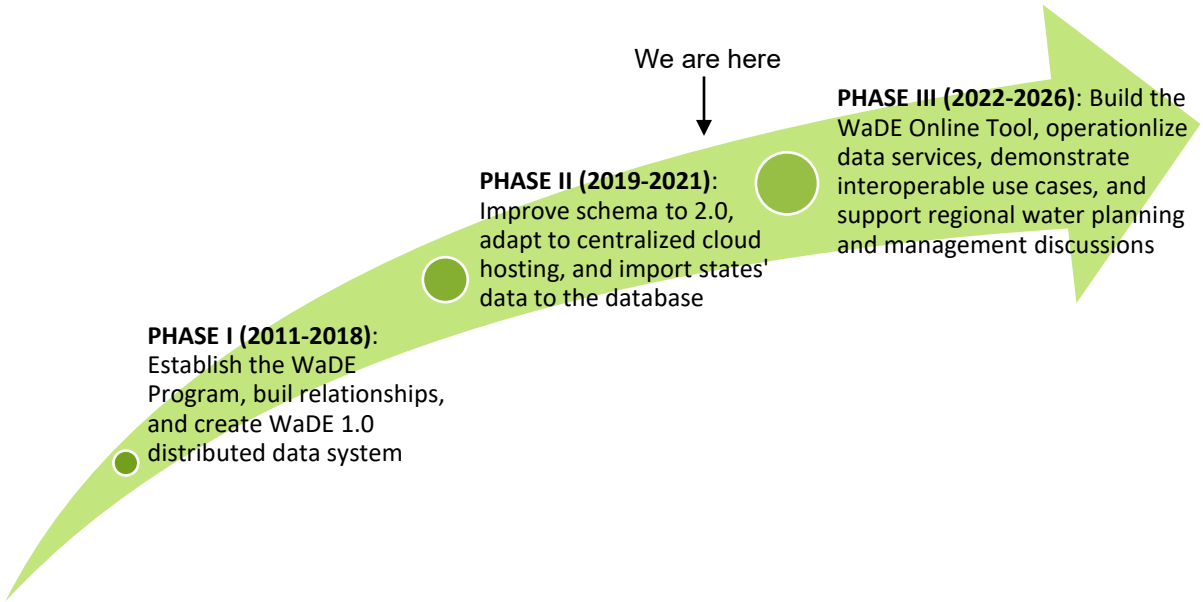

Figure 2: The Water Data Exchange (WaDE) Past, Current, and Next Phases, and their Key Activities. This proposed work will establish the third WaDE Phase that operationalizes WestDAAT.

This unique service will complement other federal data services such as the Reclamation Information Sharing Environment (RISE), USGS National Groundwater and Streamflow Information Program, and EPA's Water Quality [Data] Exchange.

Reclamation is required by federal law to comply with both substantive and procedural state water law, including securing water rights from the States for their projects and operations. This proposal will support the discovery and visualization of Bureau of Reclamation water rights by State, basin and project, aiding development of an internal Reclamation database to facilitate their water right and water resource management.

The WaDE Program is uniquely positioned within the WSWC to provide streamlined and consistent access to state agency level water rights data for the western United States. The WSWC serves as a trusted forum for water policy discussions among its eighteen member states and as an advisory body to western governors since its creation as a government entity in 1965. Data provided by WaDE is unique and is not readily available from any other data provider in the United States. WaDE and the WSWC staff maintain strong relationships with the directors of member state agencies and their water resources and information technology staff. This relationship between the WSWC and its member states and agencies enable the WaDE Program to carry out the proposed work as described below.

2.3 Project Deliverables

We envision WestDAAT as a new service that will improve access to water rights data for a broader audience beyond developers and researchers, which include water managers at state and federal agencies and the public. The dashboard will be a user-friendly tool that allows users to access, filter, and analyze water rights for the western United States. This section first describes five distinct user profiles with different interests that serve to guide the utility of the dashboard. Then, we describe the three stages of the dashboard design and what has been completed and what will be done under this project.

2.3.1 Import place of use (POU) water rights data into WaDE database

As part of this proposed work, we will complete the importation of available water rights data from WSWC member states to the WaDE data system. We will import the place of use (POU) data along with Point of Diversion (POD) data for each water right. Figure 3 shows the available POU geospatial data for six states. We will continue to work with these states to import their POU data, as well as the remaining states as the data become available to WaDE.

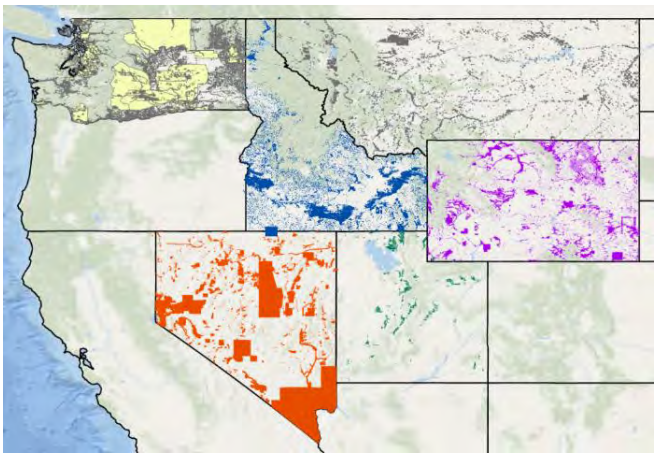

Figure 3: Available Place of Use Geospatial Data to be Imported to WaDE.

2.3.2 Support the discovery and visualization of Bureau of Reclamation water rights

We are working on classifying the water rights owners as provided by our member states into consistent categories of owners. As part of our coordination with Reclamation's data sharing efforts, we have met twice with a team working on an internal Reclamation database system to facilitate their water right and resource management. Reclamation's team sees value in consistent owner classifications that span western states and their basins. We will continue to coordinate with Reclamation's team to identify water rights that are held in storage by Reclamation, where the water right owner name is recorded as the landowner. WestDAAT and its data filtering capabilities will support data discovery and visualizations for these state-recognized Reclamation water rights by state and basin.

2.3.3 Design Online Query and Analysis Tool (WestDAAT)

Our experience developing the WaDE 1.0 data system highlighted the need of a simple and professional dashboard to allow water managers easy access to these data to inform planning and management decisions. We worked with Don't Panic Labs (DPL) to develop a proof-of-concept, clickable prototype that explored the feasibility of different software environments and tools to support our desired features and functions within a reasonable cost window to operate over time. As described below, we have completed the first two stages and have detailed plans to build out the final WestDAAT dashboard once financial resources are secured (Figure 4).

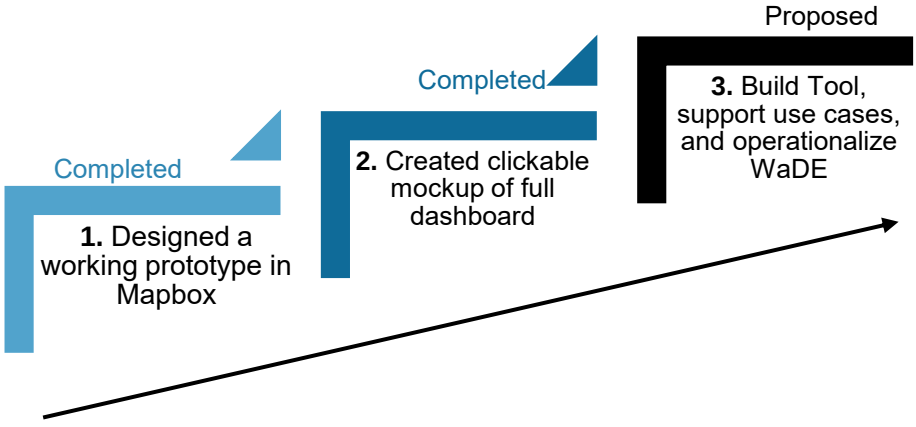

Figure 4: Completed and Proposed WestDAAT Development Stages.

Stage 1 - Prototype Design

We chose Mapbox (https://www.mapbox.com) as the mapping software and environment to build the dashboard. Mapbox offers flexibility to customize the application to our needs while maintaining a very efficient geospatial data rendering speed for our large data. The application also comes with a generous free tier that offers 60,000 user visits per month with no charge. DPL designed the prototype application using Mapbox to test its ability to render over a million points of diversions and provide a fast, interactive filtering experience. The prototype is directly connected to the WaDE database through a secure API connection. See https://wade-mapbox-prototype.azureedge.net/.

Stage 2 - Clickable Mockup of the Full Dashboard

After developing the working prototype, we worked with DPL to create a mockup dashboard that resembles the full, envisioned functionality of WestDAAT. We have had nine design sessions that further refined the expected final functionality and user experience. Based on this feedback, DPL developed a mockup: https://xd.adobe.com/view/fd505afd-2e4a-4088-9845-e86a8a720b5b-a803/?fullscreen

Stage 3 – Dashboard Design and Deployment

These first two stages have helped us define the exact features and filters of the final dashboard (Table 1). Stage 3 will build the actual Minimum Viable Product (MVP) of WestDAAT that will support the five user cases defined above. The following are the key identified activities that DPL will deliver as they build the dashboard: (1) design the dashboard architecture; (2) set up test environments with automated builds; (3) set up a Quality Assurance environment; (4) set up production environment; (5) set up the web application; (6) set up layout; (7) create user signup and login accounts; (8) implement map control and filters (see Table 1); (9) support user-selected map themes; (10) generate Uniform Resource Locator (URL) that includes the selected filters in the dashboard so users can share and replicate the same session; (11) display query results in a table view; (12) support downloading data to Excel and maps into GeoJSON or shapefiles; and (13) support the NLDI upstream and downstream search call and Geoconnex landing pages for each POD, POU and water right in WaDE. Once the dashboard is built, WaDE's streamlined data services will be operationalized to support the broader audience of data users looking to improve water management in the West.

