

RECLAMATION

Managing Water in the West

Reclamation Data Sharing:

Reclamation Water Information System (RWIS)

Reclamation Information Sharing Environment (RISE)

Colorado River Basin Data Visualization

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Western States Water Council Water Information Management Systems (WIMS) Workshop

January 16th-18th, NASA JPL, Pasadena, CA

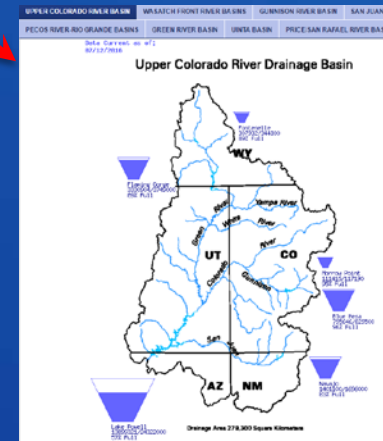
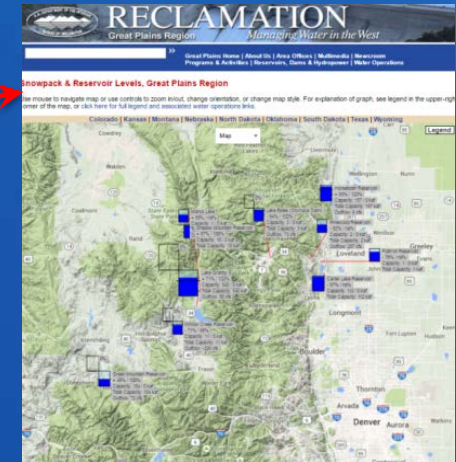
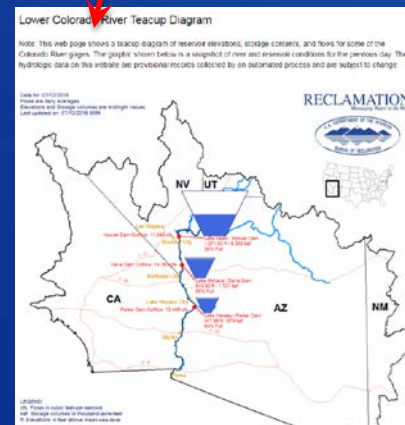
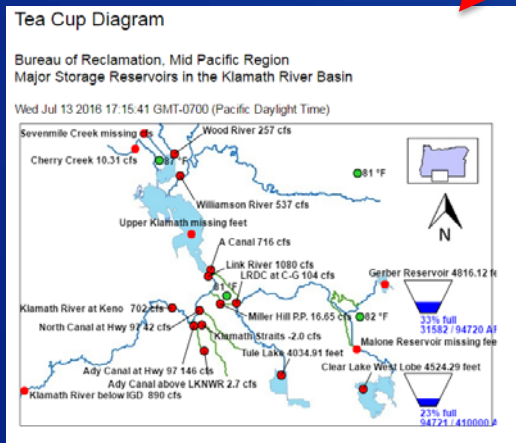
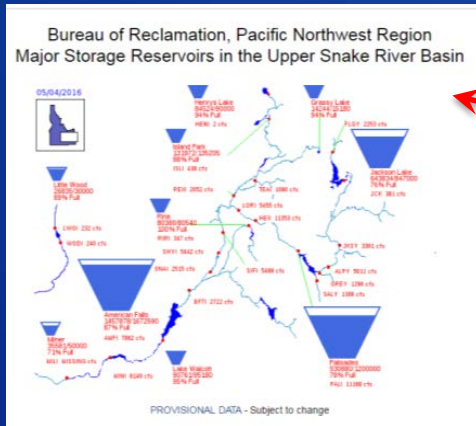


U.S. Department of the Interior
Bureau of Reclamation

RWIS and RISE

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Reclamation has used Region-specific solutions for data-sharing



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Goal: One-stop publication of Reclamation data

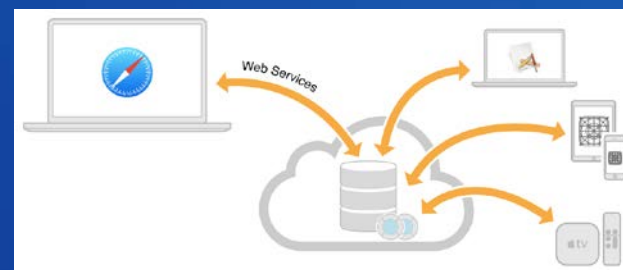
- Centralized data publication
- Support internal and external users
- Web portal for data discovery and access
- Standardized data formats
- Web services/APIs for automated data retrieval
- Visualization products

```
{ "": { "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



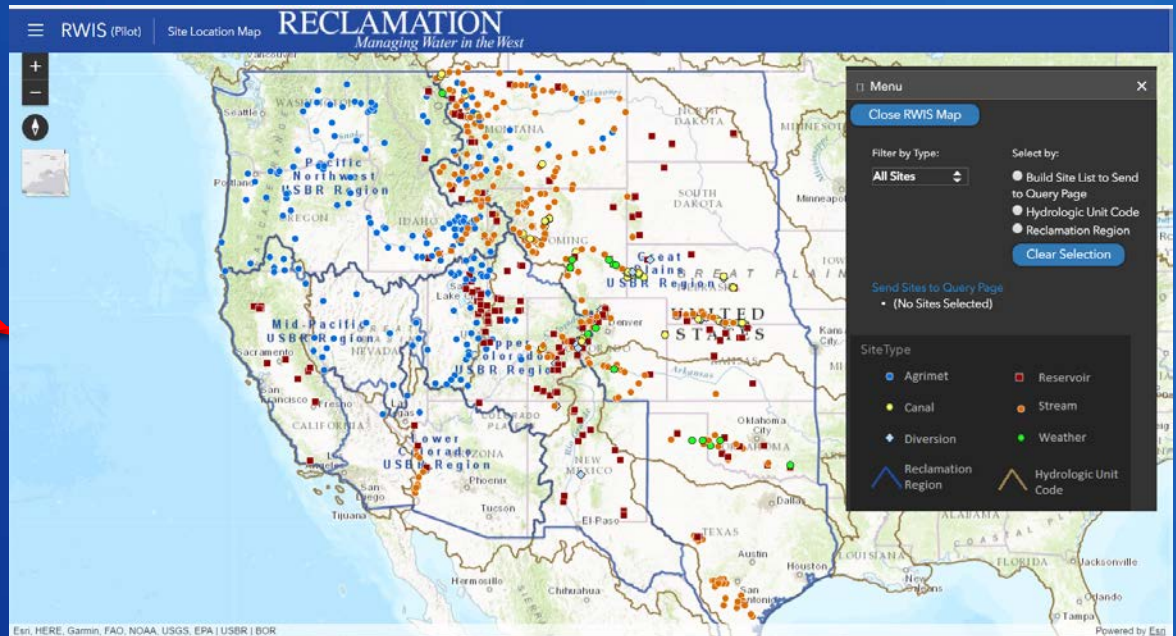
Standardized formats



Accessible via Web Services/APIs

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Reclamation Water Information System (RWIS): water.usbr.gov



