

Using WQX and WQX Web Tools to Share Data through the Water Quality Portal

Charles Kovatch

USEPA OW/OWOW

USGS and OHEPA meeting, Columbus, OH

March 21, 2014





Overview

- We have a tool to help you to share water quality data and participate on the Portal.
- Combined, the tool and Portal will increase the value of your data by making it available to multiple users.
- The tool lays out a community standard water data fields to improve water data sharing.



What does the tool do for you?

- Enables you to share data in one format
- Improves interoperability of data systems through the use of standard water monitoring data fields
- Enables you to publish data at a national level
- Increases your ability to use OTHERS data in conjunction with your data, as available in the Portal, for analysis and modeling
- Enables you to manage data in the format that best serves your program needs

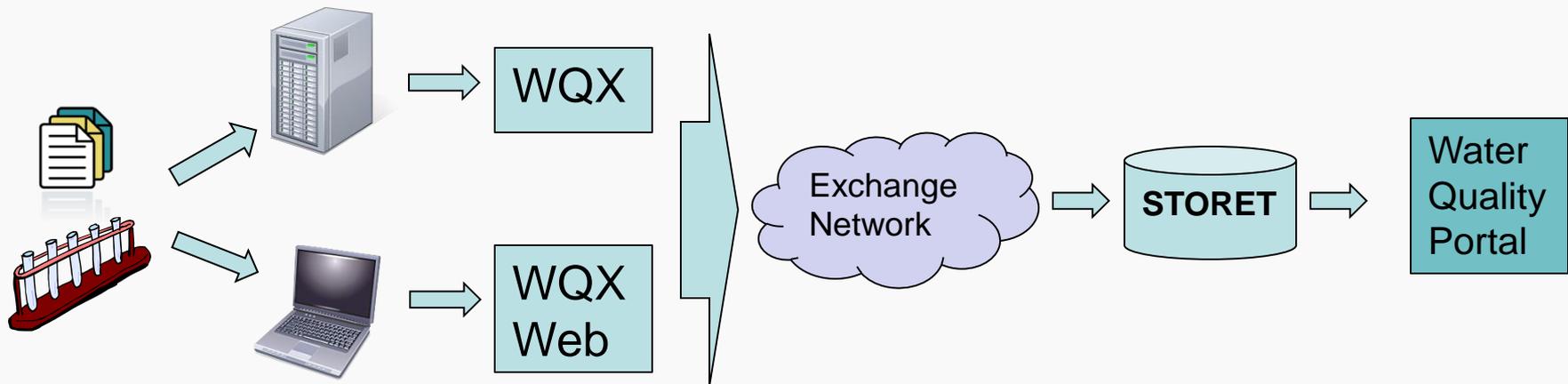


What are the Tools?

- WQX
 - Water Quality Data eXchange
 - XML Schema that provides standard data elements and file format
 - Intended for high volume data users
- WQX Web
 - Water Quality Data eXchange Web Template
 - Is based in MS Excel
 - If you can use a spreadsheet, this is for you



What do the tools do?



- The tools benefit you by:
 - Enabling you to share data in one format
 - Enabling you to publish data at a national level
 - Allowing you to manage data in the format that best serves your program needs



How do the tools work?

Question	Description	Data Field
WHO collected the sample?	Organization Name	Friends of the Potomac River
WHAT was collected?	Chemical Name	Copper
WHY was it collected?	Project Name	Quarterly Sample
WHERE was it collected?	Location Name Lat/Long	Memorial Bridge 40.594, -98.721
WHEN was it collected?	Date	July 24, 2012
HOW was it analyzed?	Method Name	USEPA 123ABC
WHAT were the results?	Result Value Result Units	5 ppm

- The tool benefits you by providing:
 - Structure to capture required data fields
 - A pick-list of common names for chemicals and analytical methods



How does the WQX XML Schema work?

- Establishes the structure to document a water monitoring sample through standard data fields
- Allows a data owner to use their existing database
- Requires a cross-walk between the database and WQX data standard
- Requires you to review the domain values or pick-list to match your database fields to the WQX schema
- Is designed for a high volume data owner
- Requires coding to generate the XML schema
- Allows for automated machine-to-machine data submission
- Is a high front end investment and high long term ROI



WQX XML Example

```
<?xml version="1.0" encoding="UTF-8" ?>
- <WQX xmlns="http://www.exchangenetwork.net/schema/wqx/2" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.exchangenetwork.net/schema/wqx/2 http://www.exchangenetwork.net/schema/wqx/2/index.xsd">
- <Organization>
  - <OrganizationDescription>
    <OrganizationIdentifier>WQXTEST</OrganizationIdentifier>
    <OrganizationFormalName>Test Organization</OrganizationFormalName>
    <OrganizationDescriptionText>Here is a description of the organization.</OrganizationDescriptionText>
    <TribalCode>001</TribalCode>
  </OrganizationDescription>
- <Activity>
  - <ActivityDescription>
    <ActivityIdentifier>RDC-4</ActivityIdentifier>
    <ActivityTypeCode>Sample-Routine</ActivityTypeCode>
    <ActivityMediaName>Water</ActivityMediaName>
    <ActivityStartDate>2010-07-19</ActivityStartDate>
    <ProjectIdentifier>SHARK</ProjectIdentifier>
    <MonitoringLocationIdentifier>NJDEP-ML1</MonitoringLocationIdentifier>
  </ActivityDescription>
- <SampleDescription>
  - <SampleCollectionMethod>
    <MethodIdentifier>10366-C</MethodIdentifier>
    <MethodIdentifierContext>WQXTEST</MethodIdentifierContext>
    <MethodName>HOBO? U22 Water Temp Pro v2</MethodName>
    <MethodDescriptionText>Depending on water conditions and desired measurement location, the logger should be appropriately weighted, secured,
      and protected. Some monitoring applications require precise placement of the temperature sensor, such as measuring the temperature of a flow
      at the bottom of a stream or river. Ensure that the logger is appropriately secured so that the temperature sensor is in the desired measurement
      location.</MethodDescriptionText>
  </SampleCollectionMethod>
  <SampleCollectionEquipmentName>Miscellaneous (Other)</SampleCollectionEquipmentName>
</SampleDescription>
</Activity>
+ <Activity>
```