Table 1: List of Filters the Online Query and Analysis Tool will Support

Filter	Description
Display POD, POU, or Both	Users have the option to display and search Point of Diversion (POD), Place of Use (POU), or both.
Priority Date Slider	Users can select use the slider to filter water rights based on a range of priority dates.
Search Location	Users can use this search to narrow down the map view to a city, town, or address.
Beneficial Use	Users can use the WaDE beneficial use terms to narrow down water rights of their interest.

Owner Name	Search by owner name as provided by states.
Owner Classification	Search by categories of owners.
Water Source Type	Filter water rights based on sources (e.g., groundwater, surface water, etc).
Flow Range (CFS)	Filter water rights by a range of permitted cubic feet per second.
Volume Range (AF)	Filter water rights by a range of permitted annual acre-feet volume.
River Basin	Filter water rights by a one or many selected major river basin in the West.
State	Filter water rights by one or many selected states.
Regulatory Overlay	Filter water right by one or many selected regulatory areas such as Nebraska Natural Resources Districts.
NLDI Site Search Tool	Identify upstream or downstream water rights or other data sources by 3rd party providers such as USGS and EPA monitoring sites.

2.3.4 Support Use Case Personas with a focus on improving water management

We have initially identified the following five user personas, which are fictional characters, to help guide the creation of the WaDE dashboard and how it would support the needs, goals, and desires of these characters from a farmer to a governor level. We will hold group calls/meetings comprised of state and federal water managers and other parties representing these personas to further refine these use cases and add new ones if needed. The use cases may overlap in their use of certain functionalities, but each persona represents a story with unique aspects that will guide the development and implementation of WestDAAT. We note that WaDE's main objective is to support regional analyses that help identify trends and facilitate policy and decision making, but may also assist local and private decision making. The use cases also demonstrate the integration of upstream and downstream data that may be possible with the Geoconnex and Hydro Network-Linked Data Index frameworks that were designed by USGS and the Internet of Water. Both frameworks aim at enabling a geospatial data search and linkage of water data across multiple data providers that range from WaDE itself, to state agencies, academics institutions, and federal agencies and bureaus.

i. Gary the Governor

Governor Gary is concerned about the impacts of a prolonged drought on the economy and environment of his state, and possibly the short and longer-term effects on various sectors. He is also concerned about possible transfers of water that would debilitate the economy of rural agriculturally dependent communities, as well as other future water use trends like water banking and marketing policies. Officials working for Gary are looking to couple water rights data and past aggregate water use estimates from WaDE with state and federal water supply and reservoir storage information to identify any looming shortages and estimate impacts to various sectors. They could also identify water rights that will become increasingly valuable during shortages (those with senior priority dates shown through WaDE), and the communities that depend on

those rights, and consider policies and programs to limit or manage short-term changes in use. Gary's staff might also want to identify persistent evolving changes in rights to the use of water, such as agriculture to urban transfers, increasing water for demands, climatic changes impacts, declining instream flows (possibly due to diversions) and other environmental impacts, etc.

ii. Stan the State Engineer

Stan the State Engineer is interested in identifying existing downstream water rights that might be impacted by a new water rights application, or a change or transfer application, especially on an interstate river basin. Stan's goals include identifying downstream senior water rights potentially injured by a proposed water use and extending beyond his state's boundary and relevant interstate compact considerations. Stan may also want to know the locations of upstream reservoirs, gage stations, and water rights to evaluate the availability of water for the water right under consideration. Stan may be interested in identifying water rights to surface and groundwater from multiple sources, and the potential impact of drought on such rights. He may wish to see whether the application falls within a special or active management area for his or other agencies that regulate the use of water for the water right under consideration. For example, such regulatory areas might include Arizona Active Management Areas, Nebraska Natural Resources Districts and Texas Groundwater Management Districts, which regulate the use and permitting of groundwater. Several States have placed moratoria on new water rights in some areas. Stan may wish to see a list of federal agencies that have an interest in waters in the area and the impact of the use of water for the water right under consideration.

iii. Frank the Farmer

Frank is an individual water right owner who may be a farmer, rancher, homesteader, etc., anywhere in the Western U.S. Frank's goals include understanding his own water right, such as his priority date compared to the surrounding rights, the maximum allowable use, and any regulatory agency limitations, etc. Frank is also considering purchasing / selling a water right and would like to gain insight into nearby similar water rights in his area. Lastly, Frank would like to be aware of how shortages and other upstream/downstream nearby water rights, storage and diversion structures, and/or environmental reservations, conservation proposals, or minimum streamflow requirements might affect his own water right and water use. The Farmer Frank persona and his above-described use case represent a simple search and return for a single to multiple water right and water right sites based on available filters and a geospatial search. The user's own knowledge of a water right may be incomplete (e.g., they may or may not know the owner's name and the approximate location of it, the water right identifier, its assigned volume, use limitations, etc.). The multiple search filters in the dashboard such as owner name, location search, and beneficial use, interactive zoom experience will help the farmer identify the relevant local water rights.

iv. Maggie the River Basin or Area Manager

Maggie is a watershed manager who is responsible for creating, developing, and implementing plans (e.g., water use, drought conservation, salinity control, etc.) or a watermaster administering water rights for the management of water in a specific river system (e.g., Upper Colorado River Basin). Maggie's watershed may span multiple states and have many

stakeholders. Maggie is interested in getting regional insights into water rights and water use in her watershed and her goals might include the following: (1) identify all the water rights in a watershed with a specific beneficial use (e.g., agriculture) and a specific priority date (e.g., rights that are older than 1922); (2) summarize the total flow or volume-based amount of water rights per beneficial use (e.g., agriculture) ; (3) identify state-recognized and administered water rights for federal agencies' use such as the Bureau of Reclamation, the Forest Service, Bureau of Land Management or Fish and Wildlife Service; (4) identify water rights, points of diversions that are upstream or downstream of a specific location in a watershed, so that she may implement a water demand management and shepherding simulation for planning purposes or possible curtailment plan to meet senior water rights or instate allocations downstream. Water shepherding involves tracking foregone use or conserved water from an upstream site to a downstream site for a designated beneficial use without being withdrawn from sites along the way; (5) identify USGS EPA water quality monitoring sites that can be used to understand minimum requirements for maintaining minimum standards, such as salinity levels (involving both quality and quantity). This use case also supports downloading the resulting data into a friendly formatted Excel file that a manager could work with for further analysis.

v. Ratibah the Researcher

Researchers and academics are interested in getting large and preferably unprocessed datasets. In this use case, Ratibah would like to select an area of interest (e.g., Colorado River) and then download all the data in WaDE into an Excel file(s). Ratibah will develop her own method or code to do all sorts of modeling and data analysis outside the WaDE portal. Ratibah will have to create a WaDE dashboard profile so that she can login and make a request to the WaDE team to retrieve this large data set. This persona and use case represents WaDE's ability to support research that ultimately can serve the program's mission to inform research, analyses, and ultimately study and report recommendations. This use case helped us decide to support user logins in the dashboard so we can manage who downloads such big datasets to make sure their use and analysis is consistent with WaDE limitations and assumptions. Advanced users would be asked to agree to the terms and conditions of use for WaDE.

2.3.5 Integrate WaDE data system with Geoconnex and NLDI framework

Another important step is to make WestDAAT and its data interoperable with RISE and other federal datasets. USGS, WaDE, Internet of Water, Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), U.S. Environmental Protection Agency (EPA), and others have begun experimenting with implementing a linked data architecture for the water data community, organized around the Geoconnex project (Figure 5; https://geoconnex.internetofwater.dev). Geoconnex is establishing a common metadata framework based on landing pages with persistent identifiers for real-world environmental features that will link disparate water datasets and enable users to search data across data systems. This architecture would allow water data providers to publish metadata about common environmental features using standardized approaches amenable to automated aggregation and inference of relationships between the underlying datasets without the need for centralized data governance and storage. We are working with the Geoconnex team to index all WaDE POU and POD sites into their system. We will create a unique landing page for each site with embedded metadata to allow data crawlers to search it. We will also index WaDE sites with the NHDPlus

network as part of the NLDI framework, which will enable use cases that search for data upstream or downstream within the proposed dashboard.

