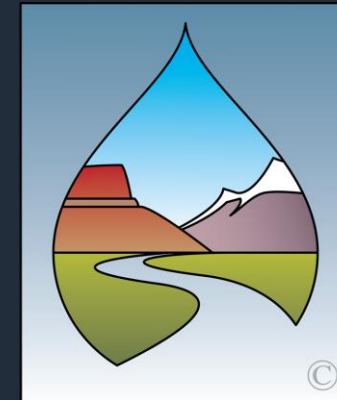
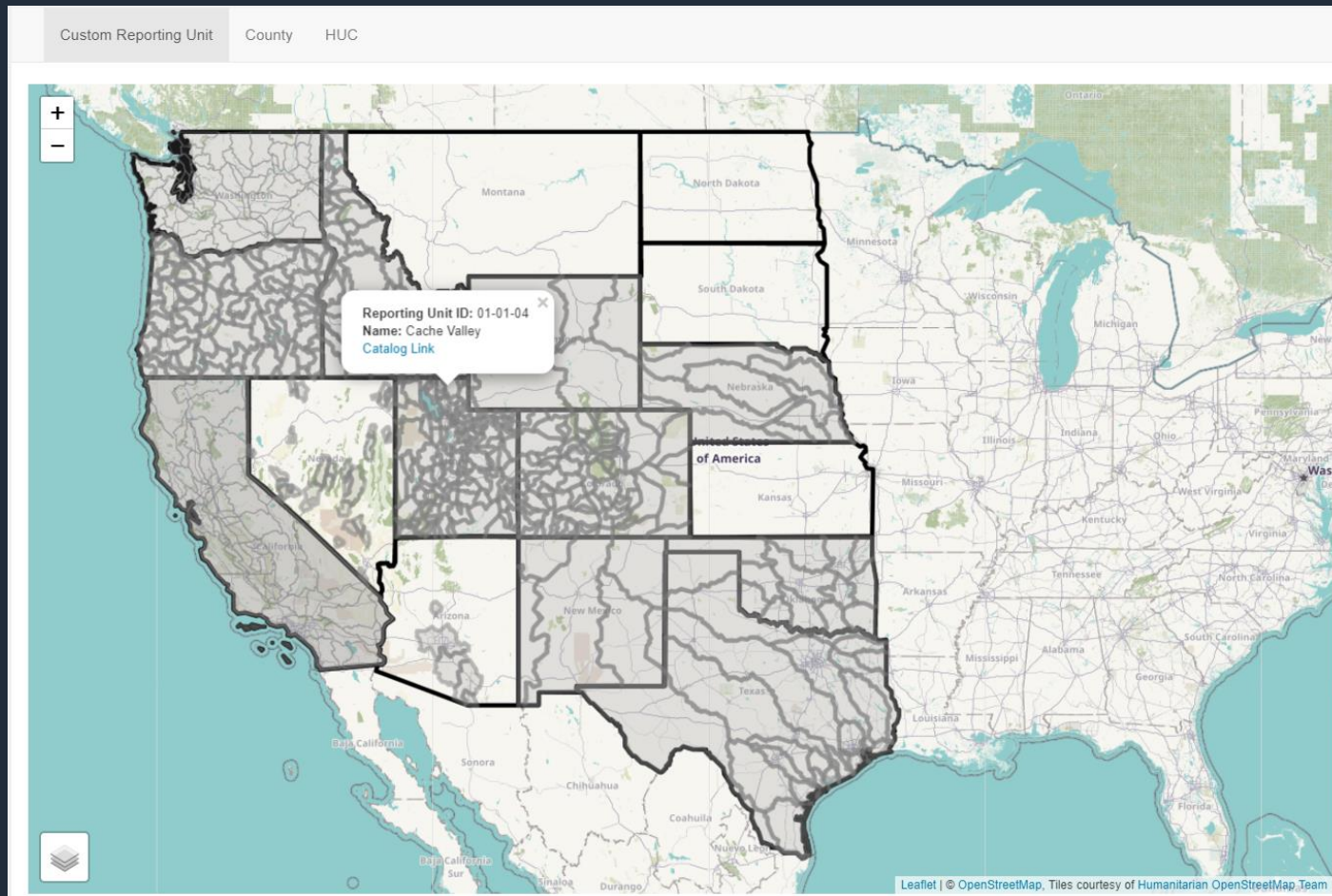


The WSWC Water Data Exchange (WaDE) Program: New Architecture



WESTERN STATES
WATER COUNCIL

Adel Abdallah, Program Manager

Sept 16, 2019

2019 WIMS/USGS Workshop

Fort Collins, CO

Outline

- Why WaDE?
- **WaDE 1.0**: Monumental Achievement
- Why **WaDE 2.0**? Design Overview and Plan



Why WaDE?

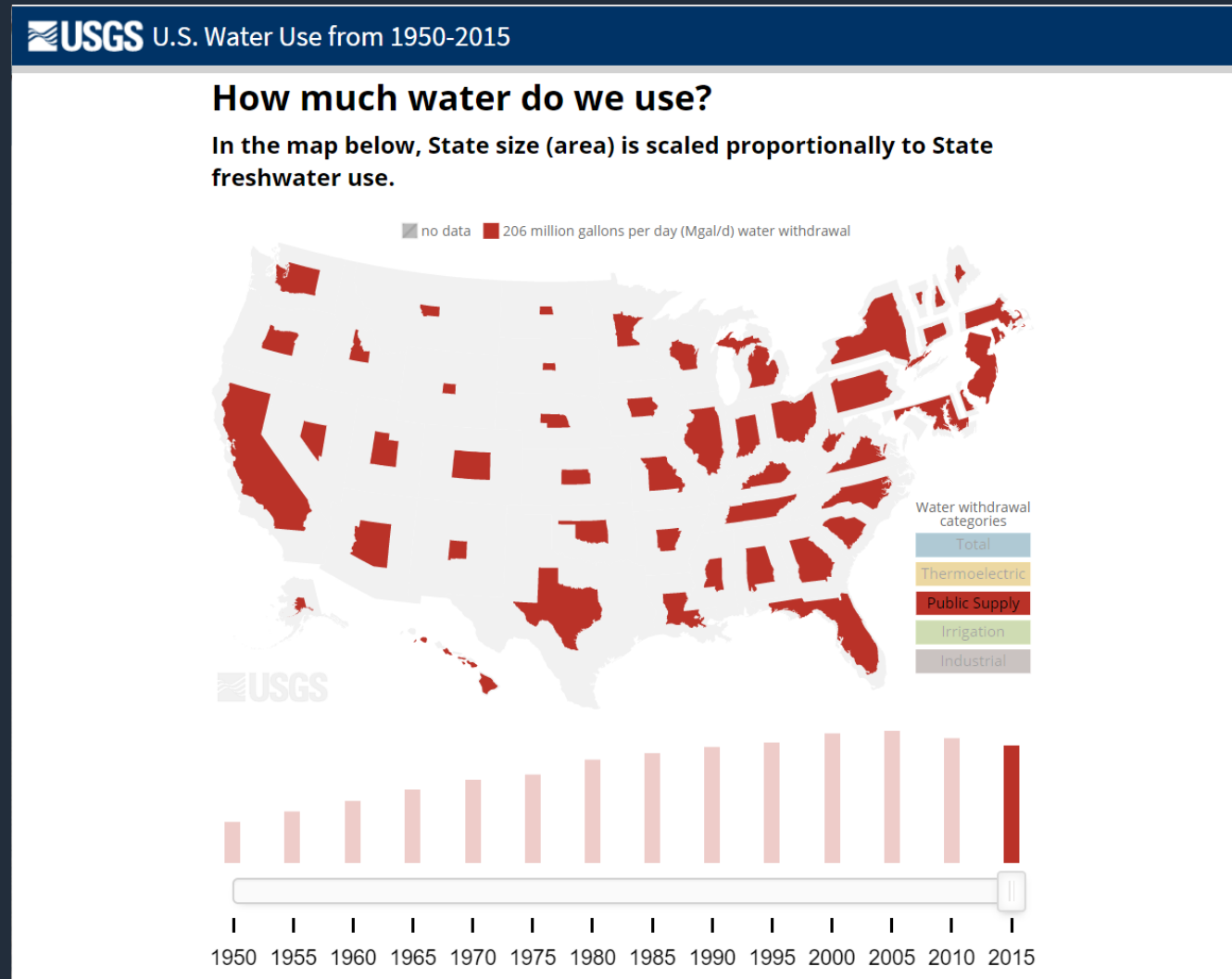
How much water is there? What is its quality? How is it currently being used?