How does the WQX Web Tool work?

- Establishes the structure to document a water monitoring sample through standard data fields
- Allows a data owner to use their existing database
- Requires a cross-walk between the database and WQX data standard
- Requires you to review the domain values or pick-list to match your database fields to the WQX Web template
- Is designed for a lower volume data owner
- Requires no coding to generate the XML schema
- Allows for manual user-to-machine data submission
- Is a lower front end investment and short term ROI



Data Entry and Data Formatting with WQX Web

Clipboard Font Alignment Number Styles Cells Edit

E2 Domain values last updated: 03/02/2012 10:38:00 AM

USEPA WQXWeb Physical Chemistry Template Domain values last updated: 03/02/2012 10:38:00 AM
Version 1.04

- This template is a data entry spreadsheet that guides data owners through organizing water quality data into a format that meets WQX data validation requirements.
- This template is intended to be paired with the WQXWeb Import Configuration - Import PhysChem Results.bin. Changes to the order of columns or the data format in this WQX Web template spreadsheet also need to be applied to the WQXWeb Import Configuration.
- Please refer to the latest version of the "WQXWeb Template Dictionary" for a detailed explanation of the contents within each data entry worksheet, in addition to a complete list of WQX Allowable Values. The dictionary also contains a list of all the columns available in each Data Entry worksheet.

Worksheets are color coded by function. The single pink tab contains buttons used to export data, the three yellow tabs are used to enter data, and the green tabs are reference lists for data columns that allow only specific values.

Group Name	Use	Worksheet Name	Description
Export	Use buttons on this tab convert Data Entry Worksheets (yellow tabs) to .txt files	Export	The Export tab contains buttons to automatically export data from each of the data entry worksheets into tab delimited files ready to be imported into WQXWeb.
Data Entry Worksheets	A template for submission of water quality monitoring data. Projects, Monitoring Locations and Results templates are provided for users	Projects	The Project tab contains information about the water quality data collection program
		Monitoring Locations	The Monitoring Locations tab contains information about the sites where water quality data is being collected
		Results	The Results tab contains the field and laboratory water quality data collected.
Allowable Values/ Look-up Lists/ Domain Values	Tables of allowable values for specific columns in the Data Entry worksheets. All green-colored cells contain the values that should be used in the worksheets. Others cells are included for additional reference.	Allowed Values - Monitoring Locs	This tab contains multiple tables of listing the values that can be entered in particular columns in the Monitoring Locations tab.
		Allowed Values - Results	This tab contains multiple tables of listing the values that can be entered in particular columns in the Results tab.
		Characteristics	This tab contains a table of all Characteristics in STORET that can be used in the Characteristic Name field in the Results tab. The table also has fields to indicate if a particular Characteristic requires a Sample Fraction or Field/Lab Analytical Procedure (or both) for a particular characteristic.
		Analytical Methods	This tab contains a list of all nationally available result analytical methods. Additional methods can be defined by an organization in the "Analytical & Collection Methods" tab.
		Units of Measure	This tab contains a single table listing all result units of measure available in WQX.
		Analytical & Collection Methods	This tab can be used to record organization specific Result Analytical Methods and Sample Collection Methods. Data entered in this tab is not exported to WQXWeb.

For assistance with using this template, please refer to the US EPA STORET/WQX online resources at <http://www.epa.gov/storet/>
The most recent copy of this template and corresponding dictionary can be downloaded from http://www.epa.gov/storet/wqx/wqxweb_downloads.html
If you have questions or comments about this template, please send email to the STORET Help Desk at STORET@epa.gov

Instructions Export Projects Monitoring Locations Results Allowed Values - Monitoring Loc Allowed Values - Results Characteristics Analytical Methods Url



Data Entry with WQX Web: Monitoring Location Fields

	A	B	C	D	E	F	G	H	I
	Monitoring Location ID	Monitoring Location Name	Monitoring Location Type	HUC Eight-Digit Code	Monitoring Location Latitude	Monitoring Location Longitude	Monitoring Location Source Map Scale	Monitoring Location Horizontal Collection Method	Monitoring Location Horizontal Coordinate Reference System
1									
2	WQXTEST16465	WQXTEST 16465 POTOMAC RIVER NEAR	River/Stream	02070008	38.94978	-77.12764	2400	Interpolation-Map	NAD83
3	WQXTEST27576	WQXTEST 27576 FAKE RIVER, NOWHE	River/Stream	02070008	38.94978	-77.12764	2400	Interpolation-Map	NAD83
4			River/Stream						
5			River/Stream Ephemeral						
6			River/Stream Intermittent						
7			River/Stream Perennial						
8			Riverine Impoundment						
9			Seep						
10			Spring						
11			State/Local Air Monitoring St.						



