

Using the New Water Quality Portal

A Watershed Academy Webcast



Tuesday, October 23, 2012
1:00pm – 3:00pm Eastern

Instructors:

Susan Holdsworth, Chief, U.S. EPA's Monitoring Branch and Co-Chair of the National Water Quality Monitoring Council

Nate Booth, Lead Architect, Center for Integrated Data Analysis, U.S. Geological Survey, Madison, WI

Charles Kovatch, WQX and STORET Team Leader, U.S. EPA's Monitoring Branch

1

Webcast Logistics

- **To Ask a Question** – Type your question in the “Questions” tool box on the right side of your screen and click “Send.”
- **To report any technical issues** (such as audio problems) – Type your issue in the “Questions” tool box on the right side of your screen and click “Send” and we will respond by posting an answer in the “Questions” box.

2

Topics for Today's Webcast

- **Introduction:** The new Water Quality Portal and the Water Quality Exchange
- **Demonstration:** Accessing water quality data from the Water Quality Portal
- **Demonstration:** Using the Water Quality Exchange to put data into the Water Quality Portal



3



NATIONAL WATER QUALITY MONITORING COUNCIL

Working Together for Clean Water

Using the New Water Quality Portal

Susan Holdsworth, EPA and Mike Yurowitz, USGS co-chairs
Nate Booth, USGS Center for Integrated Data Analysis
Charles Kovatch, EPA Office of Wetlands, Oceans and Watersheds

4

National Water Quality Monitoring Council (NWQMC) website screenshot. The header features the NWQMC logo and the slogan "Working Together for Clean Water". A navigation menu on the left includes sections for "About Us", "Workgroups", "Products", and "Publications". The main content area is titled "Understand, Restore, and Protect our Waters" and lists three featured items:

- "SMART" Monitoring: Strategic Monitoring and Assessment for River Basin Teams**: A presentation from Warren Kimball, Watershed Program Manager, Massachusetts Department of Environmental Protection.
- Webinar: "Burning Our Rivers: The Water Footprint of Electricity"**: A report by River Network on water use and electricity generation.
- Comparability of Biological Assessments**: Four articles on biological assessment comparability.

Water Quality Portal (WQP) website screenshot. The header features the NWQMC logo and the slogan "Working Together for Clean Water". The main content area is titled "Water Quality Portal" and includes the following sections:

- DOWNLOAD DATA**: Download water-quality data in Excel, CSV, TSV, and KML formats.
- HOW TO USE THE WQP**: User Guide, Web Services Guide, and FAQs.
- NATIONAL RESULTS COVERAGE**: Water-quality data in your state.
- ABOUT THE WQP**: What is the WQP?, Contributing organizations, and Comments.

The footer displays the logos for the USGS (United States Geological Survey) and the EPA (United States Environmental Protection Agency).

2003 USGS - USEPA Memorandum of Understanding

“Working with the National Water Quality Monitoring Council (NWQMC), [USGS and EPA] will develop a geospatial internet based query tool. This tool should be designed to facilitate the greatest possible sharing of data from all sources to all users...”

7

Benefits of the Portal

- ▶ Reduces effort to use other data sources
 - Collecting data from multiple sources
 - Combining into common format
 - Deliver in single file
- ▶ Leverages and protects investments in monitoring data
 - Common data elements emerging from monitoring community
 - Marketplace of what, when and where for monitoring
- ▶ Supports water quality based decision making
 - Comparison to water quality standards
 - Identify hot spots
 - Develop protection and restoration plans
 - Modeling expected changes

8

What's next today

- ▶ Nate Booth, USGS will lead you through a demonstration of the portal and show some applications of the data
- ▶ Charles Kovatch, EPA will show you how to add your data to the portal through the Water Quality eXchange

9

How you can help

- ▶ Use the portal, use the data
 - This webinar is being recorded, so you can refer to it later
 - The portal has a user guide available from the web
- ▶ Add more data through the Water Quality eXchange
 - Visit the tutorials for detailed instructions beyond those provided in this webinar
- ▶ Provide us feedback on likes and suggested improvements

10

Questions?



11



NATIONAL WATER QUALITY MONITORING COUNCIL

Water Quality Portal

www.waterqualitydata.us



Search over 150 million water-quality data records from States, Tribal Partners, USEPA, and USGS



12

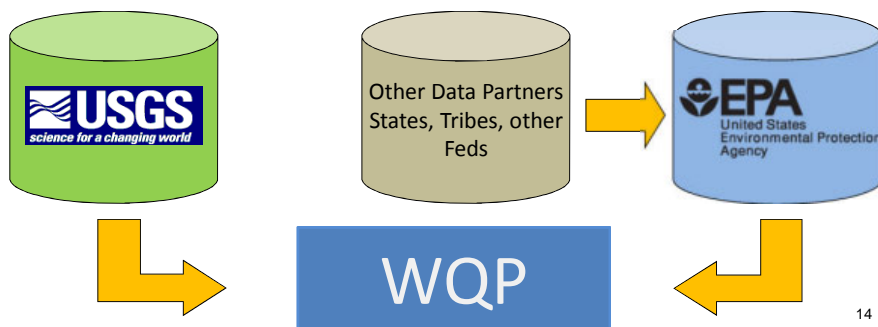
Portal Description and Capabilities

- Includes water-quality data from federal, state and tribal partners through the USGS NWIS & EPA STORET systems
- Based on WQX data format and convention (Water Quality Exchange)
- Organized to support broad regional and national assessments
- Updated every night from NWIS; every week from STORET

