

# Data and Tools to Support Efficient & Reproducible Water Quality Assessments

Cristina Mullin, PhD

EPA Office of Water


Water Data Integration Branch



# Clean Water Act

- Monitor waters
- Assess waters
  - Every two years
    - Find and analyze available information
    - Decide which waters do not meet water quality standards because they are too polluted (impaired)
- Impaired waters are placed on a State list for future actions to reduce pollution

An official website of the United States government [Here's how you know](#) ▼

 United States Environmental Protection Agency

Search EPA.gov

[Environmental Topics](#) ▼ [Laws & Regulations](#) ▼ [Report a Violation](#) ▼ [About EPA](#) ▼

**Laws & Regulations** CONTACT US

- By Business Sector
- By Topic
- Compliance
- Enforcement
- Guidance
- Laws & Executive Orders
- Regulations

## Summary of the Clean Water Act

### 33 U.S.C. §1251 et seq. (1972)

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. "Clean Water Act" became the Act's common name with amendments in 1972.

Under the CWA, EPA has implemented pollution control programs such as setting wastewater standards for industry. EPA has also developed national water quality

#### Quick Links

- [2018 version of CWA from the U.S. Code](#)  (233 pp, 1.23 MB)
- The official text of the CWA continues to be available in [the United States Code](#)  from the US Government Printing Office

# Water Quality Standards

## Water Quality Standards

- Criteria
  - Magnitude
  - Duration
  - Frequency
- Designated uses
- Antidegradation requirements

 An official website of the United States government [Here's how you know](#) ▼



[Environmental Topics](#) ▼

[Laws & Regulations](#) ▼

[Report a Violation](#) ▼

[About EPA](#) ▼

## Standards for Water Body Health

[CONTACT US](#)

[Standards for Water Body Health](#)

**What Are Water Quality Standards?**

[How Are Standards Developed?](#)

[Things You Can Do](#)

[Provide Comments and Attend Meetings](#)

[Partners to Protect Water Quality](#)

[Regulations and Resources](#)

## What are Water Quality Standards?

Water quality standards (WQS) are provisions of state, territorial, authorized tribal or federal law approved by EPA that describe the desired condition of a water body and the means by which that condition will be protected or achieved. Water bodies can be used for purposes such as recreation (e.g. swimming and boating), scenic enjoyment, and fishing, and are the home to many aquatic organisms. To protect human health and aquatic life in these waters, states, territories and authorized tribes establish WQS. WQS form a legal basis for controlling pollutants entering the waters of the United States.

## Core Components of WQS

Water quality standards consist of three core components.

### Related Information

[Water Quality Standards](#)

[Academy - The WQS](#)

Academy provides classroom-based and online courses, along with occasional webinars, to support development of water quality standards.

# Vision: Efficient and Reproducible Water Quality Assessments

- Interconnected data resources and tools
- Streamlined water quality assessment and reporting

Water quality monitoring data



Findable



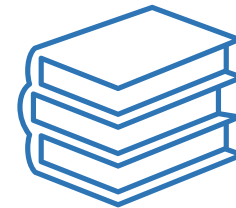
Hydrologically-referenced designated beneficial uses