“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**”

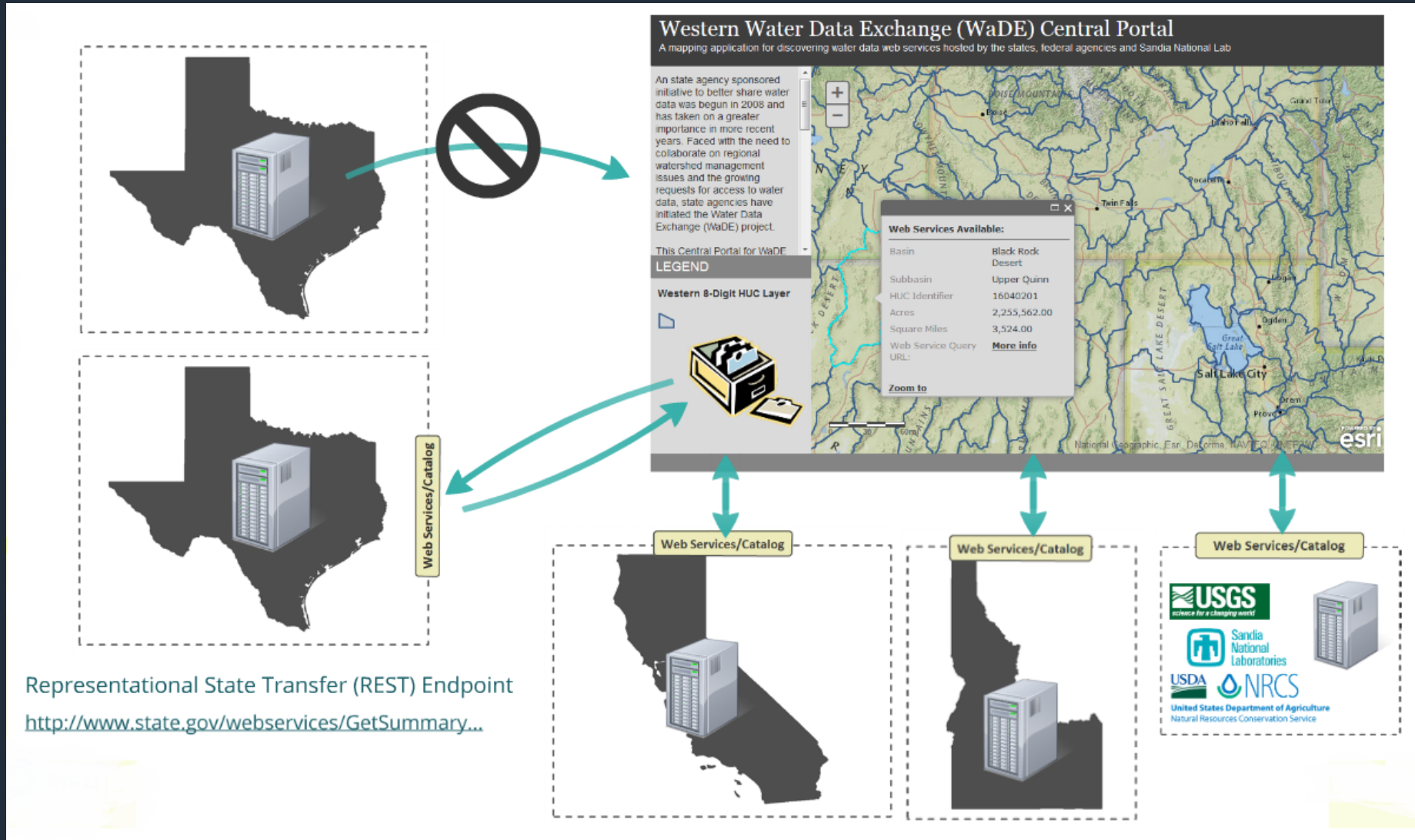


USGS National Water Use Estimates



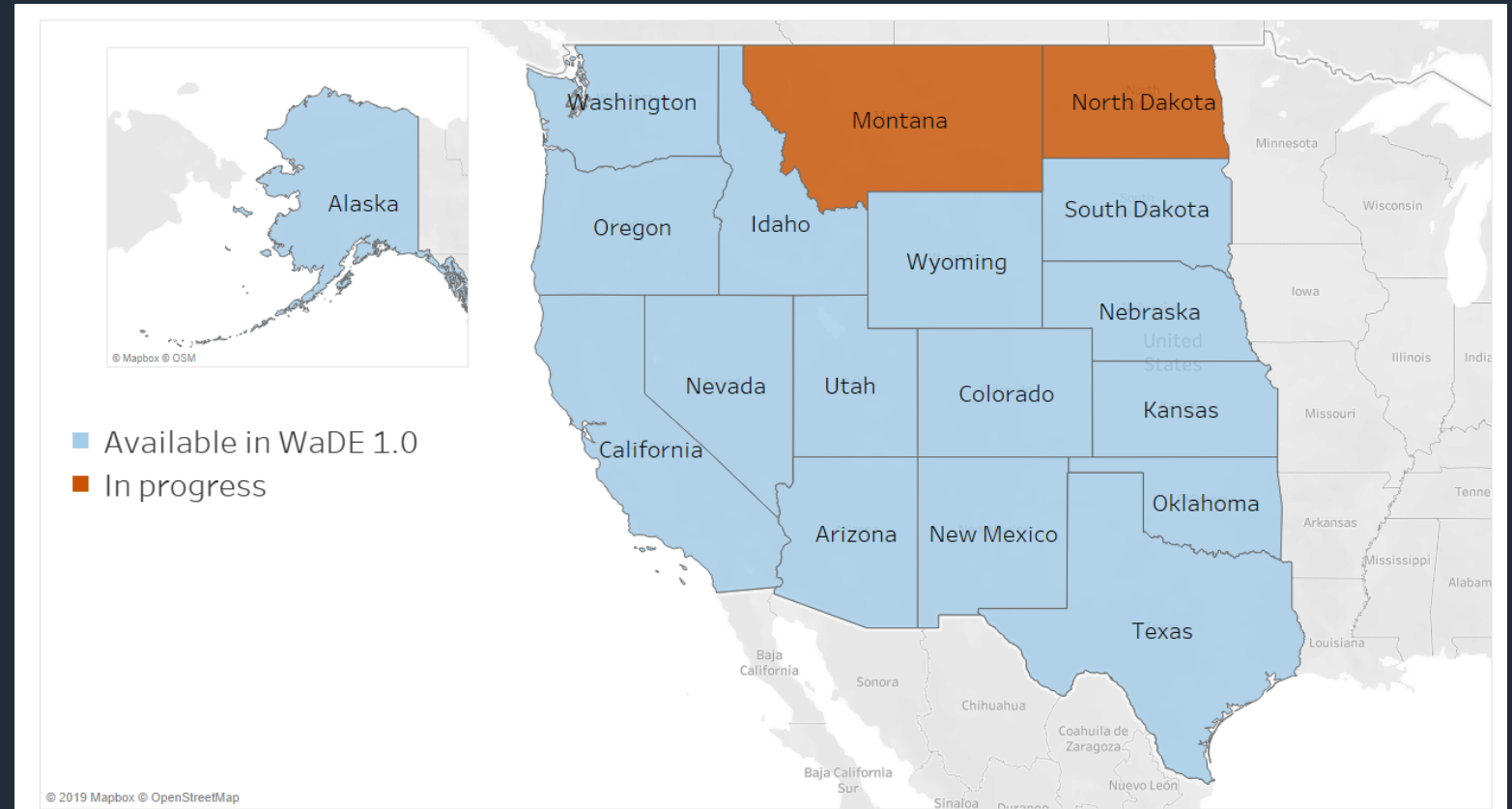
<https://owi.usgs.gov/vizlab/water-use/>