Funding: Reclamation Science and Technology Program (Open Water Data Initiative) as well as other Reclamation IT and data resource management programs.

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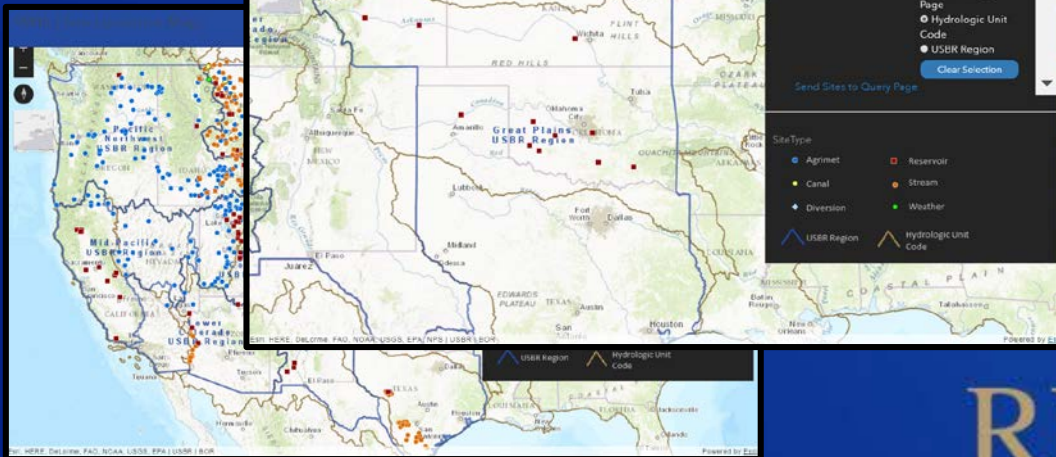
RWIS 1.0.0

Launched April 2017

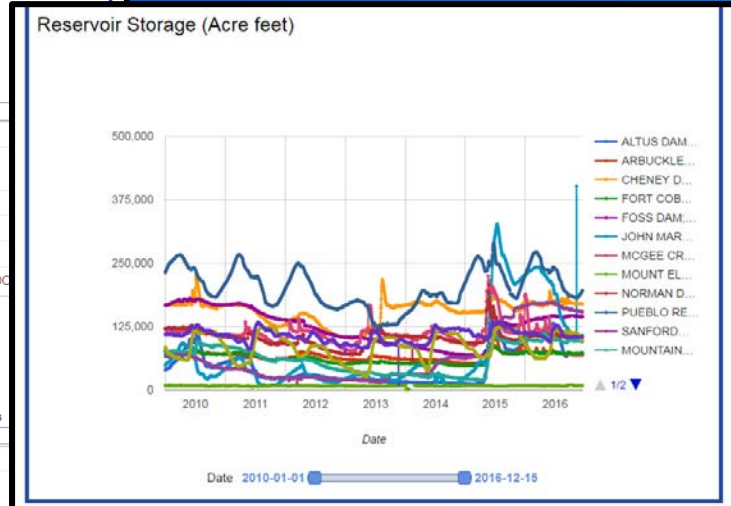
water.usbr.gov

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

2. Map Interface
for Data
Selection



3. Time Series Plots



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

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

5. Web Services

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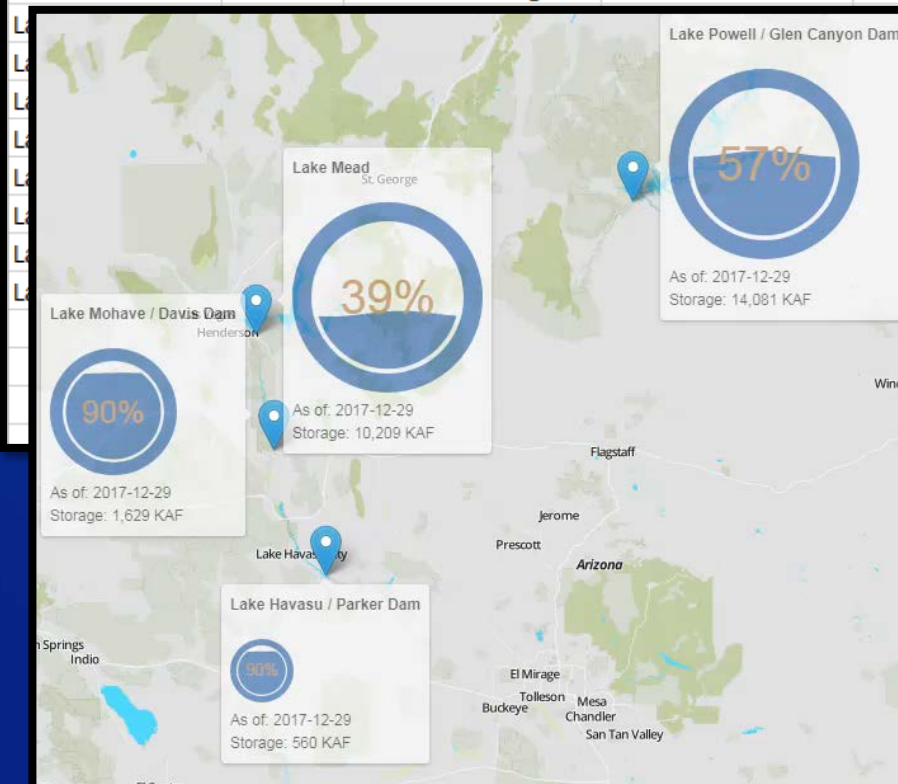
RWIS 2.0.0

To be released week of January 22, 2018)

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

Improved query page layout

Lake Name	Region	Reservoir Storage	6/11/1937 0:00	11171600 Acre f
Lake Mead	hdmlc	Reservoir Storage	6/10/1937 0:00	11114900 Acre f
Lake Mead	hdmlc	Reservoir Storage	6/9/1937 0:00	11046500 Acre f
Lake Mead	hdmlc	Reservoir Storage	6/8/1937 0:00	10968200 Acre f
Lake Mead	hdmlc	Reservoir Storage	6/7/1937 0:00	10890500 Acre f
Lake Mead	hdmlc	Reservoir Storage	6/6/1937 0:00	10808600 Acre f
Lake Mead	hdmlc	Reservoir Storage	6/5/1937 0:00	10725400 Acre f



SELECT YOUR DESIRED OUTPUT FORMAT:
Interactive plots are limited to 5 sites, 5 parameters, and 10 years of daily data. If you want more data, please choose CSV, JSON, or WaterML2.