Accessible



Water quality standards information



Interoperable

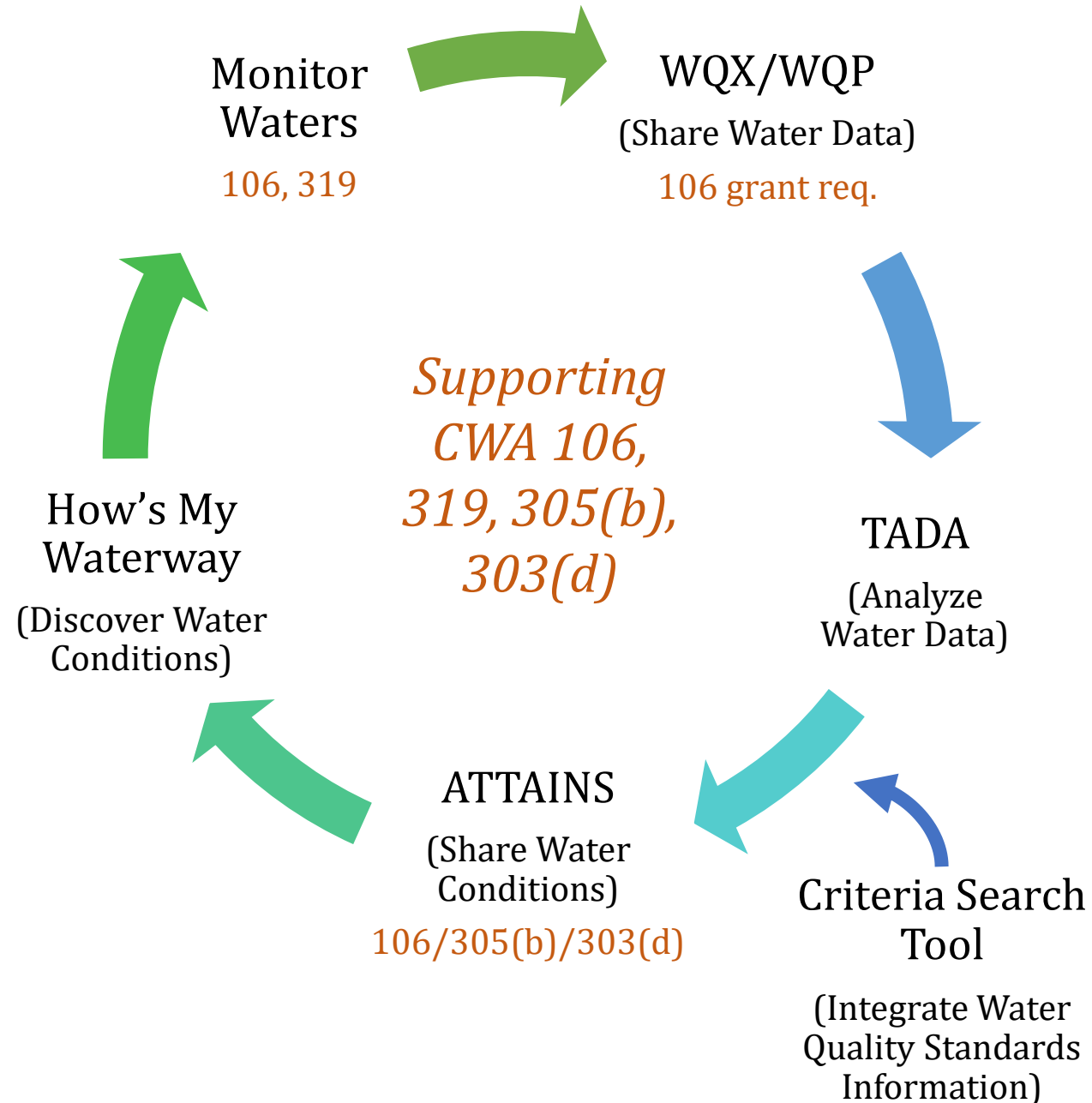


Reusable



# Where We Are Now

- Data Resources (standardized formats)
  - Water Quality eXchange and Water Quality Portal (WQX/WQP)
    - Monitoring data
  - Assessment and Total Maximum Daily Load Tracking and Implementation System (ATTAINS)
    - Assessment determinations
  - **Criteria Search Tool**
    - Water quality standards information



# Criteria Search Tool

- Under development
- Continuously updated as EPA approves new or revised WQS
- Organizes criteria using the magnitude values of parameters as related to each state's application
- Direct application = designated uses
- Indirect application = specific waterbody, all other waters, or a class of waters

- Query by parameter, application or criteria magnitude value
- Query within a state or across all states

---

## Select Water Quality Standards Information for a Specific State, Territory, or Tribe

Each state, territory, and authorized tribe has a page on this website containing information about their relevant WQS, including those in effect for CWA purposes. Other information may also be included (for example, contact information, federal promulgations, etc.). Select the state on the map or using the **Select state, territory, or authorized tribe** selector.



Select state, territory, or authorized tribe (\*includes some tribes not yet authorized)

-- select state, territory, or authorized tribe --

# Pueblo of Tesuque, Aquatic Life

## Search Criteria by State, Territory, or Authorized Tribe

Select the state, territory, or authorized tribe to generate the criteria table. Each criterion has a button that links to the source regulation to provide appropriate context.