WaDE 1.0 Architecture



Available data through WaDE 1.0

1. Water rights
2. Aggregated water budget estimates
3. Site-specific use and withdrawals
4. Regulatory overlays



15

WSWC Member States

17

State Water Agencies

26

Distinct Datasets Shared

1

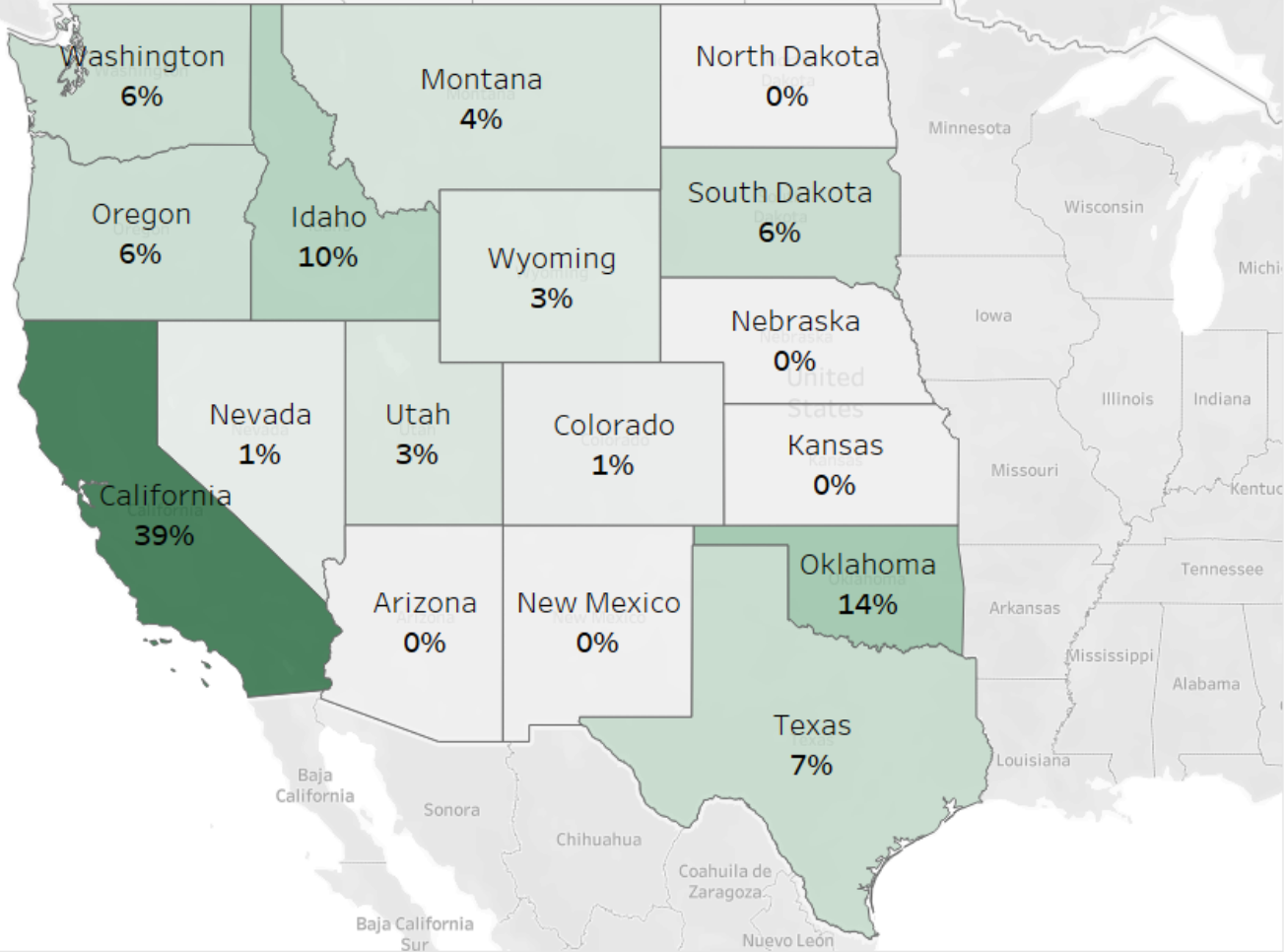
Discovery Portal and API

<http://wade.westernstateswater.org/wade-by-location-multiple-rus/>

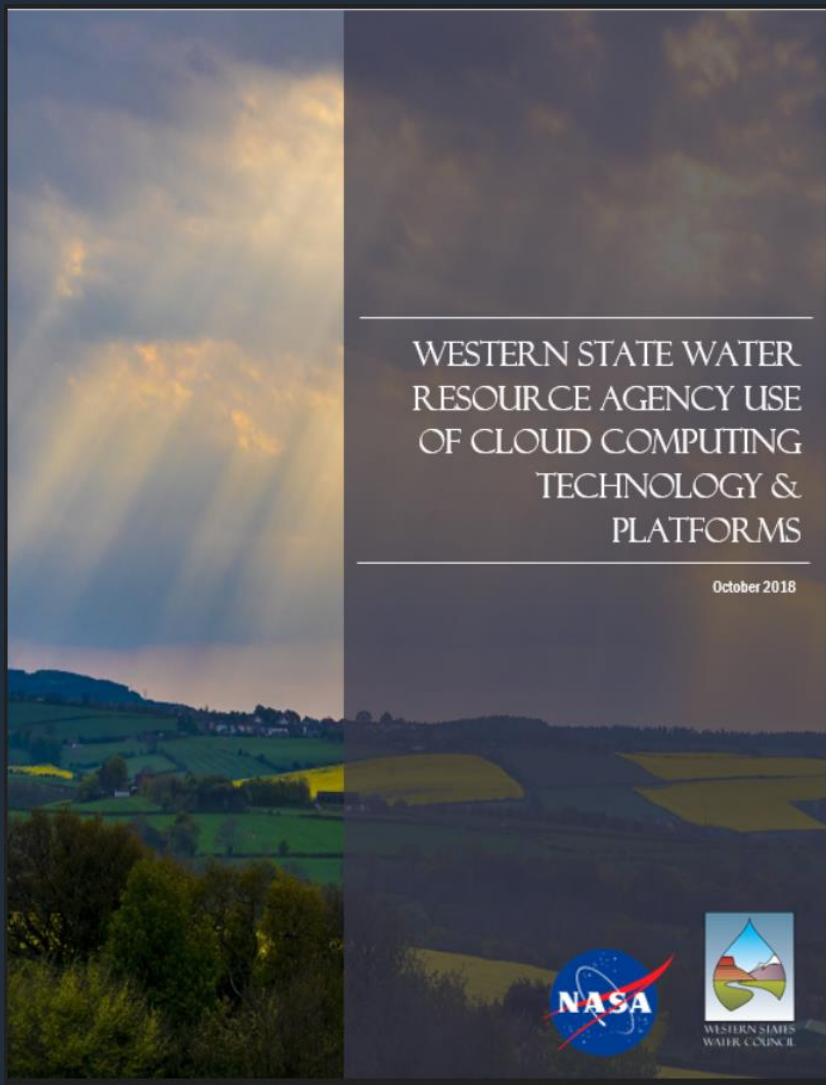
Funding Assistance to Member States



\$ Funding Assistance
\$ 643,654



2018 WIMS Workshop: Cloud Use Policies



HOME MEETINGS NEWSLETTERS POSITIONS LETTERS PUBLICATIONS WESTFAST WADE

WSWC and the NASA's ASP/WWAO team will continue to investigate what platforms and financial arrangements work well for their members and project co-sponsors. They will continue to work with project partners and co-sponsors to identify streamlined strategies to support their long-term data management needs. This may include governance bodies and partnerships that share in the benefits and costs when hosting and processing large datasets in a cloud environment.

Western State Cloud Computing Policies (as of October 2018)

Lookup_cloud_policy_ByState

Select a state to find its cloud use policy