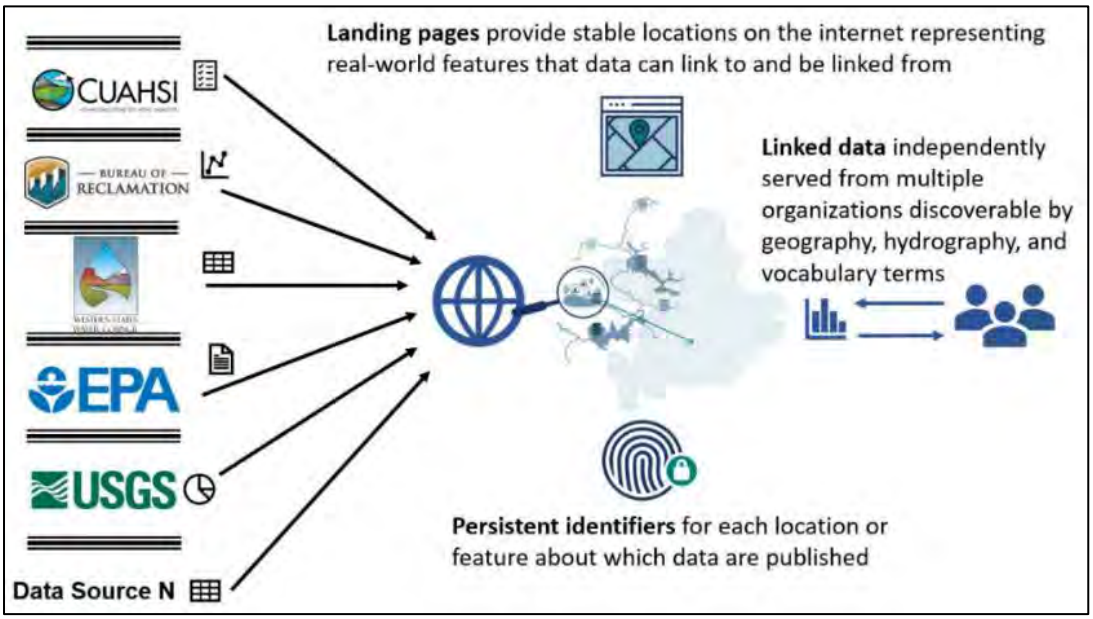

Figure 5: The Internet of Water Geoconnex Project Framework (Credit: Lilli Watson and Kyle Onda, Internet of Water). Note: Bureau of Reclamation is considering joining Geoconnex

2.4 Existing WaDE 2.0 System and its Data

At the outset, the WaDE Program sought to design a generalized database schema that works as a common denominator for the disparate and different water rights and water use datasets within the WSWC member states agencies. The first schema was deployed in 2015 a distributed database nodes system where each state loaded data into their WaDE database node. A centralized catalog would harvest metadata from all the states nodes and point data queries to each state. In Fall 2018, WaDE staff decided to overhaul the WaDE database into a centralized and cloud-based data system that incorporates lessons-learned from the previous system. WaDE 2.0 is built using an agreed-upon data schema that reconciles syntactic (e.g., structure) and address semantic differences among the participating states by following the latest changes in technology and metadata standards. WaDE 2.0 system was also motivated to support use cases that query water rights data in space and time across state boundaries. In January 2019, the WaDE team has selected an IT contactor "Don't Panic Labs" based in Nebraska to assist in deploying WaDE 2.0 schema into an industry standard cloud-hosted environment. The WaDE data system comprises four elements: (1) schema and database; (2) data loader; (3) application programming interface (API); and (4) online query and analysis tool (Figure 6).

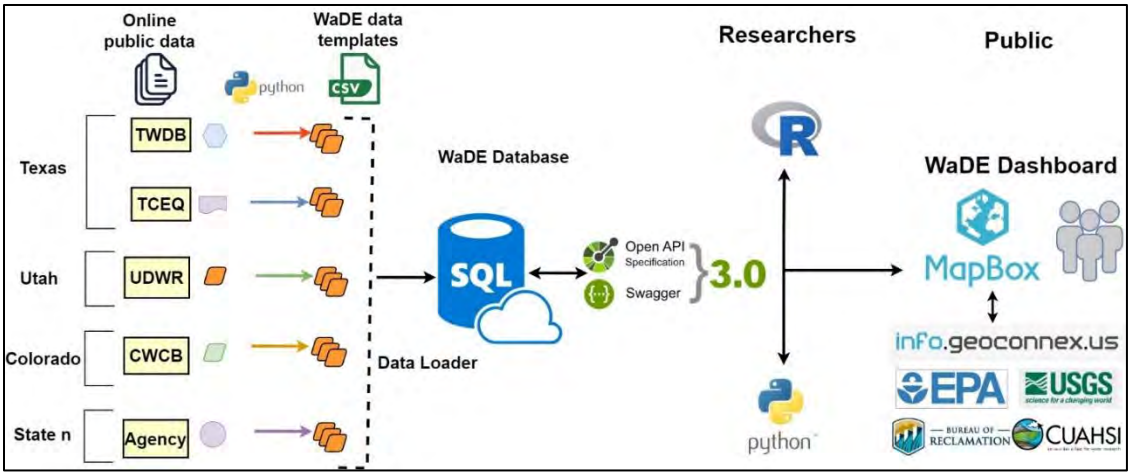

Figure 6: Architecture of the WaDE 2.0 Data System

i. Schema and Database

The WaDE schema is already deployed into a centralized Microsoft SQL Server database on Azure Cloud Services. We have two database environments: (1) Quality Assurance (QA) database where we experiment with loading states' data to; and (2) a Production (Prod) database that will be publicly available after we complete our tests. The database is based on a schema that is designed using the Online Analytical Processing (OLAP) approach. Each water right has the following fundamental required metadata: (1) a flow or volume-based amount; (2) unit of the amount; (3) beneficial use(s); (4) priority date; (5) point(s) of diversions and places of use; (6) water source (s); (7) organization and agency that administers the water right; (8) method describing the state's water right system and any assumptions; (9) regulatory overlays that affect water right use; and (10) metadata that describe the water right such as irrigated acreage, generated power, community water system name, owner name which includes Bureau of Reclamation, and their classification. The database has flexibility to support the various metadata provided across our member states. For example, we allowed a special case for water rights data to be exempt from the required volume / rate amount values and priority date value (e.g., as in the case in Arizona). The schema is publicly available online at https://schema.westernstateswater.org/diagrams/1_WaterAllocations.html

The WaDE schema supports maintaining the native terms that each state uses in describing their water rights data. To enable easier data query across states' data, we added WaDE terms as controlled vocabularies that map to the states' native terms. We support the following key WaDE controlled vocabularies: Beneficial Use, Irrigation Method, Crop Type, Site Type, Water Source Type, Water Allocation Type, Applicable Resource Type, Data Quality Value, Report Year Type, Water Quality Indicator, Water Allocation Basis, Method Type, Legal Status, Regulatory Status, Regulatory Type, and Owner Classification. We have proposed these WaDE terms based on our collective experience as we work with the states' datasets. We are continuously working with each state to review and approve them. The full list of terms is available online here http://vocabulary.westernstateswater.org

While some states' vocabularies are easier to map WaDE terms to, others are more sensitive and complex such as the legal status (e.g., "decreed," "reserved," "absolute," etc) and

water allocation terms (e.g., "application," "change," "In review," etc). We sought assistance from the Legal Committee at the WSWC to come up with an agreed-upon terms for the legal status and water allocation type terms (Table 2). We recently added a new vocabulary that classifies the owner names in the states' water rights data. The classification helps query water rights data across states that use different descriptions or abbreviations of owners especially for state-recognized rights for federal government agencies such as "Bureau of Land Management, Bureau Reclamation, and the U.S. Army." Users could then query, and filter water rights recognized for each federal agency across the West.

Table 2: Summary of Key Controlled Vocabularies Showing How WaDE Terms Narrow Down the States' Native Terms from Hundreds to a Handful.

#	Key Term	# of Unique Terms	# of WaDE Unique Terms
1	Beneficial Use Category	407	22
2	Water Source Type	37	5
3	Site Type	152	31
4	Legal Status	85	TBD
5	Water Allocation Type	92	TBD

ii. Generic Data Loader

Our IT contractor has built a generic data loader that reads water rights data from a set of Comma Separated Values (CSV) template files, validates input, and maps relationships between primary and foreign keys into the database tables (Figure 2). WaDE staff coordinate with each state to map and programmatically scrape published or shared water rights datasets into the CSV templates. The CSV files are then loaded using the data loader into the QA database. Once our tests are complete and the data quality is assured, we upload the data into the Prod database. The CSV data template is available on GitHub. https://github.com/WSWCWaterDataExchange/MappingStatesDataToWaDE2.0/tree/master/DataDict/Allocation.

We diligently work with each agency's staff and ask them to review our mapping and approve it. We document the mapping of states' data publicly on GitHub at: https://github.com/WSWCWaterDataExchange/MappingStatesDataToWaDE2.0/tree/master

iii. Application Programming Interface (API)

Once the data is loaded into our database, all states' water rights data become accessible using the API end points. The API complies with the OpenAPI 3.0 standard and is being documented using SwaggerHub at https://app.swaggerhub.com/apis-docs/WesternStatesWater/WaDE2.0/1.0.0#/

Developers can then query water data across state boundaries and build applications for specific use-cases that support the diverse needs of users and applications to inform policy decisions and data analysis across the western United States. The API has been in an

experimental phase and we plan to release it along with the proposed dashboard as described in the next section.

2.5 Data Management Practices

The WestDAAT will integrate and streamline access to water rights data across the western states. Data can be downloaded into Excel and GeoJSON geospatial formats. We will maintain these data management practices: (1) continuously publish and update source code of WaDE database schema, API, and online tool and documentation of the process to map and import western states datasets into the WaDE data system on GitHub at https://github.com/WSWCWaterDataExchange; (2) share WaDE Controlled Vocabularies online at http://vocabulary.westernstateswater.org/; (3) share the latest WaDE database interactive schema diagrams online at https://schema.westernstateswater.org/diagrams/index.html; (4) make the WaDE dashboard publicly available online at https://westernstateswater.org/wade-dashboard

3. Project Location

The project covers the seventeen western states and Alaska with a focus on eight major reclamation river basins that are identified in the SECURE Water ACT (Figure 7).