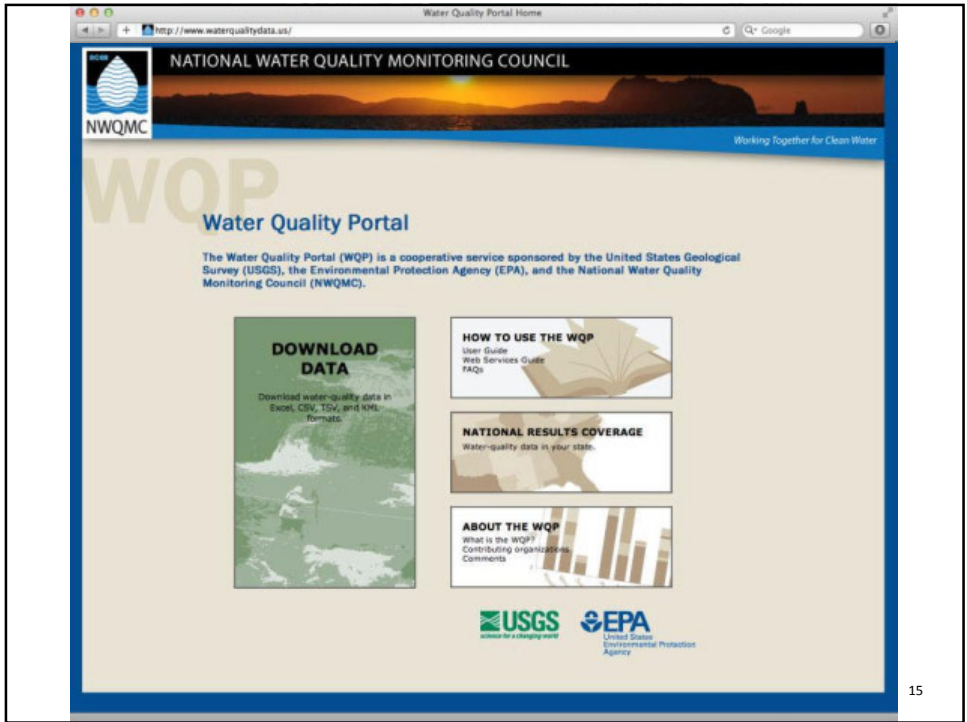
13

Water Quality Portal

The WQP integrates water-quality data from the USGS National Water Information System (**NWIS**) and the EPA STORage and RETrieval (**STORET**) Data Warehouse.



14



15

Water Quality Portal

Query data

LOCATION

Country: [select](#)

State: [select](#)

County: [select](#)

Point location: ?

Within: miles from:

Lat: Long:

[my location](#)

Bounding box: ?

North:

West: East:

South:

SITE PARAMETERS

Site Type: [select](#)

Organization ID: [select](#)

Site ID: ?

HUC: ?

SAMPLING PARAMETERS

Sample Media: [select](#)

Characteristic Group: [select](#)

Characteristics: [select](#)

Date range: from to (mm-dd-yyyy)

DOWNLOAD

Select database: All databases USGS NWIS only EPA STORET only

Select data: Sites only Sample results only

Download tabular data:

File format:

Comma-separated

Tab-separated

MS Excel (Excel 2003 and earlier versions have a limit of 65,536 rows. If your download exceeds this limit, only the first 65,536 rows will open.)

Download map data:

File format:

KML (Keyhole Markup Language - this is available for Sites only)

[Show data on Google Maps](#) Google Maps limits the number of sites shown to a maximum of 1000. It will also time out if the query is slow.

DOWNLOAD

[Show RESTlike queries ?](#)

16

Water Quality Portal

Query data

LOCATION

Country: [select](#)

State: [select](#)

County: [select](#)

Point location: ?

Within: miles from:

Lat: Long:

[my location](#)

Bounding box: ?

North:

West: East:

South:

SITE PARAMETERS

Site Type: [select](#)

Organization ID: [select](#)

Site ID: ?

HUC: ?

SAMPLING PARAMETERS

Sample Media: [select](#)

Characteristic Group: [select](#)

Characteristics: [select](#)

Date range: from to (mm-dd-yyyy)

DOWNLOAD

Select database: All databases USGS NWIS only EPA STORET only

Select data: Sites only Sample results only

Download tabular data:

File format:

Comma-separated

Tab-separated

MS Excel (Excel 2003 and earlier versions have a limit of 65,536 rows. If your download exceeds this limit, only the first 65,536 rows will open.)

Download map data:

File format:

KML (Keyhole Markup Language - this is available for Sites only)

[Show data on Google Maps](#) Google Maps limits the number of sites shown to a maximum of 1000. It will also time out if the query is slow.

DOWNLOAD

[Show RESTlike queries ?](#)

Water Quality Portal

Query data

LOCATION

Country: [select](#)

State: [select](#)

County: [select](#)

Point location: ?

Within: miles from:

Lat: Long:

[my location](#)

Bounding box: ?

North:

West: East:

South:

SITE PARAMETERS

Site Type: [select](#)

Organization ID: [select](#)

Site ID: ?

HUC: ?

SAMPLING PARAMETERS

Sample Media: [select](#)

Characteristic Group: [select](#)

Characteristics: [select](#)

Date range: from to (mm-dd-yyyy)

DOWNLOAD

Select database: All databases USGS NWIS only EPA STORET only

Select data: Sites only Sample results only

Download tabular data:

File format:

Comma-separated

Tab-separated

MS Excel (Excel 2003 and earlier versions have a limit of 65,536 rows. If your download exceeds this limit, only the first 65,536 rows will open.)

Download map data:

File format:

KML (Keyhole Markup Language - this is available for Sites only)

[Show data on Google Maps](#) Google Maps limits the number of sites shown to a maximum of 1000. It will also time out if the query is slow.

DOWNLOAD

[Show RESTlike queries ?](#)

Water Quality Portal

Query data

LOCATION

Country: [select](#)

State: [select](#)

County: [select](#)

Point location: ?

Within: miles from:

Lat: Long:

[my location](#)

Bounding box: ?

North:

West: East:

South:

SITE PARAMETERS

Site Type: [select](#)

Organization ID: [select](#)

Site ID: ?

HUC: ?

SAMPLING PARAMETERS

Sample Media: [select](#)

Characteristic Group: [select](#)

Characteristics: [select](#)

Date range: from to (mm-dd-yyyy)

DOWNLOAD

Select database: All databases USGS NWIS only EPA STORET only

Select data: Sites only Sample results only

Download tabular data:

File format:

Comma-separated

Tab-separated

MS Excel (Excel 2003 and earlier versions have a limit of 65,536 rows. If your download exceeds this limit, only the first 65,536 rows will open.)

Download map data:

File format:

KML (Keyhole Markup Language - this is available for Sites only)

[Show data on Google Maps](#) Google Maps limits the number of sites shown to a maximum of 1000. It will also time out if the query is slow.

DOWNLOAD

[Show RESTlike queries ?](#)

19



Water Quality Portal

Query data

LOCATION

Country: [select](#)

State: [select](#)

County: [select](#)

Point location: ?

Within: miles from:

Lat: Long:

[my location](#)

Bounding box: ?

North:

West: East:

South:

SITE PARAMETERS

Site Type: [select](#)

Organization ID: [select](#)

Site ID: ?

HUC: ?

