



# Water Quality Portal (WQP) & Tools for Automated Data Analysis (TADA)

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Water Data Integration Branch

EPA Office of Water

Wednesday, March 6<sup>th</sup>, 2024, 3:00pm – 4:30pm



## Installation

You must first have R and R Studio installed to use the TADA R Package (see instructions below if needed). You can install and load the most recent version of the TADA R Package on [GitHub](#) by running:

```
if(!"remotes" %in% installed.packages()){
  install.packages("remotes")
}

remotes::install_github("USEPA/TADA", ref = "develop", dependencies = TRUE)
```

# Agenda

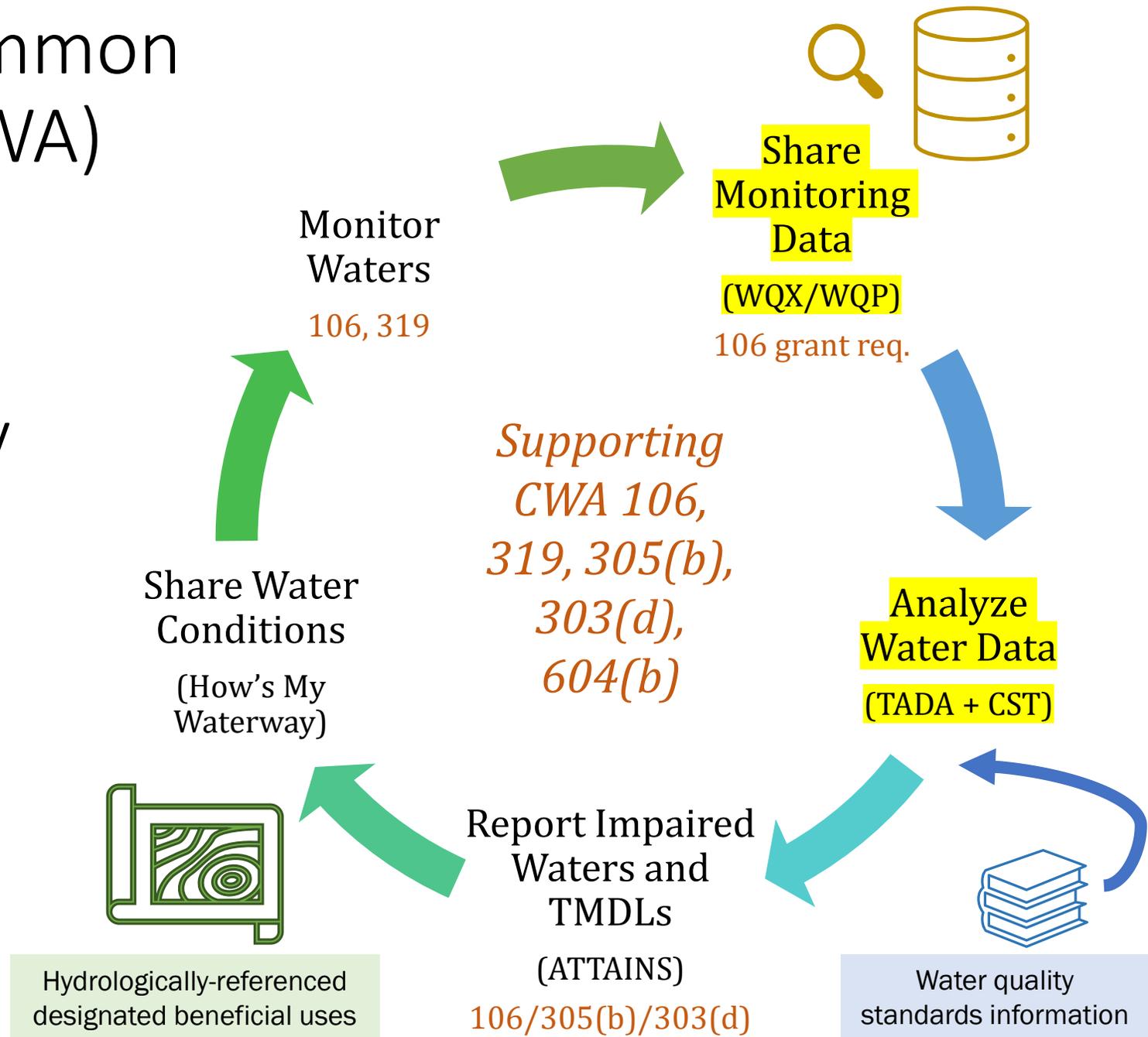
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- Water Quality Portal (WQP) Overview (15 mins)
- WQP Demo (15 mins)
- Tools for Automated Data Analysis (TADA) Overview (15 mins)
- TADA Demo (45 mins)



# Helping Answer Common Clean Water Act (CWA) Questions

- Is my water safe?
- Does it meet water quality standards?
  - Aquatic Life
  - Drinking
  - Fishing
  - Recreation