☐ Interactive Plot ☐ JSON ☒ CSV ☐ WML2

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

Filters:

Selectable sites

Type name to filter

HUNGRIE HORSE RES NR HUNGRIE HORSE, MT

HUNTINGTON NORTH RESERVOIR

HYRUM RESERVOIR

Henrys Lake Dam on Henrys Fork nr. Lake, ID

Island Park Dam and Reservoir, ID

JAMESTOWN RESERVOIR, NORTH DAKOTA

Selected sites

Type name to filter

Lake Mead

SELECT PARAMETERS:
Parameters will be filtered as sites are selected.

Selectable parameters

Type name to filter

Reservoir Elevation (feet)

Reservoir Release - Powerplant (af)

Reservoir Release - Powerplant (cfs)

Selected parameters

Type name to filter

Reservoir Storage (af)

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

☐ Current Month ☐ Current Year ☒ All Available Data

☐ Date Range: From To

SAVE QUERY SELECTIONS: <http://140.215.104.207/rwis> Copy and Open

This URL will open in a new tab to bookmark it in your browser to save your query selections.

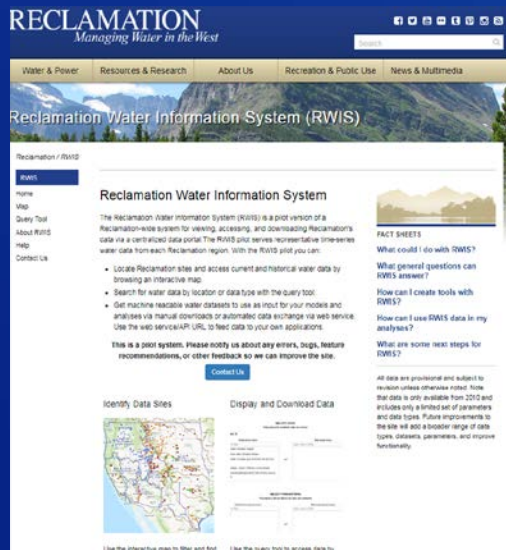
Visualization Demo

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Expand from RWIS to RISE

(Launch Fall 2018)

Reclamation Water Information System (RWIS)



- Add more water data
- Add data domains
- Extend time-series to full period of record
- Add data types (spatial, documents, etc)
- Improve portal performance
- Add portal features (enhancements to map and query, alerts, etc.)