**Note:** Selecting the button should open the regulation to the [PDF page](#). Otherwise, the source button indicates the appropriate page as indicated by the PDF file viewer.

Select a state, territory, authorized tribe, promulgated rule, or EPA recommended criteria.

Pueblo of Tesuque (Region 6)

Show  entries

Parameter	Application	Criteria Magnitude
<input type="text" value="Search this column."/>	<input type="text" value="aquatic life"/>	<input type="text" value="Search this column."/>
aluminum • <a href="#">CompTox</a> <input type="button" value="Source Page 17"/>	high quality coldwater fishery use ( <b>Aquatic Life</b> • Acute)	750 µg/l
aluminum • <a href="#">CompTox</a> <input type="button" value="Source Page 17"/>	warm water fishery use ( <b>Aquatic Life</b> • Acute)	750 µg/l
aluminum • <a href="#">CompTox</a> <input type="button" value="Source Page 18"/>	high quality coldwater fishery use ( <b>Aquatic Life</b> • Chronic)	87 µg/l
aluminum • <a href="#">CompTox</a> <input type="button" value="Source Page 18"/>	warm water fishery use ( <b>Aquatic Life</b> • Chronic)	87 µg/l
arsenic • <a href="#">CompTox</a> <input type="button" value="Source Page 17"/>	high quality coldwater fishery use ( <b>Aquatic Life</b> • Acute)	340 µg/l
arsenic • <a href="#">CompTox</a> <input type="button" value="Source Page 17"/>	warm water fishery use ( <b>Aquatic Life</b> • Acute)	340 µg/l
arsenic • <a href="#">CompTox</a> <input type="button" value="Source Page 18"/>	high quality coldwater fishery use ( <b>Aquatic Life</b> • Chronic)	150 µg/l
arsenic • <a href="#">CompTox</a> <input type="button" value="Source Page 18"/>	warm water fishery use ( <b>Aquatic Life</b> • Chronic)	150 µg/l



# Connecticut, Aquatic Life, Mercury

## Search Criteria by State, Territory, or Authorized Tribe

Select the state, territory, or authorized tribe to generate the criteria table. Each criterion has a button that links to the source regulation to provide appropriate context.

**Note:** Selecting the button should open the regulation to the [PDF page](#). Otherwise, the source button indicates the appropriate page as indicated by the PDF file viewer.

Select a state, territory, authorized tribe, promulgated rule, or EPA recommended criteria.

Connecticut (Region 1)

Show  entries

Parameter <input type="text" value="mercury"/>	Application <input type="text" value="aquatic life"/>	Criteria Magnitude <input type="text" value="Search this column."/>
<a href="#">mercury</a> • <a href="#">CompTox</a> <input type="button" value="Source Page 61"/>	class aa, a & b ( <a href="#">Aquatic Life</a> • <a href="#">Freshwater</a> • <a href="#">Acute</a> )	1.4 µg/l
<a href="#">mercury</a> • <a href="#">CompTox</a> <input type="button" value="Source Page 61"/>	class aa, a & b ( <a href="#">Aquatic Life</a> • <a href="#">Freshwater</a> • <a href="#">Chronic</a> )	0.77 µg/l
<a href="#">mercury</a> • <a href="#">CompTox</a> <input type="button" value="Source Page 61"/>	class sa & sb ( <a href="#">Aquatic Life</a> • <a href="#">Saltwater</a> • <a href="#">Acute</a> )	1.8 µg/l
<a href="#">mercury</a> • <a href="#">CompTox</a> <input type="button" value="Source Page 61"/>	class sa & sb ( <a href="#">Aquatic Life</a> • <a href="#">Saltwater</a> • <a href="#">Chronic</a> )	0.94 µg/l

Showing 1 to 4 of 4 entries (filtered from 342 total entries)