SAMPLING PARAMETERS

Sample Media: [select](#)

Characteristic Group: [select](#)

Characteristics: [select](#)

Date range: from to (mm-dd-yyyy)

DOWNLOAD

Select database: All databases USGS NWIS only EPA STORET only

Select data: Sites only Sample results only

Download tabular data:

File format:

Comma-separated

Tab-separated

MS Excel (Excel 2003 and earlier versions have a limit of 65,536 rows. If your download exceeds this limit, only the first 65,536 rows will open.)

Download map data:

File format:

KML (Keyhole Markup Language - this is available for Sites only)

[Show data on Google Maps](#) Google Maps limits the number of sites shown to a maximum of 1000. It will also time out if the query is slow.

DOWNLOAD

[Show RESTlike queries ?](#)

20



Water Quality Portal

Query data

LOCATION

Country: [select](#)
 State: [select](#)
 County: [select](#)

Point location: ?

Within: miles from:
 Lat: Long:
[my location](#)

Bounding box: ?

North:
 West: East:
 South:

SITE PARAMETERS

Site Type: [select](#)
 Organization ID: [select](#)
 Site ID: ?
 HUC: ?

SAMPLING PARAMETERS

Sample Media: [select](#)
 Characteristic Group: [select](#)
 Characteristics: [select](#)
 Date range: from to (mm-dd-yyyy)

DOWNLOAD

Select database: All databases USGS NWIS only EPA STORET only
 Select data: Sites only Sample results only

Download tabular data:

File format:
 Comma-separated
 Tab-separated
 MS Excel (Excel 2003 and earlier versions have a limit of 65,536 rows. If your download exceeds this limit, only the first 65,536 rows will open.)

Download map data:

File format:
 KML (Keyhole Markup Language - this is available for Sites only)

[Show data on Google Maps](#) Google Maps limits the number of sites shown to a maximum of 1000. It will also time out if the query is slow.

DOWNLOAD

[Show RESTlike queries ?](#)



21

Organization Name	Activity Name	Subdivision Name	Activity Date	Characteristic Name	Result Sample Fraction	Result Measure Value	Result Measure Units	Measure Code	Qualifier Code
2562	USGS Oregon Water Science Center	Surface Water	2009-12-02	Phosphorus	Total	0.1050	mg/l		
2563	USGS Oregon Water Science Center	Surface Water	2009-12-02	Organic nitrogen	Total	0.39	mg/l		
2564	USGS Oregon Water Science Center	Surface Water	2009-12-02	Ammonia and ammonium	Dissolved	0.015	mg/l NH4		
2565	USGS Oregon Water Science Center	Surface Water	2009-12-02	Epilimnetic nitrogen	Total	0.857	mg/l as N		
2566	USGS Oregon Water Science Center	Surface Water	2009-12-02	Nitrogen, mixed forms (NH3, NH4), organic (P total)	Total	1.2	mg/l		
2567	USGS Oregon Water Science Center	Surface Water	2009-12-19	Phosphoric	Dissolved	0.179	mg/l		
2568	USGS Oregon Water Science Center	Surface Water	2009-12-19	Ammonia and ammonium	Dissolved	0.017	mg/l NH4		
2569	USGS Oregon Water Science Center	Surface Water	2009-12-19	Phosphate	Dissolved	0.0060	mg/l as P		
2570	USGS Oregon Water Science Center	Surface Water	2009-12-19	Phosphorus	Total	0.18400	mg/l		
2571	USGS Oregon Water Science Center	Surface Water	2009-12-19	Ammonia and ammonium	Dissolved	0.013	mg/l as N		
2572	USGS Oregon Water Science Center	Surface Water	2009-12-19	Nitrate-nitrite	Dissolved	2.39	mg/l as N		
2573	USGS Oregon Water Science Center	Surface Water	2009-12-19	Organic nitrogen	Total	0.84	mg/l		
2574									
2575	EPA Region 10 Superfund Portland	Groundwater	2005-05-12	Phosphorus	Total	2.23	mg/l		
2576	EPA Region 10 Superfund Portland	Groundwater	2005-05-12	Nitrate	Total	0.0392	mg/l		
2577	EPA Region 10 Superfund Portland	Groundwater	2005-05-12	Nitrite	Total	0.025	mg/l		U
2578	EPA Region 10 Superfund Portland	Groundwater	2005-05-12	Nitrite	Total	0.025	mg/l		U
2579	EPA Region 10 Superfund Portland	Groundwater	2005-05-12	Nitrate	Total	0.111	mg/l		
2580	EPA Region 10 Superfund Portland	Groundwater	2005-05-12						
2581	EPA Region 10 Superfund Portland	Groundwater	2005-05-12						
2582	EPA Region 10 Superfund Portland	Groundwater	2005-05-12						
2583	EPA Region 10 Superfund Portland	Groundwater	2005-05-12						
2584	EPA Region 10 Superfund Portland	Groundwater	2005-05-12						

- Export Sites
- Export Results

Download tabular data:

File format:

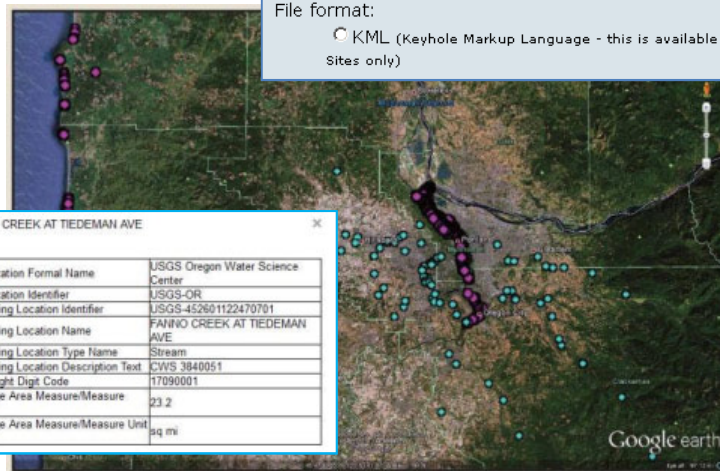
- Comma-separated
- Tab-separated
- MS Excel (Excel 2003 and earlier versions have a limit of 65,536 rows. If your download exceeds this limit, only the first 65,536 rows will open.)