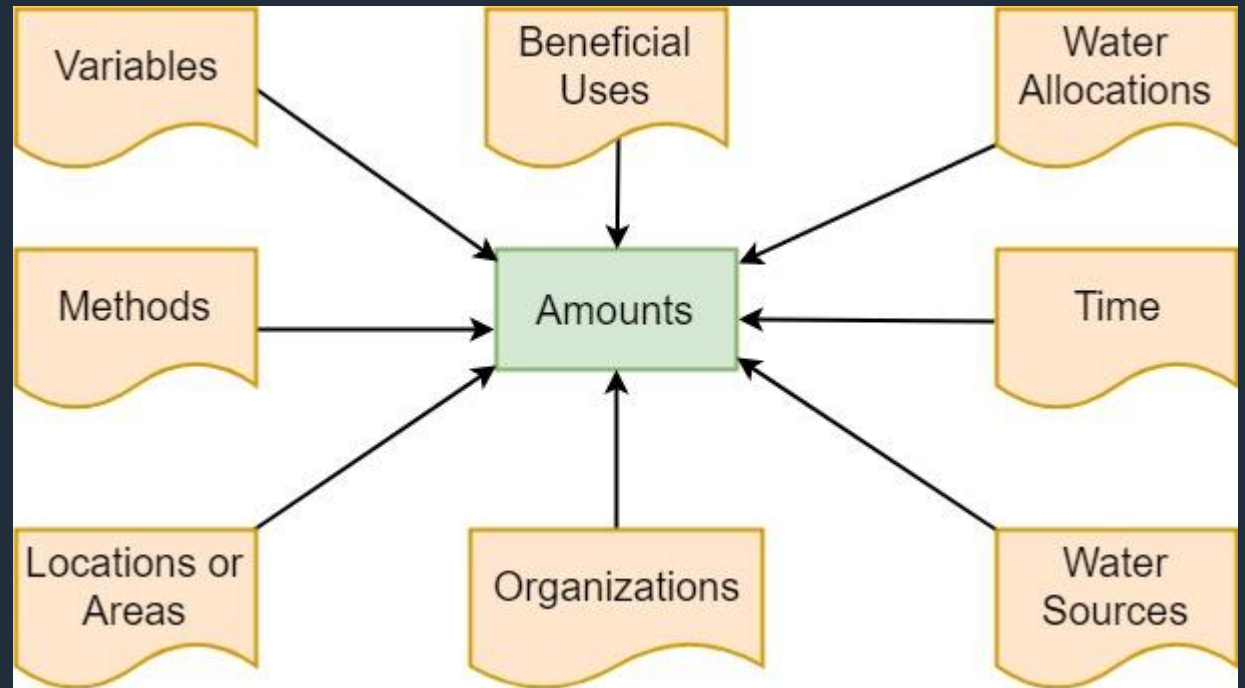
© 2019 Mapbox © OpenStreetMap

View cloud use policy by state

State	Policy title	Policy description	Hyperlink
Colorado	Office of Information Technology (OIT) – “Cloud First” Policy – Revised November 15, 2012	“Given the state of the industry, Colorado’s IT infrastructure and footprint, and the opportunities that are available, Colorado is proceeding with a “cloud first” policy, mirroring the Federal government’s cloud policy. To that end, Colorado is making a delib..	https://dat...
Idaho	Idaho Technology Authority (ITA) Enterprise Cloud Policy – P1000 General Policies – December 8, 2015	“When considering cloud services, the highest priority should be given to ensuring the security of confidential state data. Agencies are encouraged to evaluate and utilize Cloud Services as a tool for meeting the business needs of the agency. Where practical, agenci..	https://ita.i...
Kansas	Executive Branch Information Technology Strategic Plan – 2016-2017	“Project Execution Risk: The current KITO function is a well-intended attempt to provide oversight to Kansas’ largest IT projects. We will transform the existing capability to truly	https://oits...