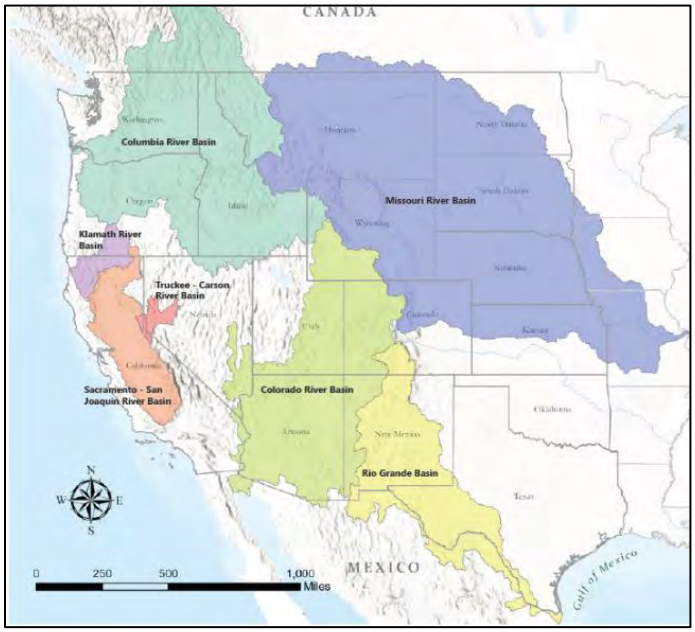

Figure 7: Eight Major Reclamation River Basins Identified in the SECURE Water ACT Reclamation [4]

[4] Reclamation (Bureau of Reclamation). 2021. SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water. Prepared for United States Congress. Denver, CO: Bureau of Reclamation, Policy and Administration. https://www.usbr.gov/climate/secure/docs/2021secure/2021SECUREReport.pdf

4. Evaluation Criteria

A. Benefit to Water Supply Reliability (40 points)

Describe the water management issue(s) that your project will address.

The WaDE Dashboard project will address the lack of consistent and accessible water rights data in the Western United States which are needed to enable regional water management and planning. Open water data and regional data sharing have been recognized by the Western States Water Council (WSWC), the Western Governors Association (WGA), and federal and state agencies and data managers as a prerequisite to better water resources planning and management.[5] WestDAAT will support the query, filtering, and visualization of water rights across the West which will increase access to data that can enable a suite of water management activities (see below).

Explain how your project will address the water management issues identified in your response to the preceding bullet. In your response, please explain how your project will contribute to one or more of the following water management objectives and provide support for your response.

- Water supply reliability: WestDAAT's functionality will enable managers to visualize water supplies and water rights across the West, helping to support innovative and collaborative solutions to challenging water reliability problems that are beginning to escalate with continued drought conditions. It will also help support Reclamation in their efforts to develop an internal water rights database that includes data at the State, basin and project level.
- Water marketing activities: Knowing where water rights exist will help to facilitate the development of water markets. WestDAAT provides this information in a simple visual format.
- Drought management activities: WestDAAT will allow for managers to quickly be able to reference priority dates of various water rights when planning for and responding to potential changes in water deliveries during drought years. For example, the priority date slider and beneficial use filter allow quick query and visualization of agriculture senior water rights prior to the 1922 Colorado River Compact. Such rights can be useful for potential voluntary and compensated water transfers to urban cities such as Denver and Salt Lake City that hold junior water rights.
- Conjunctive use of ground and surface water: WestDAAT will provide access to both surface water and groundwater rights data and identify the source of supply in one consistent format and terminology for all the Western states. It will also support filtering and querying water rights based on regulatory overlays that influence the use of surface and groundwater in a region. These new data queries can be used to study and plan regional conjunctive use of ground and surface water.
- Water rights administration: WestDAAT will support state engineers in their determinations for new or changed water rights. The use case, "Stan the State Engineer,"

[5] Doherty, T., R. Smith, A. Schempp, B. Aylward, C. Corbin, E. Hanak, J. D. Wiener, M. Myers, M. Pifher, P. Nichols, R. Watson and W. Hasencamp, 2012. Water Transfers in the West: Projects, Trends, and Leading Practices in Voluntary Water Trading. *In,* Editor. Western Governors Association and Western States Water Council.

will demonstrate how a water rights administrator can query and identify existing downstream senior water rights that might be impacted by a new application.

- Conservation and efficiency: WestDAAT will allow water managers and other stakeholders interested in water conservation to identify water rights in locations that may be experiencing specific challenges related to habitat or watershed health. It would provide the ability to better leverage existing water management tools, such as water transfers, and would allow for the development of creative approaches to complex water resources problems that improve resiliency in the face of climate change.

Describe to what extent your project will benefit one of the water management objectives listed in the preceding bullets. In other words, describe the significance or magnitude of the benefits of your project, either quantitatively or qualitatively, in meeting one or more of the listed objectives. WestDAAT is expected to have wide range of benefits to a broad audience of state agencies, federal agencies, water management districts, non-profits and other users that are involved in managing water in the west. We particularly expect the dashboard to be used for regional analyses of water management in the West that may affect neighboring states, basins, or compacts. We will track use of WestDAAT through two metrics: the number of hits or visits it receives per month and the number of advanced users who create accounts and profiles in the dashboard. These will allow us to see how WestDAAT is being used and the benefits it is providing in real-time.

Explain how your project complements other similar applicable to the area where the project is located. Will your project complement or add value to other, similar efforts in the area, rather than duplicate or complicate those efforts? Applicants should make a reasonable effort to explore and briefly describe related ongoing projects. WestDAAT is currently the only public tool that exists at the scale of the Western U.S. We are coordinating with Reclamation on their efforts to develop an internal water rights database that will support data discovery and visualization by State, basin and project. We agreed to share all state-recognized water rights for the federal government. The Reclamation's team will cross-check the data we provide with their internal data. In addition, our goal is to make WestDAAT and its data interoperable with RISE, USGS, and EPA federal datasets through the Internet of Water and USGS GeoConnnex and Network Linked-Data Indexed (NLDI) frameworks. We also believe that WestDAAT can complement other regional projects such as OpenET, spearheaded by NASA, the Environmental Defense Fund and the Desert Research Institute. OpenET is focused on delivering satellite-based data that estimates evapotranspiration on farms and natural areas.

B. Need for Project and Applicability Project Results (20 points)

Will the project result in an applied science tool(s) or information that is readily applicable, and highly likely to be used by water resource managers in the West? Yes, WestDAAT will directly result in an applied science tool and data that will be used for regional water resources planning and management decisions and conversations by state and federal agency water managers in the West.

a. Explain who has expressed the need and describe how and where the need for the project was identified (even if the applicant is the primary beneficiary of the project). Open water data and regional data sharing have been recognized by the Western States Water

Council (WSWC), Western Governors Association (WGA), and federal and state agencies and data managers as a prerequisite to better water resources planning and management.[6] In 2012, partially in response to this study, WSWC, WGA, U.S. Department of Energy (DOE), DOE National Labs (led by the Sandia National Lab), and the Western Federal Agency Support Team (WestFAST) launched the Water Data Exchange (WaDE) Program as a cooperative effort to provide greater streamlined access to information from state water agencies.[7] The WaDE Program is governed and guided by the Water Information and Data Subcommittee (WIDS) at WSWC. The WIDS group is comprised of water and IT managers from the WSWC member states, federal agencies, and non-profit organizations. (See https://westernstateswater.org/wids/

b. Will the results of your project inform water resource management actions and decisions immediately upon completion of the project, or will additional work be required? Yes, WestDAAT will be publicly available for use immediately upon completion. We anticipate that a preliminary tool will ready to launch in 2021.

c. If applicable, will the results of your project be transferrable to other users and locations? WestDAAT will initially be built for the 17 Reclamation states and Alaska, including their major watersheds. However, this tool could be expanded to other areas of the country if interest and resources allow. We anticipate the five user personas previously mentioned will be the primary beneficiaries, but other types of users, such as conservation groups, will likely benefit as well.

C. Project Implementation (20 points)

Briefly describe and provide support for the approach and methodology that will be used to meet the objectives of the project: WaDE is about to complete Phase II and enter into Phase III, which will focus on the development of WestDAAT and outreach with our user targets (identified by our "personas" detailed earlier). Our process is iterative, and builds on the completion each step. We will focus first on importing state water rights data and improving the design of the dashboard based on our current clickable mockup. We will then coordinate with Reclamation to ensure the features of WestDAAT will support their needs, as well as work to integrate WestDAAT with Geoconnex and the NLDI Framework. Concurrently, we will begin outreach with our intended users through workshops to demonstrate the functionality of WestDAAT and work to integrate feedback from these user groups to ensure their needs are supported. Section 2 details these activities.

Describe the work plan for the project. Include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates. The proposed work will be completed within two years. Table 3 lists the major tasks and their estimated timelines.

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[6] Doherty, T., R. Smith, A. Schempp, B. Aylward, C. Corbin, E. Hanak, J. D. Wiener, M. Myers, M. Pifher, P. Nichols, R. Watson and W. Hasencamp, 2012. Water Transfers in the West: Projects, Trends, and Leading Practices in Voluntary Water Trading. *In,* Editor. Western Governors Association and Western States Water Council.

[7] Larsen, S. G. and D. Young, 2014. WaDE: An Interoperable Data Exchange Network for Sharing Water Planning and Use Data. *Journal of Contemporary Water Research & Education* 153:33-41.

Table 3: Project Tasks and Schedule of Completion within two years.

