The WSWC Water Data Exchange (WaDE) Program: Architecture 2.0

The Second Roundtable on Colorado River Basin Data and Modeling
May 27, 2020

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WESTERN STATES WATER COUNCIL

Outline

- Why WaDE?
- How can WaDE help your state agency?
- Why WaDE 2.0? An overview of its design
- Portal Development and Demo
- Next Steps

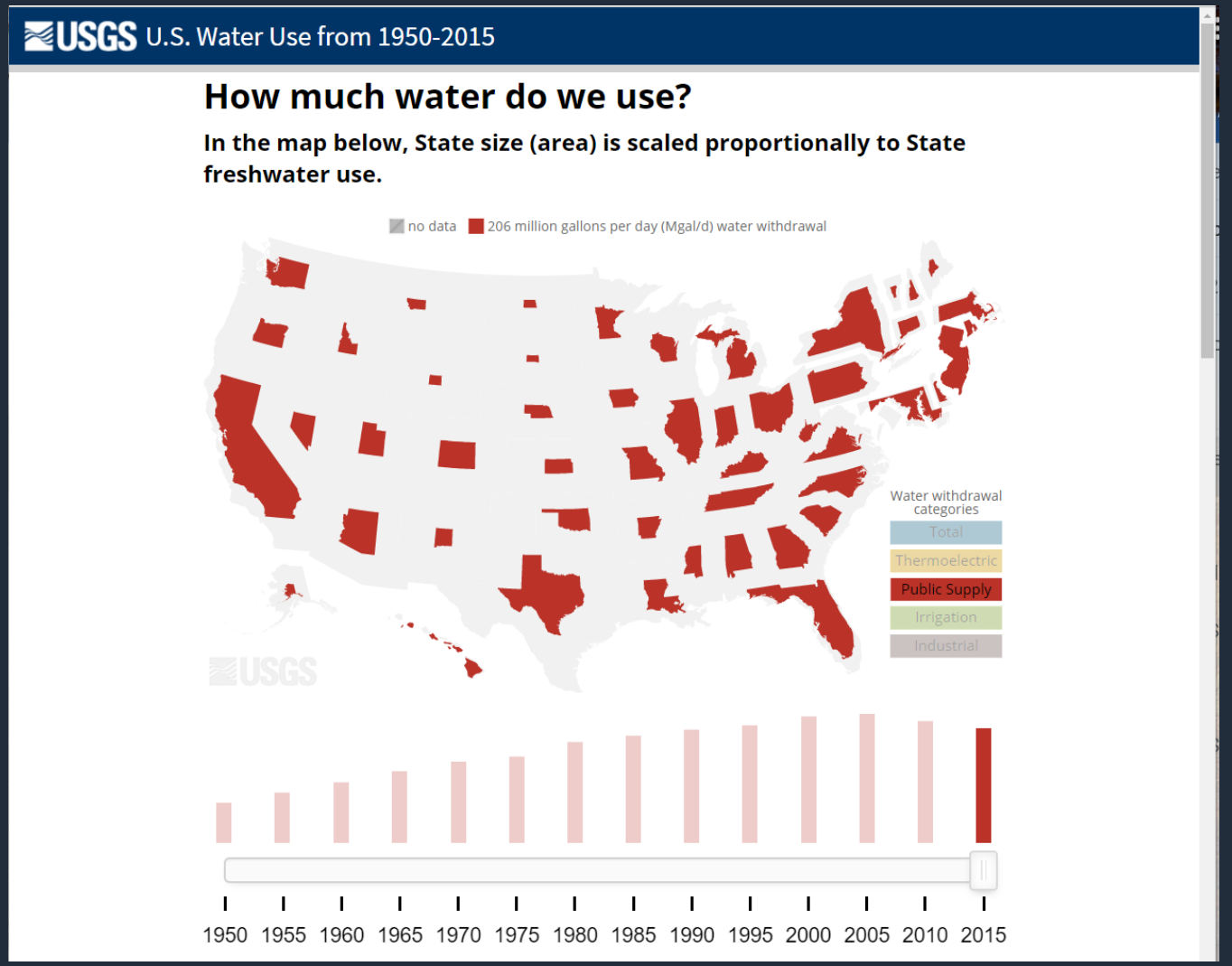
Why WaDE?

How much water is there? What is its quality? How is it currently being used?

“State primacy is fundamental to a sustainable water future”

“to formulate a strategy and to develop a framework for its member states to begin to share important water supply, water use, and water administration datasets with each other, with federal partners, and with the public”

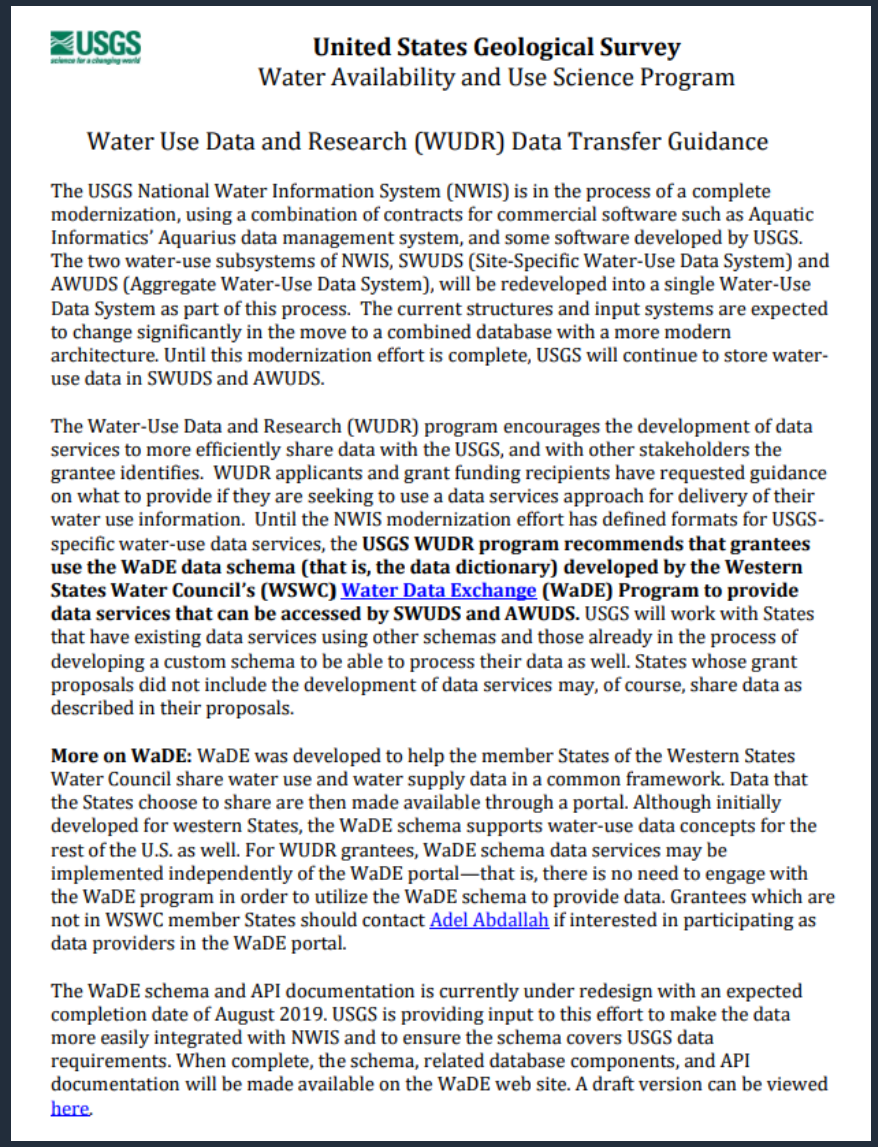
USGS National Water Use Estimates



https://owi.usgs.gov/vizlab/water-use/

How can WaDE help your state agency?

- A resource to learn from what other states are doing on water data and sharing
- Potential funding to western states' agencies
- Technical support to help you share your data/metadata for WUDR grants



United States Geological Survey
Water Availability and Use Science Program

Water Use Data and Research (WUDR) Data Transfer Guidance

The USGS National Water Information System (NWIS) is in the process of a complete modernization, using a combination of contracts for commercial software such as Aquatic Informatics' Aquarius data management system, and some software developed by USGS. The two water-use subsystems of NWIS, SWUDS (Site-Specific Water-Use Data System) and AWUDS (Aggregate Water-Use Data System), will be redeveloped into a single Water-Use Data System as part of this process. The current structures and input systems are expected to change significantly in the move to a combined database with a more modern architecture. Until this modernization effort is complete, USGS will continue to store water-use data in SWUDS and AWUDS.

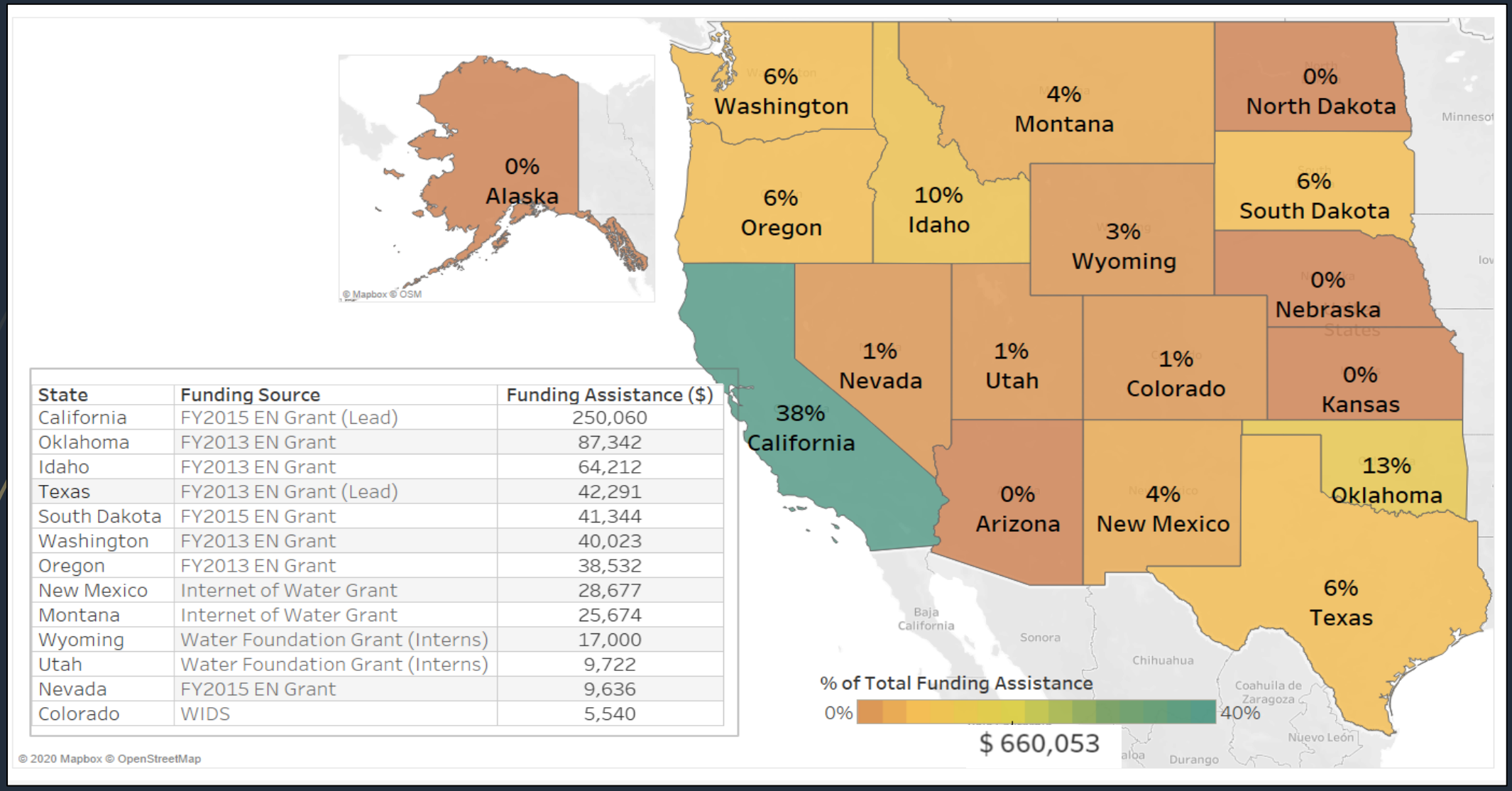
The Water-Use Data and Research (WUDR) program encourages the development of data services to more efficiently share data with the USGS, and with other stakeholders the grantee identifies. WUDR applicants and grant funding recipients have requested guidance on what to provide if they are seeking to use a data services approach for delivery of their water use information. Until the NWIS modernization effort has defined formats for USGS-specific water-use data services, the **USGS WUDR program recommends that grantees use the WaDE data schema (that is, the data dictionary) developed by the Western States Water Council's (WSWC) Water Data Exchange (WaDE) Program to provide data services that can be accessed by SWUDS and AWUDS.** USGS will work with States that have existing data services using other schemas and those already in the process of developing a custom schema to be able to process their data as well. States whose grant proposals did not include the development of data services may, of course, share data as described in their proposals.