22

Sites Retrieval

Organization Identifier	USGS-OR
Organization Formal Name	USGS Oregon Water Science Center
Monitoring Location Identifier	USGS-452601122470701
Monitoring Location Name	FANNO CREEK AT TIEDEMAN AVE
Monitoring Location Type Name	Stream
Monitoring Location Description Text	CWS 3840051
HUC Eight Digit Code	17090001
Drainage Area	23.2
Drainage Area Unit	sq mi
Latitude	45.4336778
Longitude	-122.7853417
Country Code	US
State Code	41
County Code	67

23



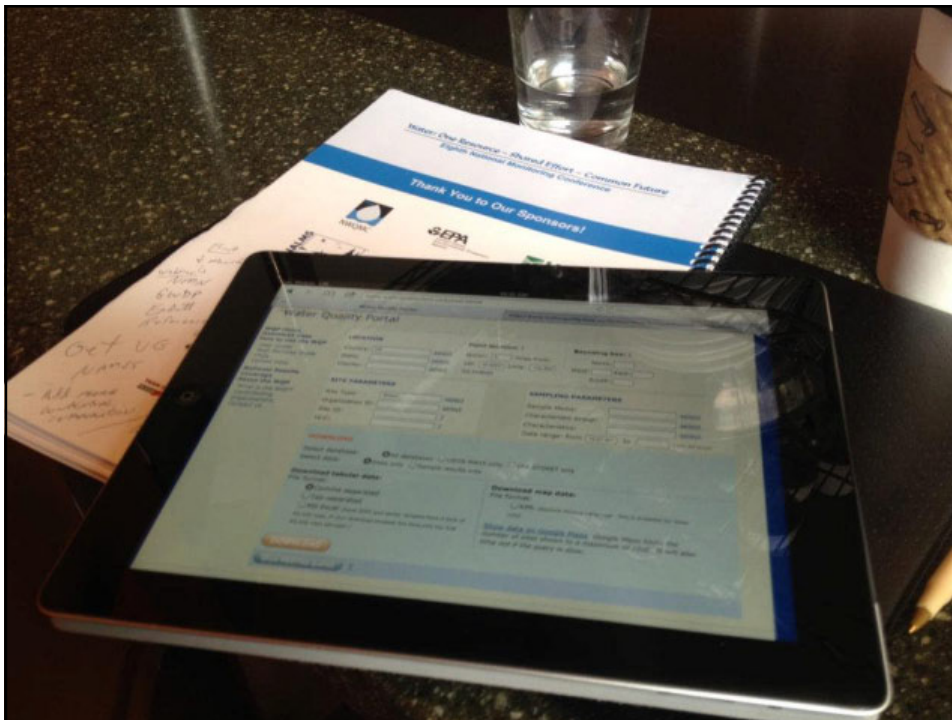
Map output from the Water Quality Portal for all sites in the Portland, Ore. area that have been sampled since 2005. The pink dots represent STORET and the blue dots represent NWIS sites.

24

Sample Result Retrieval

ActivityMediaName	Water
ActivityStartDate	4/25/2011
ActivityStartTime/Time	16:15:00
ActivityStartTime/TimeZoneCode	PDT
ProjectIdentifier	97119H6TU
ActivityConductingOrganizationText	U.S. Geological Survey-Water Resources Discipline
MonitoringLocationIdentifier	USGS-452601122470701
ActivityCommentText	A-1220118 TPCN Volumes: 1- 15.20mL 2- 17.30mL 3- 16.50mL L-1220118 Date on FCC 4/26/11,
HydrologicCondition	Rising Stage
HydrologicEvent	Storm
CharacteristicName	Nitrogen
ResultSampleFractionText	Suspended
ResultMeasureValue	0.53
ResultMeasure/MeasureUnitCode	mg/l
ResultValueTypeName	actual
USGSPCode	49570
ResultAnalyticalMethod/MethodIdentifier	COMB7
ResultAnalyticalMethod/MethodName	TPN, GF/F, combustion
LaboratoryName	USGS-National Water Quality Lab, Denver, CO
AnalysisStartDate	5/19/2011
DetectionQuantitationLimitTypeName	Long Term Method Detection Level
DetectionQuantitationLimitMeasure/MeasureValue	0.017
DetectionQuantitationLimitMeasure/MeasureUnitCode	mg/l

25



Example Data Retrieval

“I want to download all the stream sites and sampling results in the Big Thompson River Basin (HUC 10190006) where nutrient data were collected from October 1, 2000 to September 30, 2004.”