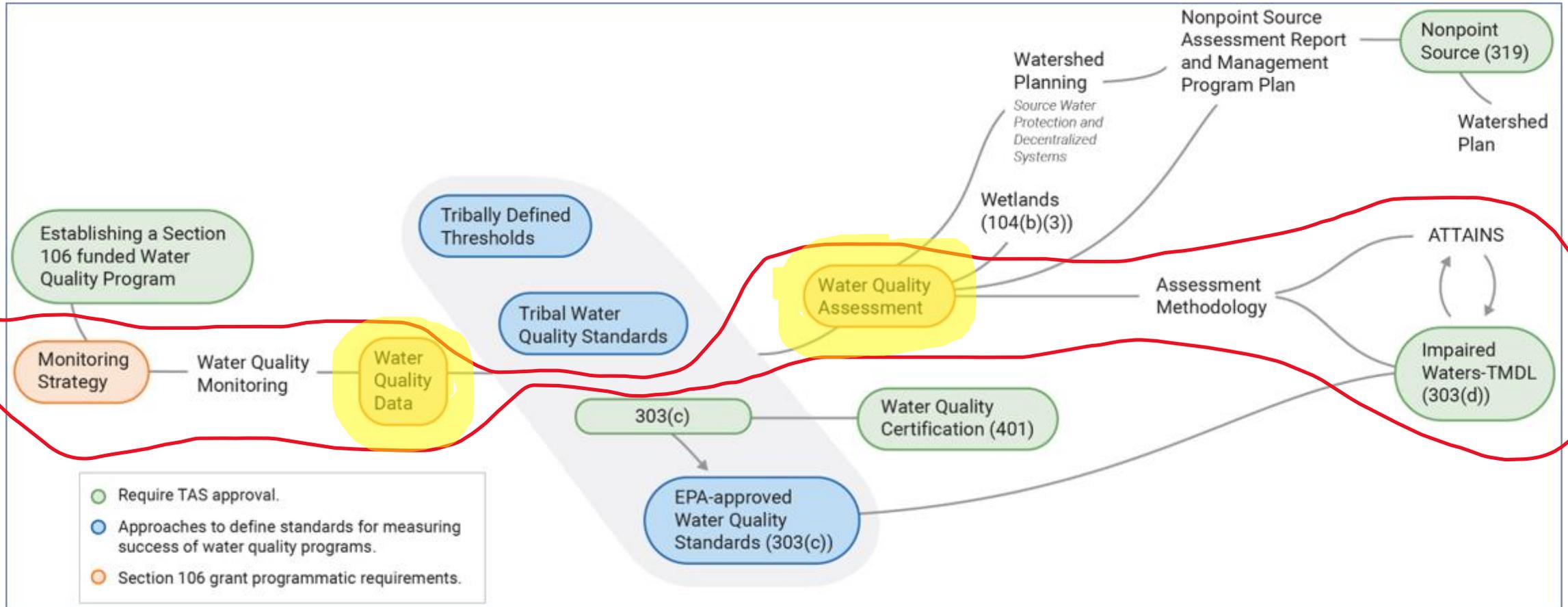
Reusable 

Interoperable 

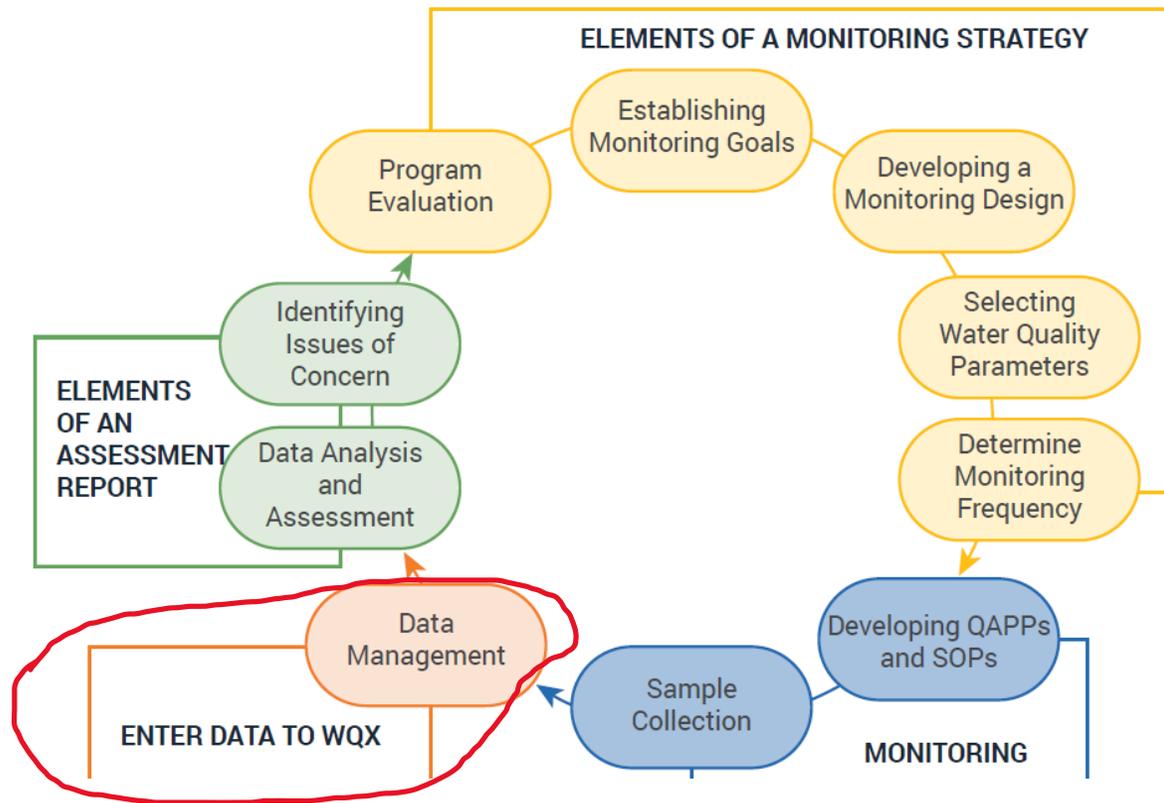
Accessible 

Findable 

# Clean Water Act - Tribal Program Road Map



# Clean Water Act Section 106 – Data Management Req.



# Water Quality eXchange



# Water Quality Portal

- 424,691,590 sample results
- 1,085,011 sites
- 1,590 organizations

# Water Quality Portal (WQP)



Water quality monitoring data is foundational to being able to answer important questions

- Is my water safe?
- Is there enough?

Format is the same for everyone who wants to share data

- Water quality monitoring and data management is complicated
- Standardized, electronic data is more valuable than data in file cabinets (reusable, sharable, discoverable, interoperable, and includes important metadata)

Usable data translates to knowledge, public awareness, and action

- Reuse adds value!
- Supports CWA assessments and other water quality research
- Serves as the backbone for water data tools like HMW

# Standardized data formats

## Stacked Style Dataset - AKA "Tall" "Narrow"

All measures in one column



Additional information about those measures



- How data is stored/served by the WQP
- Good for data management
- Allows for metadata

Result Identifier	Characteristic Name	Sample Fraction	Measure Value	Unit
NWIS-114877794	Stream width measure		3	ft
NWIS-114877795	Temperature, water		16.8	deg C
NWIS-114877797	Stream flow, instantaneous		0.19	ft <sup>3</sup> /s
NWIS-114877798	Specific conductance	Total	696	<u>uS/cm @25C</u>
NWIS-114877799	Acidity, (H <sup>+</sup> )	Total	0.00001	mg/l
NWIS-114877800	Oxygen	Dissolved	11.4	mg/l
NWIS-114877801	pH	Total	8.3	std units

# WQX/WQP data are relational

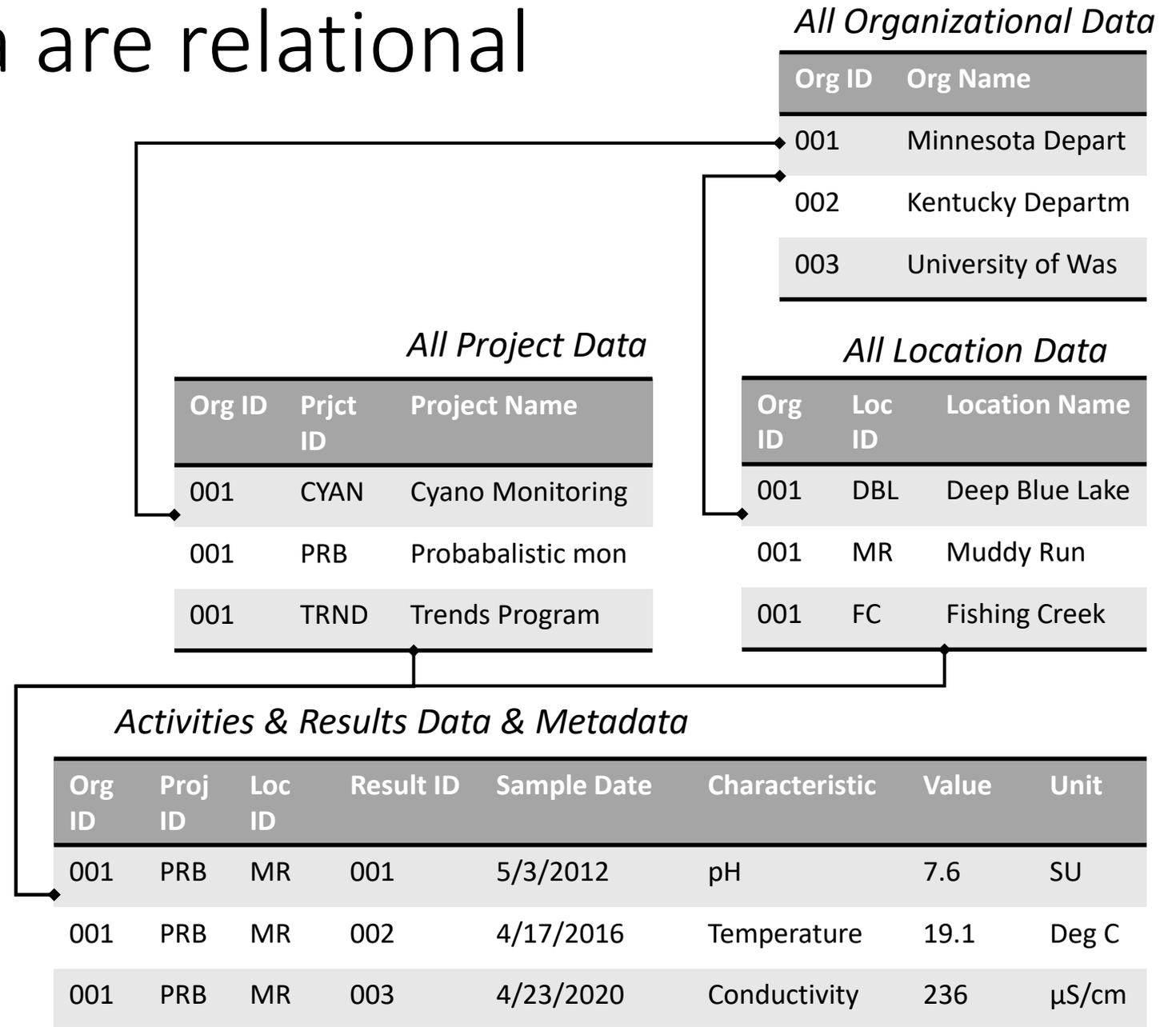
Data of different types are each managed in their own table

We establish relationships between certain pieces of information in the tables

The related pieces of information are often (but not always) ID or “key” fields

This allows for more detailed information to be stored in separate tables, allowing for useful queries of the database

Ex. This is what allows users to query across place, time, program, and result type in the WQP



# WQX QAQC Service

## EXAMPLE QAQC REPORTS

Activity	Monitorin	ResultData	Character	Resultsam	ResultMet	ResultMe	ResultMe	ResultStat	ResultDep	Statistical	Analytical	Analytical	LastChang	Transacti
22010: 1/5/2022 Field Msr/ Water	KCP	Dissolved oxygen saturation		95.1	%	Final				8157	HACH	#####	4ef84a81	
22010: 1/5/2022 Field Msr/ Water	KCP	pH		8.11	None	Final				8156	HACH	#####	4ef84a81	
22010: 1/5/2022 Field Msr/ Water	KCP	Salinity		34.7	ppt	Final				8160	HACH	#####	4ef84a81	
22010: 1/5/2022 Field Msr/ Water	KCP	Temperature, water		24.6	deg C	Final				2550	APHA	#####	4ef84a81	
22010: 1/5/2022 Field Msr/ Water	KCP	Turbidity		4.85	NTU	Final				180.1	USEPA	#####	4ef84a81	
22010: 1/5/2022 Sample-Rc Water	KCP	Total Nitrc Filtered, fias N		198.50	ug/l	Final				4500-N	APHA	#####	4ef84a81	

