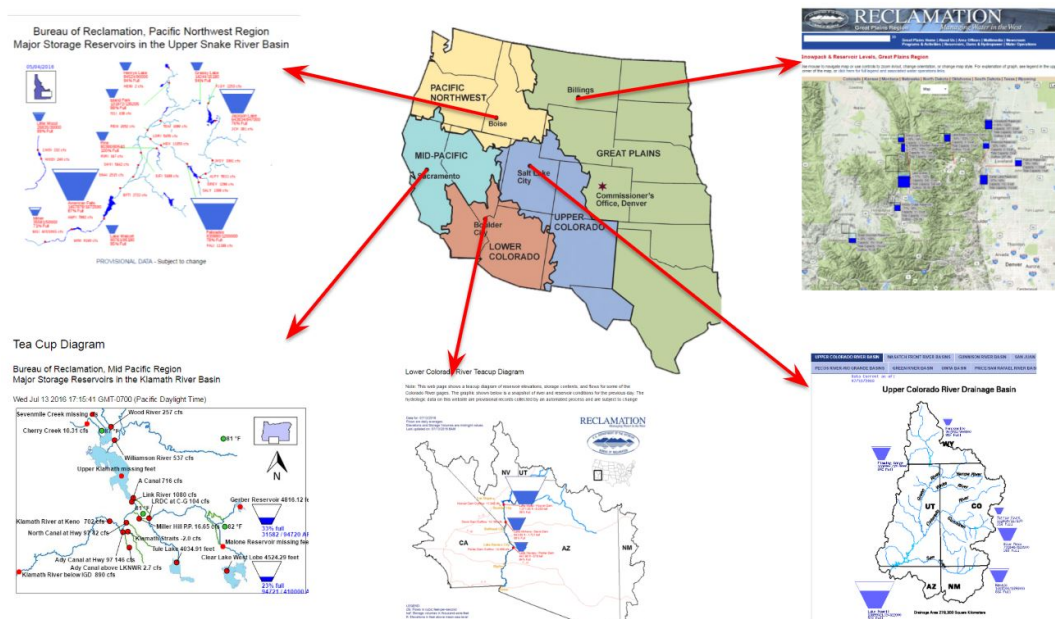


PROBLEM

The Bureau of Reclamation serves water to 31 million people and 20 percent of irrigators in the western United States. Reclamation is also the second largest hydropower producer in the United States.



Reclamation generates large amounts of data and information describing reservoir operations, hydropower generation, environmental compliance, invasive mussels, infrastructure, and other aspects of Reclamation's mission activities. Many of these datasets are currently accessed on a program-specific basis using legacy information management & technology (IMT) systems, often without modern features such as machine-readable data formats and web-services.



Led by the Department of the Interior's Open Data Initiative (<http://www.doi.gov/data>), Reclamation is striving to improve its data-publishing efforts, making its data more easily found, accessed, and applied to support public and private sector activities. This involves developing the Reclamation Water Information System (RWIS) and the forthcoming Reclamation Information Sharing

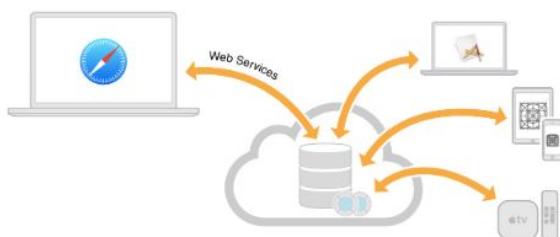
Environment (RISE).

```
{ "": { "HUC": "0", "active_flag": "T", "coordinates": {
"datum": "WGS84", "latitude": 0, "longitude": 0 },
"elevation": { "accuracy": 0.0, "datum": "NGVD29",
"method": "", "value": 0 }, "location_type": "",
"name": "", "responsibility": "USBR", "time_format":
"%Y-%m-%dT%H:%M:%S%z", "timeseries":
```