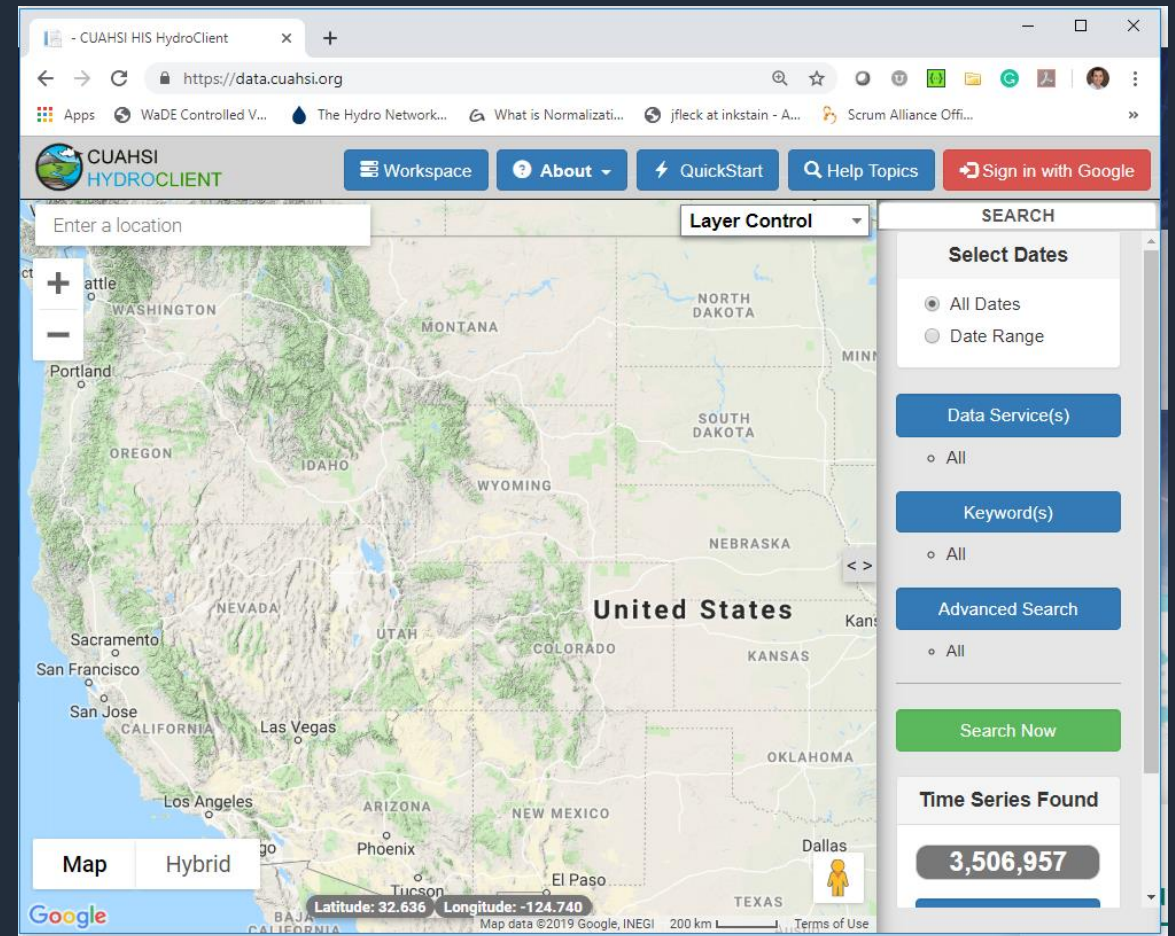
Why WaDE 2.0?

- 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 Water Use Team**

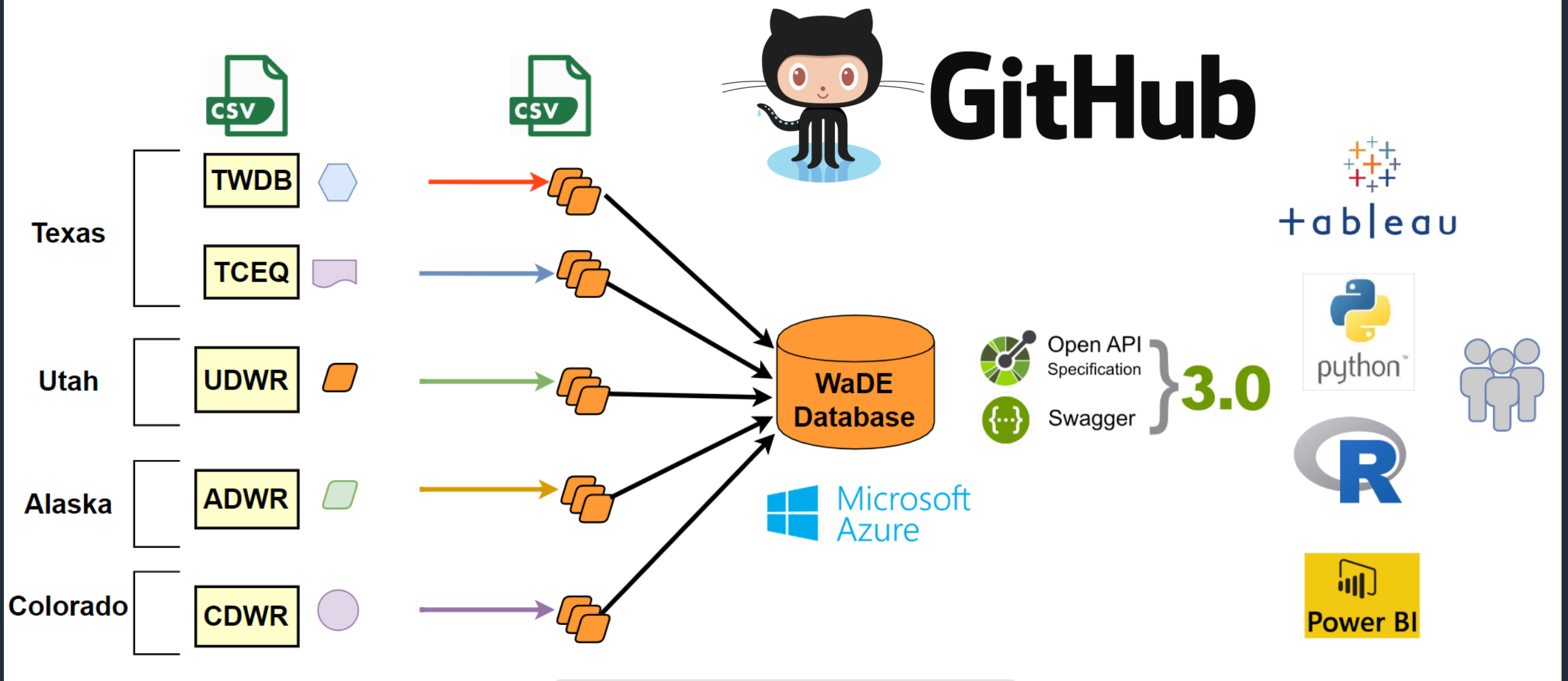


Questions WaDE 2.0 is Designed to Answer

- 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



WaDE 2.0 Schema Document

WaDE 2.0 Schema and Data Services Description Document

File Edit View Insert Format Data Tools Add-ons Help Last edit was made 4 days ago by Adel Abdallah

100% \$ % .0 .00 123 Arial 9 B I S A

fx WaDE Data Service - GetAggVariableData

1 WaDE Data Service - GetAggVariableData

2

3 The following contains the API JSON data structure (with two levels of depth) for aggregated data (either by basin, county, or custom delineation), for water supply, water withdrawals, and consumptive use data.

4

Organization Metadata	Data and Additional Metadata	Required?	Examples	Data Dictionary Description
Organization	Variable, Method, Location, Amount			
Organization		Header		Header
OrganizationUID		Y	UTDWRE	A unique identifier assigned to the organization, all uppercase letters, no numbers, no dashes
OrganizationName		Y	Utah Division of Water Resources	Name corresponding to unique organization ID
OrganizationPurview		N	Water planning, basin planning, water q	A description of the purview of the organization/agency
OrganizationWebsite		Y	https://water.utah.gov/	A hyperlink back to the organization's website. Include the http:// or https:// header.
OrganizationPhoneNumber		Y	801-538-6700	The organization's phone number for general information. Include area code and hyphens
OrganizationContactName		Y	Craig Miller	Point of Contact Name (First and Last Name)
OrganizationContactEmail		Y	craigmiller@utah.gov	Point of Contact Email Address
OrganizationDataMappingURL		N	http://www.github.com/WaDEMapping...	If needed, a hyperlink to a GitHub repository or other codebase that describes the original data source and how the data were "mapped" o
	Variable	Header		Header
	VariableCV	Y	AggregatedWithdrawal	This is a high-level variable used for aggregated water data to support water planning and water balances. The general categories availab
	VariableSpecificCV	Y	AggregatedWithdrawal, Irrigation	This is a subcategorization of the aggregated variable. This allows the user to specify not only the general category of water data, but also
	VariableDescription	N	Summary irrigation amounts of agricultu	A textual description of the aggregated variable in VariableSpecificCV.
	AggregationStatisticCV	Y	sum	The calculated statistic associated with the aggregated variable amount. Full list is here: http://vocabulary.odm2.org/aggregationstatistic/
	AggregationInterval	Y	1	The interval associated with the aggregation unit. For example, if the data are provided in 15 minute intervals, the interval would be 4 and
	AggregationIntervalUnitCV	Y	month	The aggregation unit (e.g., day, month, year).
	AmountUnitCV	Y	AF	Unit of volume for the aggregated variable amount (in AF or MG)
	ReportYearCV	Y	2018	Annual reporting period that this data are valid. There is a need to ensure the annual reporting period year matches the type of year used
	ReportYearTypeCV	Y	Water Year	The annual reporting period for this datatype. Could be a "water year," "irrigation year," a calendar year, or other variant.