Monitorin	Monitorin	Monitorin	Latitude	Longitude	LastChang	Transacti	Country	State	County	HUCEight	GEO	LATS	GEO	LON	GEO	COUGEO	STATGEO	COUGEO	HUC	GEO	REAC
000152	Ala Moan: BEACH	Prc	21.29104	-157.855	#####	5d4415b5-aed0-453a-9201-8eaab3b42bc					21.291	-157.855	UNITED	STHAWAII		20060000		20060000			
000159	Grays Bea	BEACH	Prc	21.27719	-157.831	#####	5d4415b5-aed0-453a-9201-8eaab3b42bc				21.277	-157.831	UNITED	STHAWAII		20060000		20060000			
000160	Tavern Be	BEACH	Prc	21.27564	-157.826	#####	5d4415b5-aed0-453a-9201-8eaab3b42bc				21.276	-157.826	UNITED	STHAWAII		20060000		20060000			
000169	Mokuleia	BEACH	Prc	21.58209	-158.193	#####	5d4415b5-aed0-453a-9201-8eaab3b42bc				21.582	-158.193	UNITED	STHAWAII		20060000		20060000			
000171	Haleiwa B	BEACH	Prc	21.5984	-158.104	#####	5d4415b5-aed0-453a-9201-8eaab3b42bc				21.598	-158.104	UNITED	STHAWAII		20060000		20060000			
000172	Waimea B	BEACH	Prc	21.63974	-158.064	#####	5d4415b5-aed0-453a-9201-8eaab3b42bc				21.64	-158.064	UNITED	STHAWAII		20060000		20060000			
000173	Kawela Ba	BEACH	Prc	21.69726	-158.009	#####	5d4415b5-aed0-453a-9201-8eaab3b42bc				21.697	-158.009	UNITED	STHAWAII		20060000		20060000			

## WQX QAQC Service User Guide

TADA Team  
2023-09-15

Source: [vignettes/WQXValidationService.Rmd](#)

## TADA Leverages the Water Quality eXchange (WQX) QAQC Service

This is an overview of the the WQX Quality Assurance and Quality Control (QAQC) data submission service, and how TADA leverages that service to flag potentially invalid data in the Water Quality Portal (WQP). It will cover: 1) an overview of all available WQX QAQC tests for data submissions, 2) which of these QAQC tests are also available in TADA for flagging potentially invalid WQP data, and 3) how to interpret and provide feedback on the validation reference tables referenced by WQX and TADA for this QAQC service.

## Background

The WQX expectation for submissions is that users submit only QAQC'd data and utilize WQX elements to ensure the data is of "documented quality". The WQX team has historically hosted data quality working groups aimed at creating best practices and required data elements for WQX 3.0 for specific parameter groups such as nutrients, metals and biological data. These resources have supported users to submit data of documented quality. This approach has been

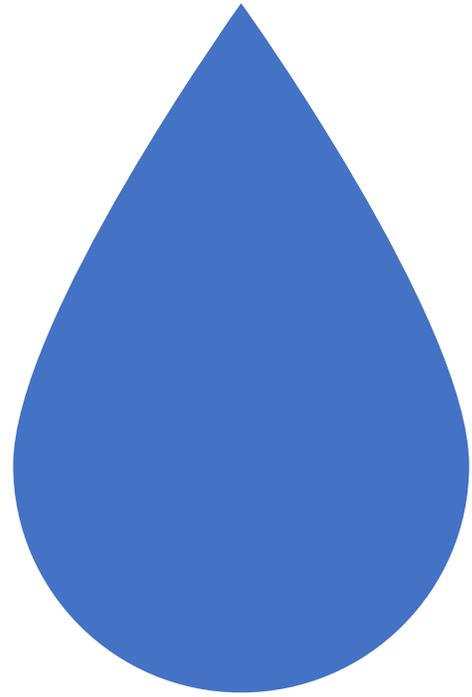
On this page

TADA Leverage  
eXchange (WQX)

Background

Available Tests

Providing Fees  
Tables



# Water Quality Portal Demo

# Retrieving data from the WQP

## Several Options:

### 1. [WQP Web Interface](#)

- [WQP Demo on How to Download Data \(2015\)](#)
- [WQP Demo on How to Download Data \(2019\)](#)

### 2. [How's My Waterway](#)

### 3. TADA

## How's My Waterway

### The Water Quality Portal Website

The screenshot shows the 'Download Water Quality Data' page on the National Water Quality Monitoring Council website. It features a navigation bar with 'Home', 'Explore WQP Sites', and 'Help & About'. Below the navigation bar are 'Basic' and 'Advanced' tabs. The main heading is 'Download Water Quality Data'. A progress indicator shows '1 of 3 Location Parameters'. A text box explains: 'Specify location parameters to describe the spatial extent of the desired dataset. Additional options are available in the [Advanced Download](#). All fields are optional.' A 'Country' dropdown menu is set to 'All Countries'.

### TADA

The screenshot shows the 'Option B: Query the Water Quality Portal (WQP)' interface. It includes a warning: 'Use the fields below to download a dataset directly from WQP. Fields with '(s)' in the label allow multiple selections. Hydrologic Units may be at any scale, from subwatershed to region. Howevr mindful that large queries may time out.' The form is divided into several sections: 'Date Range' with 'Start Date' (2023-09-20) and 'End Date' (2023-09-20) fields; 'Location Information' with 'State' (dropdown), 'County (pick state first)' (dropdown), and 'Hydrologic Unit' (text field with 'e.g. 020700100103'); 'Monitoring Location ID(s)' (text field with 'Start typing or use drop down menu'); and 'Metadata Filters' with 'Organization(s)', 'Project(s)', and 'Site Type(s)' text fields.

The screenshot shows the 'Download Data' interface with a date range selector from 1971 to 2023. Below the selector are 'Toggle All' and 'Expand All' buttons. A table lists characteristic groups with their measurement counts:

Characteristic Groups	Number of Measurements
<input checked="" type="checkbox"/> Biological, Algae, Phytoplankton	20 >
<input checked="" type="checkbox"/> Biological, Fish	20 >
<input checked="" type="checkbox"/> Information	348 >
<input checked="" type="checkbox"/> Inorganics, Major, Metals	299 >
<input checked="" type="checkbox"/> Inorganics, Major, Non-metals	812 >
<input checked="" type="checkbox"/> Inorganics, Minor, Metals	1,021 >
<input checked="" type="checkbox"/> Inorganics, Minor, Non-metals	250 >
<input checked="" type="checkbox"/> Microbiological	108 >
<input checked="" type="checkbox"/> Nutrient	989 >
<input checked="" type="checkbox"/> Organics, Other	5,301 >
<input checked="" type="checkbox"/> Organics, PCBs	235 >
<input checked="" type="checkbox"/> Organics, Pesticide	2,102 >
<input checked="" type="checkbox"/> Physical	3,223 >
<input checked="" type="checkbox"/> Radiochemical	898 >
<input checked="" type="checkbox"/> Sediment	120 >
<input checked="" type="checkbox"/> Stable Isotopes	40 >
<b>Total Measurements Selected:</b>	<b>15,788</b>

At the bottom, there are links for 'Advanced Filtering' and 'Water Quality Portal User Guide', and a 'Download Selected Data' button.

# Using Data from WQP Web Services

- Web services are URLs that provide the instructions from your query

Save the URL to your Query

URL of your data download

*Use this web service URL in any data application that can read data, like MS Excel, R, Access, Arc Online, etc.*

**Query URL**  
Copy and share the URL of this query.

`https://www.waterqualitydata.us/#mimeType=csv&providers=NWIS&providers=STEWARDS&providers=STORET`

**Station**

`https://www.waterqualitydata.us/data/Station/search?  
mimeType=csv&zip=yes&providers=NWIS&providers=STEWARDS&providers=STORET`

**cURL**

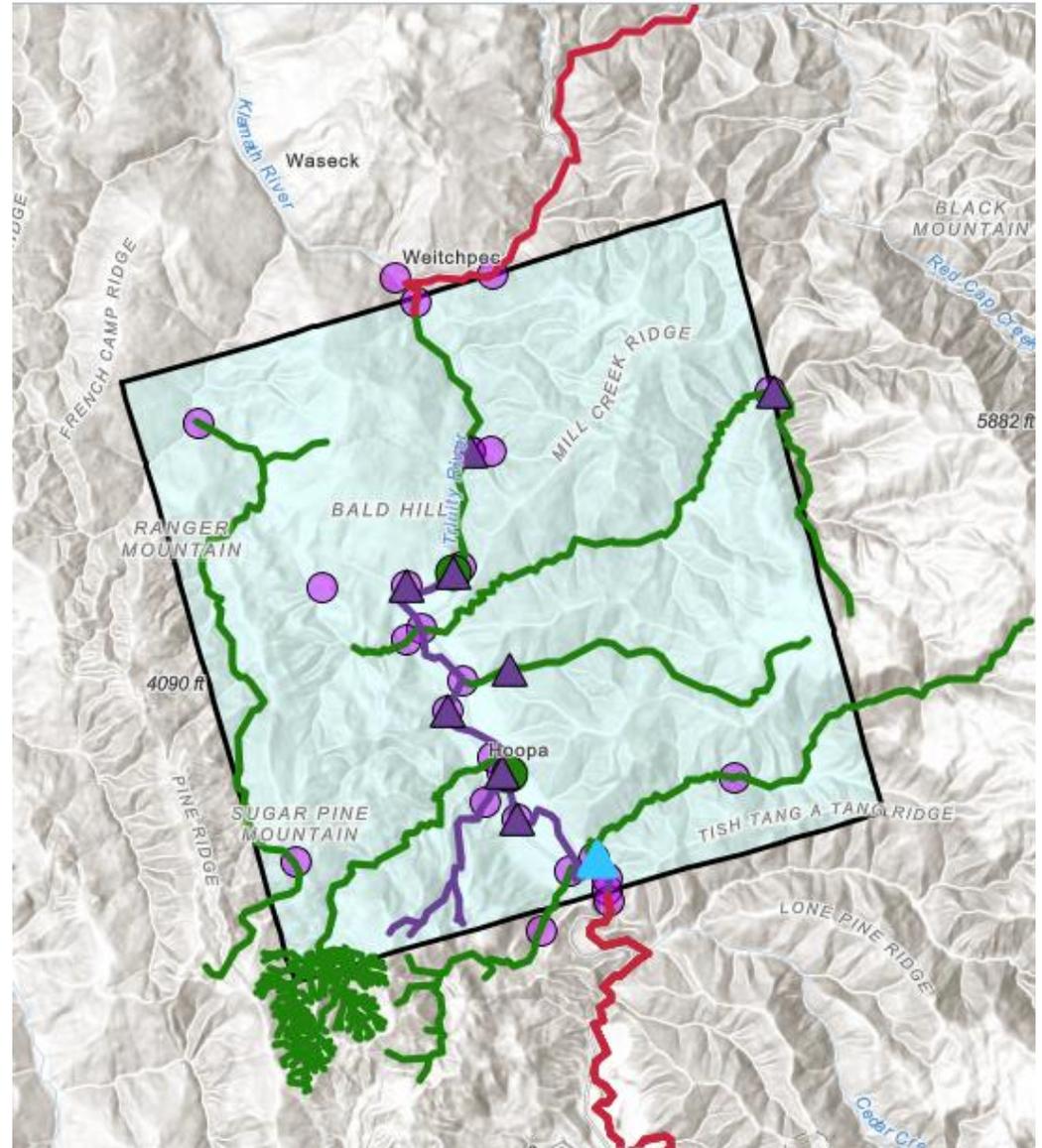
`curl -X POST --header 'Content-Type: application/json' --header 'Accept: application/zip' -d '{"providers":  
["NWIS","STEWARDS","STORET"]}' 'https://www.waterqualitydata.us/data/Station/search?mimeType=csv&zip=yes'`