Machine-readable output



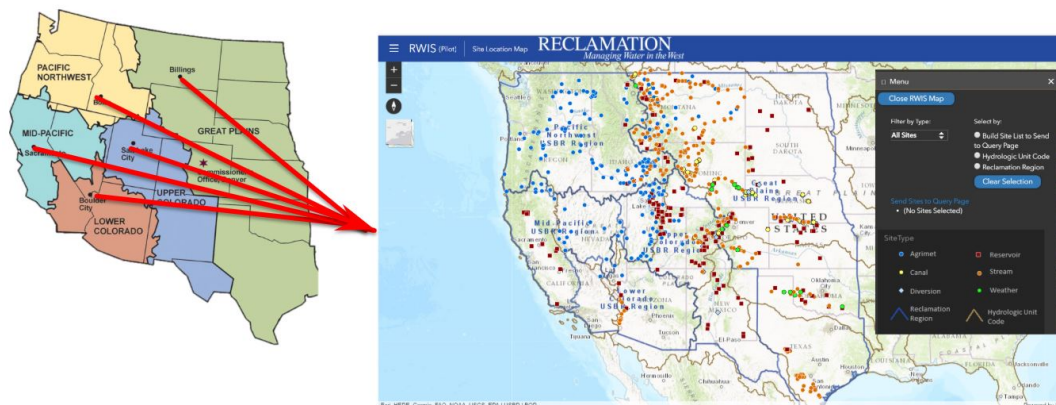
Standardized formats



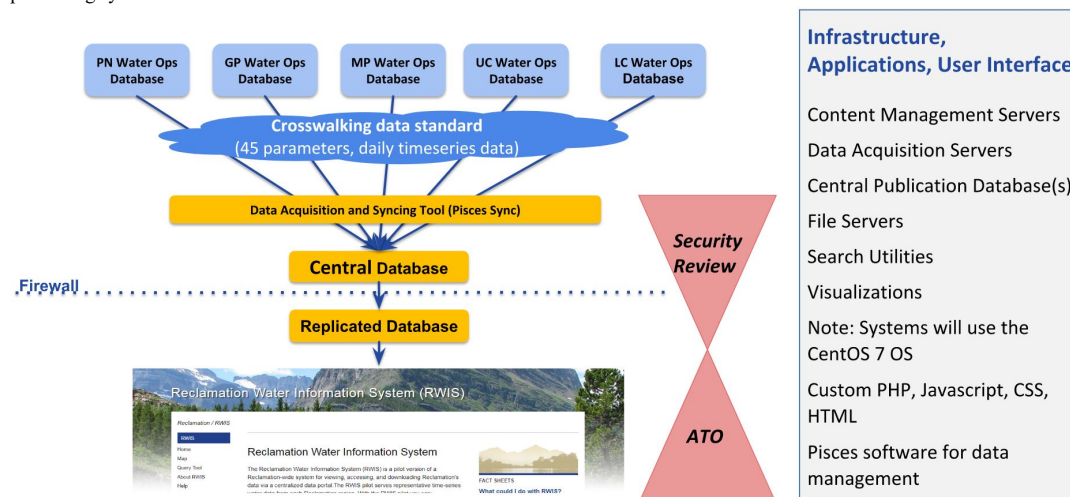
Accessible via Web Services/APIs

RECLAMATION WATER INFORMATION SYSTEM (RWIS)

RWIS is a pilot open data system that was developed to demonstrate how multiple Reclamation programs' water data could be combined into a modernized data-publishing system with web services.



RWIS development involved working with a diverse Reclamation water-data community to develop crosswalking data standards, and working with Reclamation Information Technology development and security services to develop a new database and web-publishing system.



RWIS 1.0 was released April 2017. It provides free access to reservoir and water time series data from Reclamation's five regions. It features a sites map and query form that support manual data discovery and access, and web-services for automated retrieval.