Converting Spreadsheet Data to WQX Web Compatible Format

USEPA WQXWeb Physical Chemistry Template
Version 1.04

Domain values last updated: 03/02/2012 10:38:00 AM

Export Projects

Export Monitoring Locations

Export Results

These Export buttons will export data entered in the three yellow-colored Data Entry worksheets ('Projects', 'Monitoring Locations', and 'Results') into separate tab delimited text files. You will be prompted to choose a location where to save the file. The name of the most recent exported file will be saved in the 'Last Export Saved' table below.

The tab delimited text files exported using these buttons can be imported into WQXWeb using unique import configurations for each file.

Last Export Saved:

Projects	C:\Documents and Settings\jbisese\Desktop\ExportProject20120302.txt
Monitoring Locations	C:\Documents and Settings\jbisese\Desktop\ExportMonitoringLocations20120302.txt
Results:	C:\Documents and Settings\jbisese\Desktop\ExportPchemResults20120302.txt

Notes:

- Project and Monitoring Locations need to be submitted before Results can be submitted for the first time.
- The "Export Monitoring Location" button converts the County Name into a County Code as required by WQXWeb
- Once Projects and Monitoring Locations have been submitted then do not need to be resubmitted except to update information about them.
- Users can manually export data by saving any one of the Data Entry worksheets in 'Text-file tab-delimited' format. For the 'Monitoring Locations' worksheet this will not convert the County Name into a code

Security Note: In order to use the export buttons on this page you must enable macros for this Excel spreadsheet, or set the macro security to 'Medium.' For more information on how to change macro security settings see the following articles:

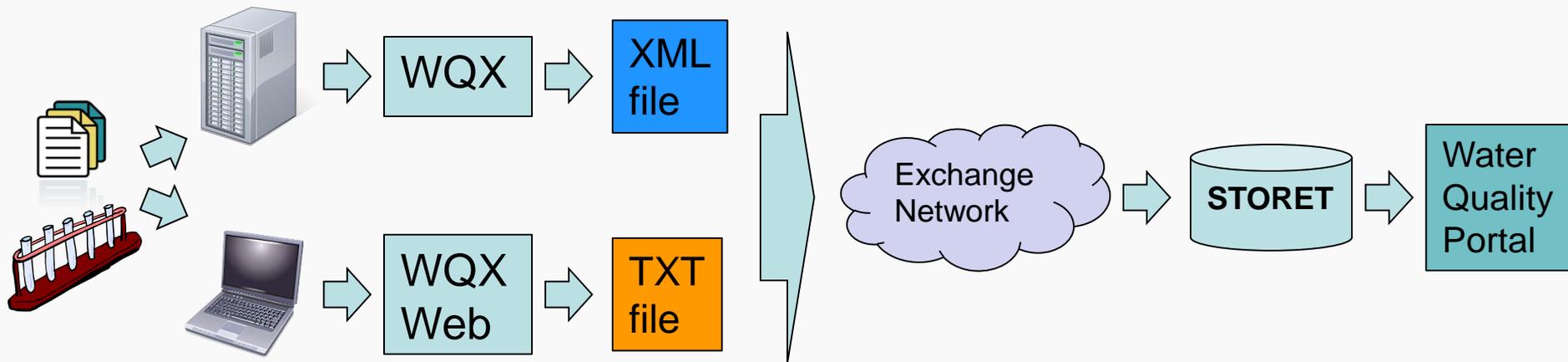
[Change Macro Security](#)
[About Macro Security](#)

For assistance with using this template, please refer to the US EPA STORET/WQX online resources at <http://www.epa.gov/storet/>

The most recent copy of this template and corresponding dictionary can be downloaded from http://www.epa.gov/storet/wqx/wqxweb_downloads.html