**WFS GetFeature**

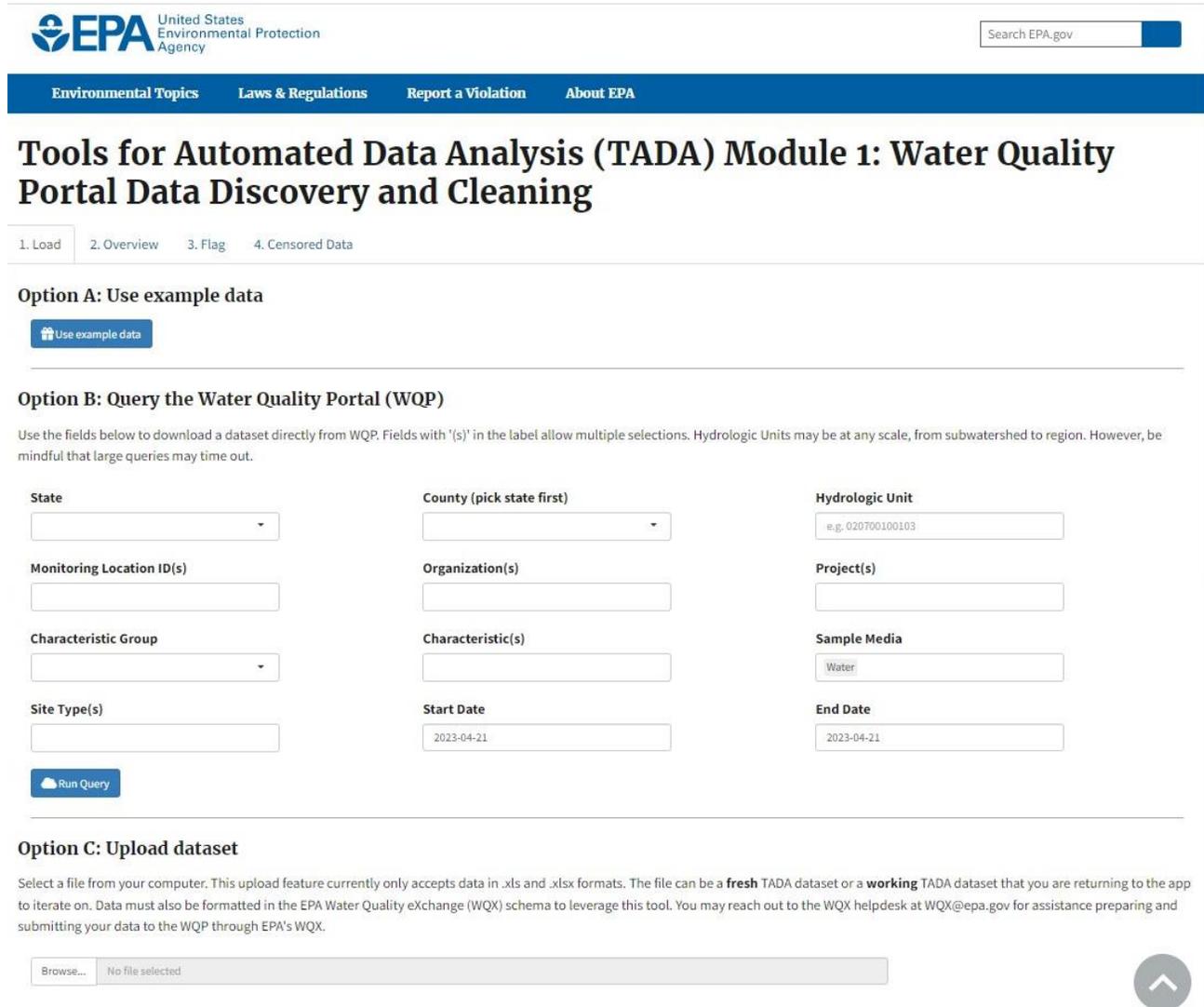
`https://www.waterqualitydata.us/ogcservices/wfs/?  
request=GetFeature&service=wfs&version=2.0.0&typeName=wqp_sites&SEARCHPARAMS=providers%3ANWIS%7CSTEWARDS%7C  
STORET&outputFormat=application%2Fjson`

[Clear search](#) [Download](#)

# How's My Waterway Data Retrieval



# TADA: WQP Data Retrieval in R



The screenshot shows the EPA TADA web interface. At the top is the EPA logo and a search bar. A navigation bar includes links for Environmental Topics, Laws & Regulations, Report a Violation, and About EPA. The main heading is "Tools for Automated Data Analysis (TADA) Module 1: Water Quality Portal Data Discovery and Cleaning". Below this are navigation tabs for "1. Load", "2. Overview", "3. Flag", and "4. Censored Data".

**Option A: Use example data**

Use example data

**Option B: Query the Water Quality Portal (WQP)**

Use the fields below to download a dataset directly from WQP. Fields with '(s)' in the label allow multiple selections. Hydrologic Units may be at any scale, from watershed to region. However, be mindful that large queries may time out.

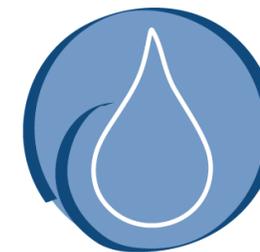
<b>State</b> <input type="text"/>	<b>County (pick state first)</b> <input type="text"/>	<b>Hydrologic Unit</b> <input type="text" value="e.g. 020700100103"/>
<b>Monitoring Location ID(s)</b> <input type="text"/>	<b>Organization(s)</b> <input type="text"/>	<b>Project(s)</b> <input type="text"/>
<b>Characteristic Group</b> <input type="text"/>	<b>Characteristic(s)</b> <input type="text"/>	<b>Sample Media</b> <input type="text" value="Water"/>
<b>Site Type(s)</b> <input type="text"/>	<b>Start Date</b> <input type="text" value="2023-04-21"/>	<b>End Date</b> <input type="text" value="2023-04-21"/>

Run Query

**Option C: Upload dataset**

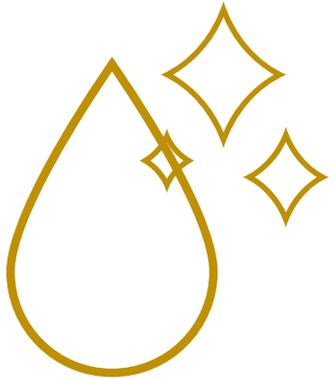
Select a file from your computer. This upload feature currently only accepts data in .xls and .xlsx formats. The file can be a **fresh** TADA dataset or a **working** TADA dataset that you are returning to the app to iterate on. Data must also be formatted in the EPA Water Quality eXchange (WQX) schema to leverage this tool. You may reach out to the WQX helpdesk at WQX@epa.gov for assistance preparing and submitting your data to the WQP through EPA's WQX.