1. Map Interface to assist Site Selection

2. Query Form (Site Types: Reservoir, Canal, Diversion, Agrimet, Stream, Weather)

3. Time Series Plots

4. Data available for 2010-present in multiple formats:

- Interactive Plot
- HTML Table
- JSON
- CSV
- WML2 (XML)

5. WEB SERVICES!

Data for full period of record for sites in LC, UC, PN, and GP regions

SELECT YOUR DESIRED OUTPUT FORMAT:

Please choose the type of data you want to download. You can select more than one type. Please choose **CSV** if you want to download the data in a spreadsheet format.

☐ Microsoft Excel
 ☐ JSON
 ☒ CSV
 ☐ HTML

SELECT SITE:

Use the filters to narrow the list of options. Only sites with available data are shown.

Filter	Selected sites	Unselected sites
Type name to filter <input type="text" value=""/>	Type name to filter <input type="text" value="Lake Street"/>	
Region (use the dropdown menu) NORTHERN		
LAUNDRY-HORSE RIDGE OR LAUNDRY HORSE, MT		
LAUNDRY-HORSE RIDGE		
HUNTINGTON-REDESVILLE		
ARTIFICIAL RESERVATION		
Hempy Lake Dam or Hempy Park or Lake, ID		
Stand Park Dam and Reservoir, ID		
WARRINGTON-REDESVILLE, NORTH DAKOTA		

SELECT PARAMETERS:

Parameters not to be filtered are listed on the left.

Selected parameters	Type name to filter	Unselected parameters
Date Range from: <input type="text" value=""/> Reservoir Elevation (feet) Reservoir Release: Flowpoint (cfs) Reservoir Release: Flowpoint (cfs)	Type name to filter <input type="text" value="Reservoir Storage (cfs)"/>	

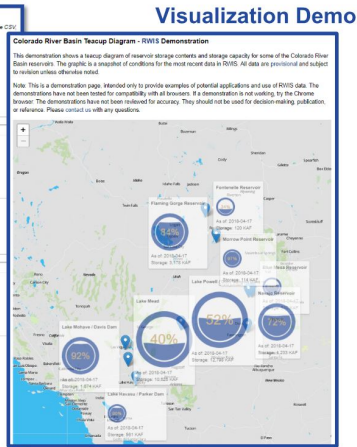
SELECT YOUR CURRENT DATE RANGE (YYYY-MM-DD) OR PERIOD:

☐ Date Range
 ☒ Current Year
 ☐ Current Year
 ☐ All Available Data

☐ Date Range: From To

SAVE YOUR SELECTIONS

This URL will open in a new tab in your browser to allow you query selections.



Improved query page layout

RWIS SCREENCASTS

RWIS (<http://water.usbr.gov/>) is available at <https://water.usbr.gov>.

Screencast: Site tour and Demonstration #1 - Select and Plot Data from a Single Site

[VIDEO] <https://www.youtube.com/embed/o2dgMMRANGs?feature=oembed&fs=1&modestbranding=1&rel=0&showinfo=0>

Screencast: Demonstration #2 - Select a Group of Sites and then Plot and Compare Data

[VIDEO] <https://www.youtube.com/embed/IaOFSx7WuOQ?feature=oembed&fs=1&modestbranding=1&rel=0&showinfo=0>

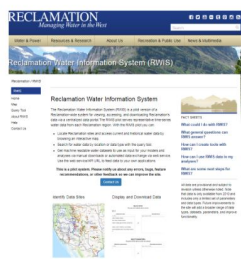
Screencast: Demonstration #3 - Download All Historical Data from a Basin-collection of Sites

[VIDEO] https://www.youtube.com/embed/CD8_MtFIBdk?feature=oembed&fs=1&modestbranding=1&rel=0&showinfo=0

RECLAMATION INFORMATION SHARING ENVIRONMENT (RISE)

Building on the RWIS pilot, RISE is being developed to absorb RWIS, serve a larger collection of Reclamation water-related data, and offer other user features.