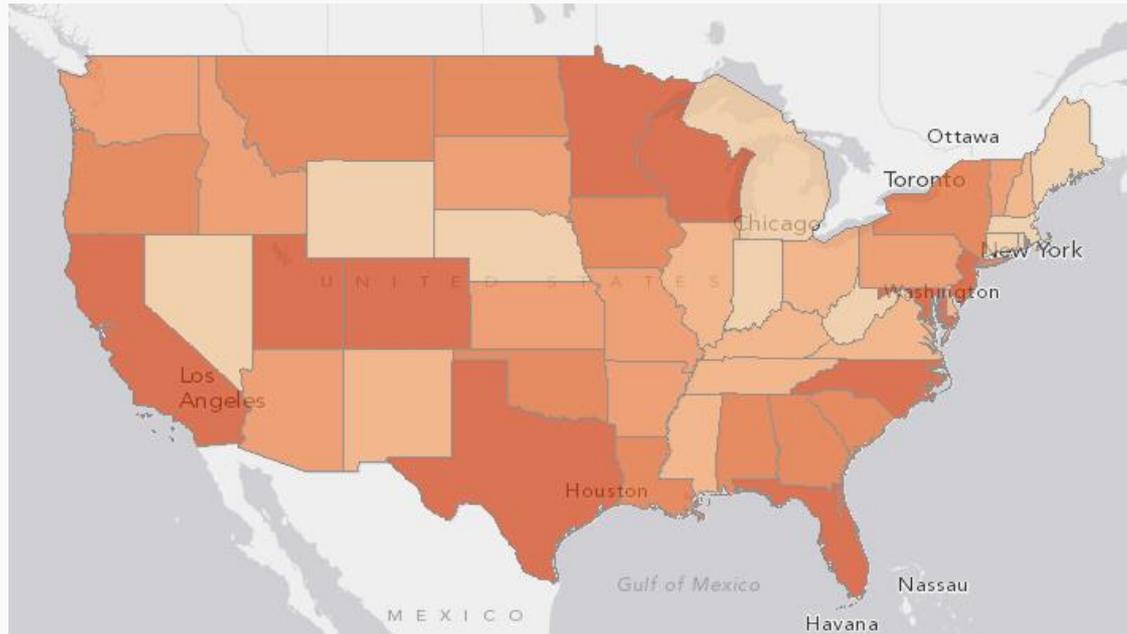
If you have questions or comments about this template, please send email to the STORET Help Desk at STORET@epa.gov

What do the tools do? - Review





What do WQX and WQX Web do for you?



- Join 390 federal, states, and tribal, agencies and watershed organizations already using the WQX and WQX Web file formats
- Enable quick access to your data in one format and the Water Quality Portal for access to over 150 million records nationally



What do WQX and WQX Web do for you?

- Improve interoperability of data systems through the use of standard water monitoring data fields
- Increase the value of your data by making it available to multiple users through the Water Quality Portal
- Increase your ability to use OTHERS data in conjunction with your data for analysis and modeling



What do WQX and WQX Web do for you?

- Enable you to manage data in the format that best serves your program needs and share data based on common data elements
- Assure that your water data results contain the critical pieces of information to increase the utility of your data for analysis and modeling
- Provide a pick-list of common names for chemicals and analytical methods