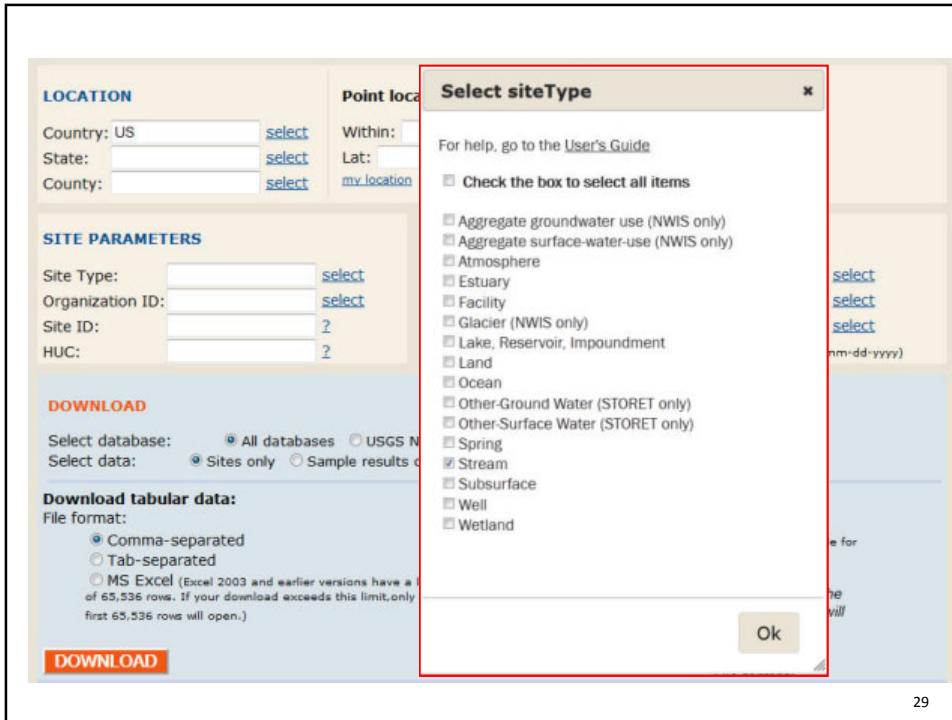
27

www.waterqualitydata.us

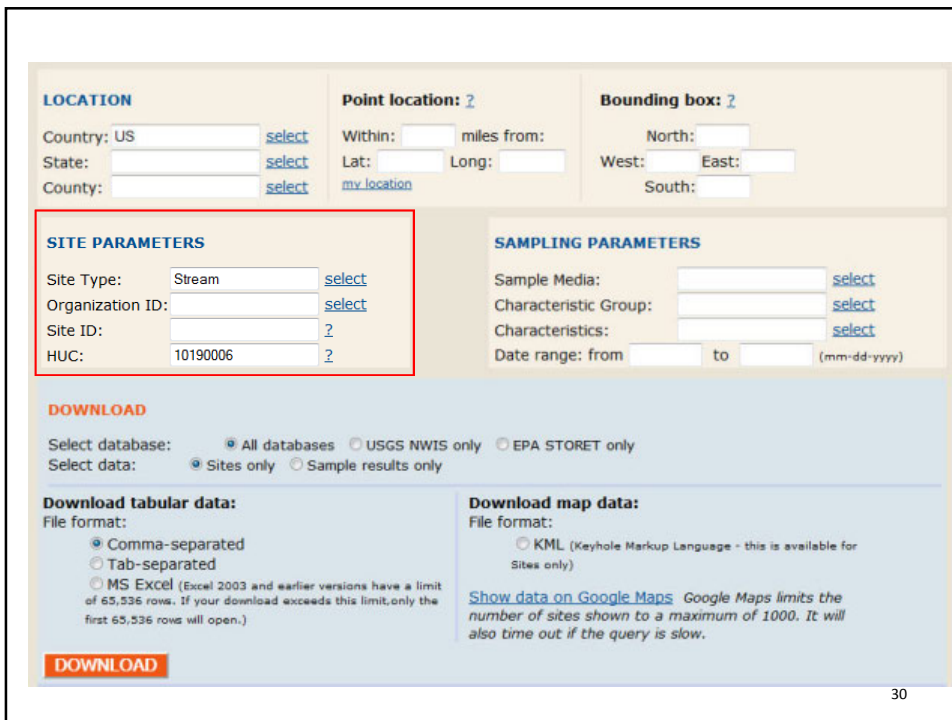
The screenshot displays the search interface for water quality data. It is organized into several sections:

- LOCATION:** Includes fields for Country (US), State, and County, each with a 'select' dropdown. It also has 'Point location' fields for 'Within' (miles from), 'Lat', and 'Long', and a 'Bounding box' section with 'North', 'West', 'East', and 'South' coordinates.
- SITE PARAMETERS:** Includes 'Site Type', 'Organization ID', 'Site ID', and 'HUC', each with a 'select' dropdown or a '?' icon.
- SAMPLING PARAMETERS:** Includes 'Sample Media', 'Characteristic Group', and 'Characteristics', each with a 'select' dropdown. It also has a 'Date range' field with 'from' and 'to' inputs and a '(mm-dd-yyyy)' format indicator.
- DOWNLOAD:** A section with radio buttons for 'Select database' (All databases, USGS NWIS only, EPA STORET only) and 'Select data' (Sites only, Sample results only).
- Download tabular data:** Includes a 'File format' section with radio buttons for 'Comma-separated', 'Tab-separated', and 'MS Excel' (with a note about row limits).
- Download map data:** Includes a 'File format' section with a radio button for 'KML' (with a note about availability for sites only).

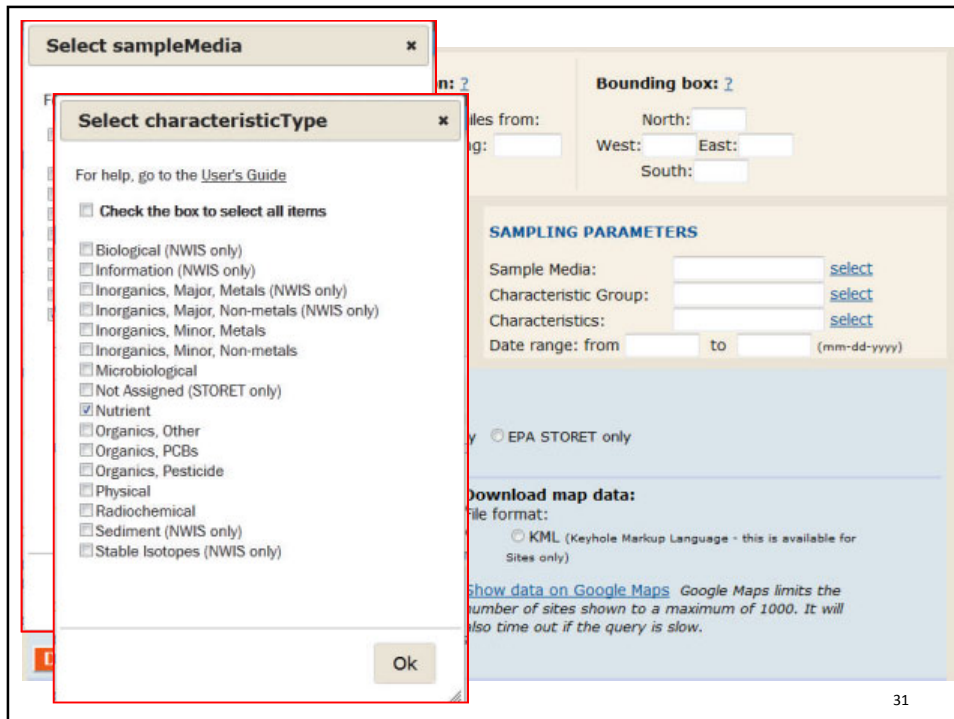
At the bottom left of the form is a red 'DOWNLOAD' button. At the bottom right of the page is the number 28.