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

Reclamation Information Sharing Environment (RISE)



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RISE: More Data Types and Domains

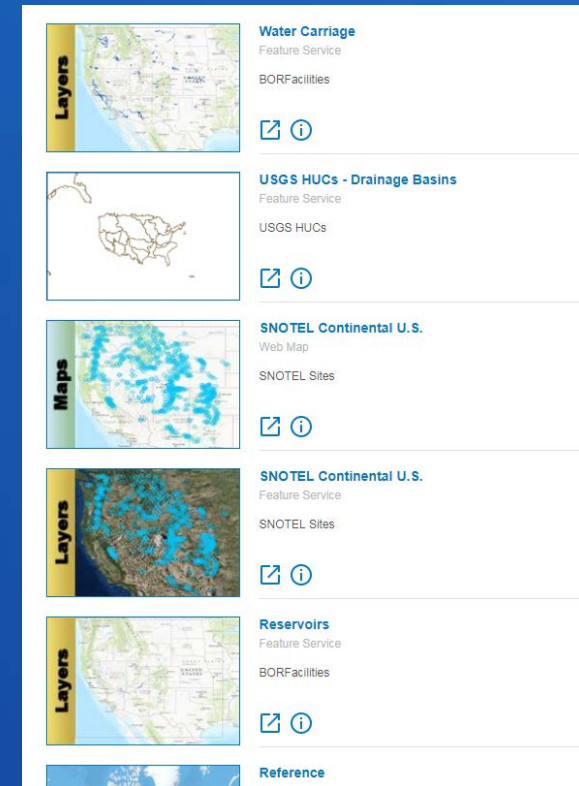
- Data Types Expanded time series

- Geospatial
- Documents
- Photos/Videos
- Expanded Metadata



- Data Domains

- Expanded Water Domain
- Environmental (Biological, Water Quality)
- Infrastructure/Assets (Facilities, Lands)
- Hydropower



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RISE: Engaging other Data Domains

- **Build communities with common goals**
 - Priorities & needs re: data consolidation and publishing
- **Identify data publishing scope and process**
- **Prepare data for publishing**
 - develop data standards for corporate consolidation
 - Identify how to acquire and aggregate datasets
 - Develop metadata
 - Data screening for privacy, security risks
- **Publish Data for Private-Sector and Public Use**
 - Add datasets in accordance with screening decisions
 - Create portal features to support new data

RISE: Hydropower Domain

- Initial data scope:
 - Regions' water databases' contents on hydropower
 - Data from Reclamation's Power Operations and Maintenance Tracking System (POMTS)
- Future
 - explore opportunities to link other operational databases



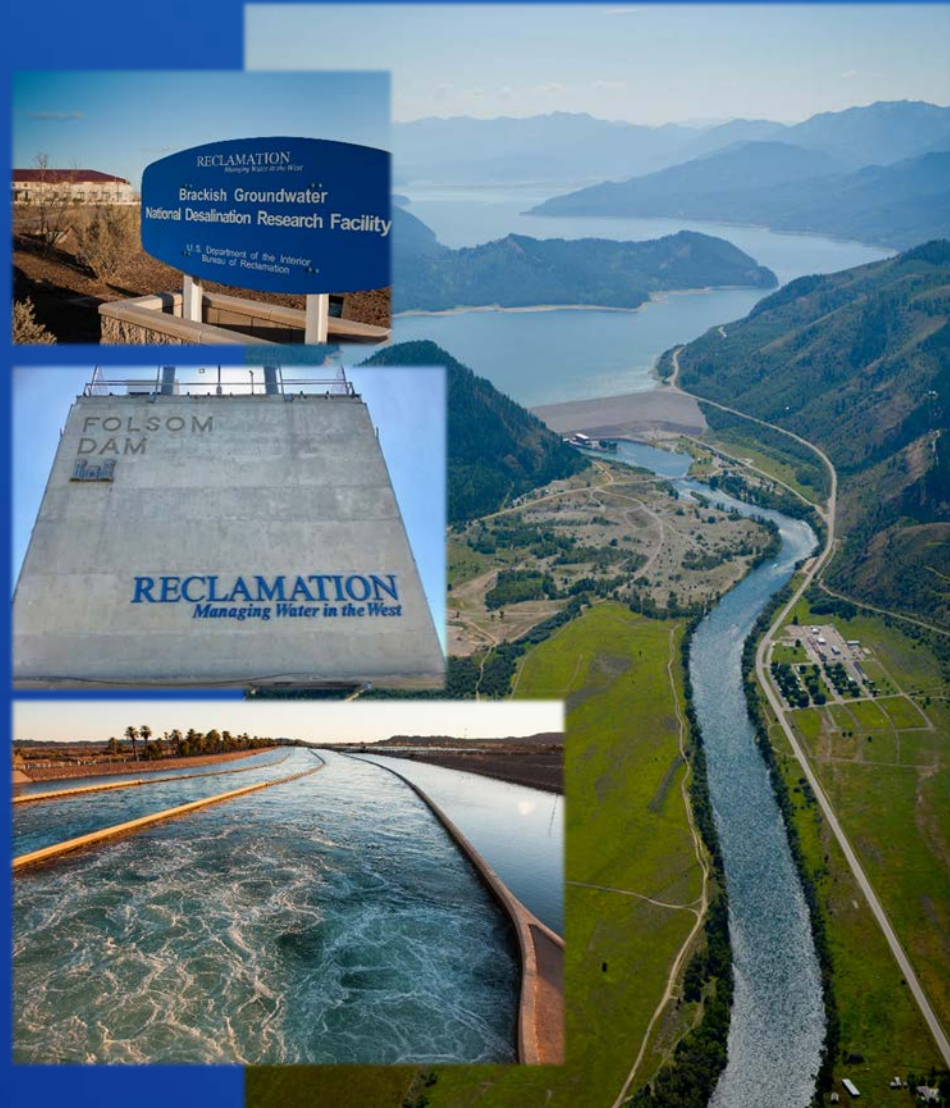
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RISE: Infrastructure Domain

RDC Asset Inventory Pilot Project

- Identified need for accessible central database of asset information
- Discussions underway on how RISE can serve this need

Infrastructure/assets
Data as Metadata:
Framework for connecting
datasets



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RISE: Environmental Domain (River Restoration sub-domain)

- Pilot with one species recovery program (Lower Colorado River MSCP) and multiple data types → integrate data into RISE for publishing
- Pilot with one program, expand to others having similar data types



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RISE: Environmental Domain (Water Quality sub-domain)

- Incorporate existing datasets from Reclamation regions and programs
- Initially consolidate and publish most common water quality parameters, then expand to others over time.