More on WaDE: WaDE was developed to help the member States of the Western States Water Council share water use and water supply data in a common framework. Data that the States choose to share are then made available through a portal. Although initially developed for western States, the WaDE schema supports water-use data concepts for the rest of the U.S. as well. For WUDR grantees, WaDE schema data services may be implemented independently of the WaDE portal—that is, there is no need to engage with the WaDE program in order to utilize the WaDE schema to provide data. Grantees which are not in WSWC member States should contact Adel Abdallah if interested in participating as data providers in the WaDE portal.

The WaDE schema and API documentation is currently under redesign with an expected completion date of August 2019. USGS is providing input to this effort to make the data more easily integrated with NWIS and to ensure the schema covers USGS data requirements. When complete, the schema, related database components, and API documentation will be made available on the WaDE web site. A draft version can be viewed here.

https://water.usgs.gov/wausp/wudr/files/WUDR-USGS-data-transfer-guidance.pdf

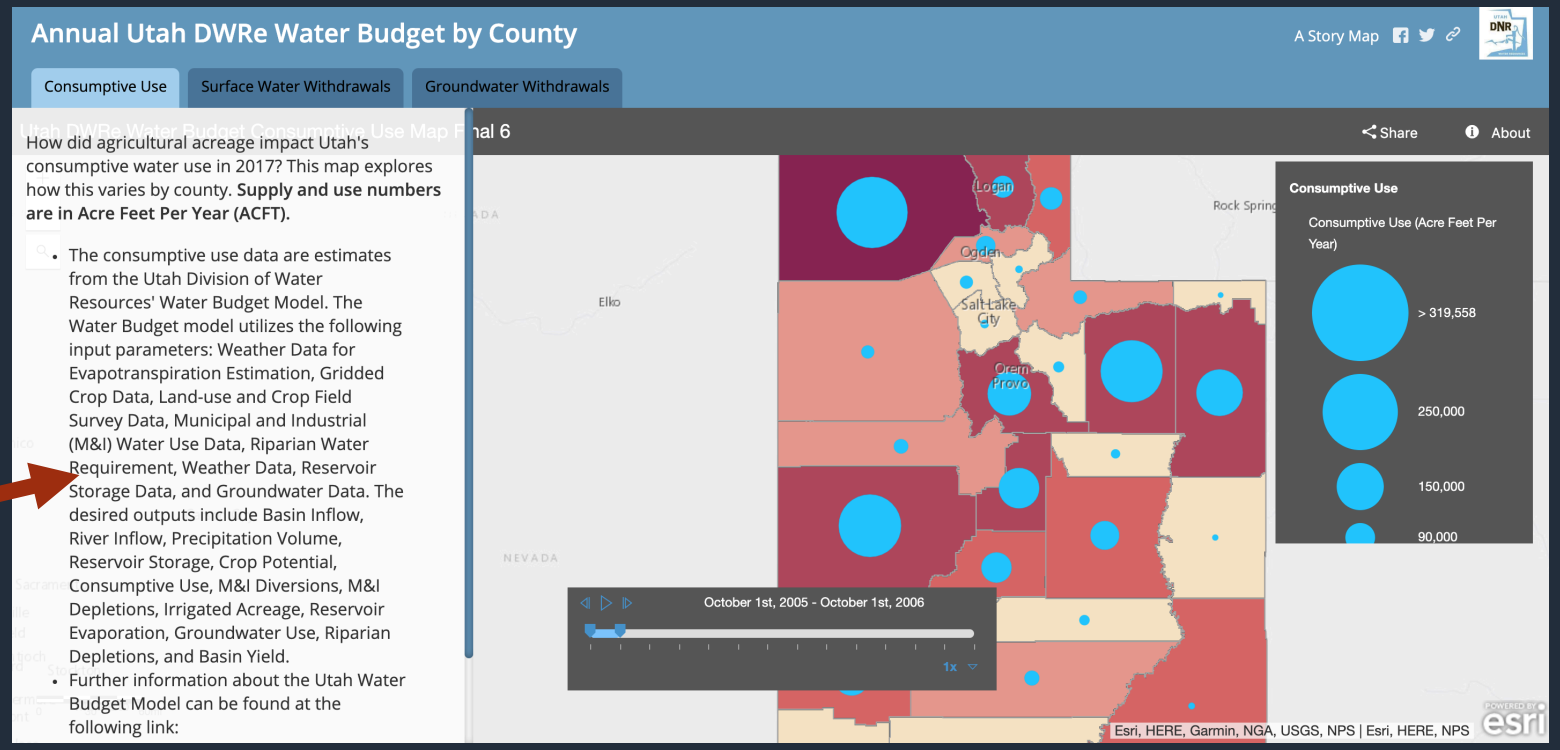
Assistance to Secure Funding to Member States



State	Funding Source	Funding Assistance ($)
California	FY2015 EN Grant (Lead)	250,060
Oklahoma	FY2013 EN Grant	87,342
Idaho	FY2013 EN Grant	64,212
Texas	FY2013 EN Grant (Lead)	42,291
South Dakota	FY2015 EN Grant	41,344
Washington	FY2013 EN Grant	40,023
Oregon	FY2013 EN Grant	38,532
New Mexico	Internet of Water Grant	28,677
Montana	Internet of Water Grant	25,674
Wyoming	Water Foundation Grant (Interns)	17,000
Utah	Water Foundation Grant (Interns)	9,722
Nevada	FY2015 EN Grant	9,636
Colorado	WIDS	5,540

Technical Assistance to Member States

Utah



Microsoft® SQL Server®

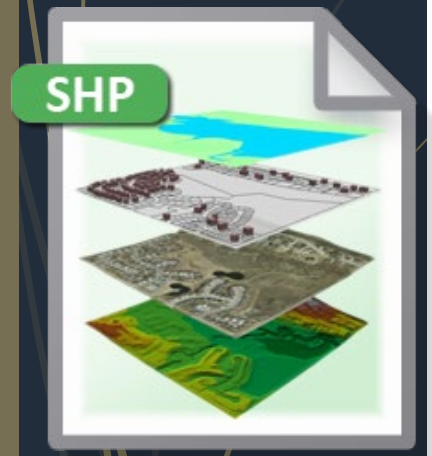
WaDE 2.0

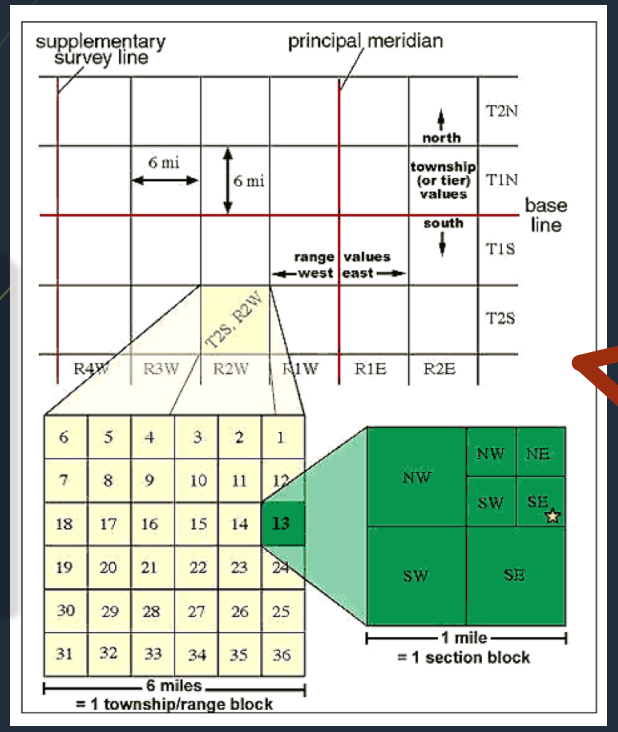
Open Data

esri

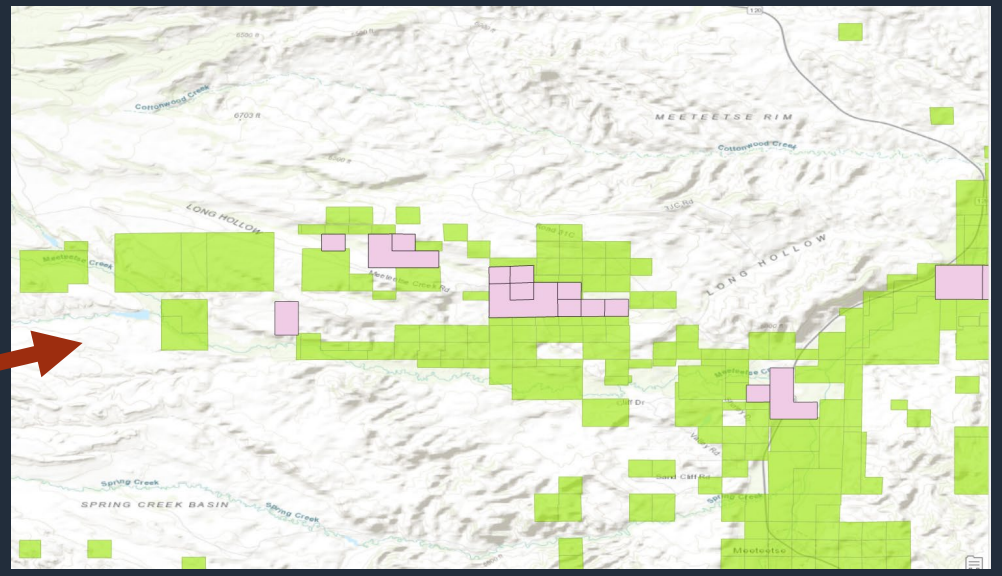
Technical Assistance to Member States

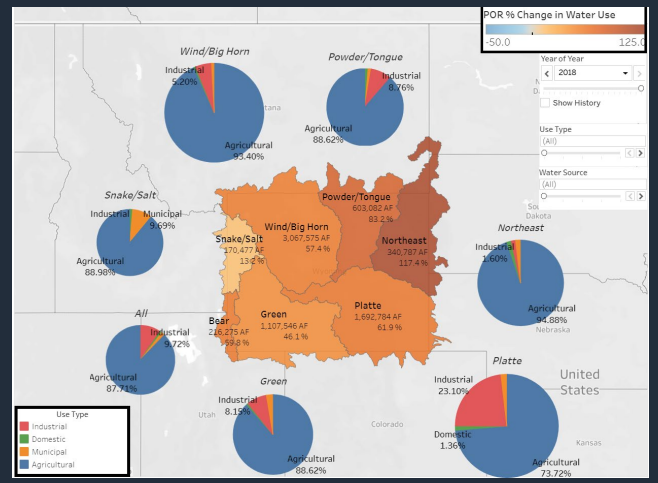
Wyoming





Linen Plat scans





WaDE 2.0

Financial Assistance to Member States
New Mexico

- Georeference about 1,600 hydrographic survey and water right filling Maps
- Enhance NM Office of State Engineer's water rights administrating and adjudication process using the digitized maps
- Share water rights data through WaDE