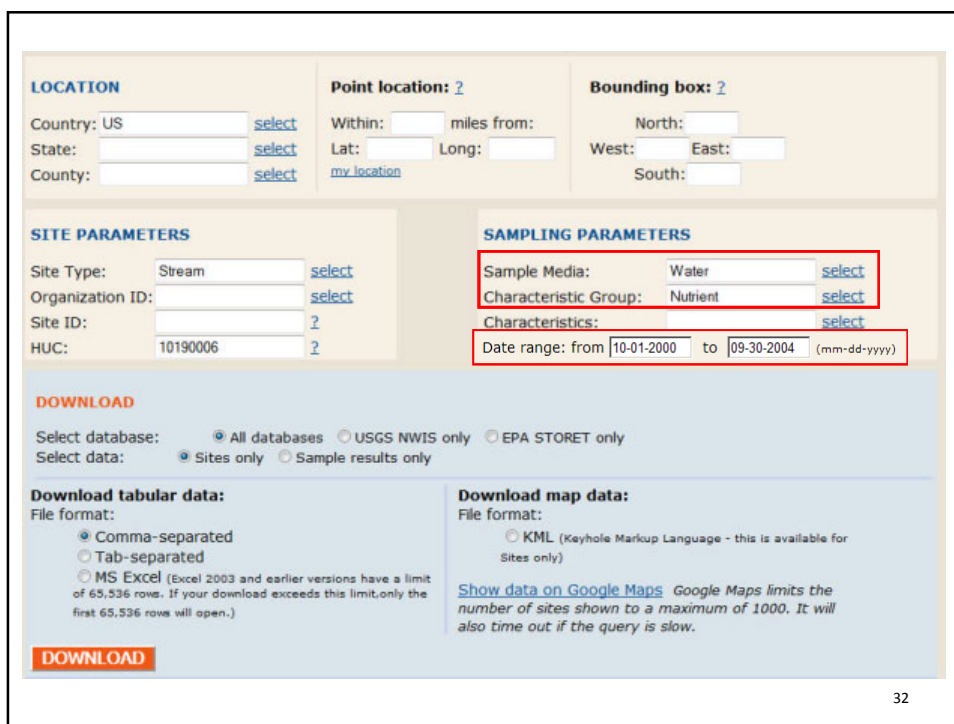
29



30



31



32

LOCATION

Country: US [select](#) Within: miles from: North:
 State: [select](#) Lat: Long: West: East:
 County:

Point location: 2 **Bounding box: 2**

SITE PARAMETER

Site Type: [select](#)
 Organization ID: [select](#)
 Site ID: [select](#)
 HUC: 10 [select](#) 09-30-2004 (mm-dd-yyyy)

DOWNLOAD

Select database:
 Select data:

Download tabular data:
 File format:
 Comma-separated
 Tab-separated
 MS Excel (Excel 2003 and earlier versions have a limit of 65,536 rows. If your download exceeds this limit, only the first 65,536 rows will open.)

Download map data:
 File format:
 KML (Keyhole Markup Language - this is available for Sites only)
[Show data on Google Maps](#) Google Maps limits the number of sites shown to a maximum of 1000. It will also time out if the query is slow.

Download Status

Your query will return **14,759** sample results from **76** sites:
 From NWIS: 13,247 sample results from 33 sites
 From STORET: 1,512 sample results from 43 sites

Click Continue to download the data or Cancel to terminate the request.

33

Google Earth

Search: Search
 ex: pizza near NYC Get Directions History

Places

- My Places
 - Sightseeing Tour
 - Make sure 3D
 - Buildings
- Temporary Places
 - Station.kml
 - Station-1.kml

Layers Earth Gallery >>

- Primary Database
 - Borders and Labels
 - Borders
 - Labels
 - Places
 - Roads
 - 3D Buildings
 - Ocean
 - Weather
 - Gallery
 - Global Awareness
 - More

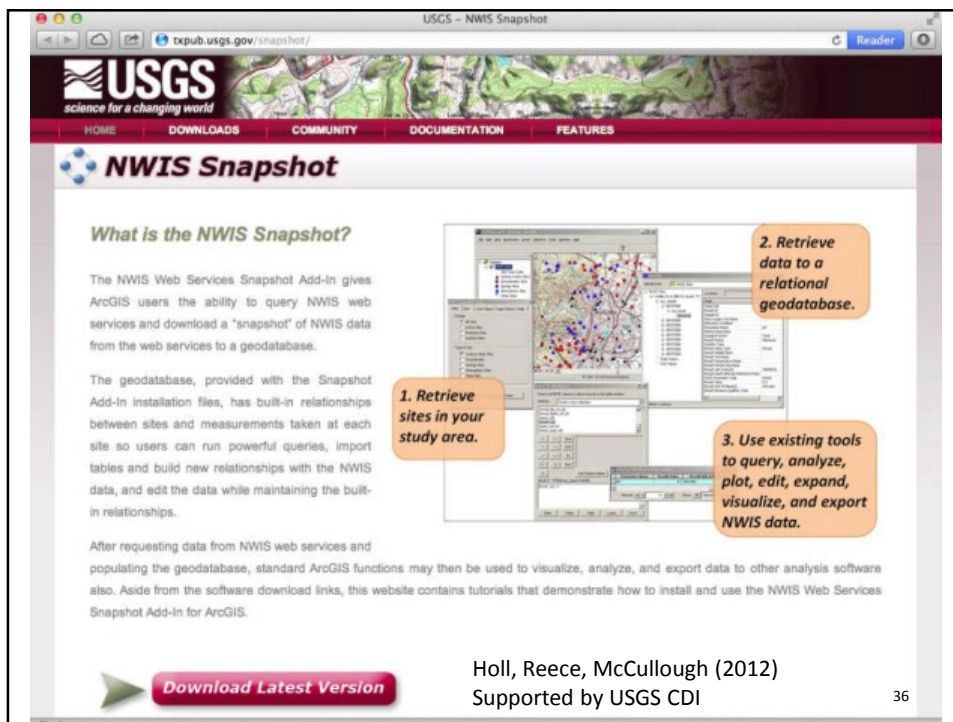
Map showing Loveland, Longmont, Greeley, and Boulder. Image © 2012 TerraMetrics © 2012 Google

40° 11' 08.94" N 104° 55' 00.18" W elev. 4873 ft Eye alt: 45.52 mi

34

Portal supporting other tools across the water management community

35



The screenshot shows the USGS NWIS Snapshot website. The header includes the USGS logo and navigation links: HOME, DOWNLOADS, COMMUNITY, DOCUMENTATION, and FEATURES. The main content area is titled "NWIS Snapshot" and includes a section "What is the NWIS Snapshot?".

1. Retrieve sites in your study area.

2. Retrieve data to a relational geodatabase.

3. Use existing tools to query, analyze, plot, edit, expand, visualize, and export NWIS data.

After requesting data from NWIS web services and populating the geodatabase, standard ArcGIS functions may then be used to visualize, analyze, and export data to other analysis software also. Aside from the software download links, this website contains tutorials that demonstrate how to install and use the NWIS Web Services Snapshot Add-in for ArcGIS.

