

NWQMC Water Quality Portal Progress and Status

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Purpose

- Describe the Water Quality Portal
- Explain the benefits of the Water Quality Portal
- Where are we at now?
- What is the future?

Portal Background

Circa 2002

- Multiple organizations are storing discrete water quality data in multiple forms
- Lots of data was only available by request or email or PDF
- Combining and harmonizing data to get a full picture is an extremely time-consuming task
- NWQMC was charged with figuring this out!

Portal Background- 2003 Memo of Understanding

USGS and EPA will deliver data from USGS-NWIS and EPA-STORET in a common format to:

1. Analyze and report on the state of the nation's water environment
2. Provide a common basis for integrated water-quality analysis and protection
3. Provide an information base for scientific inquiry about water quality

An underlying goal is to ensure that the data from these important government databases are documented to describe their quality so that users can establish the utility and comparability of the data.

Mission and Vision

Vision

Be the premiere source for water quality data for everyone, everywhere.

Mission

Provide easy access to all water quality data, facilitate improvements in data quality, and enhance data discovery and data summaries to inform sound water-quality decision making at local, state, regional, and national scales.

Scope

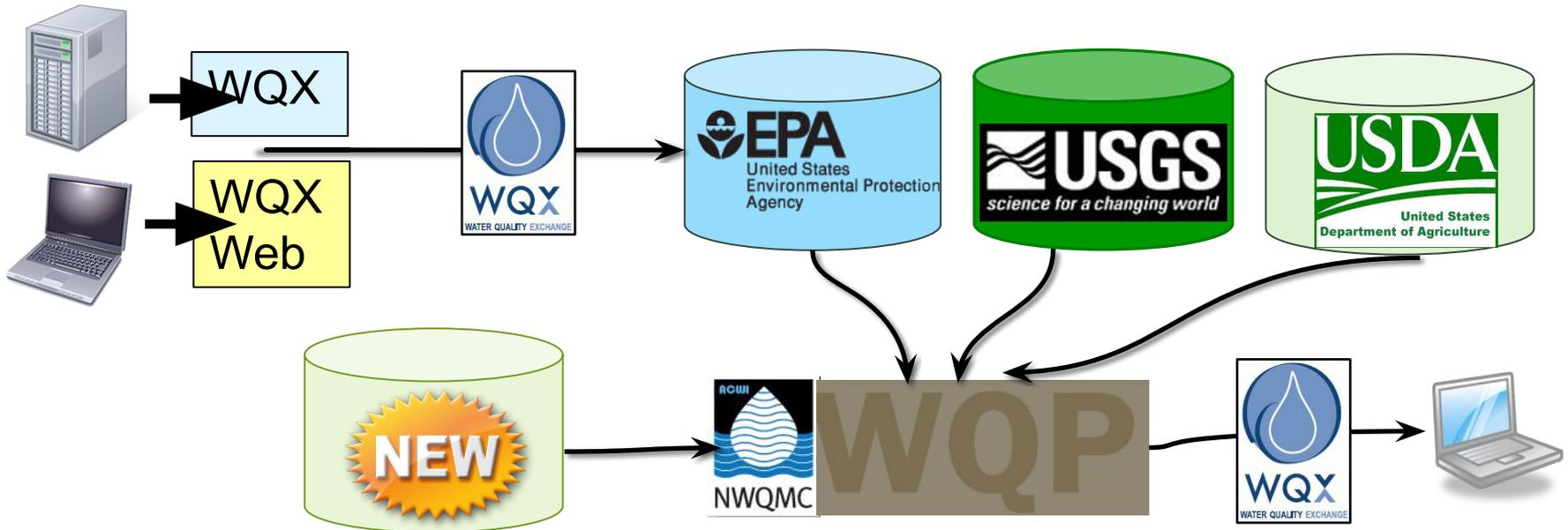
Water quality data collected from discrete samples of ambient surface and groundwater in the United States.