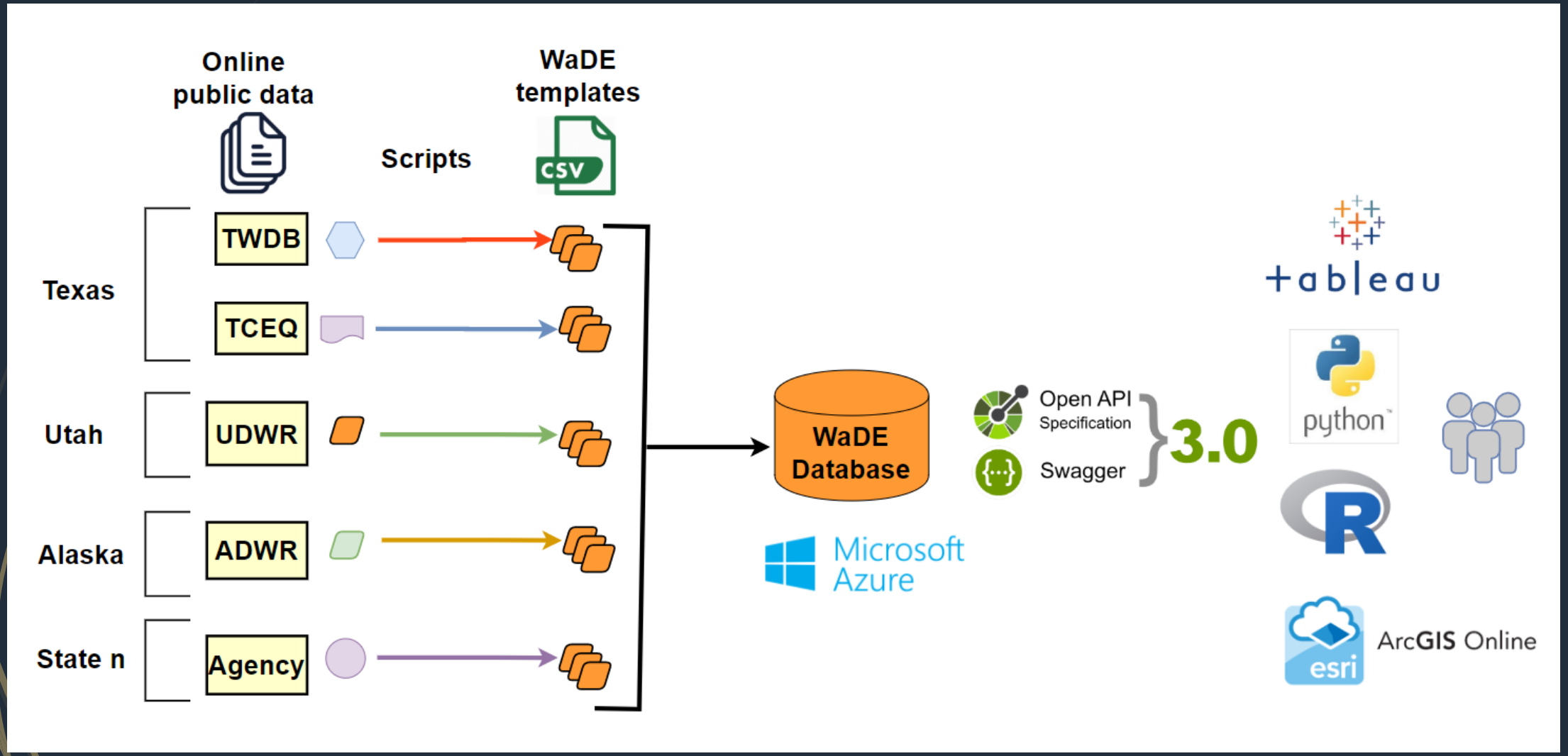
Why WaDE 2.0?

- Improve scalability, monitoring, updates, and efficiency
- Support geospatial and time series water use data in a centralized system
- Agreed-upon metadata and vocabularies across the Councils' members and with USGS

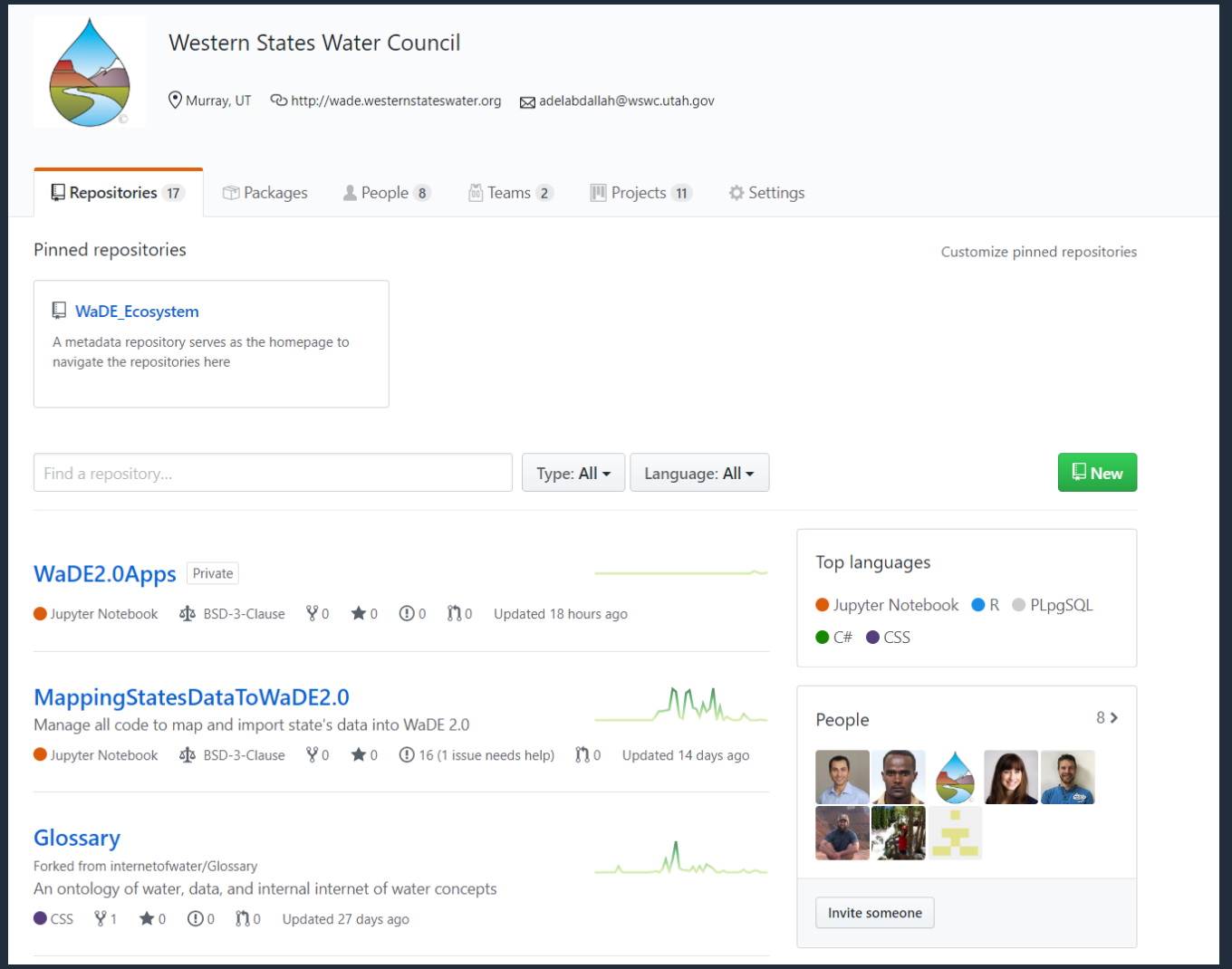
Questions WaDE 2.0 is designed to answer

- What are the appropriated water rights in an area sorted by date? List their beneficial use (s)
- What is the annual water budget in a watershed over time?
- How much water is being used in a location over time and for what purpose?
- What are the regulatory constraints in a watershed?