Previous  Next



# Dissolved Oxygen

<b>State</b> <input type="text" value="Search this column."/>	<b>Parameter (the name used by the state)</b> <input type="text" value="dissolved oxygen"/>	<b>Application</b> <input type="text" value="Search this column."/>	<b>Criteria Magnitude</b> <input type="text" value="Search this column."/>
<a href="#">Florida</a>	dissolved oxygen <small>Source Page 2</small>	Crystal River Canal System	0.1 mg/l
<a href="#">Florida</a>	dissolved oxygen <small>Source Page 35</small>	class v: navigation, utility and industrial use	0.1 mg/l
<a href="#">Port Gamble S'Klallam Tribe</a>	dissolved oxygen <small>Source Page 35</small>	cold water biota ( <i>Aquatic Life</i> )	0.2 mg/l
<a href="#">Lummi Tribe</a>	dissolved oxygen <small>Source Page 13</small>	class aa waters ( <i>Human Health • Saltwater</i> )	0.2 mg/l
<a href="#">Lummi Tribe</a>	dissolved oxygen <small>Source Page 16</small>	class a (excellent) waters ( <i>Saltwater</i> )	0.2 mg/l
<a href="#">Lummi Tribe</a>	dissolved oxygen <small>Source Page 19</small>	class b (good)	0.2 mg/l
<a href="#">Kalispel Indian Community</a>	dissolved oxygen <small>Source Page 21</small>	cutthroat and brown trout spawning, incubation, and rearing ( <i>Aquatic Life</i> )	0.2 mg/l

# Coming to Terms

- [EPA Substance Registry System](#)

The screenshot shows the EPA Substance Registry System (SRS) interface. At the top left is the EPA logo with the text "United States Environmental Protection Agency". Below it is a blue navigation bar with the word "Environment" partially visible. Underneath is the text "Substance Registry Services (SRS)". The main heading is "Chromium(VI)". Below the heading are two links: "< Back to Search Results" and "Back to Home Page". A section titled "Substance Details" contains the following information:

<b>Internal Tracking Number:</b>	212357
<b>Substance Type:</b>	Chemical Substance
<b>Systematic Name:</b>	Chromium, ion (Cr6+)
<b>CAS Number:</b>	18540-29-9
<b>EPA Registry Name:</b>	Chromium(VI)
<b>Molecular Weight:</b>	52.0
<b>Molecular Formula:</b>	Cr

At the bottom of the details section is a link for "Additional Metadata".

Field	Data Source
POLLUTANT_NAME	Criteria Search Tool
CharacteristicName	WQP/WQP
PARAM_Name	ATTAINS

Field	Data Source
CHROMIUM, HEXAVALENT, DISSOLVED	ATTAINS
CHROMIUM, HEXAVALENT, TOTAL	ATTAINS
Chromium(VI)	WQX
Hexavalent chromium compounds	WQX
Chromium (VI) ion	CompTox

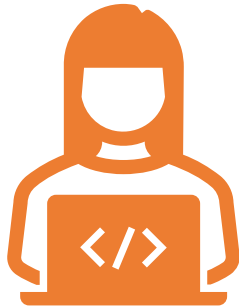
# TADA (Tools for Automated Data Analysis)

Tools vary in...