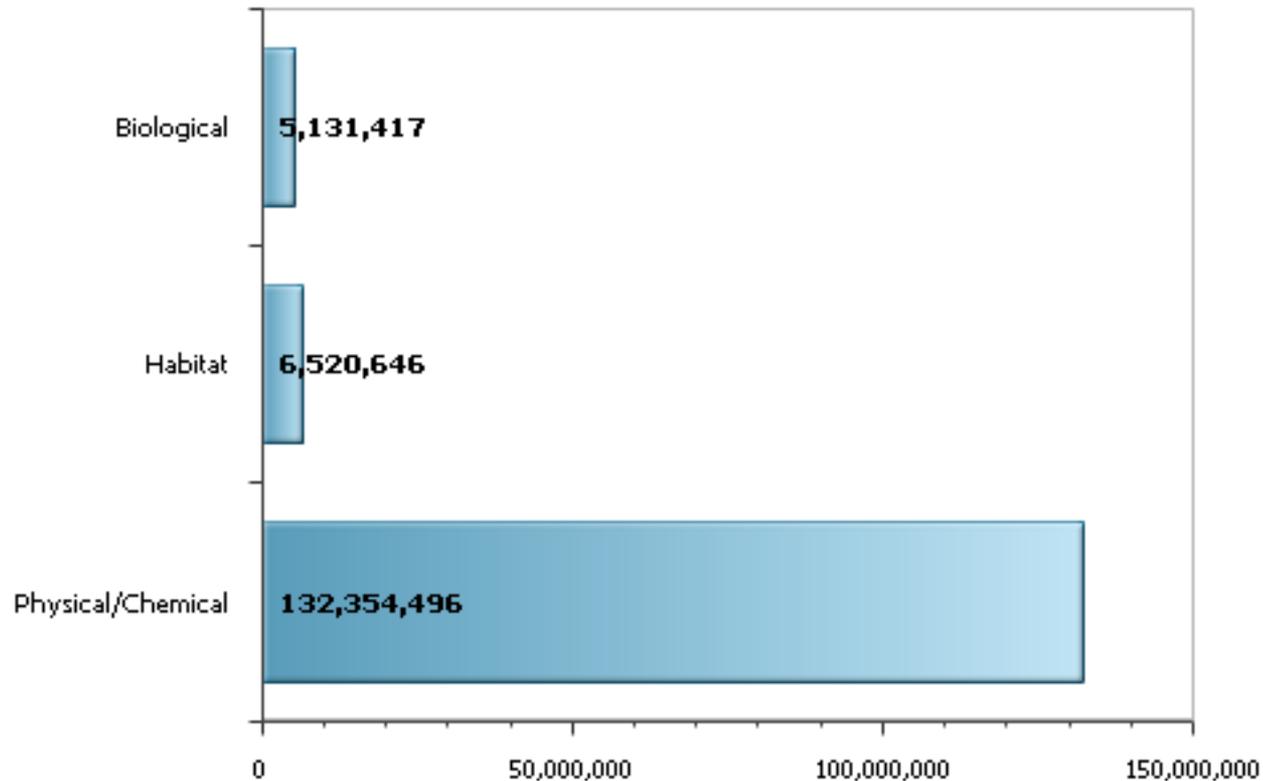


OH Data Holdings in STORET

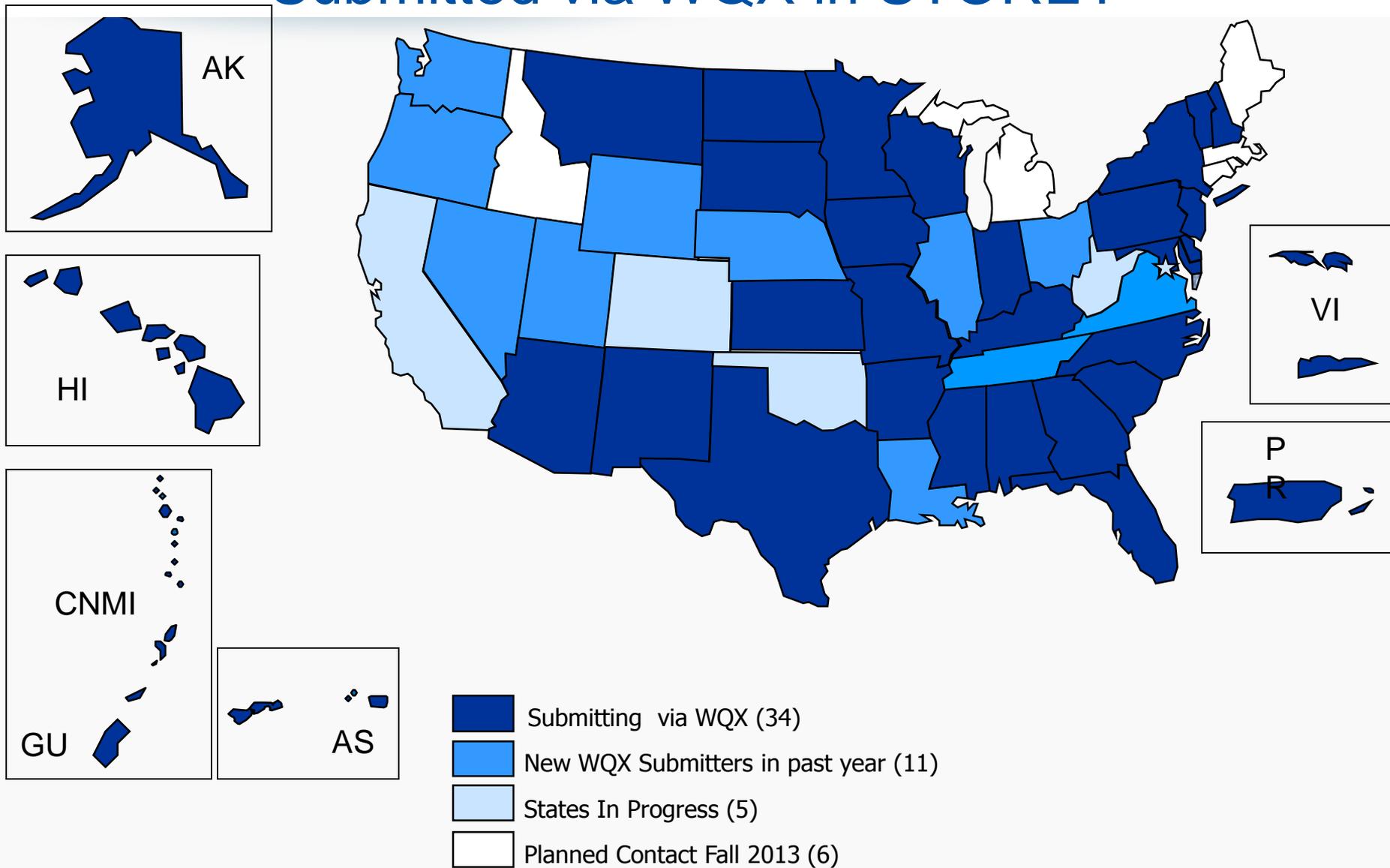


Results in STORET

Total Warehouse Records by Type



Status of State *Chemical* Water Monitoring Results Submitted via WQX in STORET

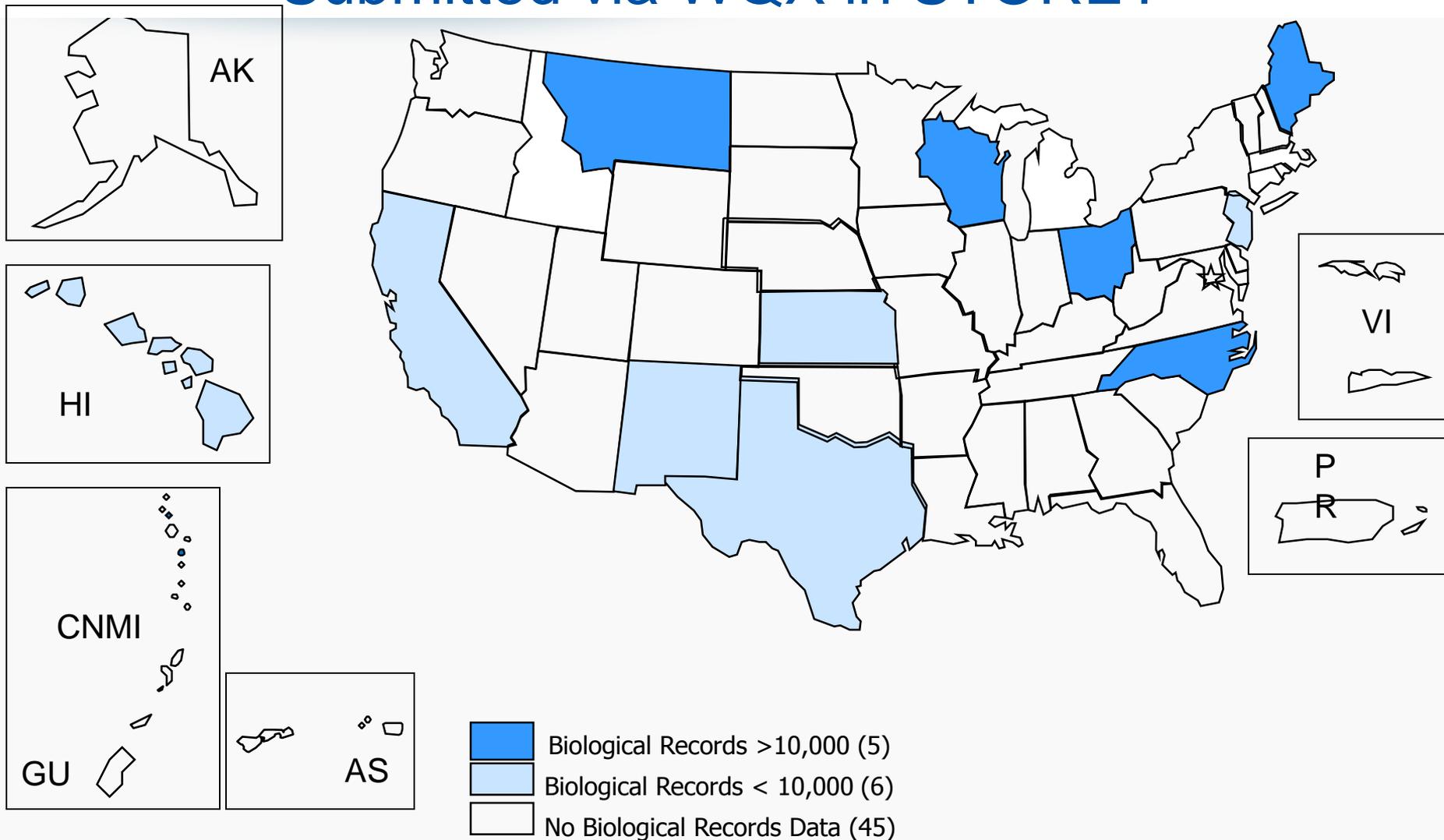




Update of State Chemical Data Flows

- We have 45 states and territories using WQX to flow ambient water quality data to EPA
- In the past year, we have assisted 11 of those states to become new WQX data flows – IL, LA, NE, NV, OH, OR, TN, UT, VA, WA, WY
- We are currently working with 5 states who are near to flowing water data via WQX – CA, CO, DC, OK, WV
- There are 6 states which we plan to contact this Fall to assess the status of their data flow and work with them to flow data via WQX – CT, ID, MA, ME, MI, RI

Status of State *Biological* Water Monitoring Results Submitted via WQX in STORET





Update of State Biological Data Flows