WaDE 2.0 Architecture

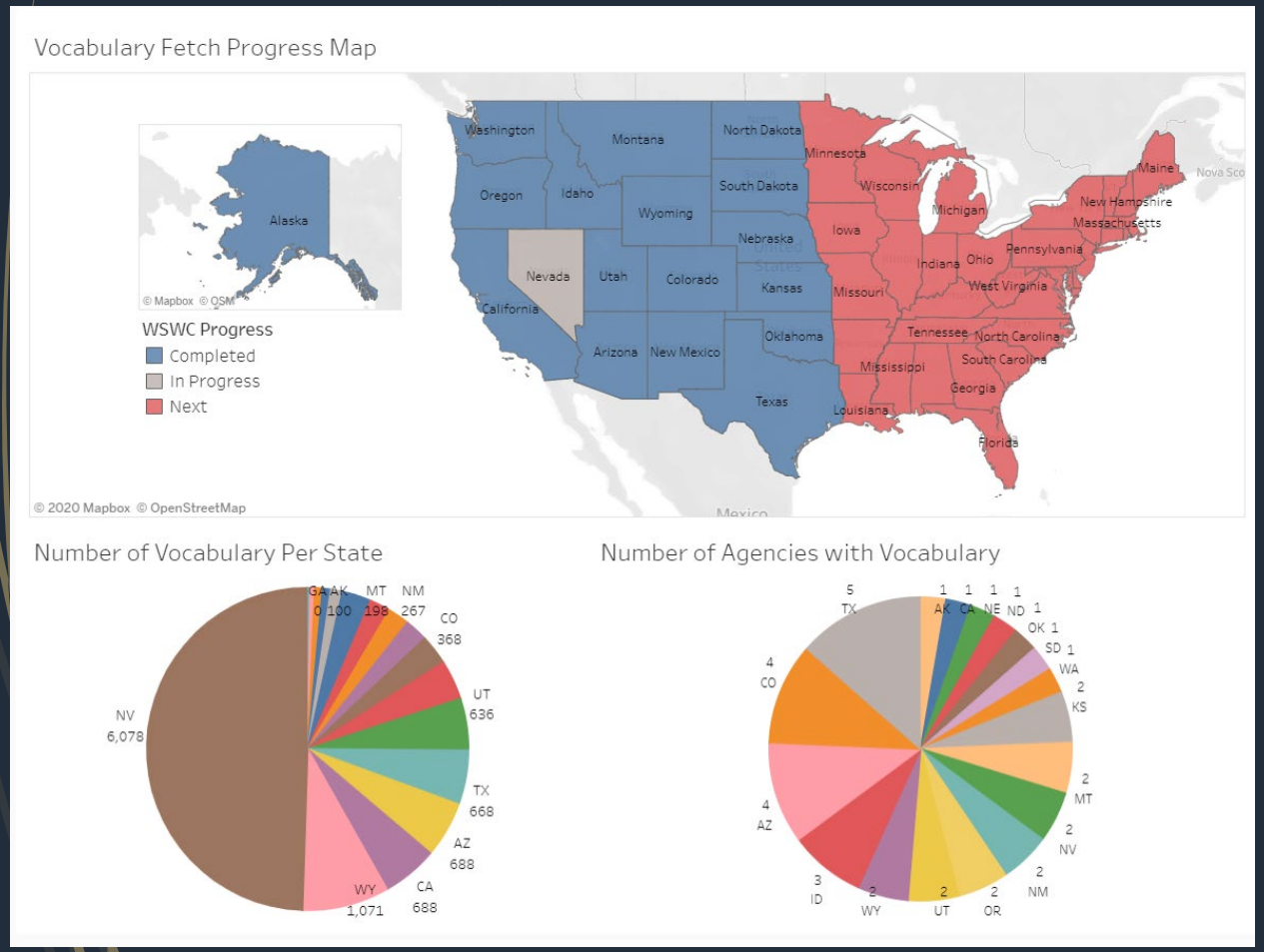


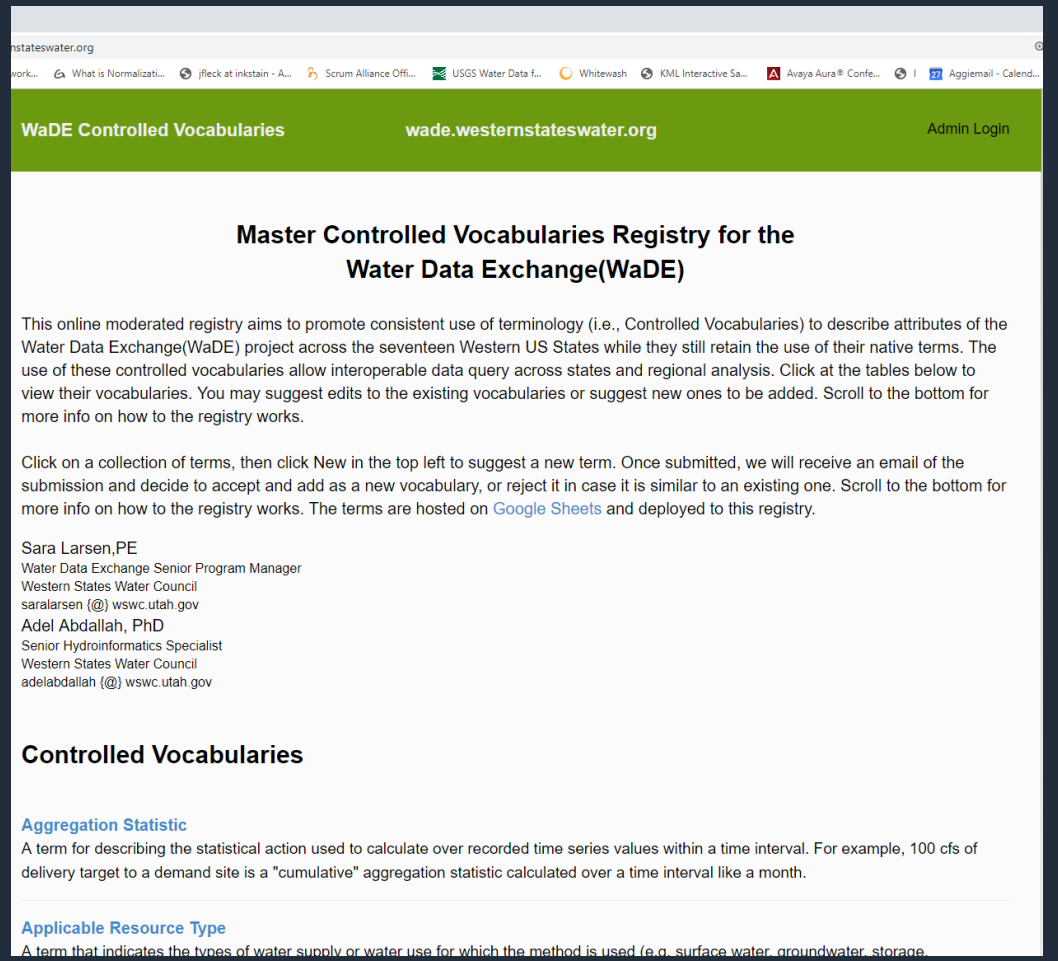
Track WaDE Progress on GitHub



https://github.com/WSWCWaterDataExchange/

WaDE 2.0 Controlled Vocabulary

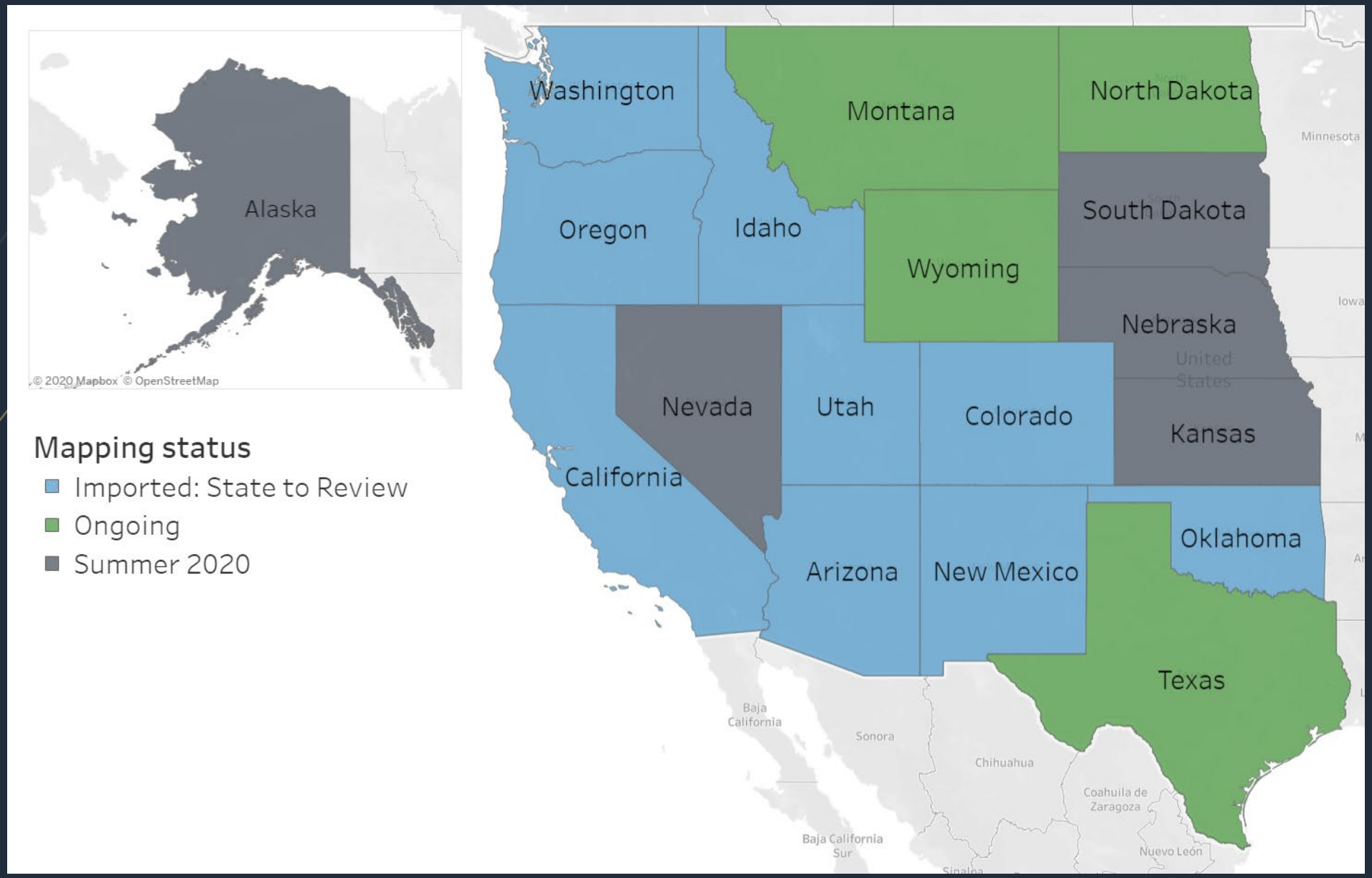




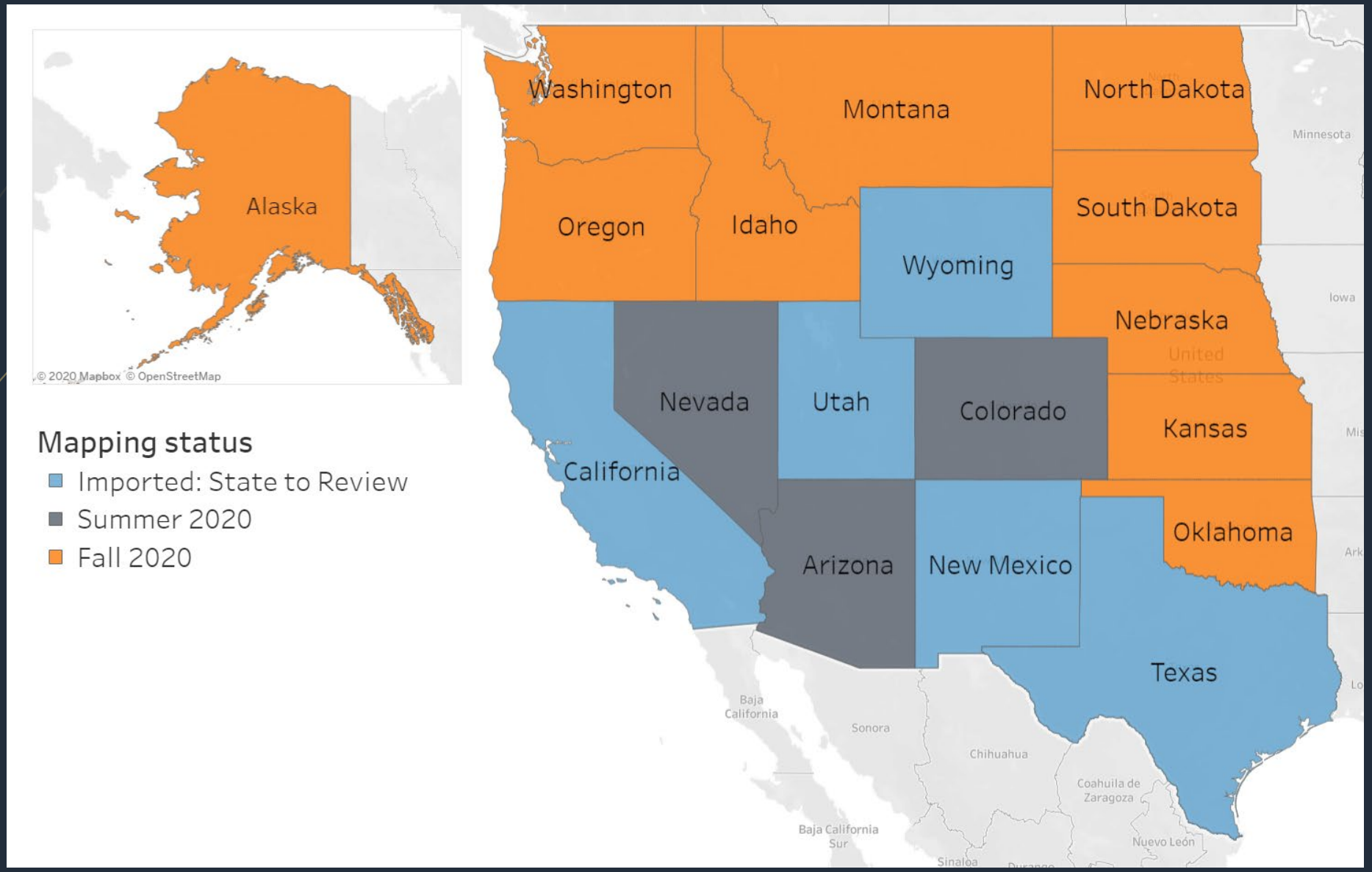
https://internetofwater.shinyapps.io/Glossary/#section-help-identify-synonyms3

http://vocabulary.westernstateswater.org/

Water Rights Data Mapping Status



Aggregate Water Use Data Mapping Status



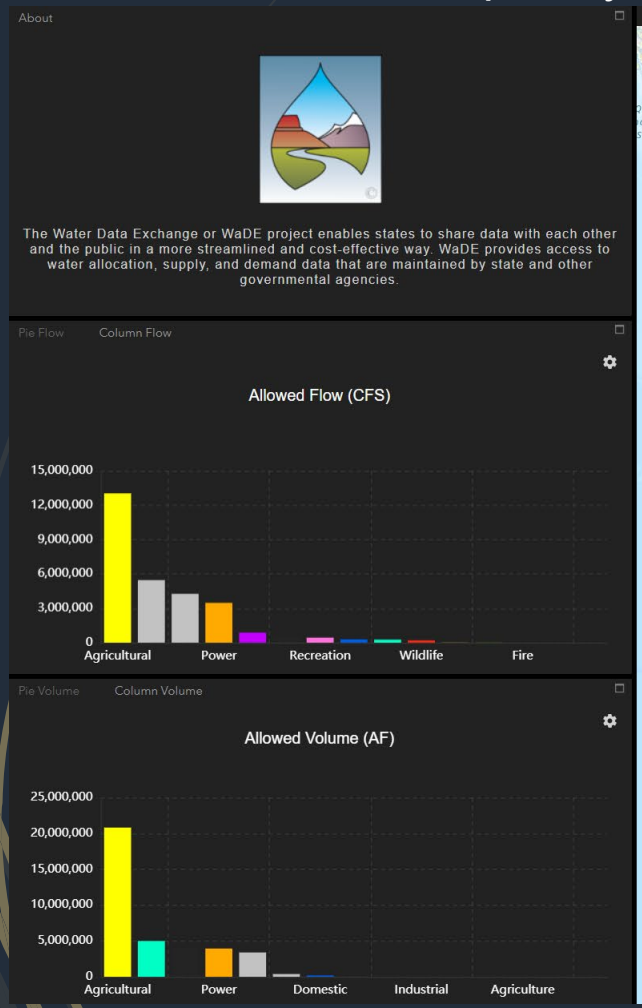
Web Tool and Portal Development for WaDE 2.0