Reclamation Water Information System (RWIS)



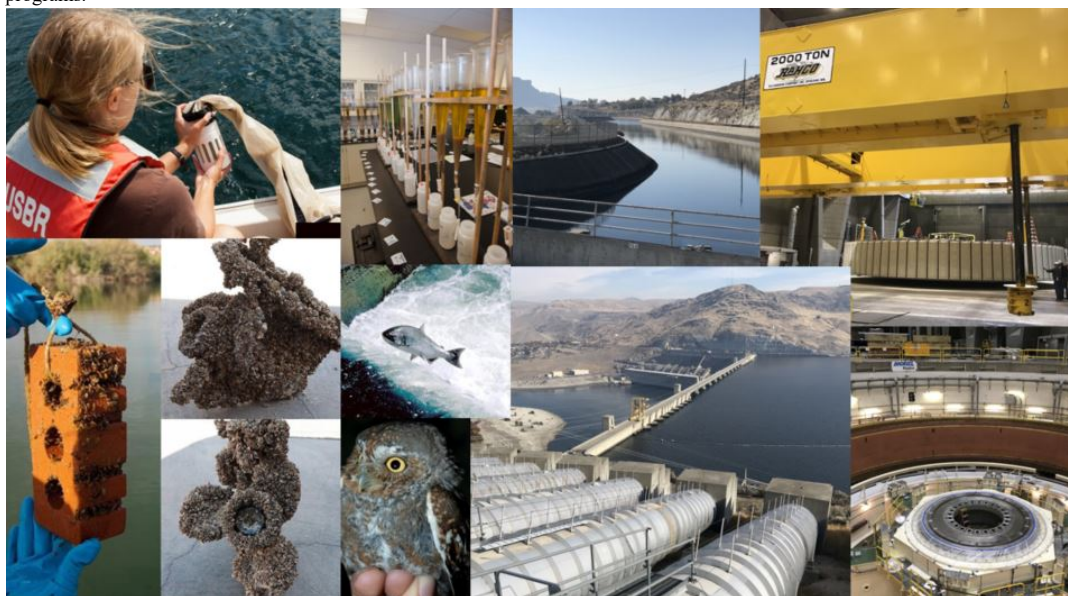
- Add more water data
- Add data domains
- Add data types (spatial, docs, etc)
- Improve portal performance
- Add portal features (offline processing, alerts, etc.)

- Form data communities
- Address security
- Create online forum
- Plan for sustainability

Reclamation Information Sharing Environment (RISE)



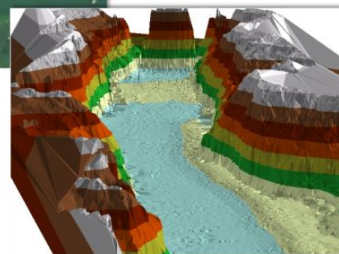
Data Themes: RISE will include data related to a variety of Reclamation mission activities, including hydropower, water infrastructure, water quality pertaining to water management, and environmental data from species recovery and invasive species programs.



Data Types: RISE will go beyond RWIS' time series scope to serve a broad mix of data types.

• **In addition to time-series offerings**

- Geospatial (*)
- Documents
- Photos
- Videos
- Metadata



(*) Active discussions w/ BORGIS group to identify opportunities to leverage apps from other investments that may support publishing

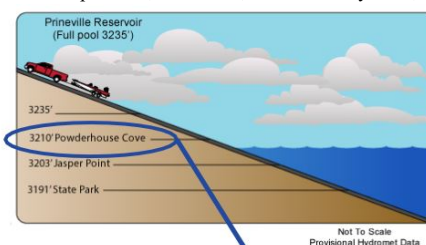
User Features: RISE will support user profiles that permit tailored user experience, data alerts, data discovery tools, and more.