ANALYTE	UNITS	SAMPLE DATE	RESULT	REPORTING LIMIT	WATER QUALITY LIMIT*	WATER QUALITY OBJECTIVE**
ALKALINITY	mg/l	24-Feb-03	<5.0	5	20	AWQ-CC
ALKALINITY	mg/l	21-Aug-06	18	2	20	AWQ-CC
COPPER	ug/l	19-Aug-03	3	0.5	1.68	CTR-HDCC
E. COLI	MPN/100ml	17-May-01	300	2	126	REC-1 BP
E. COLI	MPN/100ml	26-Aug-02	170	2	126	REC-1 BP
E. COLI	MPN/100ml	18-Nov-03	240	2	126	REC-1 BP
E. COLI	MPN/100ml	24-Sep-07	500	2	126	REC-1 BP
FECAL COLIFORM	MPN/100ml	17-May-01	300	2	200	REC-1 BP
FECAL COLIFORM	MPN/100ml	26-Aug-02	280	2	200	REC-1 BP
FECAL COLIFORM	MPN/100ml	18-Nov-03	240	2	200	REC-1 BP
FECAL COLIFORM	MPN/100ml	24-Sep-07	500	2	200	REC-1 BP
pH	units	20-May-02	6.4	-	6.5-8.4	AG
pH	units	07-Feb-05	8.5	-	6.5-8.4	AG

* Alkalinity limit is a minimum, pH a range, others indicate maximum acceptable concentration

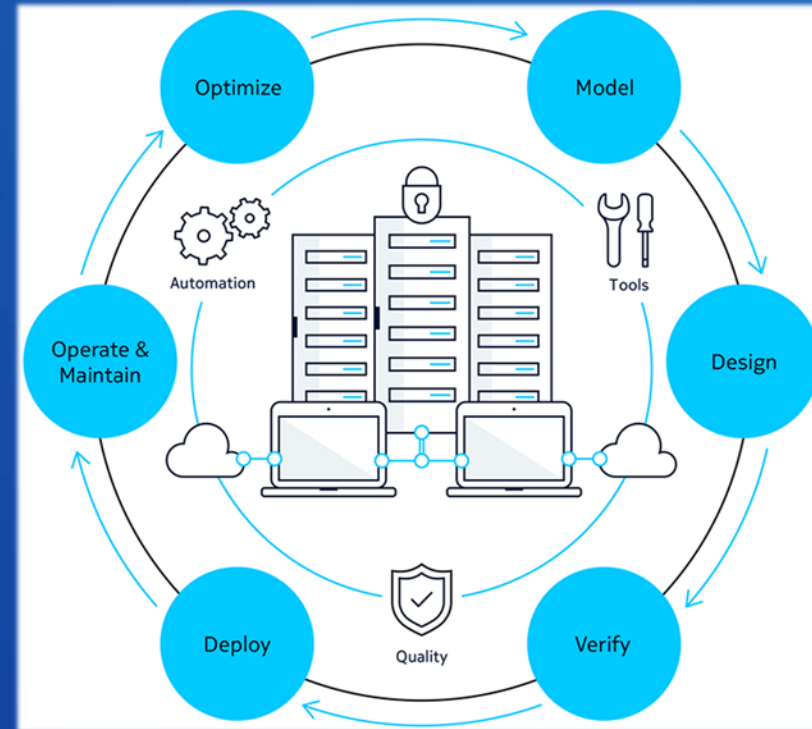
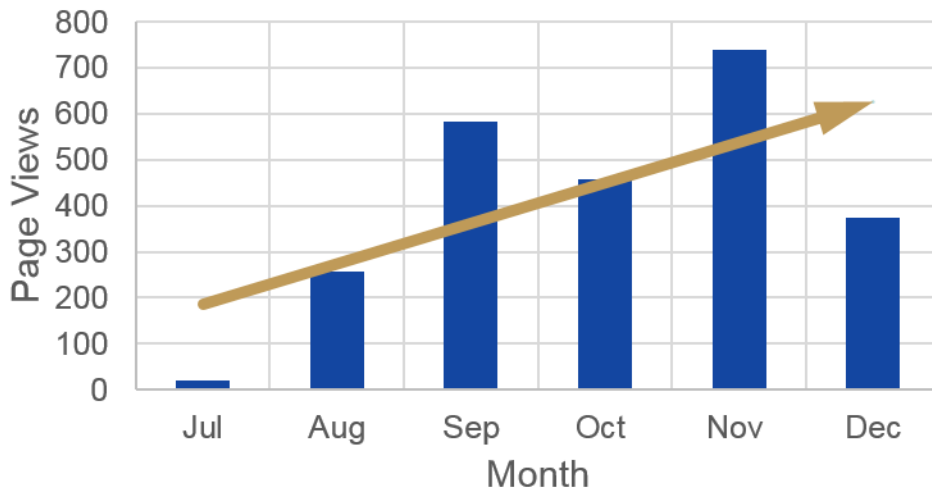
**Acronyms are explained in Table 5

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RISE: Improved Performance

- Popularity may cause congestion
 - Review site analytics and data request analytics