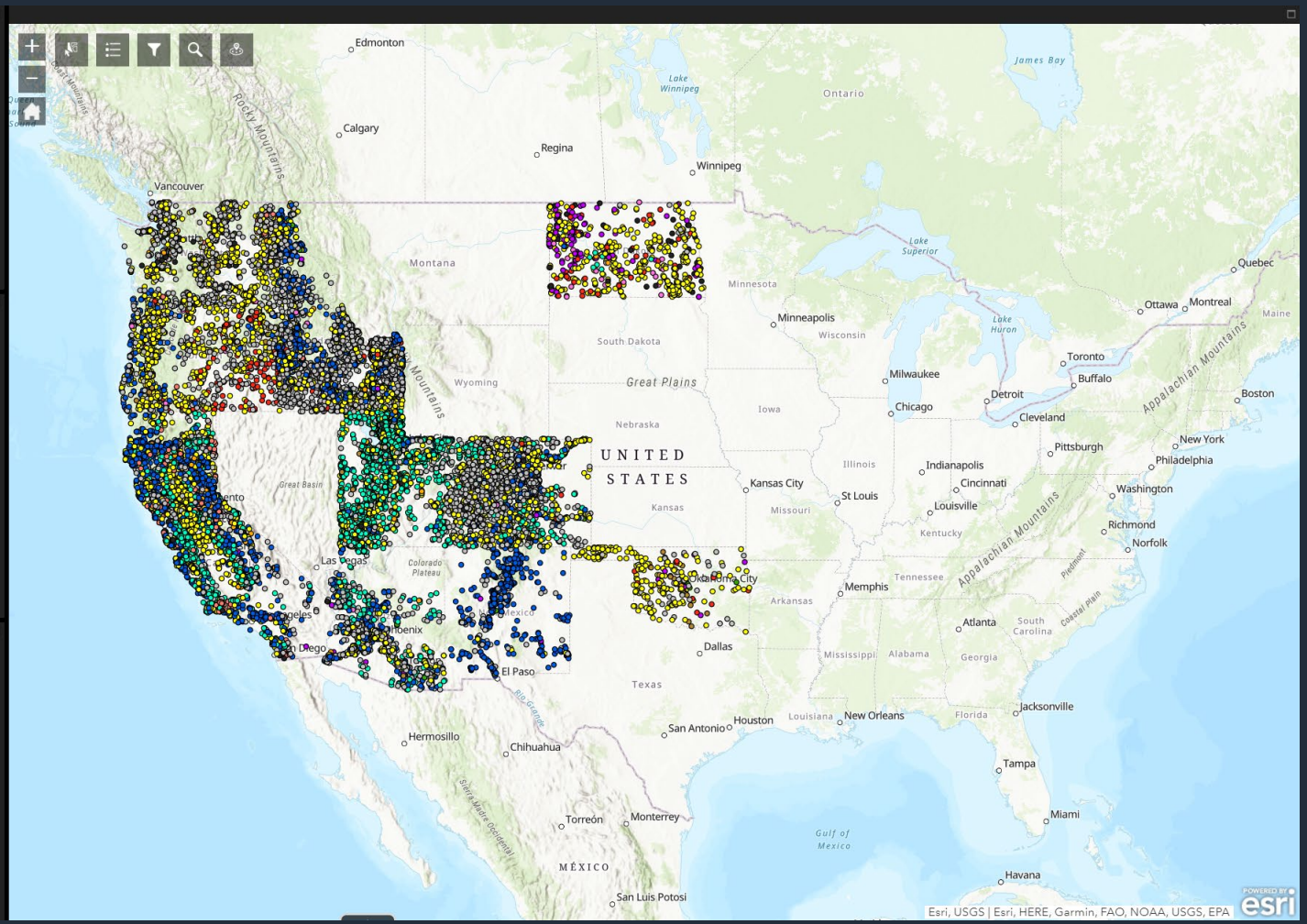
- Explored Platforms: ESRI, Tableau, Power-BI, CARTO, R Shiny
- Each Platform has strengths but cannot support our full uses cases

  (i.e., issues of optimization, budget constraints, hosting services, UI development)
- Exploring the option to outsource to an IT contractor for the custom development of WaDE 2.0 Portal
- Today's demo on R Shiny (Demo Purposes Only)

Web Tool #1: Allocation (Water Rights) Point of Diversion Site Information

- **DEMO:** Find all Water Rights near Starvation Reservoir, UT, that are associated with Agricultural for beneficial use and have priority date of 1920 or earlier.

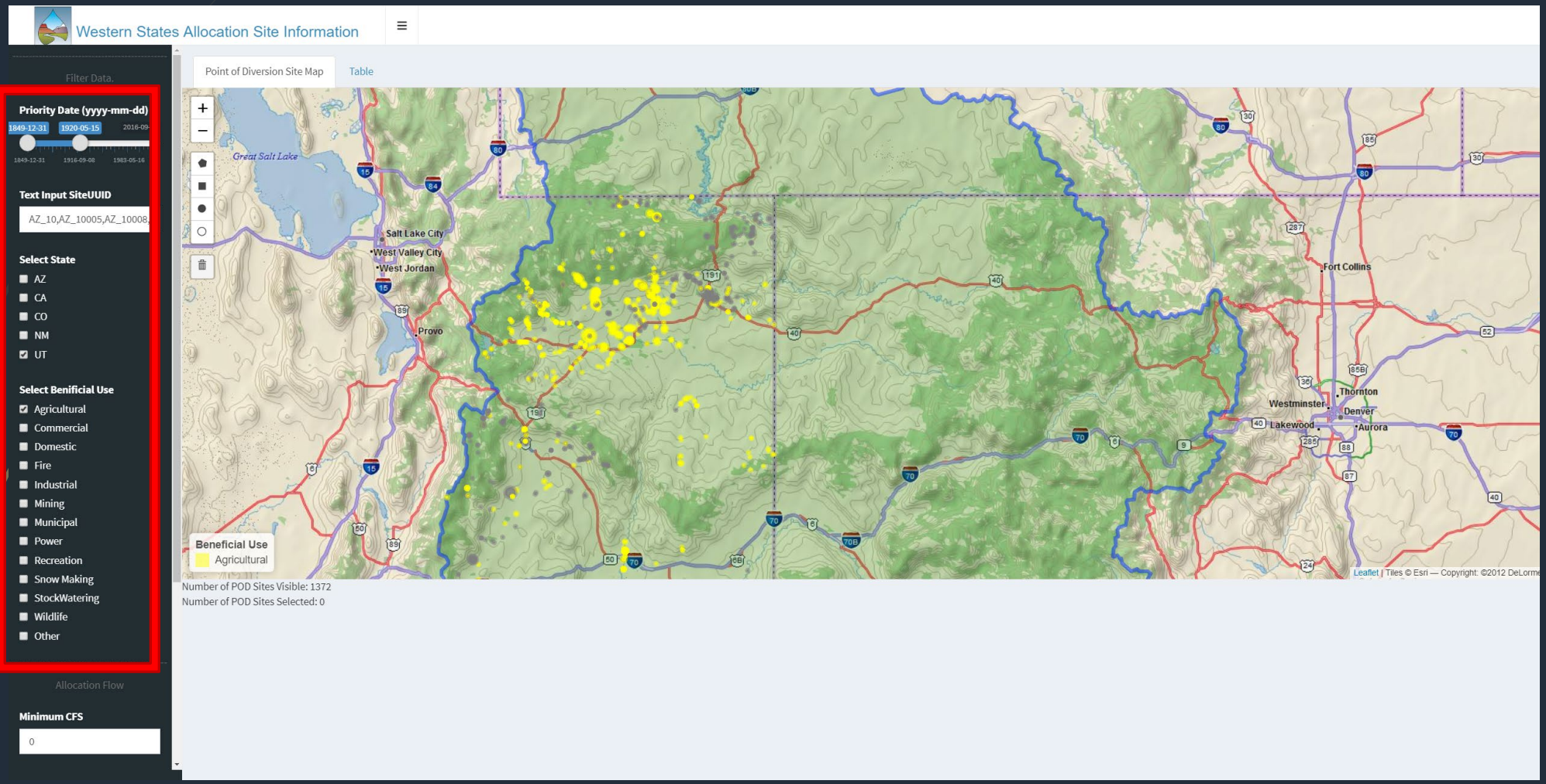




(ESRI Sample)