#	Task	Months
1	Coordinate with state and federal agencies and IT contractor on WestDAAT development milestones	0-24
2	Import "Place of Use" data and relate it to water rights for as many states that have data. Currently we have these data for six states. We will also work to automate the process to import states' water rights data into WaDE regularly, ideally once every six months	0-20
3	Develop beta model of WestDAAT • Set up dashboard environments (QA and Pro), backups, auto builds, layout • Support dashboard user account • Implement all filters and add POU as a display layer along with POD • Testing + Reviews	0-6
4	Launch beta version of WestDAAT and present to identified user groups for feedback. Organize stakeholder meetings and solicit feedback on user personas to incorporate into final version	3-20
5	Coordinate with Reclamation staff on their water rights project	0-24
6	Coordinate with the IOW and USGS teams on the Geoconnex and NLDI indexing projects	6-20
7	Develop use cases based on the identified "personas" (user groups)	12-18
8	Launch final dashboard with public announcement and outreach	24
9	Publish journal article that summarizes the contribution of WestDAAT and the WaDE Program as a proposed standard for water rights data, API, and use cases	12-24
10	Compliance with project reporting requirements	0-24

1. **Provide a summary description of the products that are anticipated to result from the project. These may include data, metadata, digital or electronic products, reports, and publications.**

The following products will be publicly accessible and available online:

1. Surface water and groundwater rights data and metadata, their points of diversion, and places of use for the 17 Reclamation states and Alaska. Data and metadata can be downloaded in Excel formats, while maps can be downloaded in GeoJSON formats.
2. Browser-based dashboard that supports the query and filtering of water rights data mentioned above (WestDAAT).
3. Application Programming Interface (API) that allows programmatic access to water rights data mentioned earlier.
4. Source code of WaDE database schema, API, and dashboard and documentation of the process to map and import western states datasets into WaDE on GitHub
5. Journal article submitted to Environmental Modeling and Software. The article will be a succinct document that describes the WaDE information model as a proposed standard for water rights data, API, and use cases.

2. **Identify staff with appropriate credentials and experience and describe their qualifications. Describe the process and criteria that will be used to select appropriate staff members for any positions that have not yet been filled. Describe any plans to request additional technical assistance from Reclamation or via a contract.**

All staff working on this project are employed by WSWC and there are no plans to fill new positions or request technical assistance from Reclamation (outside of collaborative and coordination efforts on identifying and quantifying Reclamation's water rights). We are currently working with contractor, Don't Panic Labs, to build out the dashboard. We have budgeted $201,825 for this work.

- **Adel Abdallah, PhD** – Project Manager – Adel is the WaDE Program Manager at the WSWC. He has four years of experience working on WaDE and has a PhD in Water Resources Engineering with an emphasis on Hydroinformatics and data modeling from Utah State University. Adel is the lead architect of the WaDE 2.0 data system.

- **Ryan James, MS.** - Technical Lead – Ryan has been the Hydroinformatics Specialist for the WaDE program since January 2020. Ryan has an MS in Water Resources Engineering from Utah State University and a year and half of experience working with WaDE. Ryan is an experienced programmer and works on importing and documenting states' data into the WaDE data system. Ryan also has experience in developing and testing RShiny applications to visualize WaDE data.

- **Tony Willardson**, **MS**. - WSWC Executive Director – Tony has been the Executive Director of WSWC since 2009. Formerly the Deputy Director, Tony joined the Council in 1979. He holds a BA in political science from Brigham Young University, and an MS in public administration from the University of Utah. Tony is one of the principal authors of WGA's Water Needs and Strategies for a Sustainable Future Report (2006) and the subsequent Next Steps Report (2008). He also was a contributing editor to WGA's Report on Water Transfers in the West: Projects, Trends, and Leading Practices in Voluntary Water Trading (2012). Further, he oversees the Council's Water Data Exchange (WaDE) Program and its development.

- **Michelle Bushman, MS, JD.** - Assistant Director and General Counsel – Michelle has six years of experience at WSWC. Michelle's expertise is in tackling policy issues such as jurisdiction over waters of the U.S. and waters of the states, federal reserved water rights, interstate compacts, Indian water rights settlements, droughts, floods, wildfires, harmful algal blooms, seasonal-to-sub seasonal water data and predictive capabilities, cooperative federalism and collaborative state-federal relationships, and other topics impacting the quality, quantity, and careful management of water throughout the West. Michelle has BS and MS degrees in geology from Brigham Young University and a JD degree from the J. Reuben Clark Law School, where she studied water law, natural resources and environmental law.

- **Jessica Reimer, MS**- Policy Analyst – Jessica joined WSWC in February 2020. Jessica has a broad background in environmental policy and science, with experience working in academia and the non-profit sector. She holds a BS in biology and environmental science

from Santa Clara University and a MS in Integrative Biology from Oregon State University. She also has training in developing collaborative, multi-stakeholder efforts from the Environmental Dispute Resolution Program at the University of Utah, and will help with outreach to identified target users and the development of use cases.

a. **Have the project team members accomplished projects similar in scope to the proposed project in the past either as a lead or team member?** All project team members have been involved in the development of WaDE and they will carry on the same responsibilities in completing this project.

b. **Is the project team capable of proceeding with tasks within the proposed project immediately upon entering into a financial assistance agreement? If not, please explain the reason for any anticipated delay.** Yes. As described in Section 2, our data system is established, and we have detailed plans to build WestDAAT based on a prototype and clickable mockups for the desired dashboard functionalities to support water management use cases.

D. Dissemination of Results (10 points)

Describe how the tools, frameworks, or analyses being developed will be disseminated, communicated, or made available to water resources managers who may be interested in the results. The following activities will be forums to in which WestDAAT will be presented, demonstrated and discussed:

- Western States Water Council Meetings, held three times per year. WSWC members are usually part of leadership within state water agencies who are appointed by the Governors of their states.
- Present webinars for members the Western States Federal Agency Support Team (WestFAST), comprised of 12 federal agencies that have some jurisdiction over water (https://westernstateswater.org/westfast/).
- Water Information and Data Subcommittee (WIDS), an advisory body to WaDE that is comprised of water and IT managers from the WSWC member states, federal agencies, and non-profit organizations (https://westernstateswater.org/wids/).
- Annual Conference of the American Water Resources Association (AWRA) and the World Environmental & Water Resources Congress organized by the American Society of Civil Engineers (ASCE).
- Publish a journal article that summarizes the contribution of WaDE as an information model for water rights data to an international audience. Target journal: Environmental Modeling and Software.

If the applicant is the primary beneficiary of the project, explain how the project results will be communicated internally, and to interested stakeholders and interested water resources managers in the area, if appropriate. WSWC member meetings will be the primary means of dissemination internally. These meetings are open to other stakeholders, including federal agencies. As needed, we will hold additional workshops for interested parties to demonstrate WestDAAT functionality and applicability for addressing water resource challenges.

B. PROJECT BUDGET

1. Funding plan and letters of funding commitment

WSWC is prepared to meet the non-federal matching requirement with up to $200,000 for a minimum 50% share of the total federal contribution (see attached support letter). The Internet of Water (IOW) provided support for the WSWC's Water Data Exchange (WaDE) program over the past two-years and is committed to support our WaDE/WestDAAT project at a level of $150,000/year over the next five years. A final agreement will be complete by October 2021.

Other philanthropic organizations have supported WaDE, and the development of the WestDAAT prototype, including the Moore Foundation and the Walton Foundation. We are approaching these and other organizations and agencies for additional support to launch WestDAAT, though we do not currently have firm commitments or amounts.

In addition, WSWC member states will be providing in-kind contribution to the project as part of their staff time. Member states staff help WSWC by making their data available, participating in calls, evaluating WaDE's progress, and providing feedback on our schema and future directions. The in-kind contributions are estimated $50,400 based on previous engagements with their staff. This includes 36 state IT and water management staff that spend an average of 10 hours per year with an approximate salary and fringe rate valued at $70/hour. The total projected budget is $836,581.

2. Budget proposal

Reclamation contributions will primarily be paid to build WestDAAT. Table 4 lists the income sources and Table 5 detailed the budget proposal to develop WestDAAT.

Table 4: Income Sources to Support the Proposed Project

Income	**Amount**
Costs to be reimbursed with the requested Federal WaterSmart Grant funding	$200,000
Costs to be matched by the applicant (non-federal money)	$586,181
Subtotal	
Value of in-kind contributions	$50,400
Grand Total	$836,581

Policy Resolution 2018-08

Water Resource Management in the West

A. BACKGROUND

1. Water is a crucial resource for communities, industries, habitats, farms, and western states. Clean, reliable water supplies are essential to maintain and improve quality of life. The scarce nature of water in much of the West makes it particularly important to our states.

2. States are the primary authority for allocating, administering, protecting, and developing water resources, and they are primarily responsible for water supply planning within their boundaries. States have the ultimate say in the management of their water resources and are best suited to speak to the unique nature of western water law and hydrology.

3. Many communities in the West anticipate challenges in meeting future water demands. Supplies are nearly fully allocated in many basins across the West, and increased demand from population growth, economic development, and extreme weather and fire events places added stress on those limited water resources. Sustainability of our natural resources, specifically water, is imperative to the foundations upon which the West was developed. Growth and development can only continue upon our recognition of continued state stewardship of our unique resources and corresponding responsibilities.

4. Strong state, regional and national economies require reliable deliveries of good-quality water, which in turn depend on adequate infrastructure for water and wastewater. Investments in water infrastructure also provide jobs and a foundation for long-term economic growth in communities throughout the West. Repairs to aging infrastructure are costly and often subject to postponement.

5. Western Governors recognize the essential role of partnership with federal agencies in western water management and hope to continue the tradition of collaboration between the states and federal agencies.

6. Tribal governments and western states also share common water resource management challenges. The Western Governors Association and Western States Water Council have had a long and productive partnership with tribes, working to resolve water rights claims.