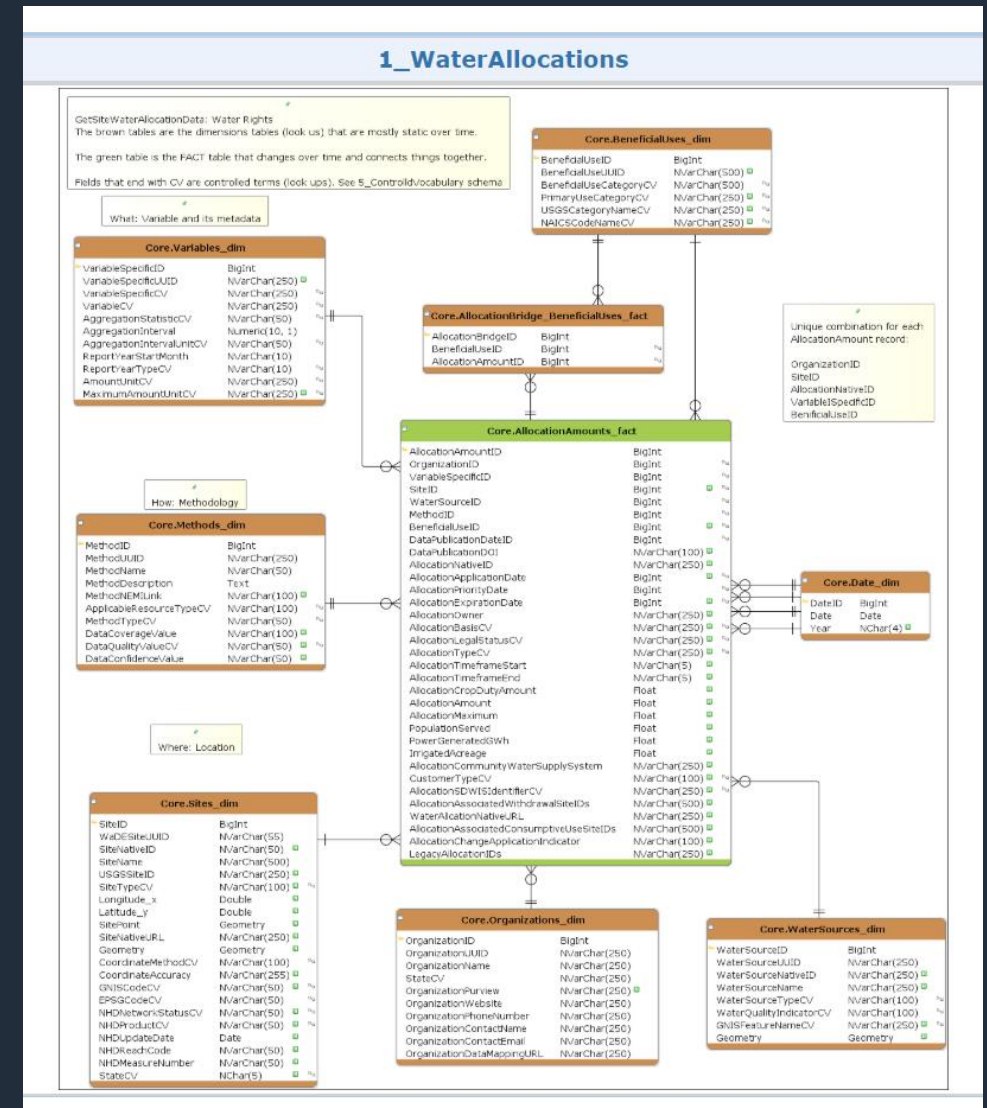
+ GetAggVariableData GetAggRegulatoryOverlay GetSiteAllocationData GetSiteVariableData (Actual) GetSitesMetadata

<https://bit.ly/2YBqvCt>

WaDE 2.0 Schema

- Reconcile differences in **syntax** and **semantics**
- Entity relationship diagrams using the dimensional model (**star schema**) to support Online Analytical Processing (**OLAP**)

<http://schema.westernstateswater.org/diagrams/index.html>



WaDE 2.0 Controlled Vocabulary

WaDE Controlled Vocabularies wade.westernstateswater.org Admin Login

Master Controlled Vocabularies Registry for the Water Data Exchange(WaDE)

This online moderated registry aims to promote consistent use of terminology (i.e., Controlled Vocabularies) to describe attributes of the Water Data Exchange(WaDE) project across the seventeen Western US States while they still retain the use of their native terms. The use of these controlled vocabularies allow interoperable data query across states and regional analysis. Click at the tables below to view their vocabularies. You may suggest edits to the existing vocabularies or suggest new ones to be added. Scroll to the bottom for more info on how to the registry works.

Click on a collection of terms, then click New in the top left to suggest a new term. Once submitted, we will receive an email of the submission and decide to accept and add as a new vocabulary, or reject it in case it is similar to an existing one. Scroll to the bottom for more info on how to the registry works. The terms are hosted on [Google Sheets](#) and deployed to this registry.

Sara Larsen,PE
Water Data Exchange Senior Program Manager
Western States Water Council
[saralarsen \(@\) wswc.utah.gov](mailto:saralarsen (@) wswc.utah.gov)

Adel Abdallah, PhD
Senior Hydroinformatics Specialist
Western States Water Council
[adelabdallah \(@\) wswc.utah.gov](mailto:adelabdallah (@) wswc.utah.gov)

Controlled Vocabularies

Aggregation Statistic
A term for describing the statistical action used to calculate over recorded time series values within a time interval. For example, 100 cfs of delivery target to a demand site is a "cumulative" aggregation statistic calculated over a time interval like a month.

Applicable Resource Type
A term that indicates the types of water supply or water use for which the method is used (e.g. surface water, groundwater, storage).