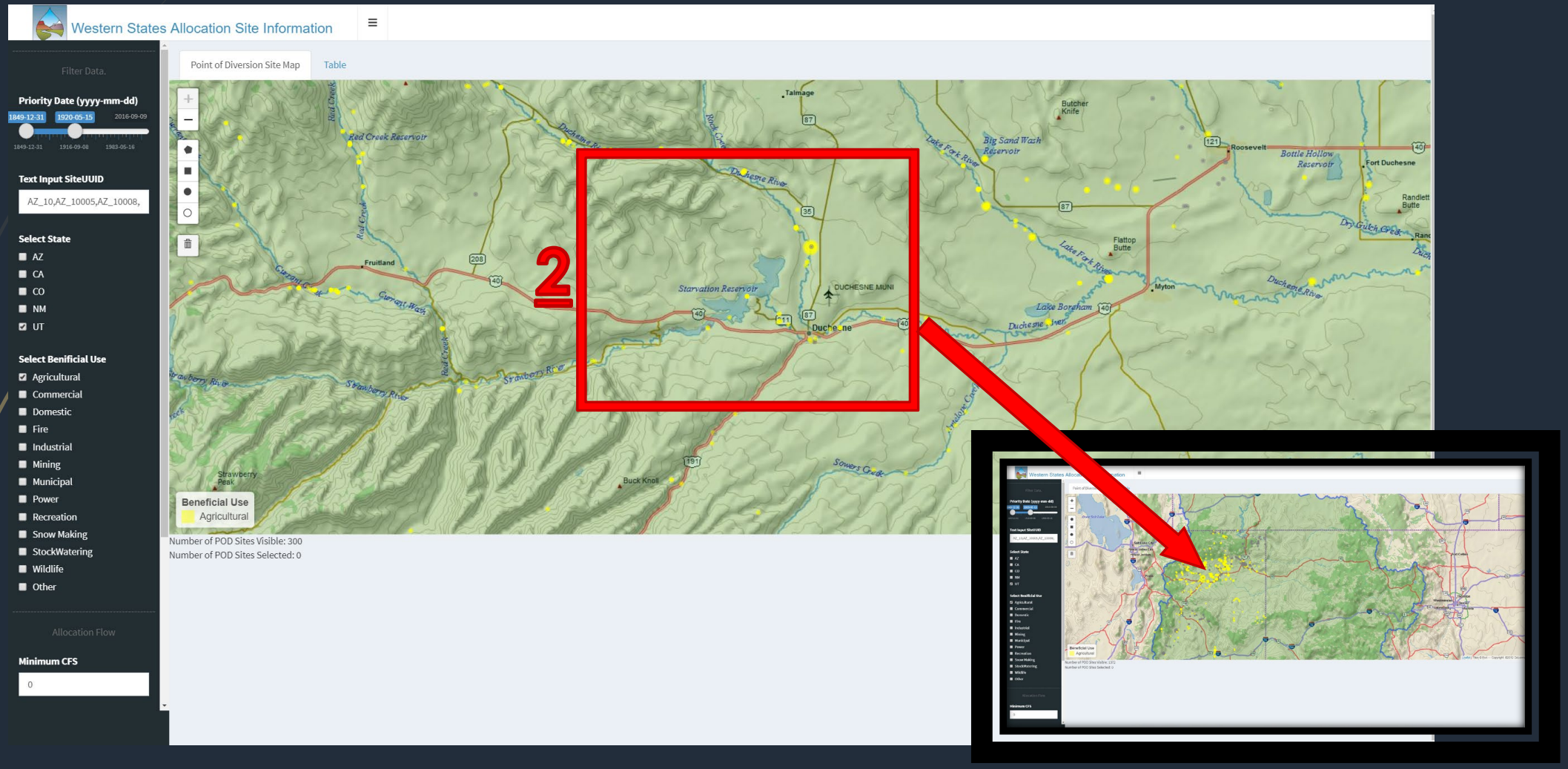
Web Tool #1: Demo Step 1

Filter Options	Example
1) Filter out sites based on 1) Priority Date, 2) State, 3) Beneficial Use, and 4) minimum and maximum Flow (CFS & AF).	• State: Utah • Beneficial Use: Agricultural • Priority Date: 1920 – 05 – 15 (yyyy-mm-dd)



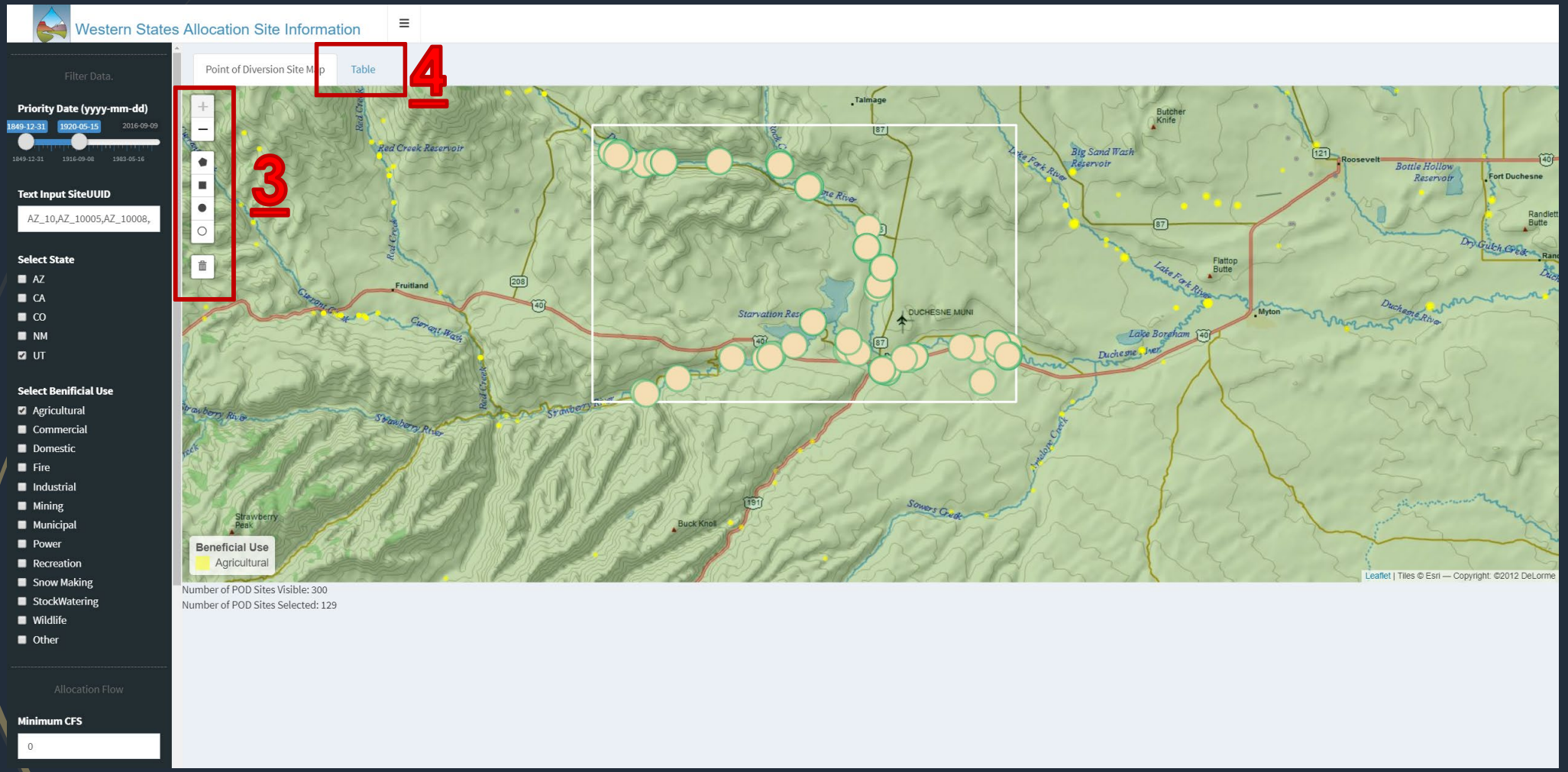
Web Tool #1: Demo Step 2

Map Search	Example
2) Search location on map	• Location of Interest: Starvation Reservoir, UT.



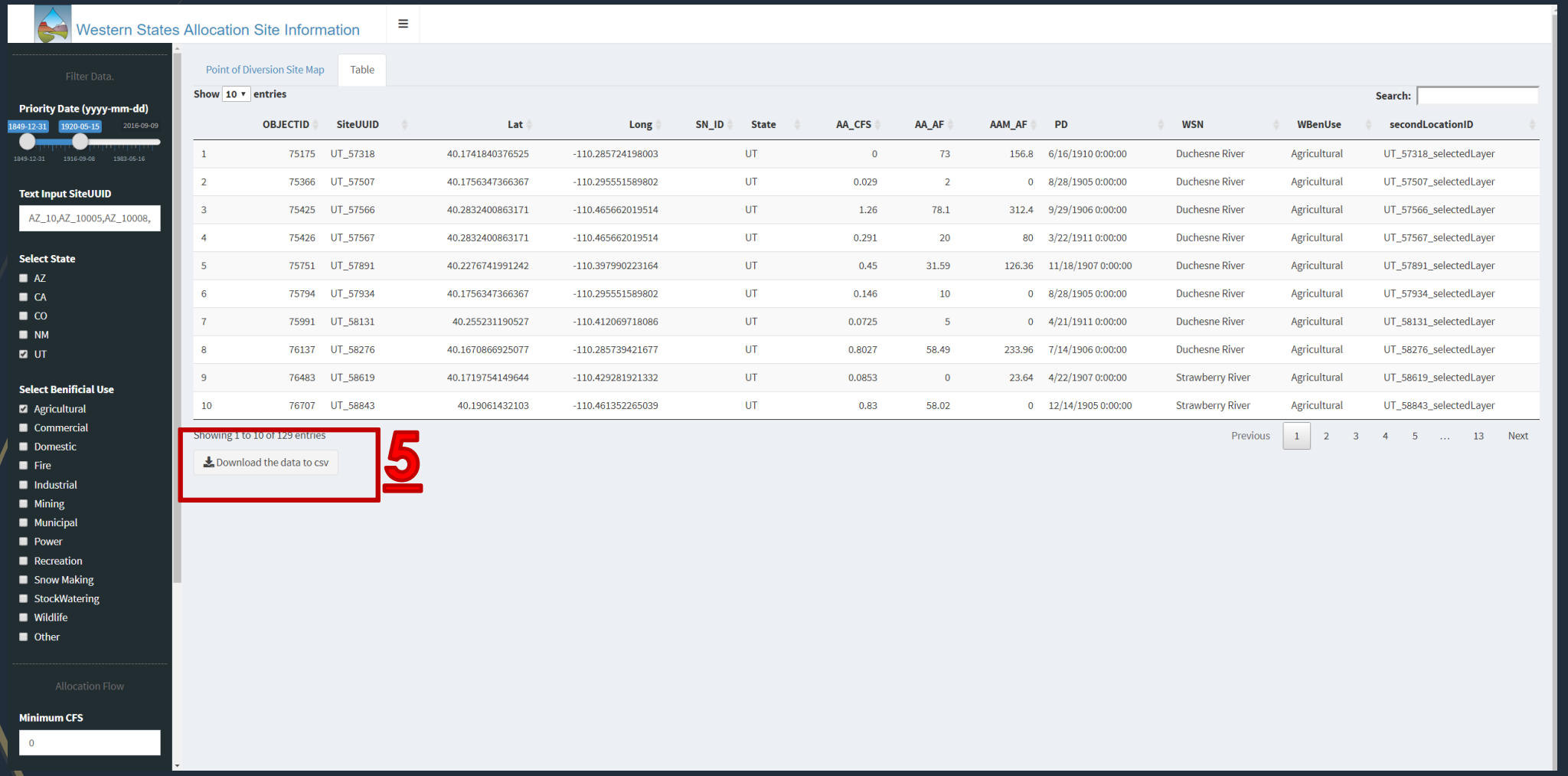
Web Tool #1: Demo Step 3

Draw Tools Selection	Example
3) Select sites using draw tools. **4)** View select sites.	• Draw Tools: Draw rectangle around sites of interest