B. GOVERNORS' POLICY STATEMENT

1. **State Primacy in Water Management:** As the preeminent authority on water management within their boundaries, states have the right to develop, use, control and distribute the surface water and groundwater located within their boundaries, subject to international treaties and interstate agreements and judicial decrees.

    a. **Federal Recognition of State Authority:** The federal government has long recognized the right to use water as determined under the laws of the various states; Western

Governors value their partnerships with federal agencies as they operate under this established legal framework.

While the Western Governors acknowledge the important role of federal laws such as the Clean Water Act (CWA), the Endangered Species Act (ESA), and the Safe Drinking Water Act (SDWA), nothing in any act of Congress or Executive Branch regulatory action should be construed as affecting or intending to affect states' primacy over the allocation and administration of their water resources.

Authorization of water resources development legislation, proposed federal surplus water rulemakings, and/or storage reallocation studies should recognize natural flows and defer to the states' legal right to allocate, develop, use, control, and distribute their waters, including but not limited to state storage and use requirements.

b. **Managing State Waters for Environmental Purposes:** States and federal agencies should coordinate efforts to avoid, to the extent possible, the listing of water-dependent species under the ESA. When ESA listings cannot be avoided, parties should promote the use of existing state tools, such as state conservation plans and in-stream flow protections, to conserve and recover species.

2. **Infrastructure Needs:** Aging infrastructure for existing water and wastewater facilities and the need for additional water projects cannot be ignored. Infrastructure investments are essential to our nation's continued economic prosperity and environmental protection, and they assist states in meeting federally-mandated standards.

a. **Federal Support for Infrastructure Investment:** Congress should provide adequate support for the CWA and SDWA State Revolving Funds. Further, Congress should fully utilize the receipts accruing to the Reclamation Fund for their intended purpose in the continuing conservation, development and wise use of western resources to meet western water-related needs, including the construction of Congressionally-authorized Bureau of Reclamation rural water projects and facilities that are part of a Congressionally-authorized Indian water rights settlement.

Congress should authorize water resources development legislation on a regular schedule and appropriate funding so all projects and studies authorized in such legislation can be completed in a timely manner.

Congress also should consider facilitating greater investment in water infrastructure, utilizing such tools as loan guarantees, revolving funds, infrastructure banks and water trust funds.

Capital budgeting and asset management principles should be used to determine funding priorities based on long-term sustainability and not annual incremental spending choices. It should be accompanied by dedicated sources of funding with appropriate financing, cost-sharing, pricing and cost recovery policies.

b. **Alternatives to Direct Federal Investment:** Federal and state policymakers should also consider other tools to promote investment in water infrastructure and reduce financing costs, including: public-private partnerships, bond insurance, risk pooling, and credit enhancements.

Congress should remove the state volume caps for private activity bonds used for water and wastewater projects, provide guaranteed tax-exempt status for bonds issued by state or local agencies to finance water infrastructure, provide loan guarantees, and otherwise support and encourage alternatives to direct federal investment of limited general funds.

c. **Hydropower:** Congress and the Administration should authorize and implement appropriate hydropower projects and programs through efficient permitting processes that enhance renewable electric generation capacity and promote economic development, while ensuring protection of important environmental resources and indigenous people's rights.

d. **Infrastructure Planning and Permitting:** Infrastructure planning and permitting guidelines, rules and regulations should be coordinated, streamlined and sufficiently flexible to: (1) allow for timely decision-making in the design, financing and construction of needed infrastructure; (2) account for regional differences; (3) balance economic and environmental considerations; and (4) minimize the cost of compliance.

3. **Western States Require Innovative and Integrated Water Management:** Western Governors believe effective solutions to water resource challenges require an integrated approach among states and with federal, tribal and local partners. Federal investments should assist states in implementing state water plans designed to provide water for municipal, rural, agricultural, industrial and habitat needs, and should provide financial and technical support for development of watershed and river basin water management plans when requested by states.

Integrated water management planning should also account for flood control, water quality protection, and regional water supply systems. Water resource planning must preserve state authority to manage water through policies which recognize state law and financial, environmental and social values of water to citizens of western states today and in the future.

a. **Water Transfers:** Western Governors recognize the potential benefits of market-based water transfers, meaning voluntary sales or leases of water rights. The Governors support water transfers that avoid or mitigate damages to agricultural economies and communities while preventing injury to other water rights, water quality, and the environment.

b. **Energy Development:** Western Governors recognize that energy development and electricity generation may create new water demands. Western Governors recommend increased coordination across the energy and water management communities, and support ongoing work to assess the interconnection of energy and water through the Regional Transmission Expansion Planning Project for the Western Interconnection and similar efforts.

c. **Conservation and Efficiency:** Because of diminished water resources and declining and inconsistent snowpack, Western Governors encourage adoption of strategies to sustain water resources and extend existing water supplies further through water conservation, water reuse and recycling, desalination and reclamation of brackish

waters, and reductions in *per capita* water use. The Governors encourage the use of and research into promising water-saving strategies.

d. **Local Watershed Planning:** Western Governors encourage federal agencies and Congress to provide resources such as technical support to states and local watershed groups. States may empower these watershed groups to address local water issues associated with water quality, growth and land management to complement state water needs.

e. **Intergovernmental Collaboration and Conflict Resolution:** Western Governors support the negotiated settlement of interstate water disputes, Indian and Hawaiian water rights claims, and other federal water needs and claims, the settlement of which are in the best interest of western states.

f. **State-Federal Coordination:** Western Governors recognize the important role of federal agencies in water resource management in the western states. Governors appreciate the efforts of federal agencies to coordinate water-related activities, particularly through the Western States Water Council, and support the continuation of these key state-federal partnerships.

4. **Western States Need Reliable Water Resource Information:** Basic information on the status, trends and projections of water resource availability is essential to sound water management.

a. **Basic Water Data:** Western Governors support the U.S. Geological Survey's Groundwater and Streamflow Information Program, the Natural Resources Conservation Service's Snow Survey and Water Supply Forecasting Program, the National Oceanic and Atmospheric Administration's weather and hydrology-related data collection, monitoring, and drought information programs, and the National Aeronautics and Space Administration's National Land Imaging (Landsat) Program with its thermal infrared sensor. Western Governors support federal efforts to coordinate water data gathering and information programs across multiple agencies.

b. **Extreme Weather Events Planning**: Western Governors recognize the significant potential impacts of extreme weather events and variability in water supplies. Western Governors urge Congress and the Administration to work closely with states and other resource managers to improve predictive and adaptive capabilities for extreme weather variability and related impacts. We specifically urge the federal government to place a priority on improving the sub-seasonal and seasonal precipitation forecasting capabilities that could support water management decision-making.

c. **Water Data Exchange:** The Western Governors' Association and the Western States Water Council have worked together to create the Water Data Exchange, an online portal that will enable states to share their water data with each other, federal agencies, and the public via a common platform. The Governors encourage the use of state water data in planning for both the public and private sectors.

5. **Drought Preparedness and Response:** As exceptional levels of drought persist across the West, Governors are leading on drought preparedness and response through the Western Governors' Drought Forum. The Drought Forum provides a

framework for leaders from states, businesses, non-profits, communities, research organizations and federal agencies to share best practices and identify policy options for drought management. The Governors have identified several areas in need of additional attention from Drought Forum partners, including:

a. **Data and Analysis:** Basic data on snowpack, streamflow and soil moisture is essential to understanding drought. Though a great deal of information already exists, enhanced drought data collection and real-time analysis at a higher resolution is essential. Governors support state and federal efforts to maintain adequate collection of drought and water data, enhance data networks where appropriate, and facilitate better use of existing information.

   The Governors appreciate the collaborative efforts on drought provided through NOAA's National Weather Service River Forecast Centers and Weather Forecast Offices, and the Office of Atmospheric Research's labs and programs, such as the National Integrated Drought Information System (NIDIS).

b. **Produced, Reused, and Brackish Water:** Technology exists to use produced, reused, recycled and brackish water -sources traditionally considered to be marginal or wastewater. Adoption of this technology has been limited by inadequate data, regulatory obstacles, financial barriers, public attitudes and logistical uncertainties. Governors support regulatory streamlining and policy options to encourage use of produced, brackish, and reused water where appropriate.

c. **Forest Health and Soil Stewardship:** Better land management practices for forests and farmland may help improve availability and soil moisture retention. Wildfires can cause sediment runoff in water systems, leading to problems for reservoir management and water quality. Governors support policies and practices that encourage healthy and resilient forests and soils in order to make the most of existing water supplies.

d. **Water Use Efficiency and Conservation:** Public awareness of drought has directed increasing attention to water conservation strategies, both in-home and on-farm. Governors encourage municipal, industrial and agricultural water conservation strategies as drought management strategy.

e. **Infrastructure and Investment:** Water infrastructure to store and convey water is crucial to drought management, but maintenance and expansion of that infrastructure is often difficult to fund. Governors support efforts to make the most of existing infrastructure, while seeking creative solutions to add more infrastructure with limited resources.

f. **Working within Institutional Frameworks to Manage Drought**: Legal frameworks and regulatory regimes can sometimes limit the ability of state, local and federal agencies to respond quickly to drought conditions. Governors believe that innovative, flexible policy solutions, such as streamlined processing of temporary water transfers, should be considered when managing drought.

g. **Communication and Collaboration:** Communication among state officials, federal agency representatives, water providers, agricultural users and citizens is a crucial component of effective drought response. The Western Governors' Drought Forum will continue to provide a framework for sharing best practices through its online resource library, informational webinars, and strategy-sharing meetings for the duration of this resolution.

C. GOVERNORS' MANAGEMENT DIRECTIVE

1. The Governors direct the WGA staff, where appropriate, to work with Congressional committees of jurisdiction and the Executive Branch to achieve the objectives of this resolution including funding, subject to the appropriation process, based on a prioritization of needs.