- Review data from the 11 states using WQX to flow biological data to EPA
- Engage with 11 states to understand their data flow and discuss ways to increase the amount of data
- Identify other states who are interested in flowing biological data
- Conduct Biological Data Webinar to explain the template and promote the data flow



OH Results in STORET

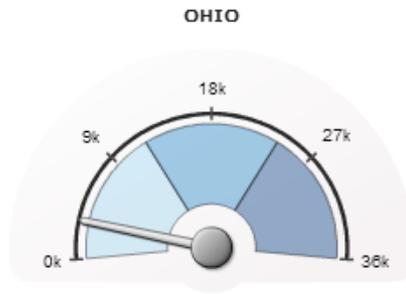
Select Year: 2013 ▼

Select State: OHIO ▼

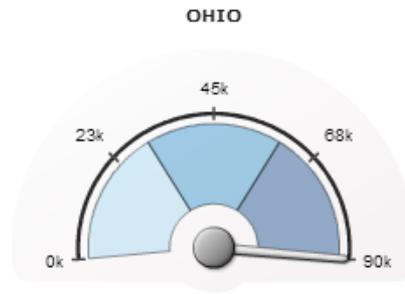
Submit

Number of Organizations Submitting Data for OHIO in 2013: **2**
 Total Number of Organizations Submitting Data for OHIO: **18**
 Number of Distinct Characteristics Submitted for OHIO in 2013: **39**
 Total Number of Distinct Characteristics Submitted for OHIO: **1,923**
 Number of Stations in OHIO with Data for 2013: **78**
 Total Number of Stations in OHIO with Data: **1,700**
 Total Number of Stations in OHIO: **12,645**