 - Improve load balancing and scaling
 - Evaluate in-browser vs back-end processing

RWIS Main Page Views

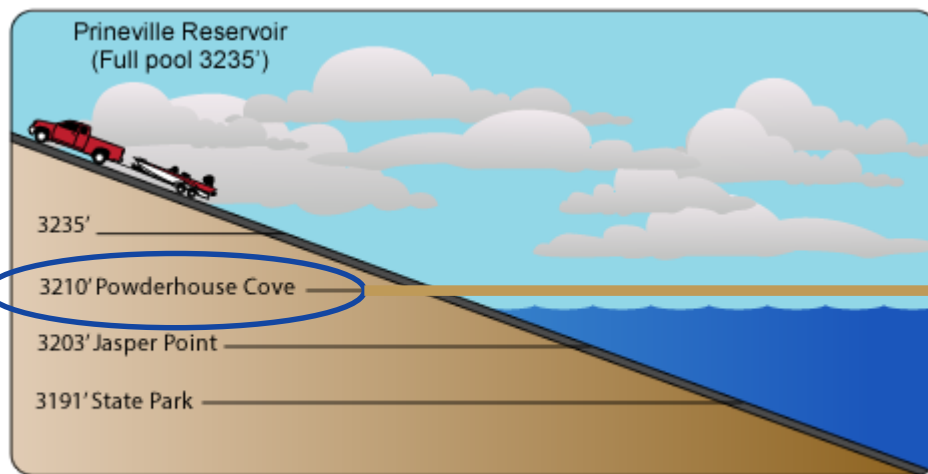


<https://networks.nokia.com/services/data-center-services>

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RISE: New Features

- Alerts and notifications
 - data request is ready
 - new data added
 - user specified condition
- Download/web service access to geospatial data layers
- Interpretive visualization tools
- Dataset sharing permissions (internal vs external)



Not To Scale
Provisional Hydromet Data

Alert me when this
boat ramp is
accessible

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To be included on RWIS and
RISE release notifications,
contact: rwis@usbr.gov

For accessing RWIS, go to:
<http://water.usbr.gov>

Colorado River Basin Data Visualization

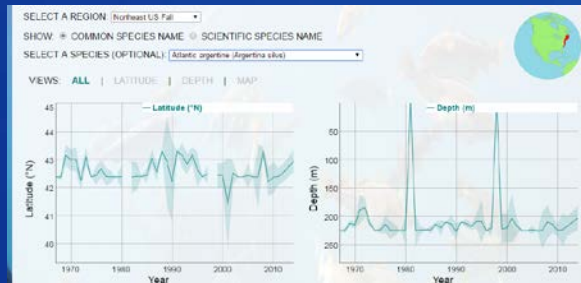
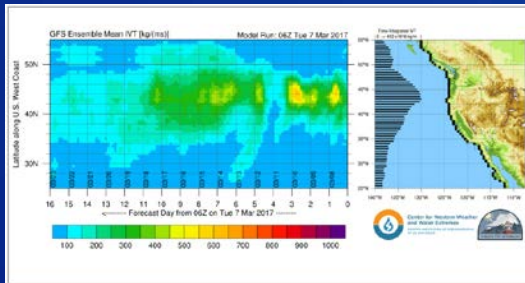
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Goal: Explore the process of opening data

- Which data?
- How do we make data open?
- How can data be used?

Expected end product:

- Documentation of open data process that can be applied throughout Reclamation
- Web-based visualization tool for the Colorado River Basin



Funding: Reclamation Science and Technology Program (Open Water Data Initiative)



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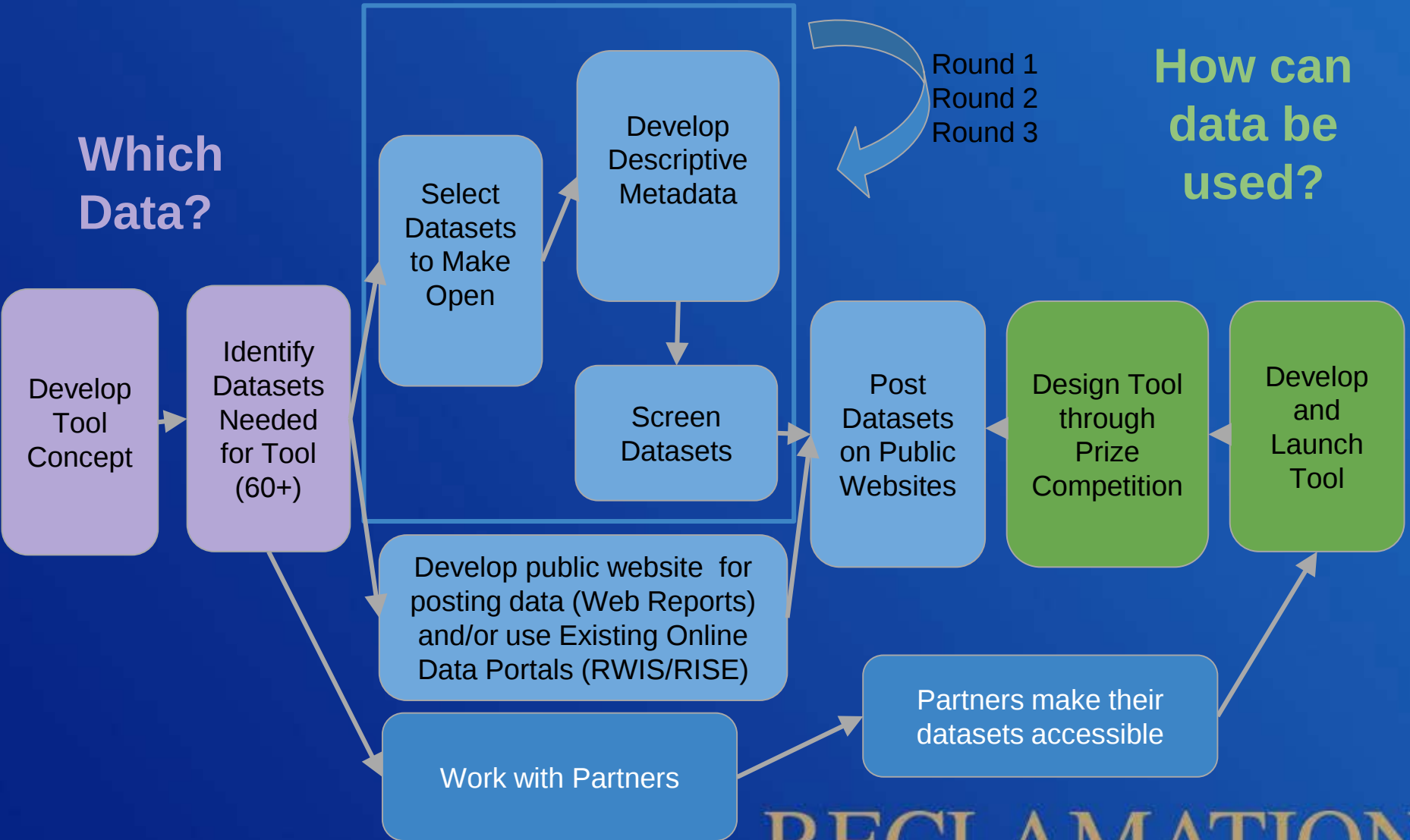
Project Tasks

How do we make
data open?

How can
data be
used?

Which
Data?

Round 1
Round 2
Round 3



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Prize Competition

Closed November 17, 2017, Awards to be announced February 2018



WATER
PRIZE COMPETITION CENTER

\$60,000 in prize \$\$\$

Can you help us improve data visualization of the Colorado River?

usbr.gov/research/challenges/datavis.html

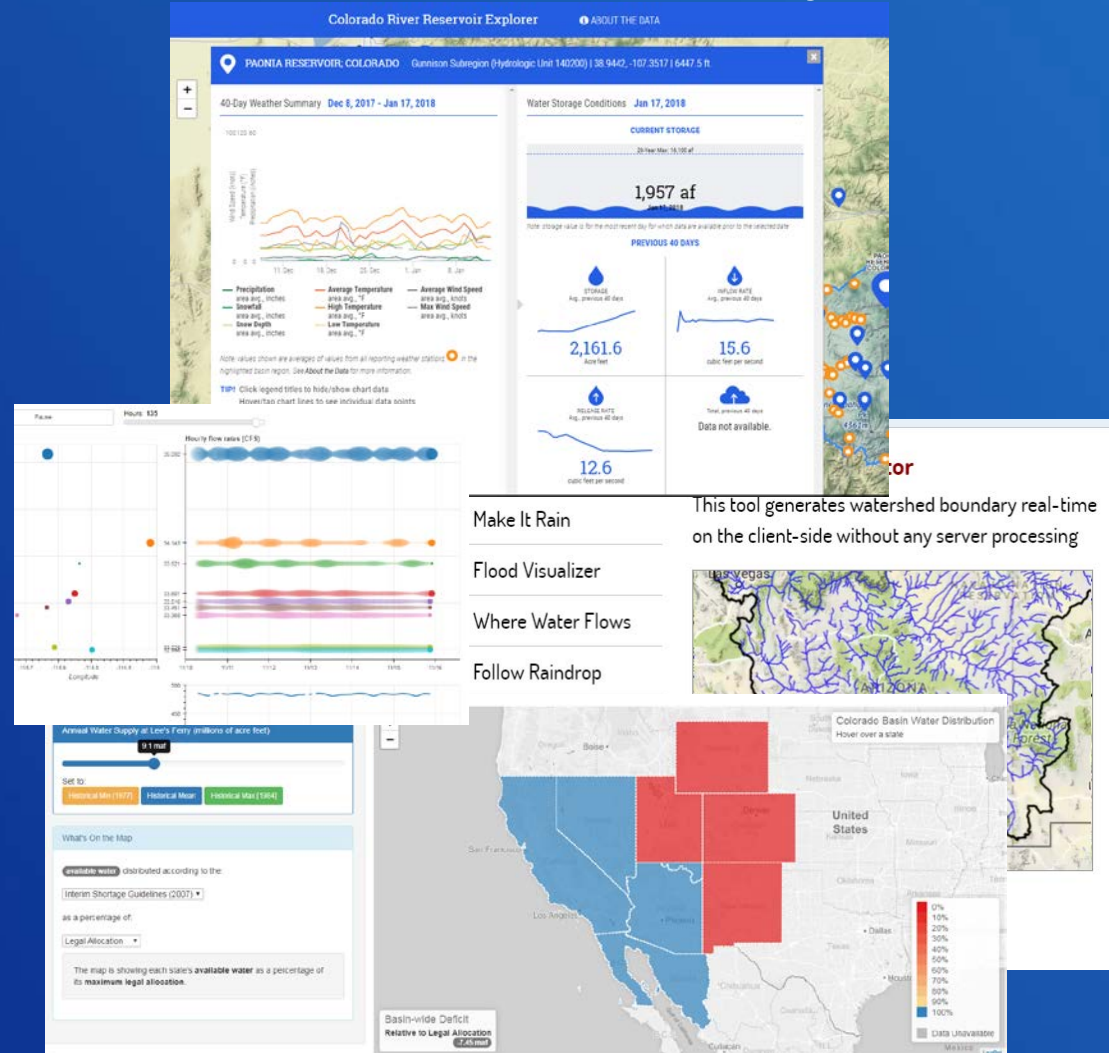
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USGS
United States Geological Survey

NOAA
National Oceanic and Atmospheric Administration

USDA
United States Department of Agriculture

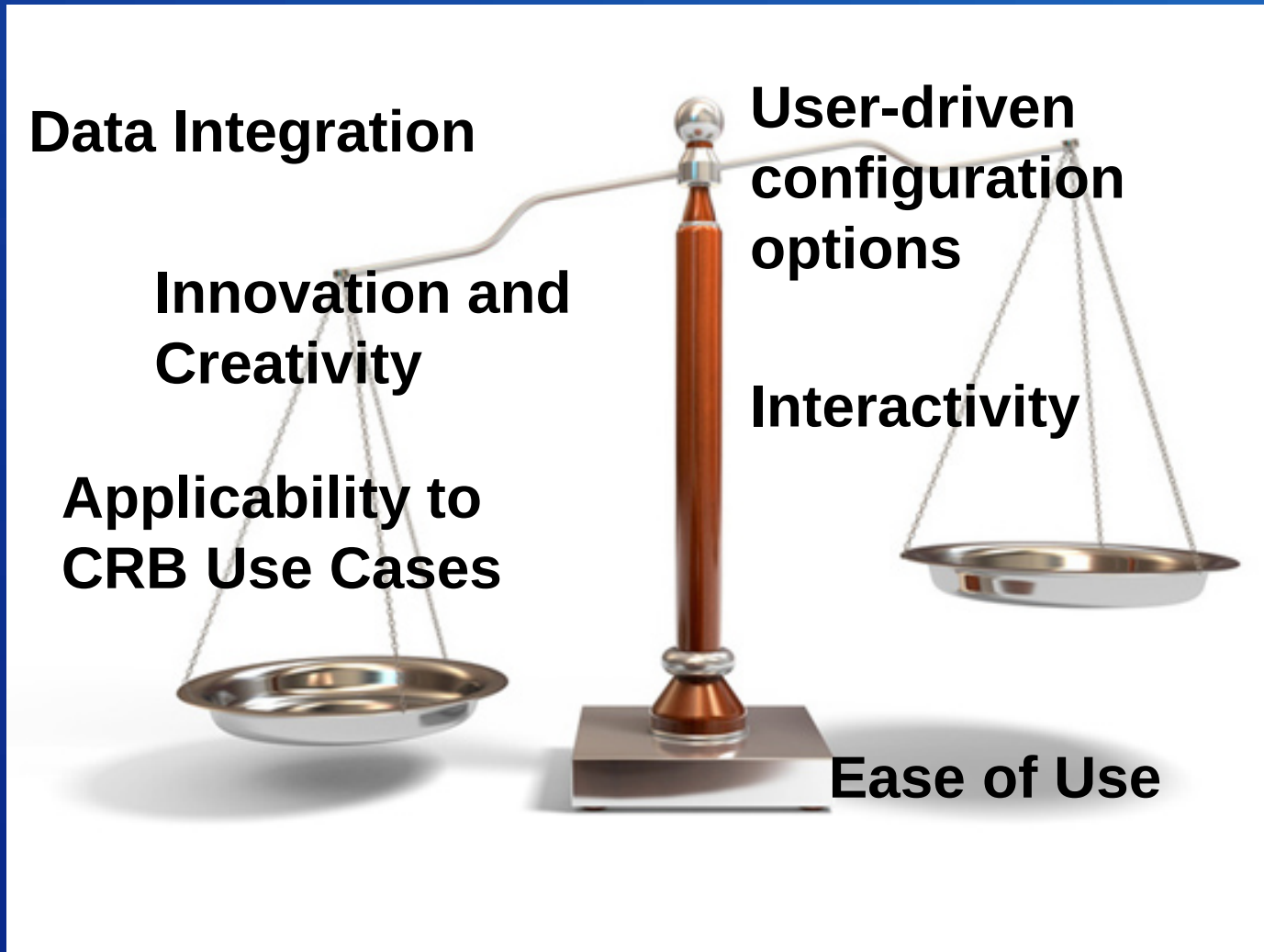
Mexico



20 solutions being evaluated

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Criteria for Evaluating Submissions



Acknowledgments

- RWIS/RISE
 - 50+ BOR staff and contractors participating in Bureau-wide sub-teams working on
 - System Vision and Planning
 - Data Scope, Standards, Metadata, Screening, Prep for Publishing
 - Functionality (Web Portal, User Experience, Tools)
 - Core Infrastructure (Servers, Databases, Software)
 - IT Security
- CRB Data Visualization
 - USBR Upper Colorado and Lower Colorado Region Water Operations staff contributing datasets and participating in tool development process
 - Partner Agencies (NOAA NWS CBRFC, NRCS, USGS, IBWC)
 - USBR Denver Prize Competition staff

Discussion Questions

- What datasets would you like to see available in RISE?
- How do you and your stakeholders want to use Reclamation's data?
- What types of visualizations would be useful to you and your stakeholders?

Questions?

adanner@usbr.gov
rwis@usbr.gov

Email me to be included on the email list for release notifications

RWIS Website:
water.usbr.gov

CRB Datasets:
<https://www.usbr.gov/lc/region/g4000/riverops/webreports/>