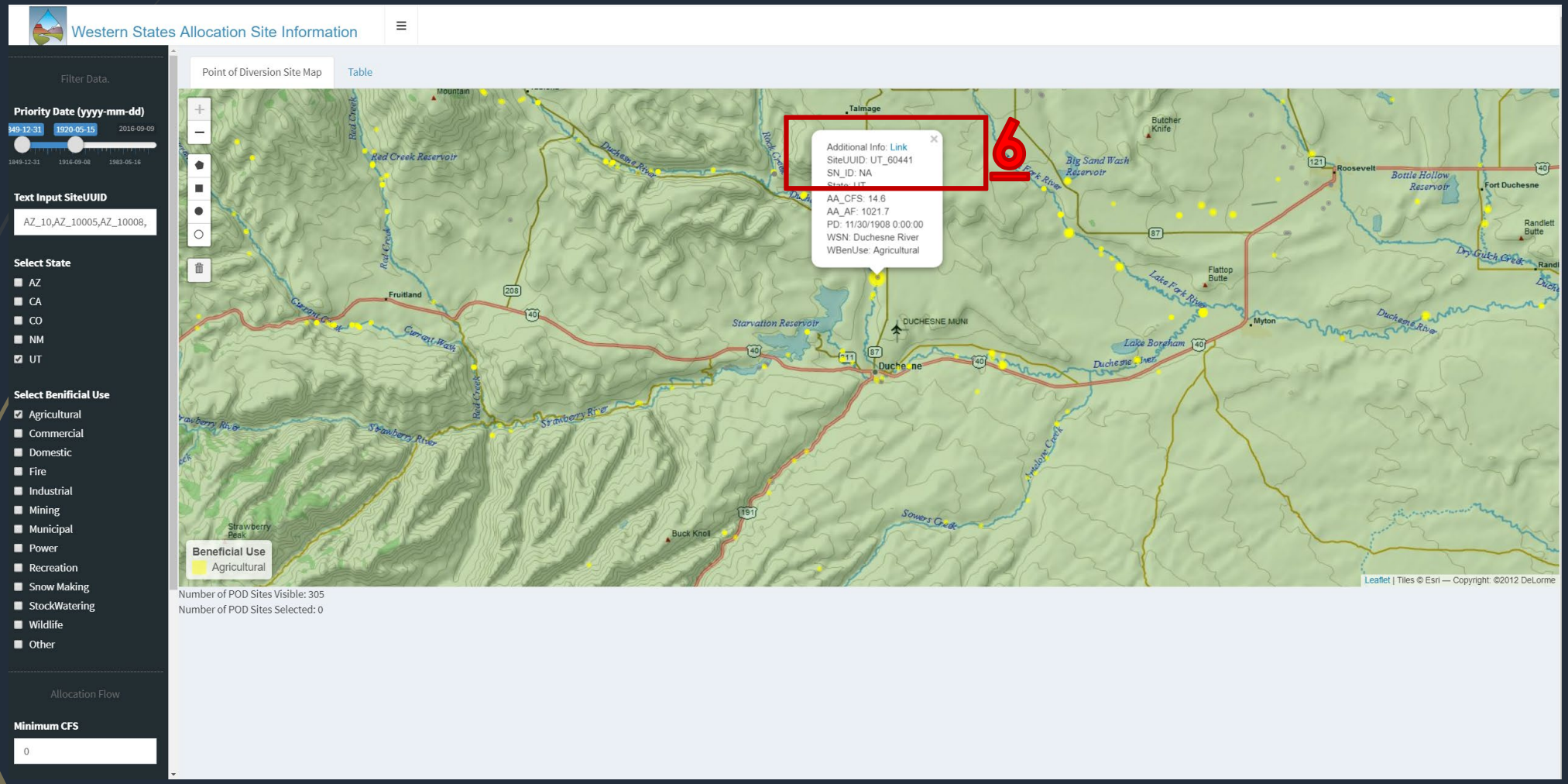
Web Tool #1: Demo Step 4

Download Sites to Excel	Example
5) Download select sites to excel.	



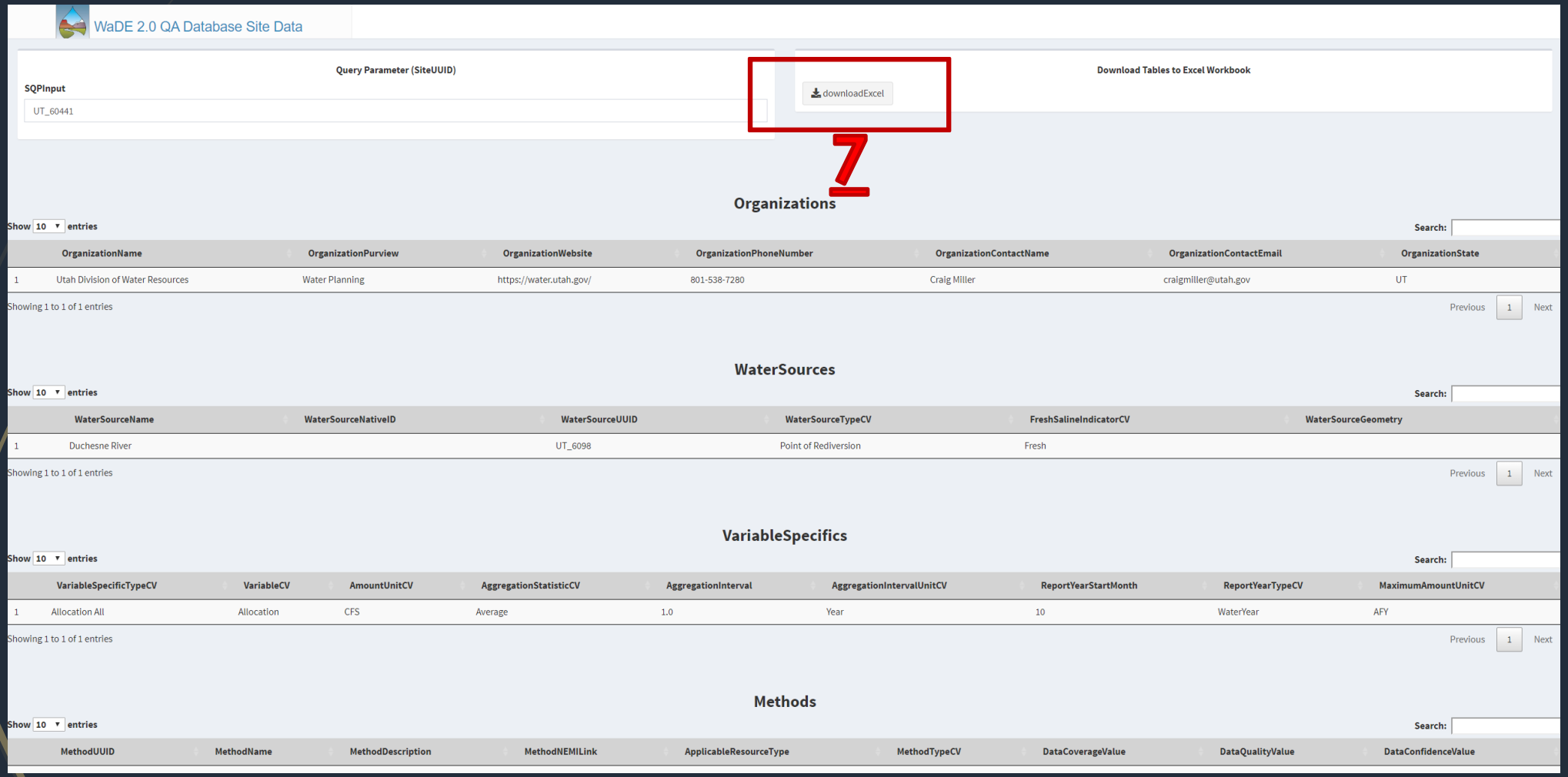
Web Tool #1: Demo Step 5

Additional Info	Example
6) Click site of interest. Select 'Link' on Additional Info	• Site of Interest: SiteUUID: UT_60441



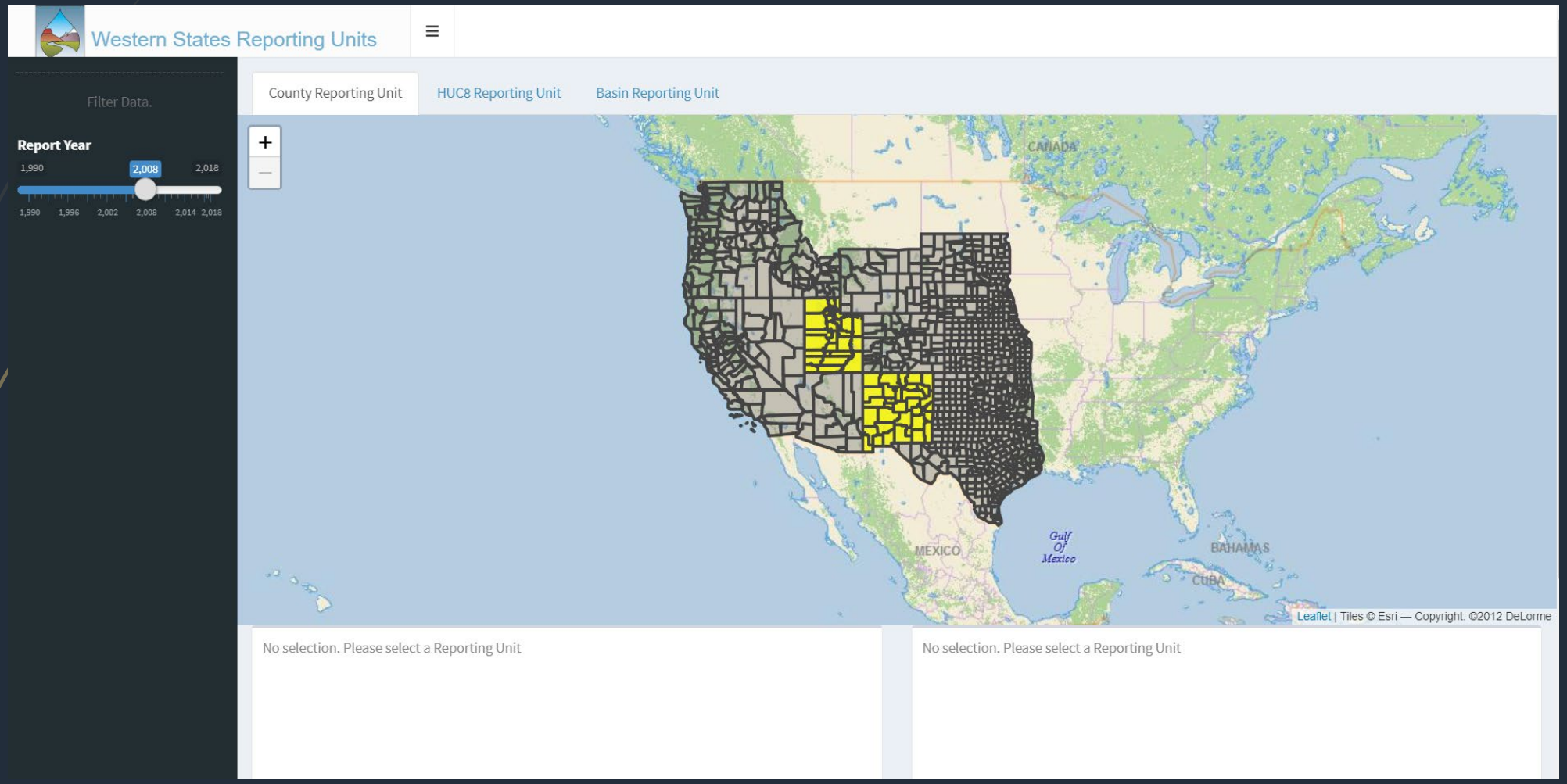
Web Tool #1: Demo Step 6

Download Additnal Site Info to Excel	**Example**
7) Click site of interest. Select 'Link' on Additional Info	• Site of Interest: SiteUUID: UT_60441