[Download Latest Version](#)

Holl, Reece, McCullough (2012)
Supported by USGS CDI

36

National Groundwater Monitoring Network

TIPPECANOE 17 (TC 17)

Activity Start Date	Activity Start Time	Time Zone	Characteristic Name	Measure Value	Units
1989-08-17	17:25:00	EST	Temperature, water	11.9	deg C
1989-06-17	17:25:00	EST	Depth, from ground surface to well water level	36.6	m
1989-06-17	17:25:00	EST	Sodium adsorption ratio	0.16	None
1989-06-17	17:25:00	EST	Sodium	6.60	mg/l
1989-06-17	17:25:00	EST	Fluoride	0.20	mg/l
1989-06-17	17:25:00	EST	Silica	18.0	mg/l
1989-06-17	17:25:00	EST	Sulfate	47	mg/l
1989-06-17	17:25:00	EST	Specific conductance	621	uS/cm @25C
1989-06-17	17:25:00	EST	Magnesium	30.0	mg/l
1989-06-17	17:25:00	EST	Potassium	1.40	mg/l
1989-06-17	17:25:00	EST	Alkalinity	320	mg/l CaCO3
1989-06-17	17:25:00	EST	Chloride	4.0	mg/l
1989-06-17	17:25:00	EST	Total dissolved solids	385	mg/l
1989-06-17	17:25:00	EST	Total dissolved solids	0.52	tons/ac ft
1989-06-17	17:25:00	EST	Ammonia and ammonium	0.049	mg/l NH4
1989-06-17	17:25:00	EST	Ammonia and ammonium	0.038	mg/l as N
1989-06-17	17:25:00	EST	Nitrate-nitrite	0.288	mg/l as N
1989-06-17	17:25:00	EST	Iron	7.0	ug/l
1989-06-17	17:25:00	EST	Carbon dioxide	51	mg/l
1989-06-17	17:25:00	EST	pH	7.1	std units
1989-06-17	17:25:00	EST	pH, lab	7.4	std units

37

Grand River Plume Aerial Photography and Model Simulations



38

Nearshore Modeling Support

USGS Home Contact USGS Search USGS

Environmental Data Discovery and Transformation - Beta Service Version 1.3.0

Access and Integrate Environmental Observations for Coastal Decision Support

Choose Data Create Project Location EndDaT Information

USGS Time Series (NWIS, Plotting Tool)
 National Data Buoy Center (NDBC)
 6-hr Quantitative National Precipitation

Great Lakes Coastal Forecasting System (GLCFS)
 National Climate Data Center (NCDC)
 1-hr Quantitative North Central Precipitation

USGS Water Quality (Water Quality)
 Surface Summary of Day Data (SOD)

Search within a 5 mile bounding box from selected project (click marker to identify)

Map Satellite Hybrid Terrain

NWIS GLCFS Water Quality NDBC NCDC SOD Precipitation

Overview Active Stations

Clear list: Uncheck All:

MANITOWOC RIVER AT MANITOWOC, WI

MANITOWOC RIVER AT MANITOWOC, WI
Station ID: USGS-04085427
Approximate distance to active beach: 3.508 miles

Property	Units	Start Date	End Date
<input type="checkbox"/> Temperature, water	deg C	1972-11-30	2008-09-16
<input type="checkbox"/> Suspended sediment concentration (SSC)	mg/l	1972-11-30	2002-10-16
<input type="checkbox"/> Stream flow, instantaneous	cfs	1972-11-30	2011-09-08
<input type="checkbox"/> Suspended sediment discharge	tons/day	1972-11-30	2011-09-08

Statistical Models in R

```

1 library(dataRetrieval)
2 library(EGRET)
3
4 siteNumber <- '09522000'
5 ParameterCd <- '00631' #Nltrate
6
7 StartDate <- ''
8 EndDate <- ''
9
10 Sample <- getSampleData(siteNumber, ParameterCd, StartDate, EndDate)
11 StartDate <- as.character(min(Sample$Date))
12 EndDate <- as.character(max(Sample$Date))
13 Daily <- getDailyData(siteNumber, '00660', StartDate, EndDate)
14 INFO <- getMetadata(siteNumber, '00631', interactive=FALSE)
15 INFO$shortName <- INFO$station_nm
16 boxConcMonth()
17

```

Console

```

~/Downloads/ > ParameterCd <- '00631' #Nltrate
> StartDate <- ''
> EndDate <- ''
> Sample <- getSampleData(siteNumber, ParameterCd, StartDate, EndDate)
Warning message:
In reshapeWide(data, idvar = idvar, timevar = timevar, var
multiple rows match for USGSCode=00631: first taken
> StartDate <- as.character(min(Sample$Date))
> EndDate <- as.character(max(Sample$Date))
> INFO <- getMetadata(siteNumber, '00631', interactive=FALSE)
> INFO$shortName <- INFO$station_nm
> boxConcMonth()
>

```

dataRetrieval
R package source for USGS data retrieval

Introduction

The dataRetrieval package was created to simplify the process of getting hydrologic data in the R environment. It has been specifically designed to work seamlessly with the EGRET package: Exploration and Graphics for RivEr Trends (EGRET)

Download and Installation Options

The easiest way to install the dataRetrieval package is to first install the package 'devtools', along with a set of LaTeX tools, and anything else required to build R packages. Those tools can be found here for a Mac, or here for Windows. Carefully follow the directions on the Windows page, and note that you need to install Rtools, as well as MiKTeX.

Once you have the required tools for building R packages, you can simply type the following commands in R to build the dataRetrieval package on your system:

```
install.packages('devtools') #if not already installed
library('devtools')
```

Once that is installed, you can use the function install_github to install this package directly from

Hirsch, DeCicco 2012

Available Documentation & Resources

- Portal and Web Services Guide
- FAQs
- Materials for new data providers
- Training materials available



41

Future Enhancements

- **Data Integration**
 - Linking with a common river network (NHD)
 - Standardized analytical method metadata (NEMI)
- **Community Support**
 - Highlighting new community tools
 - Monitoring marketplace
- **Other Data Sources**
 - Additional data partners
 - Real-time monitoring
 - Biological and habitat data
- **Geospatial**
 - Mapping Interface
 - NHD based search

42

Questions?



43

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

Charles Kovatch
OW/OWOW
October 23, 2012





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.

45



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

46



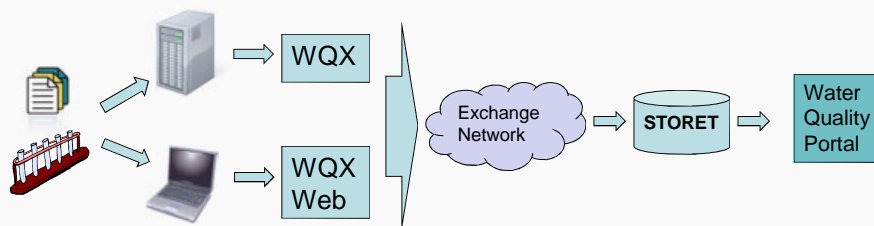
What are the Tools?