The WQP allows data to be reused

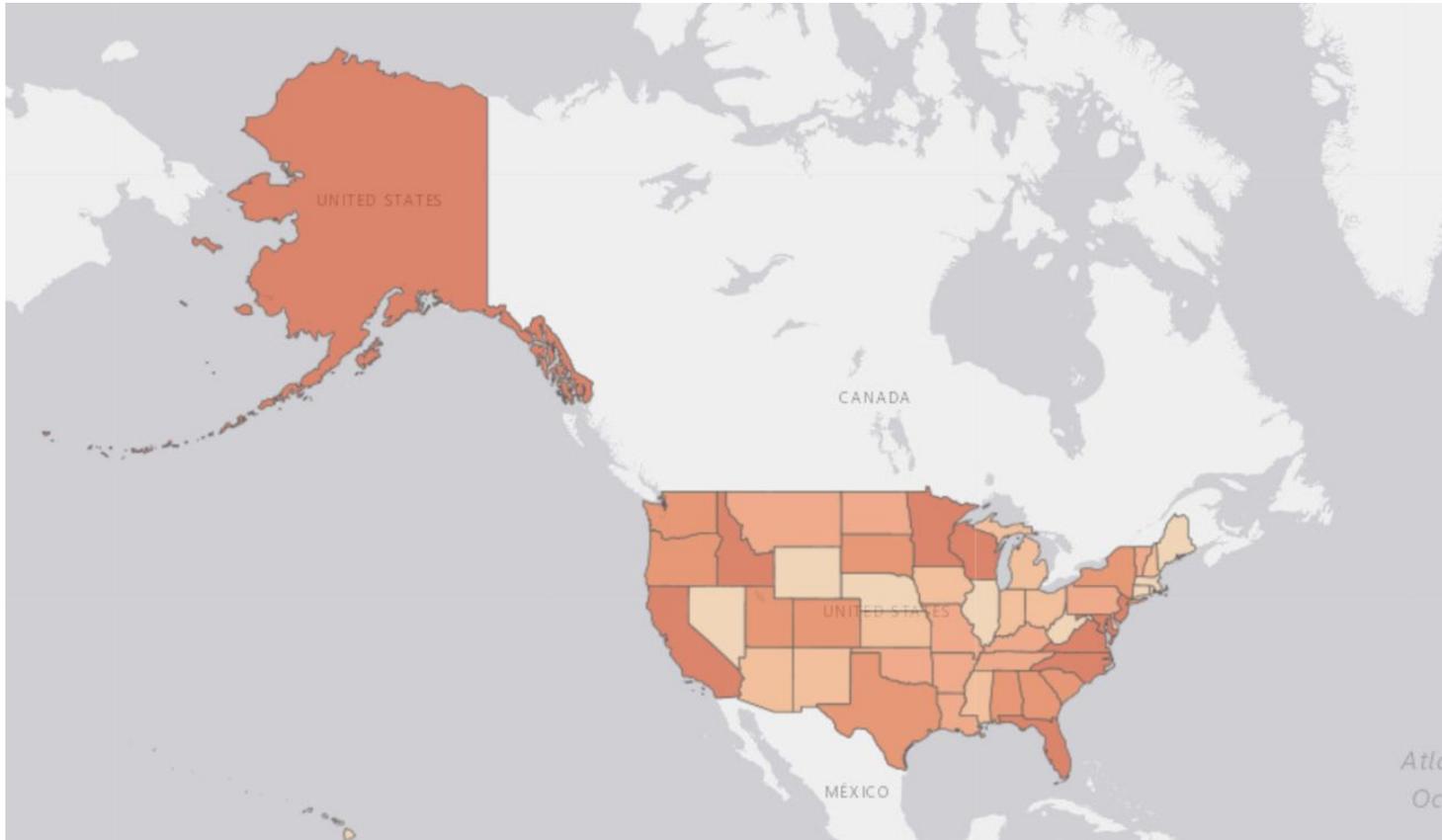
- The more times a piece of data is reused, the more valuable it is and the easier it is to justify collecting more data
- National-scale analyses are possible without a huge team reaching out to hundreds of different agencies to collect data
- Services allow for dynamic data processing pipelines and low barrier of entry to data use

One place to access data

With the National Water Quality Monitoring Council (**NWQMC**), the Water Quality Portal (**WQP**) integrates publicly available water-quality data, through use of the Water Quality eXchange (**WQX**), from the USGS **NWIS**, EPA **STORET**, and USDA ARS **STEWARDS**.