Browse... No file selected



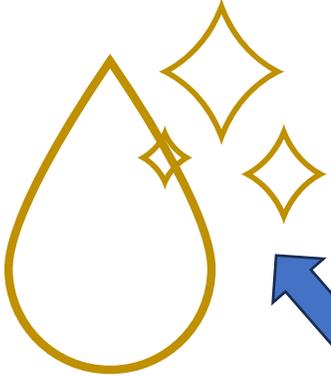
# TADA Vision

Discover, wrangle, and QC data

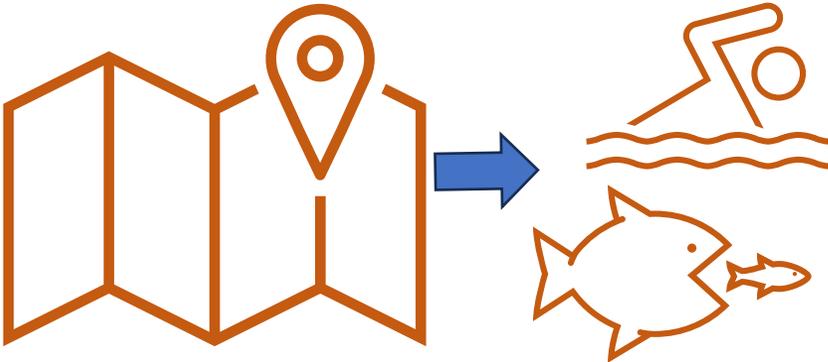


# TADA Vision

Discover, wrangle, and QC data



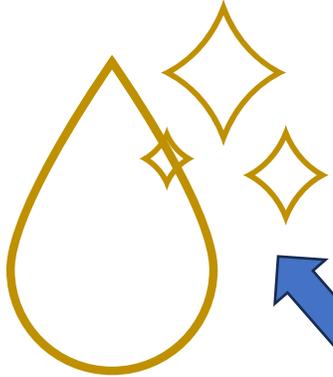
Assign beneficial uses



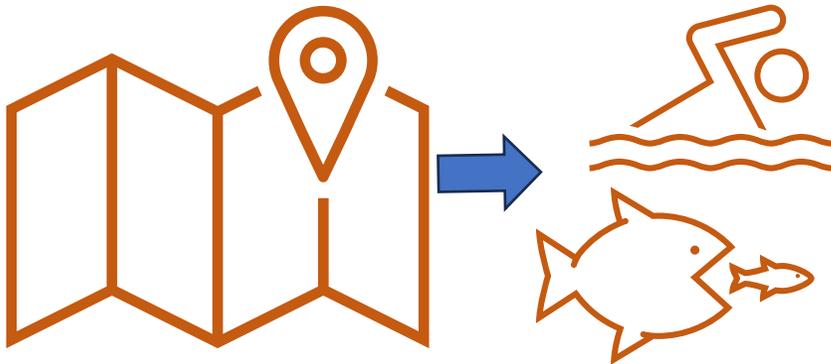
Assessment unit overlay with monitoring locations

# TADA Vision

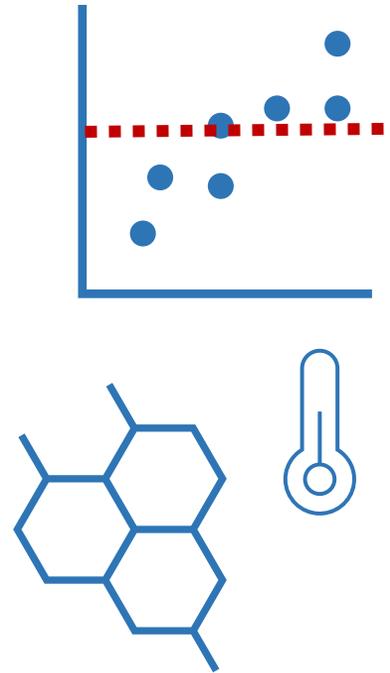
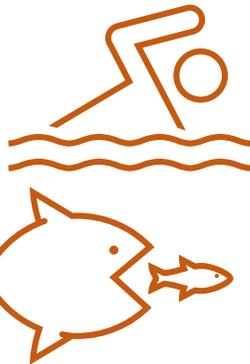
Discover, wrangle, and QC data



Assign beneficial uses



Assessment unit overlay with monitoring locations



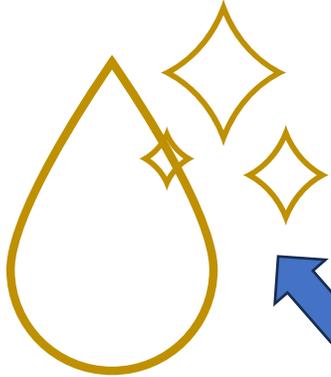
Beneficial uses determine numeric criteria used

Assessment methods guide impairment decisions based on:

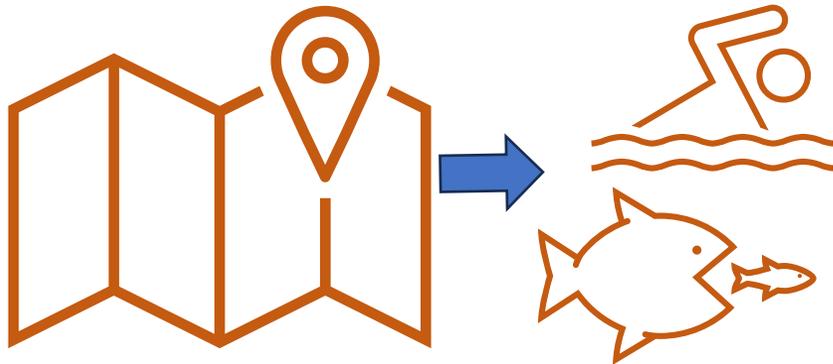
- Period of record
- Aggregated measurements
- Frequency
- Duration
- Magnitude
- Season
- Correction factors
- Covariates
- Site-specific criteria

# TADA Vision

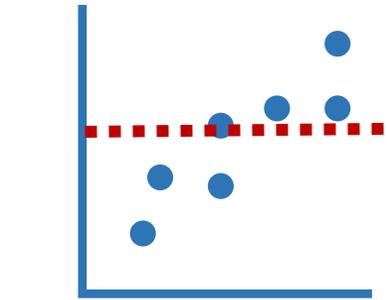
Discover, wrangle, and QC data



Assign beneficial uses



Assessment unit overlay with monitoring locations



Beneficial uses determine numeric criteria used

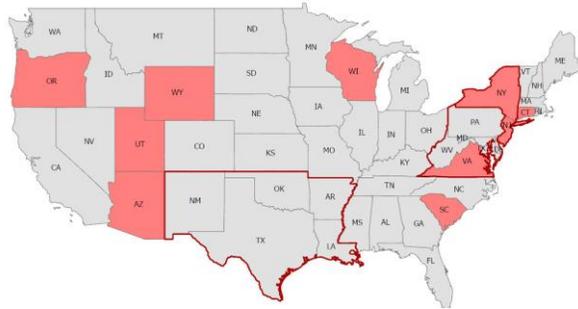
Assessment methods guide impairment decisions based on:

- Period of record
- Aggregated measurements
- Frequency
- Duration
- Magnitude
- Season
- Correction factors
- Covariates
- Site-specific criteria

# WQP TADA Working Group

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- Established in 2020
  - Built a community
  - Sharing examples from around the country
  - Extensive assessment process and methodologies discussions
  - Join us!



- Growing over time
- Currently meeting once every other month

- EPA
  - HQ: WDIB, MAB, WB, OST, ORD, OECA, OLEM, ARD
  - Regions: 1, 2, 3, 6, 7, 8
- At least 1 State from each EPA Region
  - VA, WI, MA, SC, MT, UT, AZ, IL, WA, OR, KS, CT, CA, MN, OK, MO, NJ, IN, NY, AR, AK, LA, MD, GA, DC
- Tribal Nations from Regions 1, 6 and 8
  - Penobscot Nation, Ute Mountain Ute, Absentee Shawnee Tribe, Pueblo of Tesuque, Owens Valley Indian Water Commission, others early on (staff turnover)
- Federal Agencies/Universities/Other
  - USGS, TetraTech, Colorado State, Long Island Sounds Study, Oak Ridge National Laboratory

# Inventory of Open-Source R Tools for Water Analyses

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- Over 50 resources to learn from, and build on
- Working Group helps share knowledge, examples, and set priorities
- Faster progress through collaboration and iteration (learning from each other)



# TADA Working Group: Identified Requirements/Priorities

## Scope

- Focusing on quantitative (numeric) water data in the WQP to start
- Focusing on frequently assessed parameters
- Common assessment processes and methodologies

Arsenic	Nickel
Boron	Nitrate
Chlorophyll a	Total Nitrogen, mixed forms
Chromium	pH
Chromium(VI)	Total Phosphorus, mixed forms
Cadmium	Depth, Secchi disk depth
Copper	Selenium
Dissolved oxygen (DO)	Silver
Dissolved oxygen saturation	Temperature, water
Escherichia coli	Total suspended solids
Lead	Chromium(III)
Mercury	Zinc

## Common Methodologies

- Spatial aggregation – assessment unit and station level assessments
- Characteristic specific assessment start and end dates
- Magnitude, duration (temporal aggregation)
- Criteria context – upper or lower limit, range
- n-day mean, n-day mean maximum or mean minimum, n-hour mean, geometric mean, arithmetic mean, n-day rolling average
- Frequency criteria (e.g., 10% rule, 1-in-3 years rule applied using binomial test or percentile)
- Custom input equations needed to calculate criteria (e.g., for ammonia and certain metals)
- Incorporating depth
- Acute vs chronic
- Seasonality