<http://vocabulary.westernstateswater.org/>

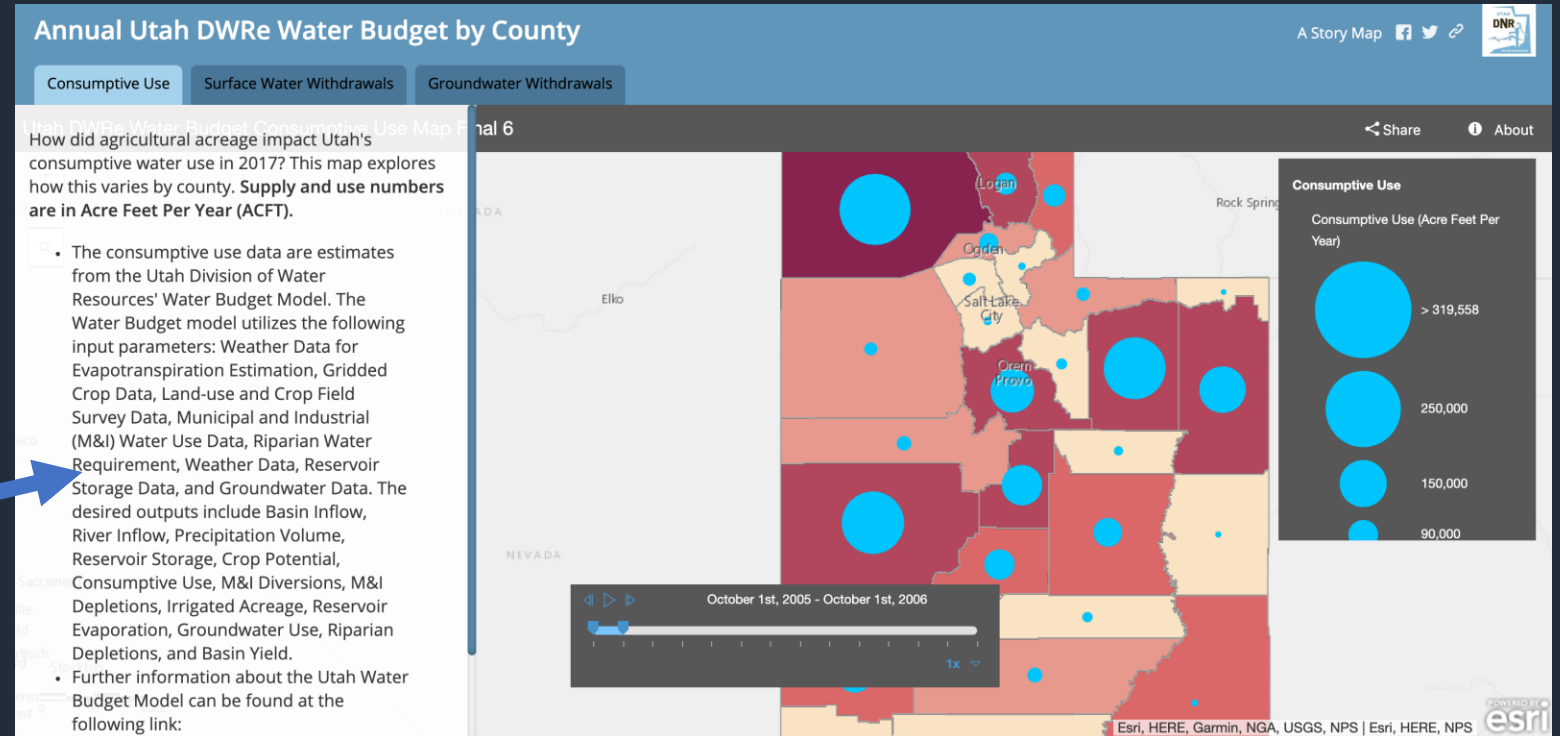
SwaggerHub Rest API

The screenshot shows the SwaggerHub interface for the Western States Water WaDE 2.0 API. The browser address bar displays the URL: `app.swaggerhub.com/apis/WesternStatesWater/WaDE2.0/1.0.0#`. The page title is "The Water Data Exchange (WaDE) program API 2.0". The version is 1.0.0, and the API is OAS3. The description states: "This is demo for the WaDE 2.0 API". There are links for "Terms of service", "Contact the developer", and "The 3-Clause BSD License". A "Servers" dropdown menu is set to "https://wade-api.azure-api.net/v1 - Azure Production". The API is categorized into "WaDE Admins" (Secured WaDE Admin-only calls) and "Developers" (Operations available to regular developers). The "Developers" section lists four GET endpoints:

- `GET /SiteAllocationAmounts` retrieves water allocations (water rights) data for a site
- `GET /AggregatedAmounts` retrieves time series data for aggregate data (water budgets within geospatial areas)
- `GET /SiteVariableAmounts` retrieves time series data for given site and specific variable for a site
- `GET /AggRegulatoryOverlay` retrieves data for each of the HUC, county, or planning region's regulatory and institutional concerns.

<https://app.swaggerhub.com/apis/WesternStatesWater/WaDE2.0/1.0.0>

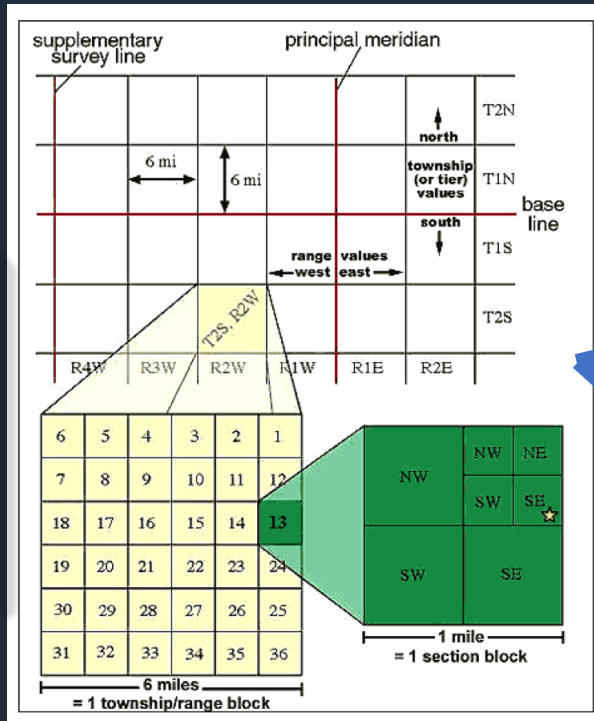
Technical Assistance to Member States: **Utah**



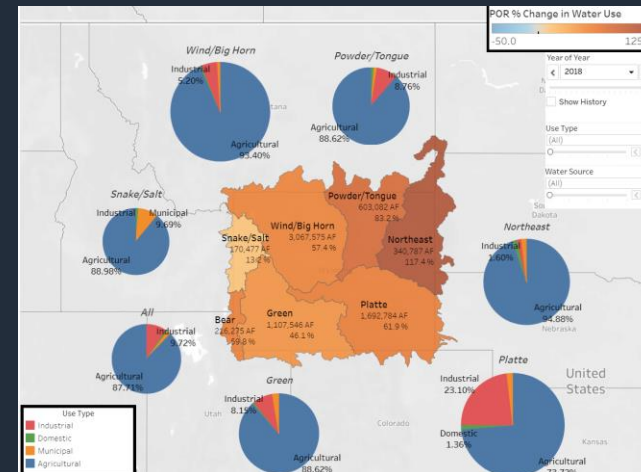
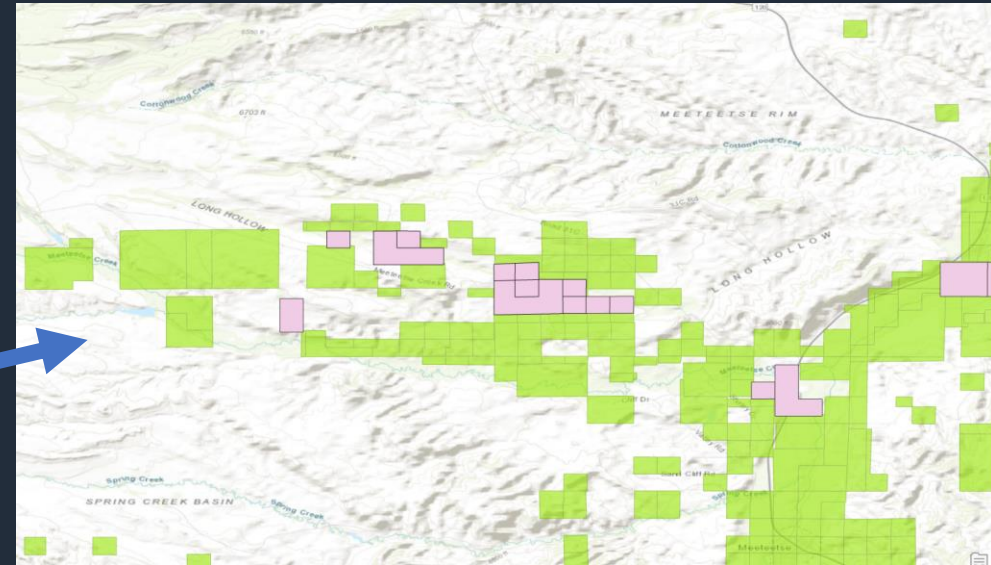
WaDE 2.0