• **Alerts for a variety of notifications, e.g.,**

- data request is ready
- new data added
- user specified condition

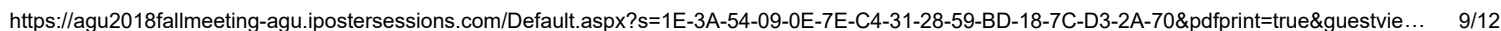
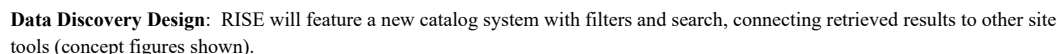
• **Dashboard examples and visualization tools**

• **BOR-internal tools to inspire more use → more data to publish**

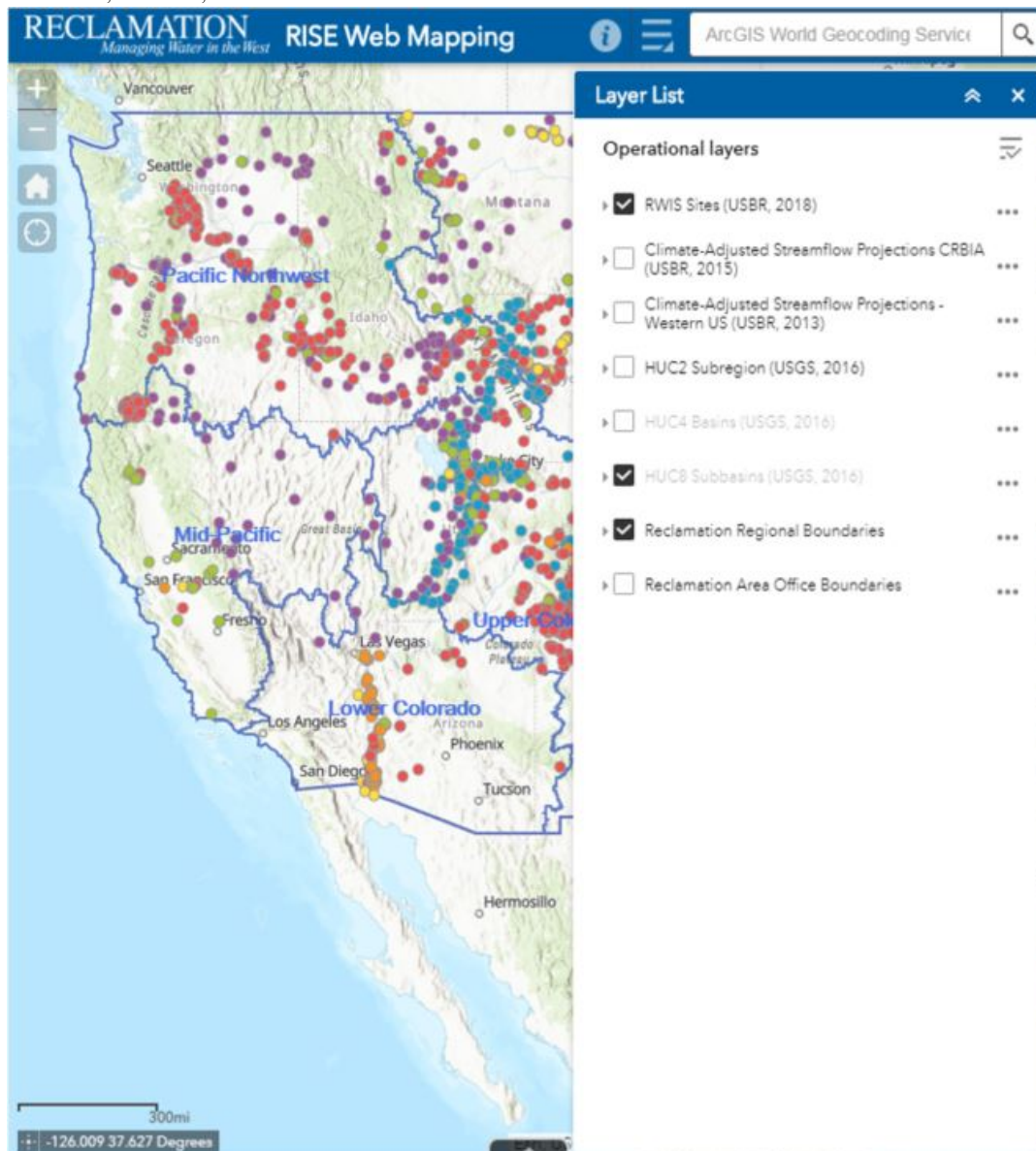


Alert me when this boat ramp is accessible

Scheme and Preparations: For each data theme, we are assembling bureauwide communities and identifying common internal sharing and external publishing priorities, developing crosswalking data standards, completing metadata requirements, and developing a process to screen data for sharing sensitivities and risks.



Map Design: RISE will support data discovery through filters, search, and browsing; display geospatial data; and, provide access to web services, downloads, and detailed metadata.



Development Discussion: RISE development is an FY18-FY19 activity. During the course of planning and development, several issues are being addressed.

- *data readiness* – What assistance do programs need to prepare their data for publishing through RISE?
- *data screening* - What are the sharing sensitivities and risks, and how should screening occur?
- *system development paradigm* – How should development focus be balanced between fast data-access features vs. user-interaction features?
- *sustainability* – How do we develop a bureau-wide system that provides long-lasting support for Reclamation regions and programs (e.g., ownership, staff support, funding, lifecycle, internal vs. procured solutions)
- *system scaling* – As more programs use RISE, how do we ensure scalability of data management and publishing services?

FUTURE PLANS

Release: RISE Version 1.0 expected Summer 2019.

Feedback: Please share thoughts here (<http://water.usbr.gov/contactus.php>), or email us at rwis@usbr.gov.

Acknowledgments: More than 50 staff and contractors from Reclamation Regions and Denver directorates, contributing to bureauwide sub-teams on: System Vision and Planning, Content (Data Scope, Standards, Metadata, Screening, Preparation for Publishing), Functionality (Web Portal, User Experience, Tools), Core Infrastructure (Servers, Databases, Software), IT Security, and Outreach/Launch.