2. Furthermore, the Governors direct WGA staff to develop, as appropriate and timely, detailed annual work plans to advance the policy positions and goals contained in this resolution. Those work plans shall be presented to, and approved by, Western Governors prior to implementation. WGA staff shall keep the Governors informed, on a regular basis, of their progress in implementing approved annual work plans.

Western Governors enact new policy resolutions and amend existing resolutions on a bi-annual basis. Please consult www.westgov.org/policies for the most current copy of a resolution and a list of all current WGA policy resolutions.

THE STATE
of ALASKA
GOVERNOR MICHAEL J. DUNLEAVY

Department of Natural Resources
DIVISION OF MINING, LAND & WATER
Water Resources Section

550 West 7th Avenue, Suite 1020
Anchorage, Alaska 99501-3579
Main: 907.269.8600
TDD: 907.269.8411
Fax: 907.269.8904

April 20, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: WSWC WaterSMART Grant Application, Funding Opportunity R21AS00289R21AS00289

To Whom It May Concern:

I'm writing on behalf of the State of Alaska to express support for the Western States Water Council (WSWC) to apply for a WaterSMART grant under the Bureau of Reclamation's Applied Sciences Program for $200,000 over two years for the Water Data Exchange (WaDE) program and development of a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT).

Our state provides water data to the WaDE program and expends resources to ensure that the data is accurate and up-to-date. WaDE offers a platform for states to learn from each other on water data management, serves as a resource on best data practices, facilitates sharing data between states and federal agencies and the public, and offers streamlined and consistent data services that enable regional water data analysis and planning. The grant award would further the goals of the WaDE program as well as our state's collaborative working relationship with the Bureau of Reclamation.

As a member of the WSWC, we also support the WSWC's matching commitment of at least 50% towards this grant, including the in-kind contributions of our own state's staff.

Sincerely,

Tom Barrett

Tom Barrett, CPG
Water Resources Section Chief
Alaska Department of Natural Resources
Division of Mining, Land and Water

DOUGLAS A. DUCEY
Governor

THOMAS BUSCHATZKE
Director

ARIZONA DEPARTMENT of WATER RESOURCES
1110 West Washington Street, Suite 310
Phoenix, Arizona 85007
602.771.8500
azwater.gov

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: WSWC WaterSMART Grant Application, Funding Opportunity R21AS00289R21AS00289

To Whom It May Concern:

I am writing on behalf of the Arizona Department of Water Resources to express support for the Western States Water Council (WSWC) to apply for a WaterSMART grant under the Bureau of Reclamation's Applied Sciences Program for $200,000 over two years for the Water Data Exchange (WaDE) program and development of a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT).

Our state provides water data to the WaDE program and expends resources to ensure that the data is accurate and up to date. WaDE offers a platform for states to learn from each other on water data management, serves as a resource on best data practices, facilitates sharing data between states and federal agencies and the public, and offers streamlined and consistent data services that enable regional water data analysis and planning. The grant award would further the goals of the WaDE program as well as our state's collaborative working relationship with the Bureau of Reclamation.

As a member of the WSWC, we also support the WSWC's matching commitment of at least 50% towards this grant, including the in-kind contributions of our own state's staff.

Sincerely,

Thomas Buschatzke
Director

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

RE: WSWC WaterSMART Application – Funding Opportunity R21AS00289

To Whom It May Concern:

I am writing to provide strong support for the Western States Water Council's WaterSMART applied science proposal to fund the Water Data Exchange (WaDE) Program and its Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT). Once functional, it will provide unprecedented access to water rights and water use information across the West. This information is crucial for decision-making around water management, especially with ongoing drought conditions in the West that impact watershed and stream health, farmers, municipalities, our economy and the environment.

Environmental Defense Fund has significantly invested in tools to create access to data that can improve the ability to manage water resources. Most recently, this includes our Open Evapotranspiration (OpenET) platform that utilizes satellite-driven evapotranspiration models to operationally map daily and monthly field-level (0.25 acre) consumptive use from irrigated agriculture and reservoirs.

In a similar vein, WaDE complements our work by allowing users to identify, visualize and analyze water rights and water use information that are critical for understanding how and where water conservation can be most beneficial for watersheds and farmers. It also enables the ability to better leverage existing water management tools, such as water transfers, and would allow for the development of creative approaches to complex water resources problems that improve resiliency in the face of climate change.

We enthusiastically support the WSWC's WaDE Program and their WaterSMART proposal. Thank you for your consideration.

Sincerely,

Maurice Hall
Vice-President, Ecosystems - Water

1875 Connecticut Avenue, NW
Washington, DC 20009
T 202 387 3500
F 202 234 6049
edf.org

1320 Research Park Drive
Manhattan, KS 66502
785-564-6700
www. agriculture.ks.gov

Kansas
Department of Agriculture

900 SW Jackson, Room 456
Topeka, KS 66612
785-296-3556

Mike Beam, Secretary

Laura Kelly, Governor

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: WSWC WaterSMART Grant Application, Funding Opportunity R21AS00289R21AS00289

To Whom It May Concern:

I'm writing on behalf of the State of Kansas to express support for the Western States Water Council (WSWC) to apply for a WaterSMART grant under the Bureau of Reclamation's Applied Sciences Program for $200,000 over two years for the Water Data Exchange (WaDE) program and development of a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT).

Our state provides water data to the WaDE program and expends resources to ensure that the data is accurate and up-to-date. WaDE offers a platform for states to learn from each other on water data management, serves as a resource on best data practices, facilitates sharing data between states and federal agencies and the public, and offers streamlined and consistent data services that enable regional water data analysis and planning. The grant award would further the goals of the WaDE program as well as our state's collaborative working relationship with the Bureau of Reclamation.

As a member of the WSWC, we also support the WSWC's matching commitment of at least 50% towards this grant, including the in-kind contributions of our own state's staff.

Sincerely,

Earl D. Lewis, Jr. P.E.
Chief Engineer
Division of Water Resources

NEBRASKA

Good Life. Great Water.

DEPT. OF NATURAL RESOURCES

Pete Ricketts, Governor

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: WSWC WaterSMART Grant Application, Funding Opportunity R21AS00289R21AS00289

To Whom It May Concern:

I'm writing on behalf of the Nebraska Department of Natural Resources (NeDNR) to express support for the Western States Water Council (WSWC) to apply for a WaterSMART grant under the Bureau of Reclamation's Applied Sciences Program for $200,000 over two years for the Water Data Exchange (WaDE) program and development of a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT).

NeDNR provides water data to the WaDE program and expends resources to ensure that the data is accurate and up-to-date. WaDE offers a platform for states to learn from each other on water data management, serves as a resource on best data practices, facilitates sharing data between states and federal agencies and the public, and offers streamlined and consistent data services that enable regional water data analysis and planning. The grant award would further the goals of the WaDE program as well as our state's collaborative working relationship with the Bureau of Reclamation.

As a member of the WSWC, we also support the WSWC's matching commitment of at least 50% towards this grant, including the in-kind contributions of our own state's staff.

Sincerely,

Thomas E. Riley

Thomas E. Riley, P.E., Director

Thomas E. Riley, P.E., Director
Department of Natural Resources
301 Centennial Mall South
P.O. Box 94676
Lincoln, Nebraska 68509
OFFICE 402-471-2363
FAX 402-471-2900
dnr.nebraska.gov

NORTH Dakota | Water Commission
Be Legendary.™

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: WSWC WaterSMART Grant Application, Funding Opportunity R21AS00289R21AS00289

To Whom It May Concern:

I'm writing on behalf of the North Dakota State Engineer's Office to express support for the Western States Water Council (WSWC) to apply for a WaterSMART grant under the Bureau of Reclamation's Applied Sciences Program for $200,000 over two years for the Water Data Exchange (WaDE) program and development of a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT).

Our state provides water data to the WaDE program and expends resources to ensure that the data is accurate and up-to-date. WaDE offers a platform for states to learn from each other on water data management, serves as a resource on best data practices, facilitates sharing data between states and federal agencies and the public, and offers streamlined and consistent data services that enable regional water data analysis and planning. The grant award would further the goals of the WaDE program as well as our state's collaborative working relationship with the Bureau of Reclamation.

As a member of the WSWC, we also support the WSWC's matching commitment of at least 50% towards this grant, including the in-kind contributions of our own state's staff.

Sincerely,

John Paczkowski
Interim State Egineer

JULIE CUNNINGHAM
EXECUTIVE DIRECTOR

KEVIN STITT
GOVERNOR

OKLAHOMA
Water Resources Board

April 16, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: WSWC WaterSMART Grant Application, Funding Opportunity R21AS00289R21AS00289

To Whom It May Concern:

I'm writing on behalf of the Oklahoma Water Resources Board ("Board") to express support for the Western States Water Council (WSWC) to apply for a WaterSMART grant under the Bureau of Reclamation's Applied Sciences Program for $200,000 over two years for the Water Data Exchange (WaDE) program and development of a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT).

The Board provides water data to the WaDE program and expends resources to ensure that the data is accurate and up-to-date. WaDE offers a platform for states to learn from each other on water data management, serves as a resource on best data practices, facilitates sharing data between state and federal agencies and the public, and offers streamlined and consistent data services that enable regional water data analysis and planning. The grant award would further the goals of the WaDE program as well as our collaborative working relationship with the Bureau of Reclamation.

As a member of the WSWC, we also support the WSWC's matching commitment of at least 50% towards this grant, including the in-kind contributions of our own state's staff.