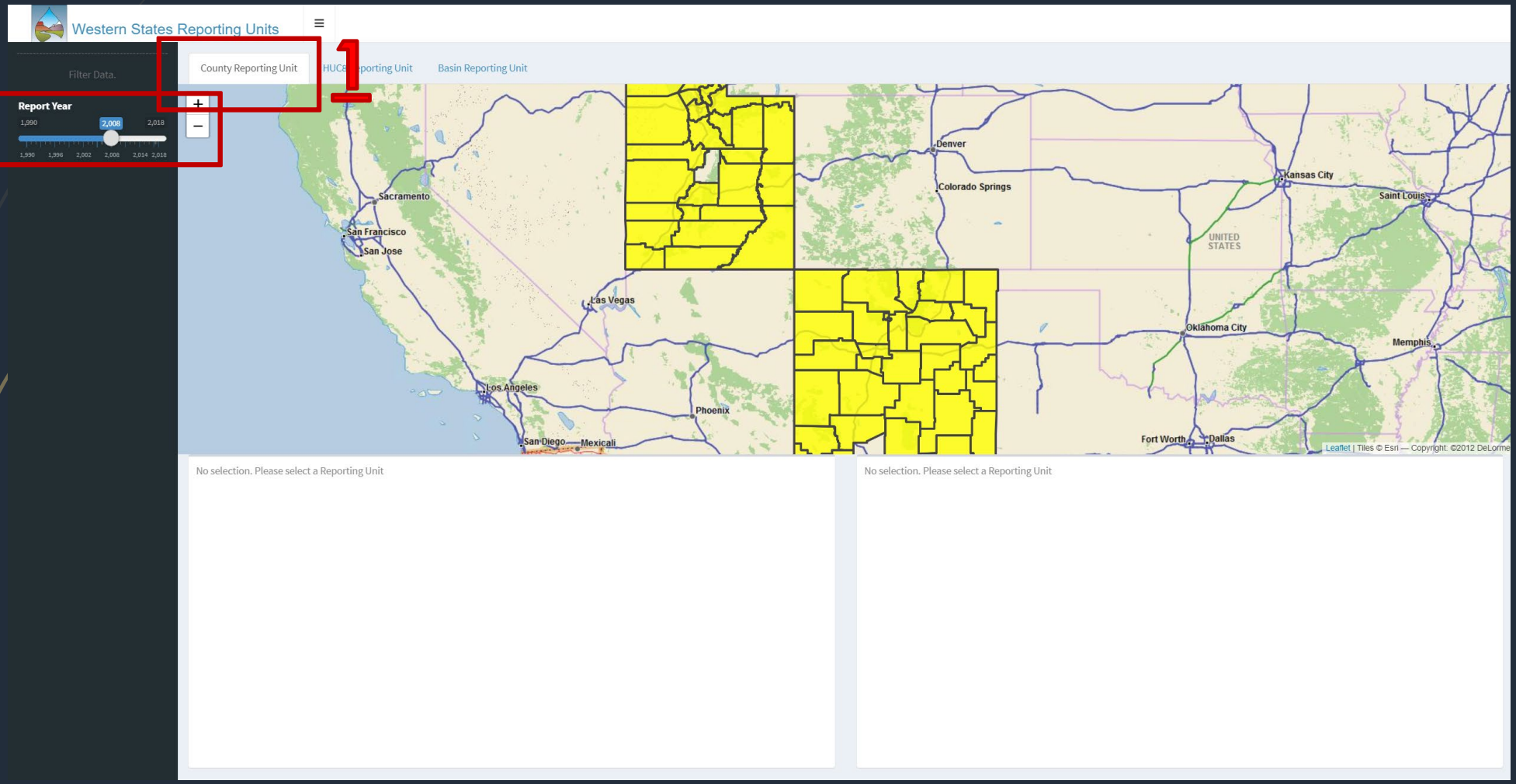
Web Tool #2: Aggerated Reporting Unit (Polygon) Water Use Information Over Time

- **DEMO:** Find all Water Usage in San Juan County, ,UT, over a 10 years period.



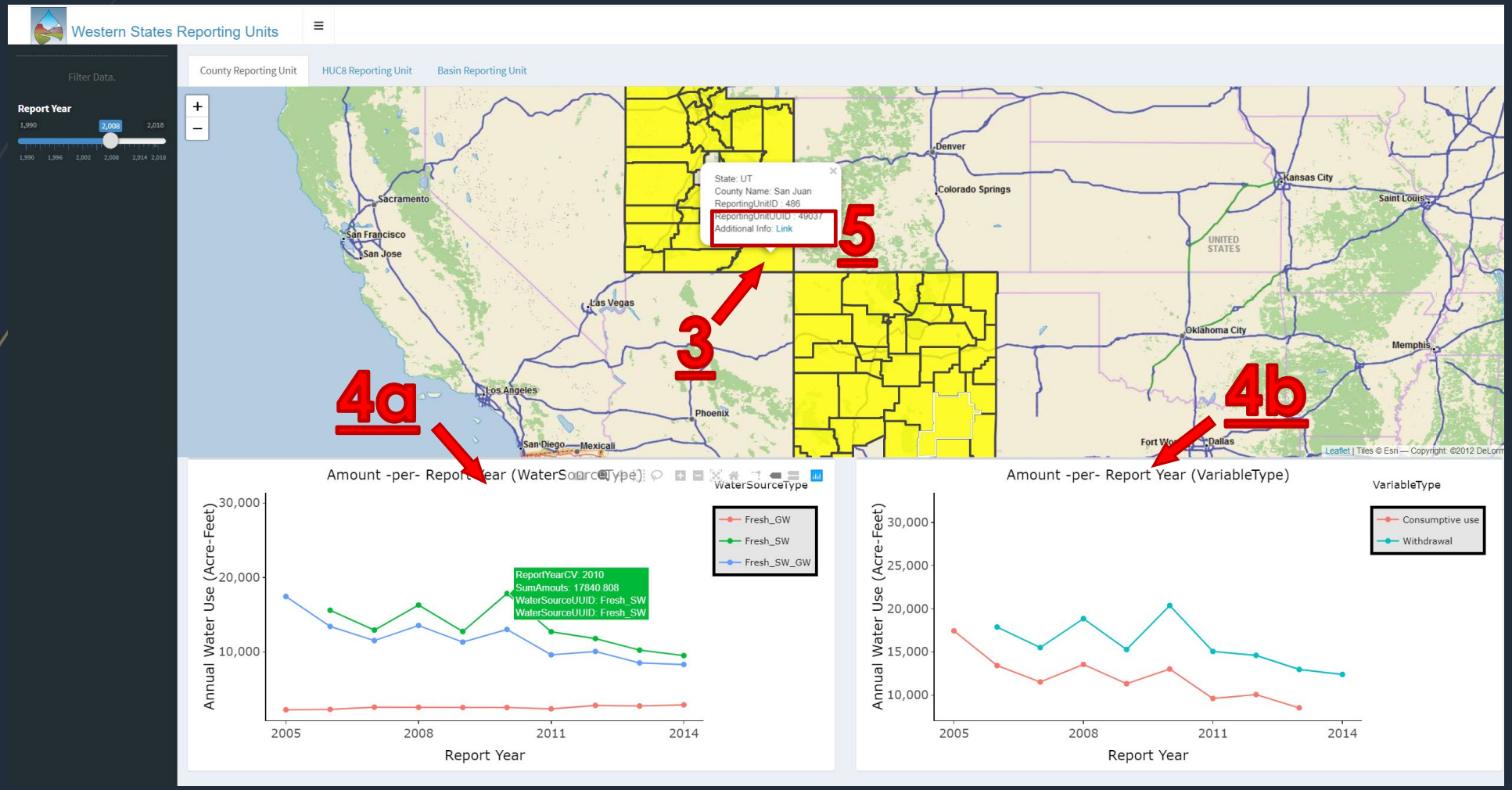
Web Tool #2: Demo Step 1

Filter Options	Example
1) Select Reporting Unit Type of interest. **2)** Filter available Aggregated Data based on Reporting Year of interest.	• Reporting Unit Type: County • Reporting Unit of Interest: 49307, San Juan County, UT • _60441



Web Tool #2: Demo Step 2

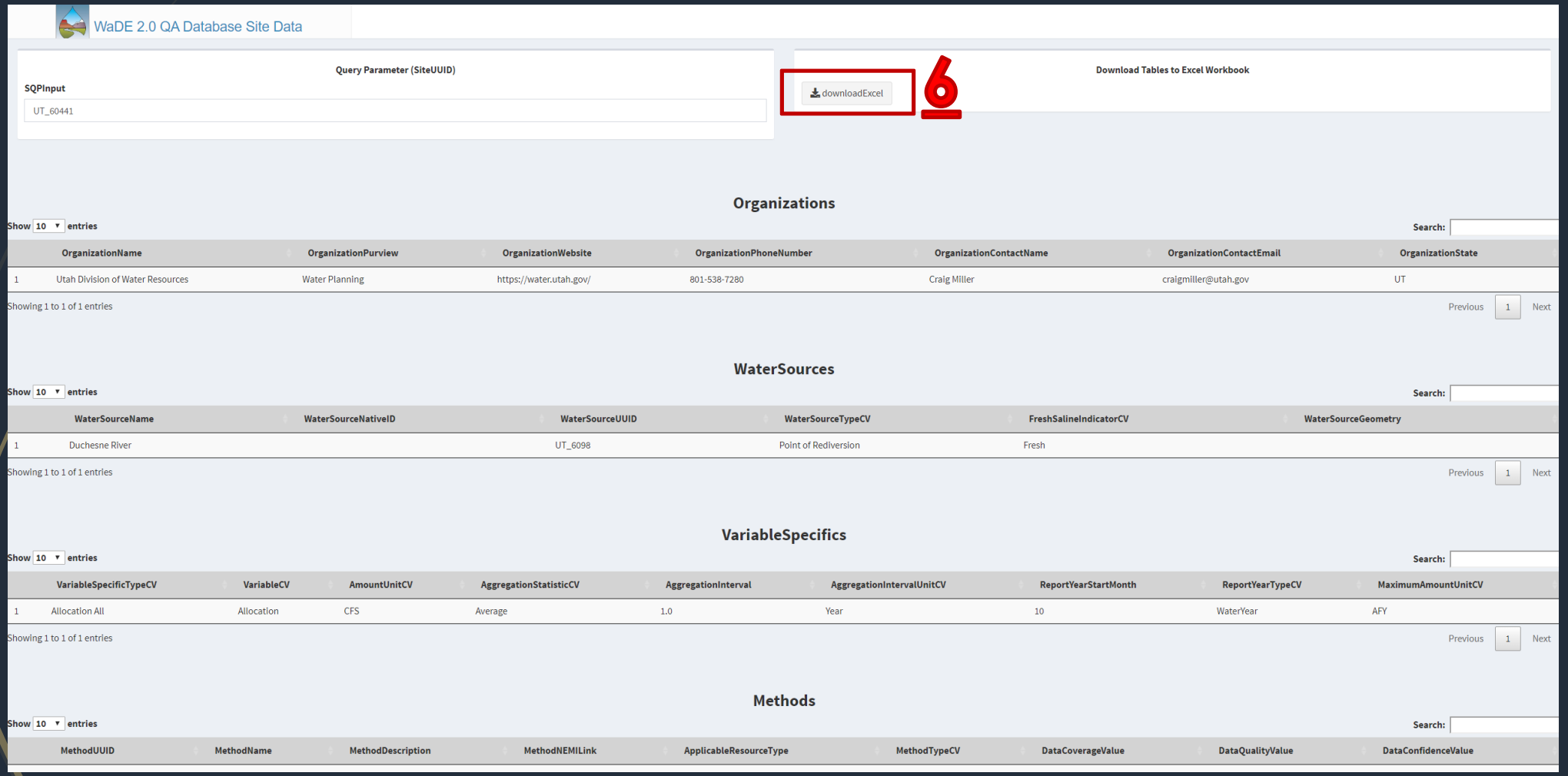
Water Usage Over Time	Example
3) Click on Reporting Unit Polygon **4)** Resulting Collected Water Use by a) Water Source Type & b) Variable Type. **5)** For more Reporting Unit Information, Select 'Link' on Additional Info.	• Reporting Unit of Interest: 49307, San Juan County, UT



Web Tool #2: Demo Step 3

Download Additional Reporting Unit Info to Excel

6) Download additional info from the WaDE 2.0 Database to Excel.



Next steps

- Continue connecting member states data into WaDE
- Work with our IT Contractor on designing WaDE Portal 2.0
- Support WaDE data interoperability with USGS and IOW Geoconnex U.S. Hydrologic Features
- Contribute to the Water Budget Navigator for the Upper Colorado Basin
- Beta release WaDE 2.0 system to our partners and then the public in Summer and Fall 2020

Strategic Partnerships

CUAHSI

Universities Allied for Water Research

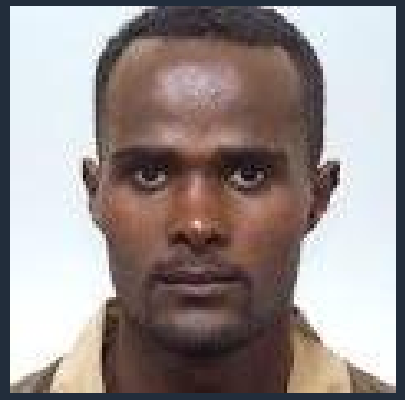
DON'T PAN!C LABS™

USGS

science for a changing world

WSWC Fall 2019 and Spring 2020 Interns

Ryan James
Utah State Univ.



Tseganeh Gichamo
Utah State Univ.

Joseph Brewer
Utah State Univ.

Thank you

Water Foundation

Mitchell Foundation

MOORE Foundation

EPA Exchange Network Grant Program

WESTERN STATES WATER COUNCIL

Questions?

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https://www.wade.westernstateswater.org/