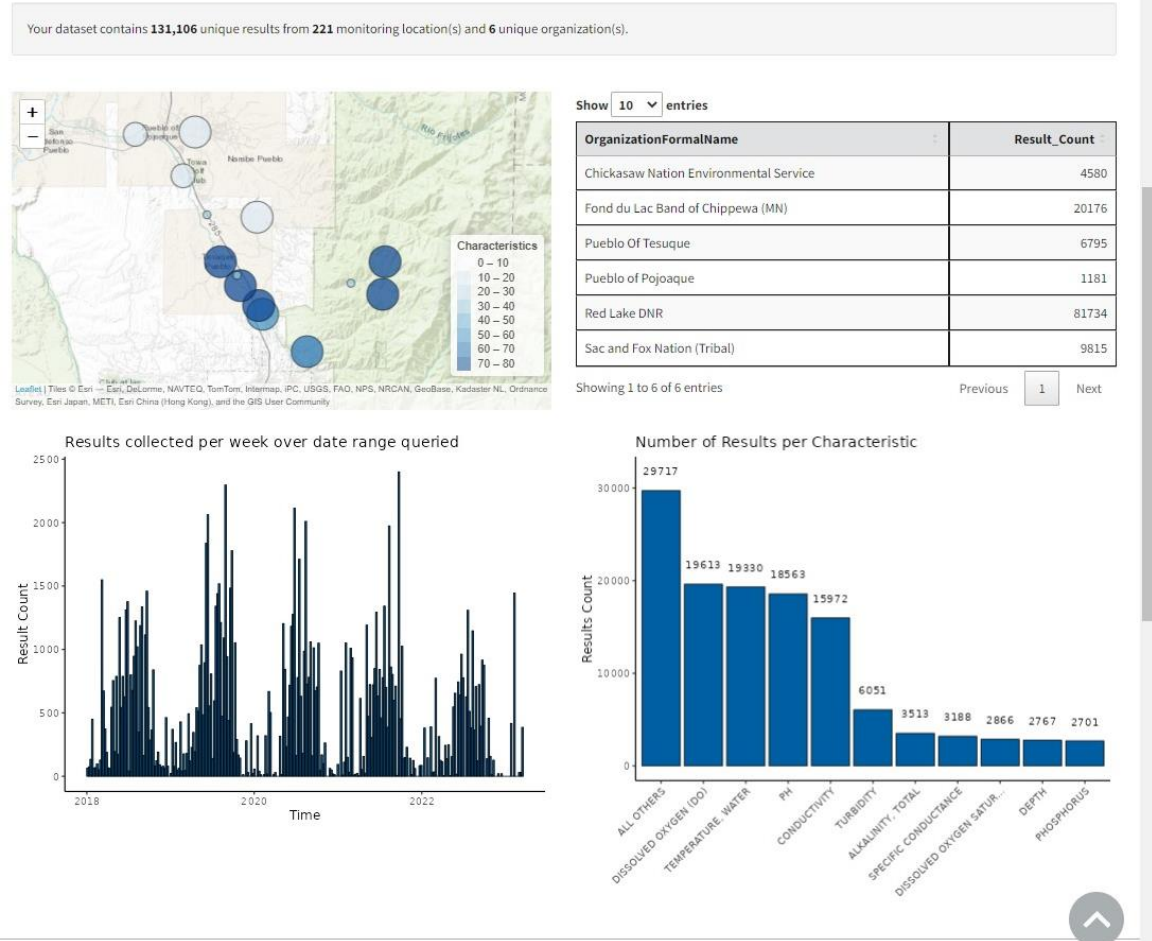
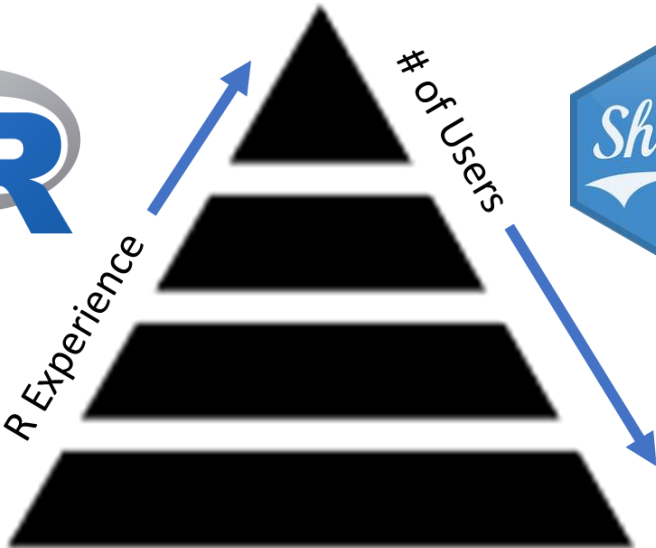
Scope

Users/audience

Stage of development



R Experience



Reusable



Monitor Waters  
106,319



WQX/WQP  
(Share Water Data)  
106 grant req.



Water quality monitoring data



Interoperable



How's My Waterway  
(Discover Water Conditions)



Supporting  
CWA 106,  
319, 305(b),  
303(d)

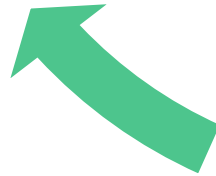
TADA  
(Analyze Water Data)



Accessible



ATTAINS  
(Share Water Conditions)  
106/305(b)/303(d)



Criteria Search Tool

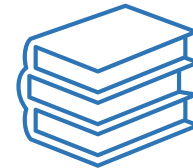


Findable



Hydrologically-referenced designated beneficial uses

Water quality standards information



Thank You For  
Listening!

Contact Cristina:  
[mullin.cristina@epa.gov](mailto:mullin.cristina@epa.gov)

We want your feedback!  
We are always looking  
for users to test our  
products and features