ABSTRACT

The Bureau of Reclamation serves water to 31 million people and 20 percent of irrigators in the western United States. Reclamation generates large amounts of data and information describing reservoir operations, hydropower generation, environmental compliance, invasive mussels, infrastructure, and other aspects of Reclamation's mission activities. Much of these data are currently accessed on a program-specific basis via legacy information management & technology (IMT) systems, often without modern features such as machine-readable data formats and web-services. The Department of the Interior's Open Water Data Initiative addresses these issues, and Reclamation is striving to improve its data-publishing efforts, making its data more easily found, accessed, and applied to support public and private sector activities.

This presentation provides an overview of two IMT systems that Reclamation has developed under OWDI: the Reclamation Water Information System (RWIS, water.usbr.gov) and the Reclamation Information Sharing Environment (RISE). RWIS was developed first as a pilot, demonstrating how multiple programs' water data could be combined into a modernized data-publishing system. It provides free access to reservoir and water time series data from Reclamation's five regions, includes map and query interfaces for data discovery and access, and web-services for automated retrieval. Based on the success of the RWIS pilot, Reclamation has more recently focused on developing RISE, which will envelop RWIS and feature a much larger collection of Reclamation data, including water quality as it pertains to Reclamation water management activities, invasive mussels, hydropower, and infrastructure, and more. RISE will also serve a mix of data types, going beyond RWIS' scope of time series data to also include geospatial and documents data. This presentation summarizes RISE development approach, architecture and previews the upcoming release in Winter 2019.