# R Package



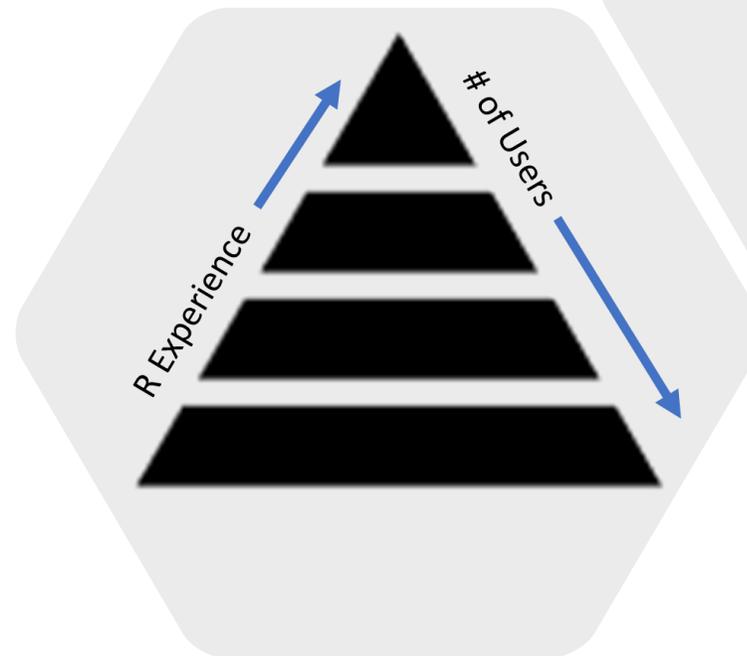
Data downloads  
Data cleaning  
Filtering  
Normalizing

*Analysis algorithms*

- Focus on algorithms specific to WQP data
- Series of functions to assist common analysis processes
- Data is flagged but not automatically removed or modified
- Can be easily incorporated into existing tools or data processing methods
- Highly customizable
- Companion to **dataRetrieval** package

# R Shiny User Interface

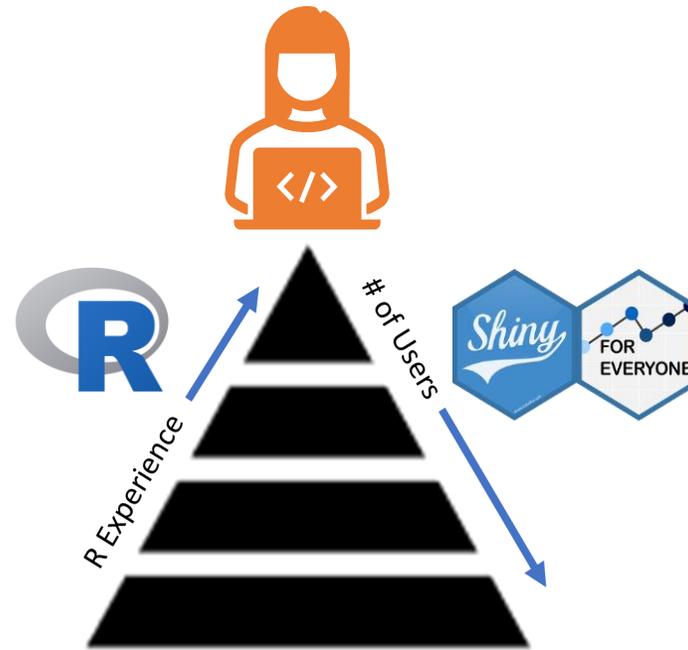
- R Shiny
  - Makes use of R package
- Developed independently
- Guides user through process
- Interactive
  - data exploring
  - cleaning
  - graphing
  - etc.
- Web based



# TADA Products

- Different tools for different users
  - [R Package](#) (coders)
  - [R Shiny Application](#) (non-coders)
- [User Guide](#) on GitHub Pages
- [EPA TADA Website](#)
- [R and R Shiny Learning Resources](#) for Water Community, Collaborative Effort Between TADA Working Group & North American Lake Management Society (NALMS)
- Working Group SharePoint & inventory of open-source R code and WQP tools – please reach out to learn more!

“Serve as a hub for an open-source water quality community”



**Working Group Mission**  
*To share and develop **R code** for evaluating and visualizing **WQP** data more efficiently through collaboration and open-source programming. This includes working together to find commonalities in assessment processes across the nation, creating flexible tools that can be easily customized to work within existing workflows, supporting each other in learning R, and ensuring products will be accessible to organizations most in need.*

# Involving users in the development process

The screenshot shows a GitHub repository page for 'TADA'. The top navigation bar includes 'TADA 0.0.1', 'Reference', and 'Articles'. A search bar is present on the right. The main content area features an article titled 'Contributing' dated '2023-06-07', with a source link to 'vignettes/CONTRIBUTING.Rmd'. Below the article is a section 'Contribute to TADA!' with a paragraph of text and a link to the 'CONTRIBUTING' policy. A sidebar on the right lists 'On this page' links: 'Contribute to TADA!', 'TADA Working Group Mission', 'Package Development', 'What is GitHub?', 'Required Installations', 'Issues', 'Branches and Pull Requests', 'Additional References', 'Open-Source Code Policy', 'License', 'Disclaimer', and 'Contact'. To the right of the main content is a pull request status summary with a red 'Review required' message and a green 'Some checks haven't completed yet' message. The summary lists several checks with their status and completion time.

**Contributing**  
2023-06-07  
Source: [vignettes/CONTRIBUTING.Rmd](#)

**Contribute to TADA!**  
We encourage you to read this project's [CONTRIBUTING](#) policy (you are here), its [LICENSE](#), and its [README](#).

We're so glad you're thinking about contributing to an EPA open source project! If you're unsure about anything, just ask — or submit your issue or pull request anyway. The worst that can happen is we'll politely ask you to change something. We appreciate all friendly contributions.

No matter who you are, if you spot an error, omission, or bug, you're welcome to open an issue in this repo!

**TADA Working Group Mission**  
To share and develop R code for evaluating and visualizing Water Quality Portal (WQP) data more efficiently though collaboration and open-source programming. This includes working together to find commonalities in assessment processes across the nation, creating flexible tools that can be easily customized to work within existing workflows, supporting each other in learning R, and ensuring products will be accessible to organizations most in need.

**Contributors 11**

**On this page**  
Contribute to TADA!  
TADA Working Group Mission  
Package Development  
What is GitHub?  
Required Installations  
Issues  
Branches and Pull Requests  
Additional References  
Open-Source Code Policy  
License  
Disclaimer  
Contact

**Review required**  
At least 1 approving review is required by reviewers with write access. [Learn more](#)

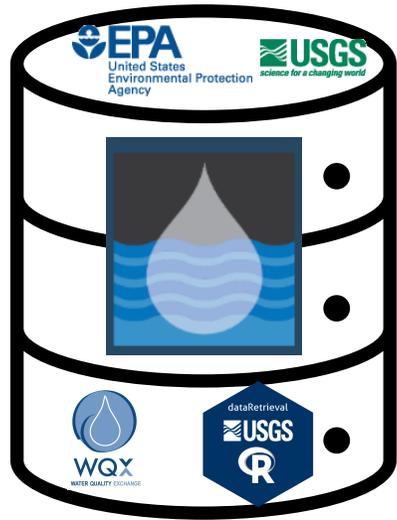
**Some checks haven't completed yet**  
5 successful and 1 in progress checks

- ✓ R-CMD-check / macos-latest (release) (pull\_request) Successful in 52m
- ✓ test-coverage / test-coverage (pull\_request) Successful in 10m
- ✓ R-CMD-check / windows-latest (release) (pull\_request) Successful in 43m
- R-CMD-check / ubuntu-latest (devel) (pull\_request) In progress — This check
- ✓ R-CMD-check / ubuntu-latest (release) (pull\_request) Successful in 35m
- ✓ R-CMD-check / ubuntu-latest (oldrel-1) (pull\_request) Successful in 25m

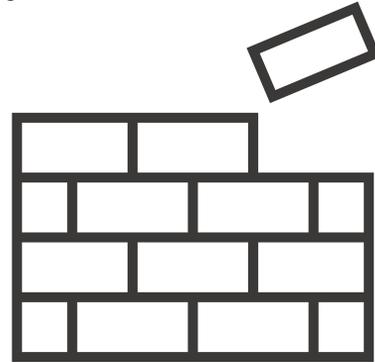
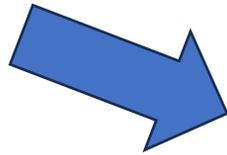
**Protect matching branches**

- Require a pull request before merging**  
When enabled, all commits must be made to a non-protected branch and submitted via a pull request before they can be merged into a branch that matches this rule.
- Require approvals**  
When enabled, pull requests targeting a matching branch require a number of approvals and no changes requested before they can be merged.  
Required number of approvals before merging: 1