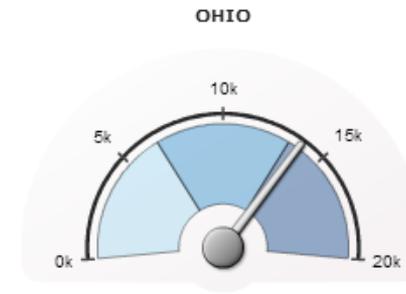
To query and download the submitted data, please visit the [STORET/WQX Warehouse Reports](#)



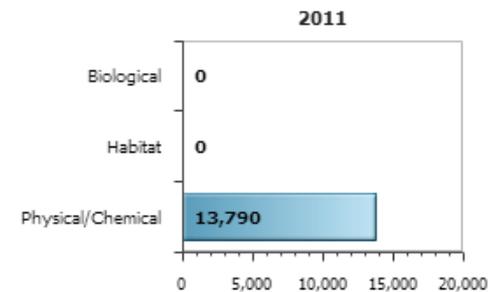
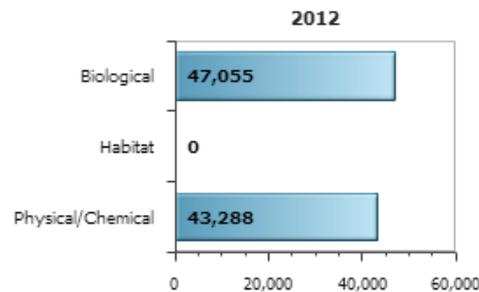
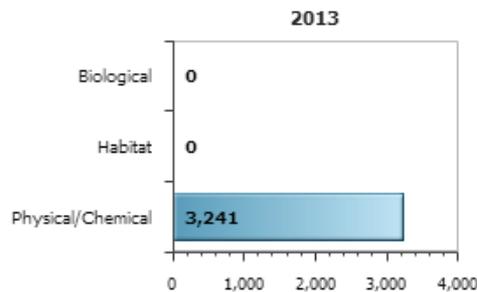
In 2013: 3,241 records
5 yr avg: 35,853/yr



In 2012: 90,343 records
5 yr avg: 20,024/yr



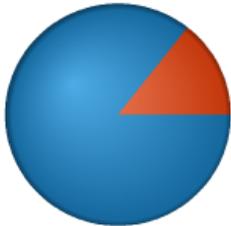
In 2011: 13,790 records
5 yr avg: 19,915/yr



OH Results in STORET



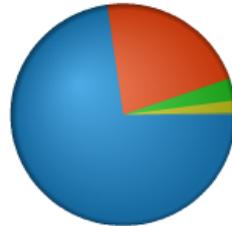
3,241 Total Records



2013 Top 5 Orgs

- 21OHBCH - 85.59%
- 21OHIO_WQX - 14.41%

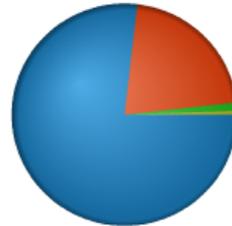
90,343 Total Records



2012 Top 5 Orgs

- 21OHIO_WQX - 72.72%
- 21OHDGW_WQX - 21.97%
- 21OHBCH - 3.21%
- USCOEKY - 1.79%
- 31ORWUNT_WQX - 0.20%
- All others - 0.11%

13,790 Total Records



2011 Top 5 Orgs

- 21OHIO_WQX - 76.82%
- 21OHBCH - 21.39%
- 31ORWUNT_WQX - 1.26%
- 21PA_WQX - 0.53%

27,292 Total Records



2010 Top 5 Orgs

- USCOEKY - 40.39%
- ARMYCORPS - 32.16%
- 21OHIO_WQX - 15.42%
- 21OHBCH - 10.74%
- 31ORWUNT_WQX - 1.27%
- All others - 0.02%

38,383 Total Records



2009 Top 5 Orgs

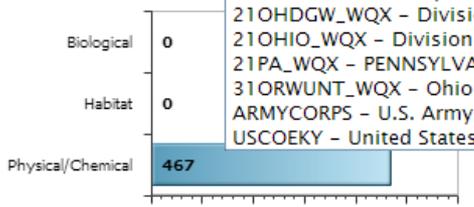
- 21OHIO_WQX - 41.83%
- USCOEKY - 25.35%
- All others - 10.30%
- ARMYCORPS - 8.51%
- 21OHBCH - 7.19%
- NARSTEST - 6.82%

To view more details, use the pull down menu and select a single organization by name to display Biological (fish, algae), Habitat (bank stability), and Physical/Chemical (pH, Temperature, metals).

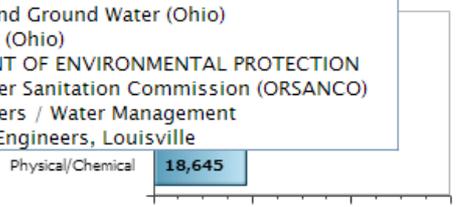
Select Organization:

- SELECT -
 - SELECT -
 21OHBCH - Ohio Department of Health
 21OHDGW_WQX - Division of Drinking and Ground Water (Ohio)
 21OHIO_WQX - Division of Surface water (Ohio)
 21PA_WQX - PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
 31ORWUNT_WQX - Ohio River Valley Water Sanitation Commission (ORSANCO)
 ARMYCORPS - U.S. Army Corps of Engineers / Water Management
 USCOEKY - United States Army Corps of Engineers, Louisville