Technical Assistance to Member States: Wyoming

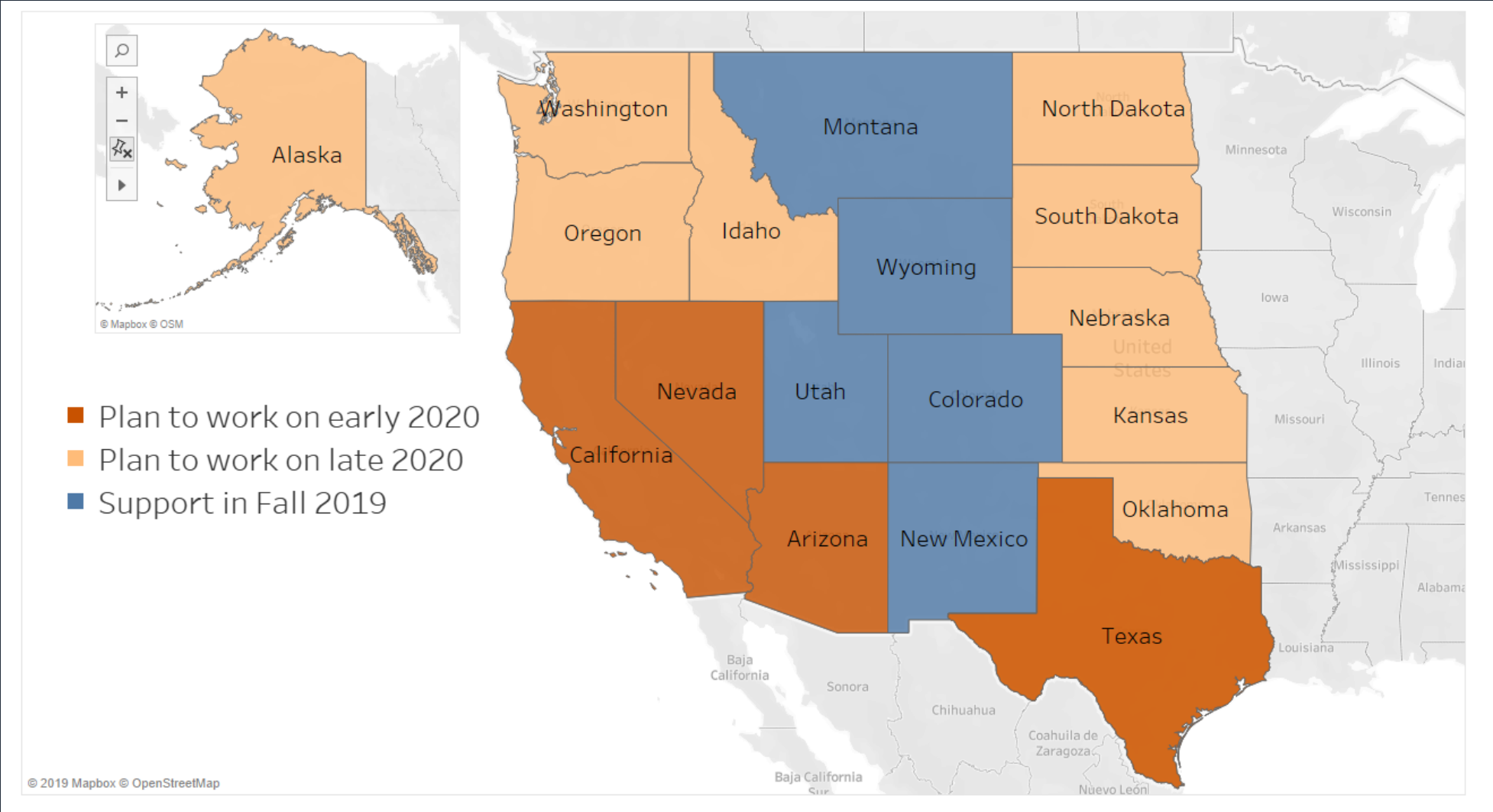


Linen Plat scans



WaDE 2.0

WaDE 2.0 Transition Plan



Strategic Partnerships

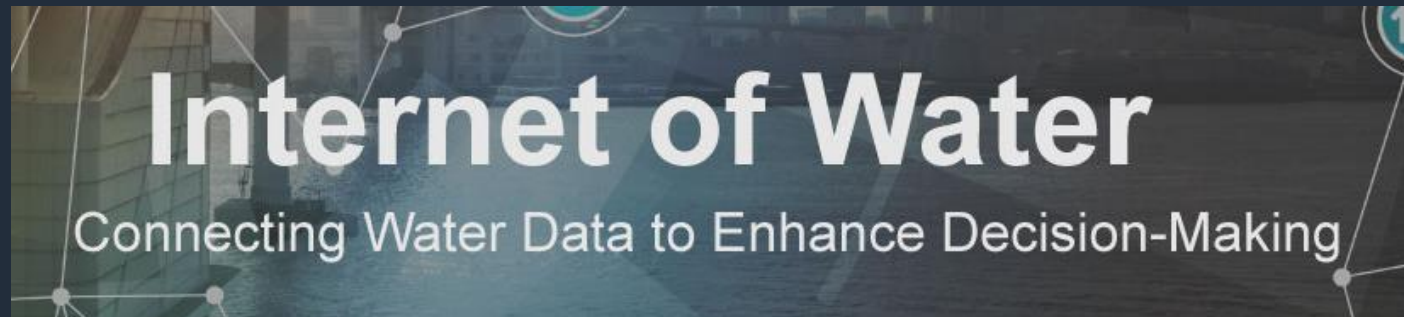


CUAHSI

Universities Allied for Water Research



LABS™



Internet of Water

Connecting Water Data to Enhance Decision-Making



USGS

science for a changing world

Thank you

Water Foundation

Mitchell Foundation

MOORE Foundation

EPA Exchange Network Grant Program



WESTERN STATES
WATER COUNCIL

Questions?

What can WaDE do to help your state meet its challenges?

Adel Abdallah

AdelAbdallah@WSWC.Utah.Gov