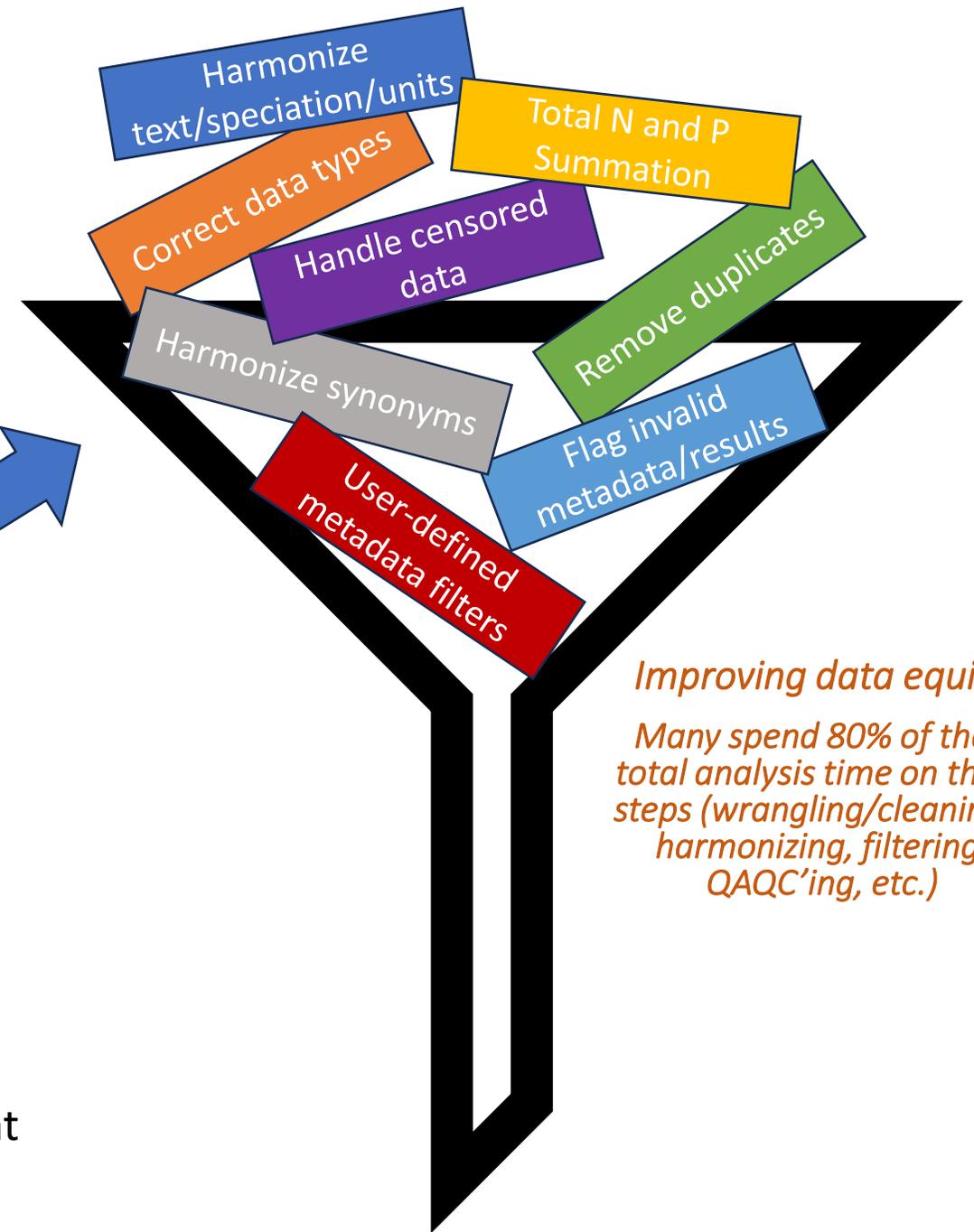
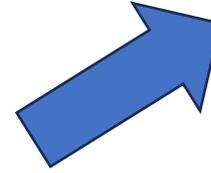
# Module 1



Retrieve data from WQP



Construct a unified dataset containing key metadata



*Improving data equity  
Many spend 80% of their total analysis time on these steps (wrangling/cleaning – harmonizing, filtering, QAQC'ing, etc.)*

- Is the data of sufficient quality for my analysis?
- Is it relevant?
- Does it include key metadata?
- Can the data be harmonized and grouped in a way that makes sense for my analysis?

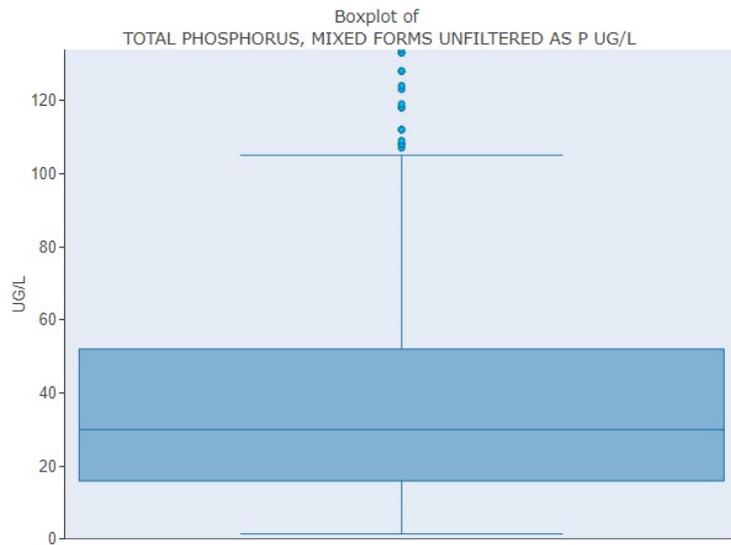
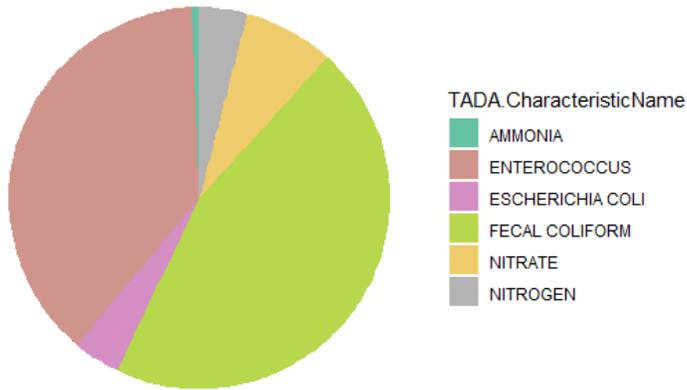
# Modules 2-4

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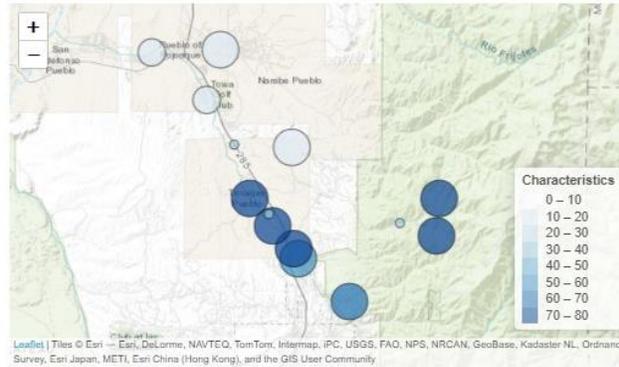


- Gathered requirements, at refining stage
- Started proof of concept, starting development soon
- Challenges
  - Formatting water quality standard information
    - Criteria Search Tool does not include narrative standards, duration and frequency, or methodologies
  - System (ATTAINS/WQP/CST) crosswalk development and maintenance (parameters, designated uses)

# TADA Visualizations



Your dataset contains **131,106** unique results from **221** monitoring location(s) and **6** unique organization(s).

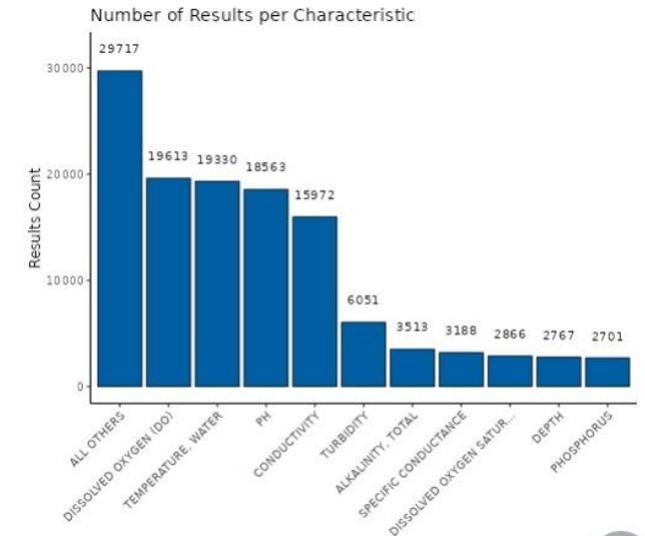
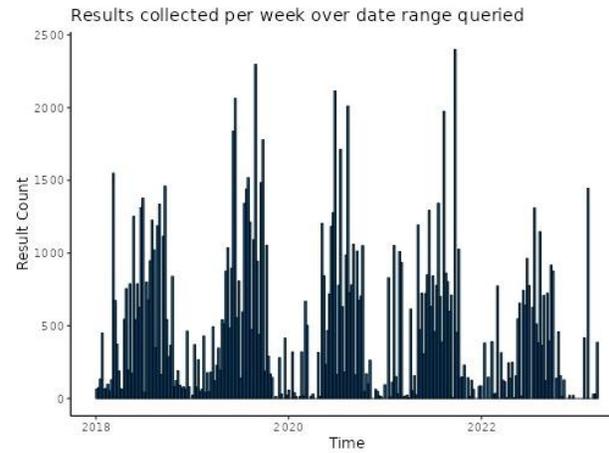