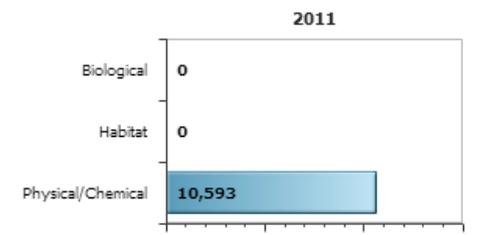
Submit



17 Stations Reporting Data



525 Stations Reporting Data



141 Stations Reporting Data



OH Results in STORET by Organization

Year : 2013

Organization Id	Organization Name	Stations	Biological	Habitat	Physical/Chemical	Total	Percentage
21OHBCH	Ohio Department of Health	61	0	0	2774	2774	85.59
21OHIO_WQX	Division of Surface water (Ohio)	17	0	0	467	467	14.41

Year : 2012

Organization Id	Organization Name	Stations	Biological	Habitat	Physical/Chemical	Total	Percentage
21OHIO_WQX	Division of Surface water (Ohio)	525	47055	0	18645	65700	72.72
21OHDGW_WQX	Division of Drinking and Ground Water (Ohio)	175	0	0	19844	19844	21.97
21OHBCH	Ohio Department of Health	61	0	0	2898	2898	3.21
USCOEKY	United States Army Corps of Engineers, Louisville	33	0	0	1618	1618	1.79
31ORWUNT_WQX	Ohio River Valley Water Sanitation Commission (ORSANCO)	3	0	0	180	180	.2
21PA_WQX	PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION	1	0	0	103	103	.11

Year : 2011

Organization Id	Organization Name	Stations	Biological	Habitat	Physical/Chemical	Total	Percentage
21OHIO_WQX	Division of Surface water (Ohio)	141	0	0	10593	10593	76.82
21OHBCH	Ohio Department of Health	61	0	0	2950	2950	21.39
31ORWUNT_WQX	Ohio River Valley Water Sanitation Commission (ORSANCO)	3	0	0	174	174	1.26
21PA_WQX	PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION	1	0	0	73	73	.53

OH Results in STORET by Parameter

Activity Year : 2013

Substance	Result Count
Escherichia coli	2774
Specific conductance	42
Alkalinity, total	17
Ammonia	17
Chloride	17
Dissolved oxygen (DO)	17
Dissolved oxygen saturation	17
Inorganic nitrogen (nitrate and nitrite)	17
Kjeldahl nitrogen	17
Nitrite	17
Phosphorus	17
Sulfate	17
Temperature, water	17
Total dissolved solids	17
Total suspended solids	17
pH	17
Water level reference point elevation	12
Carbonaceous biochemical oxygen demand, standard conditions	9
Depth	9
Aluminum	8
Arsenic	8
Barium	8
Cadmium	8
Calcium	8
Chemical oxygen demand	8
Chromium	8
Copper	8
Hardness, Ca, Mg	8
Iron	8
Lead	8
Magnesium	8
Manganese	8
Nickel	8
Potassium	8
Selenium	8

Activity Year : 2012

Substance	Result Count
Escherichia coli	3011
Specific conductance	1592
Total dissolved solids	1060
Phosphorus	949
Inorganic nitrogen (nitrate and nitrite)	938
Chloride	895
Hardness, Ca, Mg	895
Kjeldahl nitrogen	890
Sulfate	870
Alkalinity, total	835
Ammonia	790

Activity Year : 2011

Substance	Result Count
Escherichia coli	3084
Specific conductance	639
pH	330
Temperature, water	328
Dissolved oxygen (DO)	318
Chloride	317
Alkalinity, total	315
Ammonia	315
Chemical oxygen demand	315
Dissolved oxygen saturation	315
Inorganic nitrogen (nitrate and nitrite)	315
Kjeldahl nitrogen	315
Phosphorus	315
Total dissolved solids	315
Total suspended solids	315
Nitrite	308
Sulfate	308
Calcium	274
Magnesium	274
Copper	272
Hardness, Ca, Mg	272

Water Quality Portal Demo

Water Quality Data Home x

www.waterqualitydata.us

NATIONAL WATER QUALITY MONITORING COUNCIL

NWQMC

Working Together for Clean Water

WQP Water Quality Portal

The Water Quality Portal (WQP) is a cooperative service sponsored by the United States Geological Survey (USGS), the Environmental Protection Agency (EPA), and the National Water Quality Monitoring Council (NWQMC).

DOWNLOAD DATA

Download water-quality data in Excel, CSV, TSV, and KML formats.

HOW TO USE THE WQP

- User Guide
- Web Services Guide
- FAQs
- Upload Data

NATIONAL RESULTS COVERAGE

Water-quality data in your state.

ABOUT THE WQP

- What is the WQP?
- Contributing organizations
- Other Water Quality Portals
- Contact us

USGS
science for a changing world

EPA
United States



User Support and Technical Assistance

- STORET Help Desk
 - 1-800-424-9067; STORET@epa.gov
- Monthly User Calls
- STORET List Serve
- Helpful Websites:
 - WQX <http://www.epa.gov/storet/wqx/index.html>
 - WQX Web
http://www.epa.gov/storet/wqx/wqxweb_downloads.html
 - Exchange Network
<http://www.exchangenetwork.net/data-exchange/wqx/>