- 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

47



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

48



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

49



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

50



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>
```

51



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

52



Data Entry and Data Formatting with WQX Web

US EPA WQXWeb Physical Chemistry Template
Version 1.04

Domain values last updated: 03/02/2012 10:38:09 AM

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 Physical Results file. 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	Line	Worksheet Name	Description
Export	One button on this tab convert Data Entry Worksheets (yellow tabs) to .csv 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 worksheets are provided for users.	Projects Monitoring Locations Results	The Project tab contains information about the water quality data collection program. The Monitoring Locations tab contains information about the sites where water quality data is being collected. The Results tab contains the field and laboratory water quality data collected.
Allowable Values/Link us Later/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. Other cells are included for additional reference.	Allowed Values - Monitoring Locations Allowed Values - Results Characteristics Analytical Methods Units of Measure Analytical & Collection Methods	This tab contains multiple tables of listing the values that can be entered in particular columns in the Monitoring Locations tab. This tab contains multiple tables of listing the values that can be entered in particular columns in the Results tab. This tab contains a table of all Characteristics in STORET that can be used in the Characteristics Name field in the Results tab. The table also has fields to indicate if a particular Characteristic requires a Sample Fraction or Field Air Analytical Procedure (or both) for a particular characteristic. 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. This tab contains a single table listing all result units of measure available in WQX. 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/wqxweb/downloads.html>.
If you have questions or concerns about this template, please send email to the STORET Help Desk at STORET@epa.gov.

53



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	0207000839 94978	39 94978	-77 12764	2400	Interpolation-Map	NAD83
3	WQXTEST27576	WQXTEST 27576 FAKE RIVER, NOVA	River/Stream	0207000839 94978	39 94978	-77 12764	2400	Interpolation-Map	NAD83
4			River/Stream						
5			River/Stream Epifaunal						
6			River/Stream Intermittent						
7			River/Stream Perennial						
8			River/Stream Impoundment						
9			Seep						
10			Spring						
11			State/Local Air Monitoring St.						

54



Data Entry with WQX Web: Results Fields

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Project ID	Monitoring Location ID	Activity Type	Activity Media Name	Activity Start Date	Activity Start Time	Sample Collection Method ID	Sample Collection Equipment Name	Characteristic Name	Result Value	Result Unit	Result Sample Fraction	Result Analytical Method ID	Result Analytical Method Center
1	SL_MONIT	TWPK01	Field Mar/Obs	Water	2001-10-03	10:03:00		Temperature, water	43.46	deg F		2550	APHA
2	SL_MONIT	TWPK01	Field Mar/Obs	Water	2001-10-03	10:03:00		Turbidity	43	NTU		2130	APHA
3	SL_MONIT	L0PK01	Sample-Routine	Water	2001-09-10	9:48:00	STNDRO_SCP	Ammonia-nitrogen	0.9022	mg/l	Dissolved	4500-NH3(C)	APHA
4	SL_MONIT	TWPK01	Sample-Routine	Water	2001-09-10	9:48:00	STNDRO_SCP	Nitrate	7.2	mg/l	Dissolved	353.3	USEPA
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													

55



Converting Spreadsheet Data to WQX Web Compatible Format

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

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\josee\Desktop\ExportProject06120302.txt
Monitoring Locations	C:\Documents and Settings\josee\Desktop\ExportMonitoringLocations20120302.txt
Results	C:\Documents and Settings\josee\Desktop\ExportPulhamResults20120302.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.

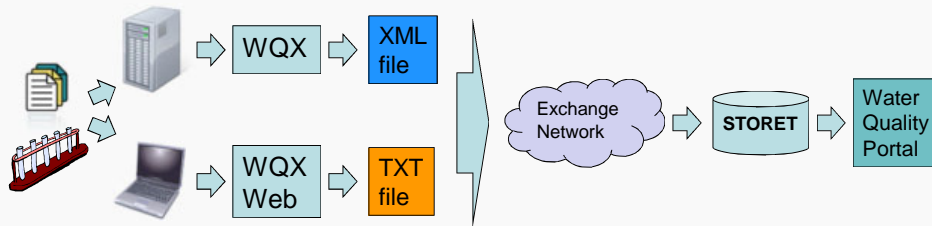
Security Note: In order to use the export buttons on this page you must enable macros for this Excel spreadsheet, or set the macro security to 'Medium'. For more information on how to change macro security settings see the following articles:
[Change Macro Security](#)
[About Macro Security](#)

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.

56



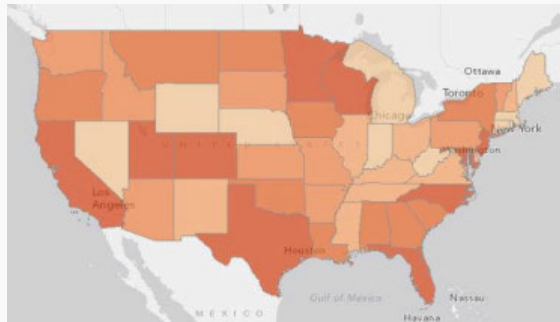
What do the tools do? - Review



57



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

58



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

59



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

60



User Support and Technical Assistance

- STORET Help Desk
 - 1-800-424-9067
 - STORET@epa.gov
- Monthly User Calls
- STORET List Serve
- Website www.epa.gov/storet



61



Questions?



62

Speaker Contact Information



Susan Holdsworth

holdsworth.susan@epa.gov, 202-566-1187

Co-Chair of the National Water Quality Monitoring Council
US EPA, Office of Wetlands, Oceans, and Watersheds



Nate Booth

nlbooth@usgs.gov, 608-821-3822

Lead Architect, Center for Integrated Data Analysis
US Geological Survey



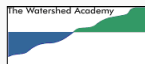
Charles Kovatch

kovatch.charles@epa.gov, 202-566-0399

WQX/STORET Team Leader
Monitoring Branch,
US EPA, Office of Wetlands, Oceans, and Watersheds

63

Next Watershed Academy Webcast



Check back in November for the next Webcast:

“How's My Waterway” and Other Water Quality Apps

Information will be posted at
www.epa.gov/watershedwebcasts

64

Participation Certificate

If you would like to obtain participation certificates type the link below into your web browser:

http://water.epa.gov/learn/training/wacademy/upload/wawebcast_certificate_102312.pdf

You can type each of the attendees names into the PDF and print the certificates.