Show **10** entries

OrganizationFormalName	Result_Count
Chickasaw Nation Environmental Service	4580
Fond du Lac Band of Chippewa (MN)	20176
Pueblo Of Tesuque	6795
Pueblo of Pojoaque	1181
Red Lake DNR	81734
Sac and Fox Nation (Tribal)	9815

Showing 1 to 6 of 6 entries

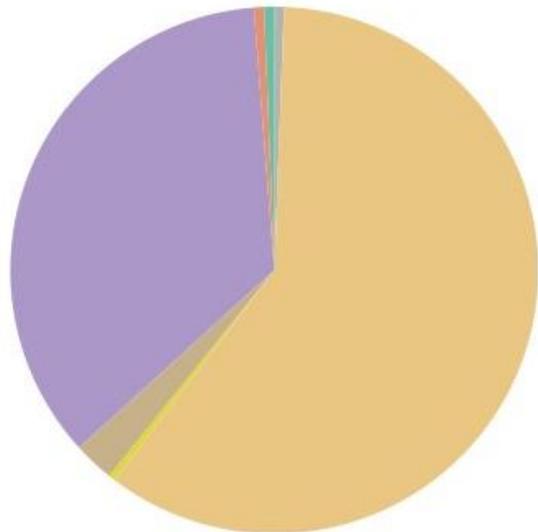
Previous **1** Next



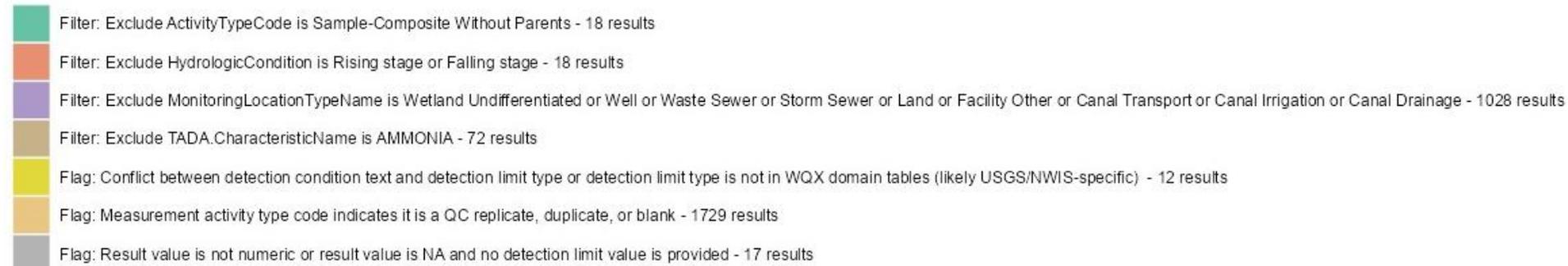
# Summary of User Decisions

## TADA.Remove TADA.RemovalReason

TRUE	Flag: Measurement activity type code indicates it is a QC replicate, duplicate, or blank
TRUE	Filter: Exclude ActivityTypeCode is Sample-Composite Without Parents
TRUE	Filter: Exclude HydrologicCondition is Rising stage or Falling stage
FALSE	
	Filter: Exclude MonitoringLocationTypeName is Wetland Undifferentiated or Well or Waste Sewer or Storm Sewer or Land or Facility Other or Canal Transport or Canal Irrigation or Canal Drainage
TRUE	Flag: Result value is not numeric or result value is NA and no detection limit value is provided, Flag: Measurement activity type code indicates it is a QC replicate, duplicate, or blank
TRUE	
FALSE	
TRUE	Flag: Result value is not numeric or result value is NA and no detection limit value is provided
	Flag: Measurement activity type code indicates it is a QC replicate, duplicate, or blank, Filter: Exclude MonitoringLocationTypeName is Wetland Undifferentiated or Well or Waste Sewer or Storm Sewer or Land or Facility Other or Canal Transport or Canal Irrigation or Canal Drainage
TRUE	



Removal Reasons



# TADA Limitations and Challenges

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Does not cover narrative/text data

Water data only for now (could expand in future)

Does not include WQP biological data profile (taxon)

Will require some user upkeep / maintenance

User decides which components to use (or not)

Discrete data only for now (could expand in future)

Human review required

# Broader Impacts

Use of TADA has potential to greatly reduce total government costs across:

- State and tribal agencies
- EPA regions
- EPA HQ
- USGS, other federal agencies

Efficient, transparent, and reproducible assessments

- Frees up time for other important tasks
- May facilitate assessing more waters
- Assists tribal onboarding to ATTAINS
- Helps discover and share commonalities in assessment processes nationally
- Improves interoperability across WQX/WQP, ATTAINS, and the Criteria Search Tool (CST)

Building data equity

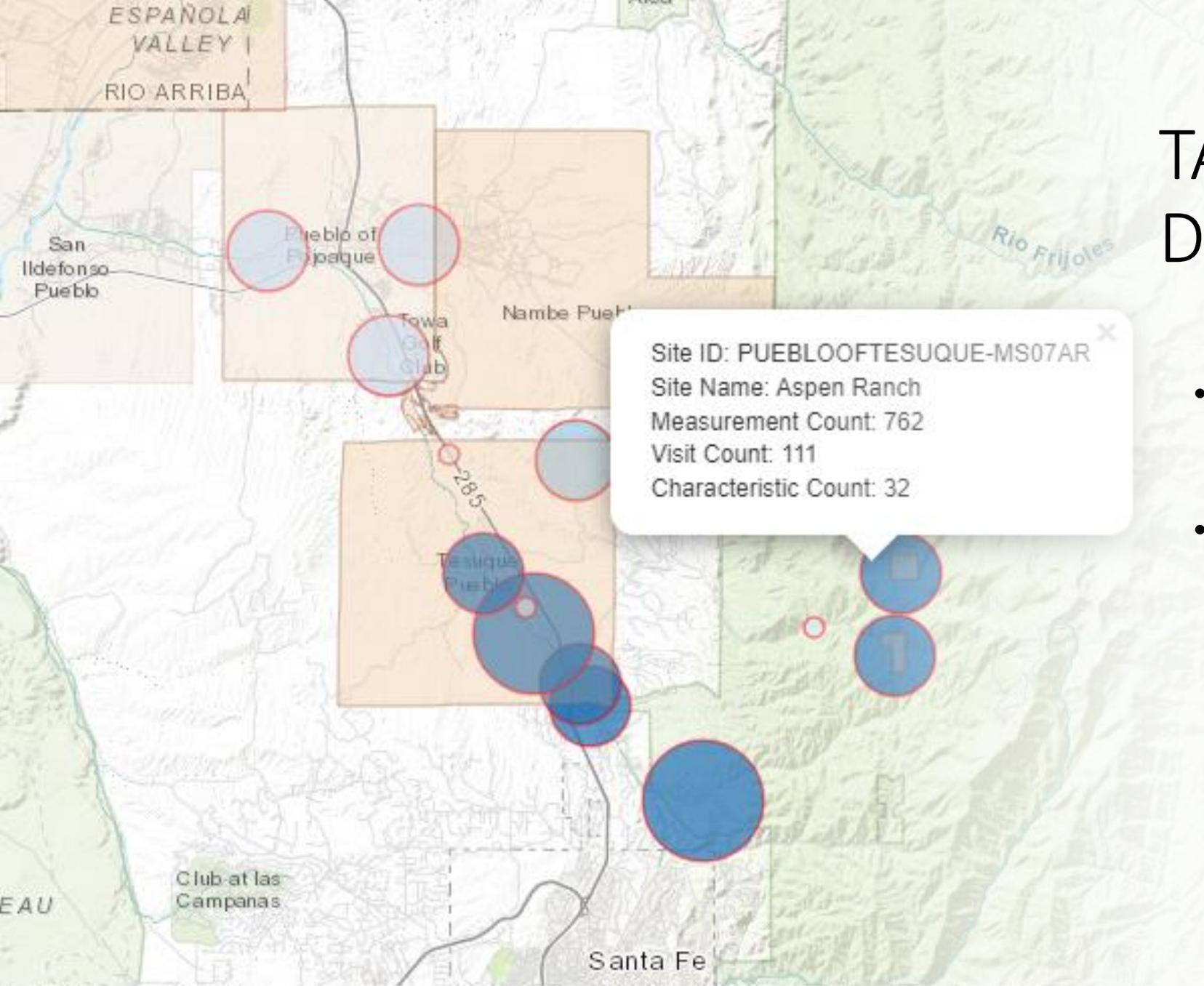
- Facilitates use of other organizations data in State or Tribal assessments
- Makes the WQX QAQC service available on the WQP side
- Helps find and address data quality issues in WQX/WQP

TADA



WQ Assessment





# TADA R Shiny App Demo

- TADA Shiny App: <https://github.com/USEPA/TADAShiny>
- Dev web application: <https://owshiny-dev.app.cloud.gov/tada-dev/>



Thank you  
for listening!

And a BIG  
thank you to  
all our TADA  
contributors!

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***TADA Working Group (all participants)***

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