Sincerely,

Julie Cunningham
Executive Director

DEPARTMENT of AGRICULTURE and NATURAL RESOURCES
JOE FOSS BUILDING
523 E. CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: WSWC WaterSMART Grant Application, Funding Opportunity R21AS00289R21AS00289

To Whom It May Concern:

I'm writing on behalf of the South Dakota Department of Agriculture and Natural Resources to express support for the Western States Water Council (WSWC) to apply for a WaterSMART grant under the Bureau of Reclamation's Applied Sciences Program for $200,000 over two years for the Water Data Exchange (WaDE) program and development of a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT).

Our state provides water data to the WaDE program and expends resources to ensure that the data is accurate and up-to-date. WaDE offers a platform for states to learn from each other on water data management, serves as a resource on best data practices, facilitates sharing data between states and federal agencies and the public, and offers streamlined and consistent data services that enable regional water data analysis and planning. The grant award would further the goals of the WaDE program as well as our state's collaborative working relationship with the Bureau of Reclamation.

As a member of the WSWC, we also support the WSWC's matching commitment of at least 50% towards this grant, including the in-kind contributions of our own state's staff.

Sincerely,

Hunter Roberts
Secretary

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attention: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, Colorado 80225

Re: WSWC WaterSMART Grant Application, Funding Opportunity R21AS00289R21AS00289

To Whom It May Concern:

I'm writing on behalf of the Texas Commission on Environmental Quality to express support for the Western States Water Council's (WSWC's) application for a WaterSMART grant under the Bureau of Reclamation's Applied Sciences Program for $200,000 over two years for the Water Data Exchange (WaDE) program and development of a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT).

Texas provides current and accurate water data to the WaDE program, making a material investment in the quality of that data. The WaDE program, in turn, offers streamlined and consistent data services that enable regional water data analysis and planning. WaDE also offers a platform for states to work together on water data management issues, serving as a resource on best data practices and facilitating data sharing among the states and Reclamation, as well as other federal agencies and the public. The grant award would further the goals of the WaDE program as well as our state's collaborative working relationship with Reclamation.

As a member of the WSWC, we also support the WSWC's matching commitment of at least 50% towards this grant, including the in-kind contributions of our own agency's staff.

Sincerely,

Jon Niermann
Chairman

The Nature Conservancy
2424 Spruce Street
Boulder, CO 80302
nature.org/coriver

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: WSWC WaterSMART Application – Funding Opportunity R21AS00289

To Whom it May Concern:

I am writing to provide support for the Western States Water Council's WaterSMART proposal to fund the ongoing development of their Water Data Exchange (WaDE) Program and a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool. Once functional, this work will provide unprecedented access to water rights information across the West. While already public, this information is currently difficult and cumbersome to access. The ability to quickly and easily get this important information on water rights across the West would allow for better management of our water resources and greater opportunities for improving water management to benefit people and nature.

The Nature Conservancy's Colorado River Program works throughout the Colorado River Basin to protect and restore healthy rivers in partnership with local communities. We have a strong commitment to environmental conservation that also benefits the people that rely on the landscapes and waterways we are working to protect. WSWC's WaDE Program and this tool will help us and our partners get the information we need for our work – allowing us to identify and explore opportunities to improve conservation efforts and increase instream flows.

We enthusiastically support the WaDE Program and are happy to support their WaterSMART proposal. Thank you for your consideration.

Sincerely,

Taylor Hawes
The Nature Conservancy
Colorado River Program Manager

UPPER COLORADO
RIVER COMMISSION
355 South 400 East • Salt Lake City, UT 84111 • 801-531-1150 • www.ucrcommission.com

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: WSWC WaterSMART Application – Funding Opportunity R21AS00289

To Whom it May Concern:

The Upper Colorado River Commission supports the Western States Water Council's WaterSMART proposal to fund the development of their Water Data Exchange (WaDE) Program and a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT). WaDE will fill a data gap in water rights administration by creating a tool that allows users to identify, visualize, and analyze water rights information quickly and more easily. This information is often difficult to access and thus difficult to use for water management, despite it largely being public information.

We thank you for your consideration of WSWC's WaDE proposal for WaterSMART grant funding. We believe the work proposed by WSWC, if funded, will help fill an important data gap in the Upper Colorado River Basin.

Sincerely,

Amy I. Haas

Amy Haas
Executive Director
Upper Colorado River Commission

SPENCER J. COX
Governor

DEIDRE HENDERSON
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES

BRIAN C. STEED
Executive Director

Division of Water Resources

Todd D. Adams
Division Director

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: WSWC WaterSMART Grant Application, Funding Opportunity R21AS00289R21AS00289

To Whom It May Concern:

I am writing on behalf of the Utah Division of Water Resources to express support for the Western States Water Council's (WSWC) WaterSMART grant application under the Bureau of Reclamation's Applied Sciences Program. This application requests $200,000 over two years for WSWC's Water Data Exchange (WaDE) program and to develop a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT).

Our state provides water data to the WaDE program and expends resources to ensure that the data is accurate and up-to-date. WaDE offers a platform for states to learn from each other on water data management, serves as a resource on best data practices, facilitates sharing data between states and federal agencies and the public, and offers streamlined and consistent data services that enable regional water data analysis and planning. The grant award would further the goals of the WaDE program as well as our state's collaborative working relationship with the Bureau of Reclamation.

As a member of the WSWC, we also support the WSWC's matching commitment of at least 50% towards this grant, including the in-kind contributions of our own state's staff.

Sincerely,

Todd D. Adams

Todd D. Adams, PE
Director

1594 West North Temple, Suite 310, PO Box 146201, Salt Lake City, UT 84114-6201
telephone (801) 538-7230 • facsimile (801) 538-7279 • TTY (801) 538-7458 • *www.water.utah.gov*

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: WSWC WaterSMART Grant Application, Funding Opportunity R21AS00289R21AS00289

To Whom It May Concern:

I'm writing on behalf of the Washington State Department of Ecology's Water Resources Program to express support for the Western States Water Council (WSWC) application for a WaterSMART grant under the Bureau of Reclamation's Applied Sciences Program for $200,000 over two years for the Water Data Exchange (WaDE) program and development of a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT).

Our state provides water data to the WaDE program and expends resources to ensure that the data is accurate and up-to-date. WaDE offers a platform for states to learn from each other on water data management, serves as a resource on best data practices, facilitates sharing data between states and federal agencies and the public, and offers streamlined and consistent data services that enable regional water data analysis and planning. The grant award would further the goals of the WaDE program as well as our state's collaborative working relationship with the Bureau of Reclamation.

As a member of the WSWC, we also support the WSWC's matching commitment of at least 50% towards this grant, including the in-kind contributions of our own state's staff.

Sincerely,

Mary Verner

Mary Verner
Water Resources Program Manager
Washington State Department of Ecology
mary.verner@ecy.wa.gov Cell phone/voicemail/text: 360-280-2826

WESTERN STATES WATER COUNCIL

682 East Vine Street, Suite 7 / Murray, Utah 84107 / (801) 685-2555 / FAX (801) 685-2559

Web Page: www.westernstateswater.org

April 21, 2021

Bureau of Reclamation
Financial Assistance Support Section
Attn: Applied Science NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225

Re: Financial Commitment, WaterSMART Funding Opportunity R21AS00289

To Whom It May Concern:

The Western States Water Council (WSWC) is a state government entity and instrumentality of each of the seventeen Reclamation States. As a Category A entity, in response to the Bureau of Reclamation's Applied Science Grants Notice of Funding Opportunity (NOFO), the WSWC is submitting the accompanying grant proposal for completion of a Western Water Rights and Aggregate Water Use Data Access and Analysis Tool (WestDAAT). Our grant award application requests $200,000 over the next two years to stand up WestDAAT, moving from an existing and tested prototype to full operational functionality. As part of this project, working with Reclamation, the WSWC will also identify by state, basin, and project Reclamation's existing state-based water rights and incorporate that information into WestDAAT.

This letter provides a firm commitment from the WSWC that we are prepared to meet the non-federal matching requirement with up to $200,000, for a minimum 50% of the total project costs. The WSWC already has reserve funds sufficient to cover the $200,000 minimum commitment. The Internet of Water (IOW) has also secured approval of funding from a major corporate trust, and related contracts and commitments will be completed this summer. IOW has provided support for the WSWC's Water Data Exchange (WaDE) program over the past two-years and is committed to support our WaDE/WestDAAT project at a level of $150,000/year over the next five years. A final agreement will be complete by October 2021.

Other philanthropic organizations have supported WaDE and the development of the WestDAAT prototype, including the Moore Foundation and the Walton Foundation, individually and as part of a Water Funders coalition. We are approaching these and other organizations and agencies for additional support to launch WestDAAT, though we do not currently have firm commitments or amounts.

Additionally, our member states (through state agency staff) have and will continue to contribute many hours of in-kind services to ensure the long-term success of the WaDE/WestDAAT project. Much of the water data shared on the WaDE platform is provided and updated by agencies in our member states, involving many hours of coordinated effort. Moreover, they are involved in WaDE review and outreach activities, and will provide direction for the WestDAAT project.

Over the next five years, we anticipate we will be able to combine all these resources to leverage the currently requested federal funds by a factor of 4-5.

We appreciate your consideration of our application and look forward to working with the Bureau of Reclamation to improve water data access and analysis across the West.

Sincerely,

Jennifer L. Verleger
WSWC Chair

Tony Willardson
WSWC Executive Director


CANADA
Columbia River Basin
Missouri River Basin
Klamath River Basin
Truckee - Carson River Basin
Sacramento - San Joaquin River Basin
Colorado River Basin
Rio Grande Basin
MEXICO
Gulf of Mexico
N
W
E
S
0
250
500
1,000
Miles