Access to Water Quality Data



Over 366 million discrete water data records and over 957,000 sites

Ever more data!

Portal Data Records (365m total)

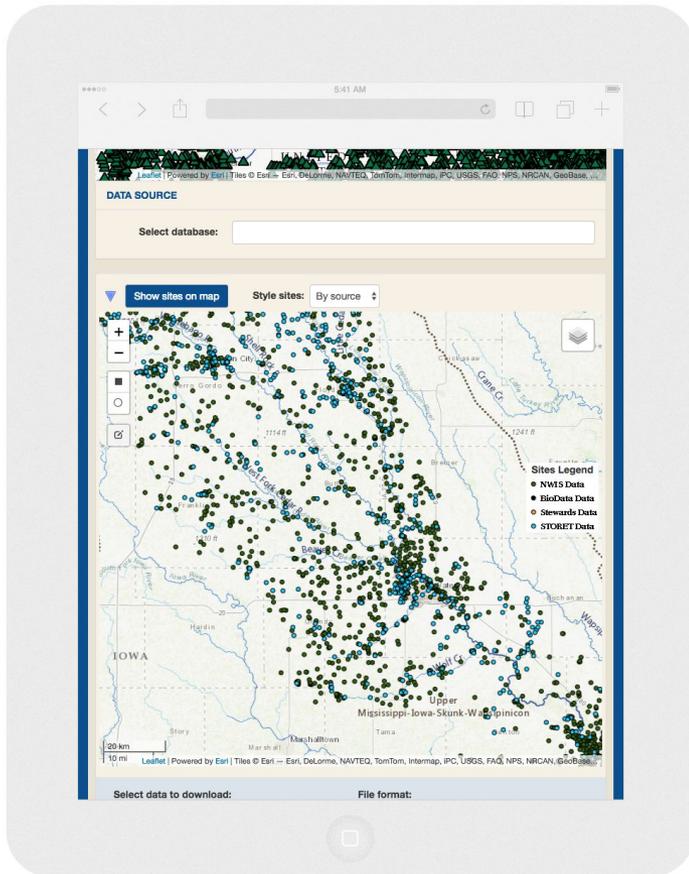
- USGS NWIS – 103m records
- USDA STEWARDS – 1m records
- USEPA STORET – 260m records

Portal Data Contributors

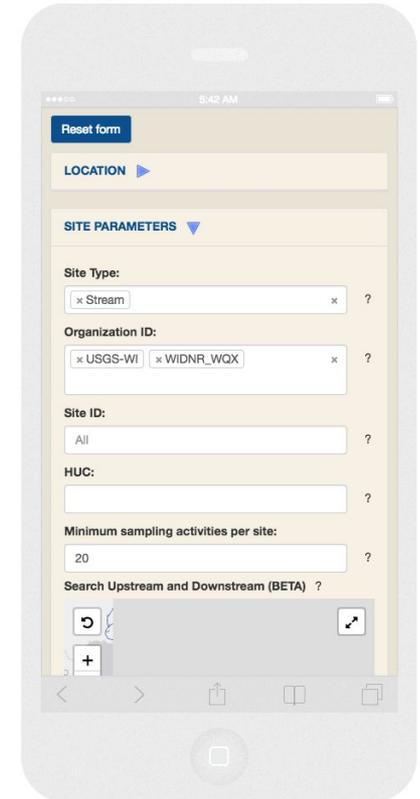
- Federal – EPA, USGS, USACOE, NPS, USBR
- All 50 states
- Tribes – 130+ agencies
- Other organizations – county, watershed groups, academic

Almost entire WQX Data model is being served

Built using Responsive Design



Water Quality Portal works on any device with a modern web browser



Portal Usage continues to rise

Visits per week, March 2016 - February 2019

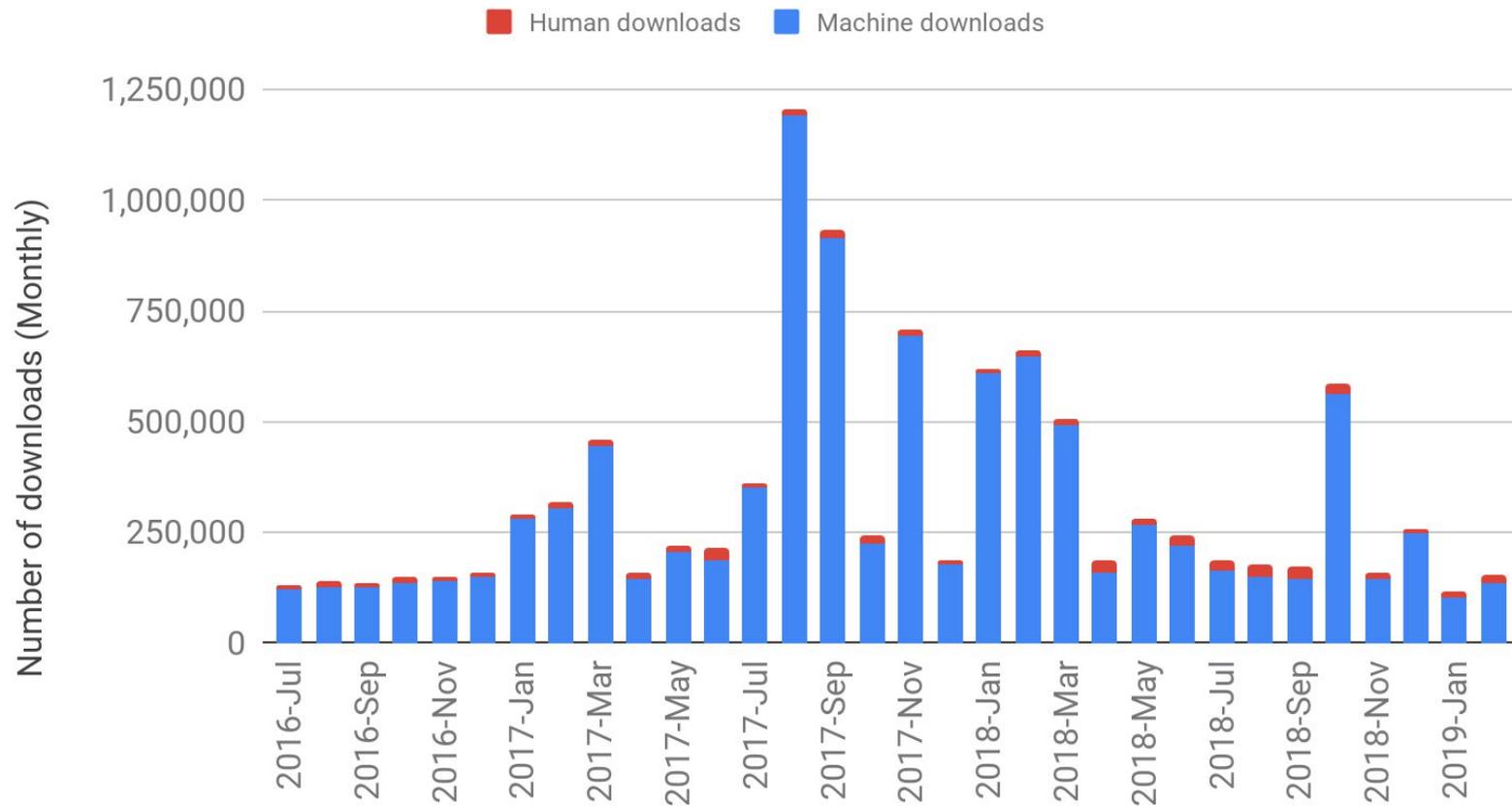


Google indexes site pages

STORET turned off

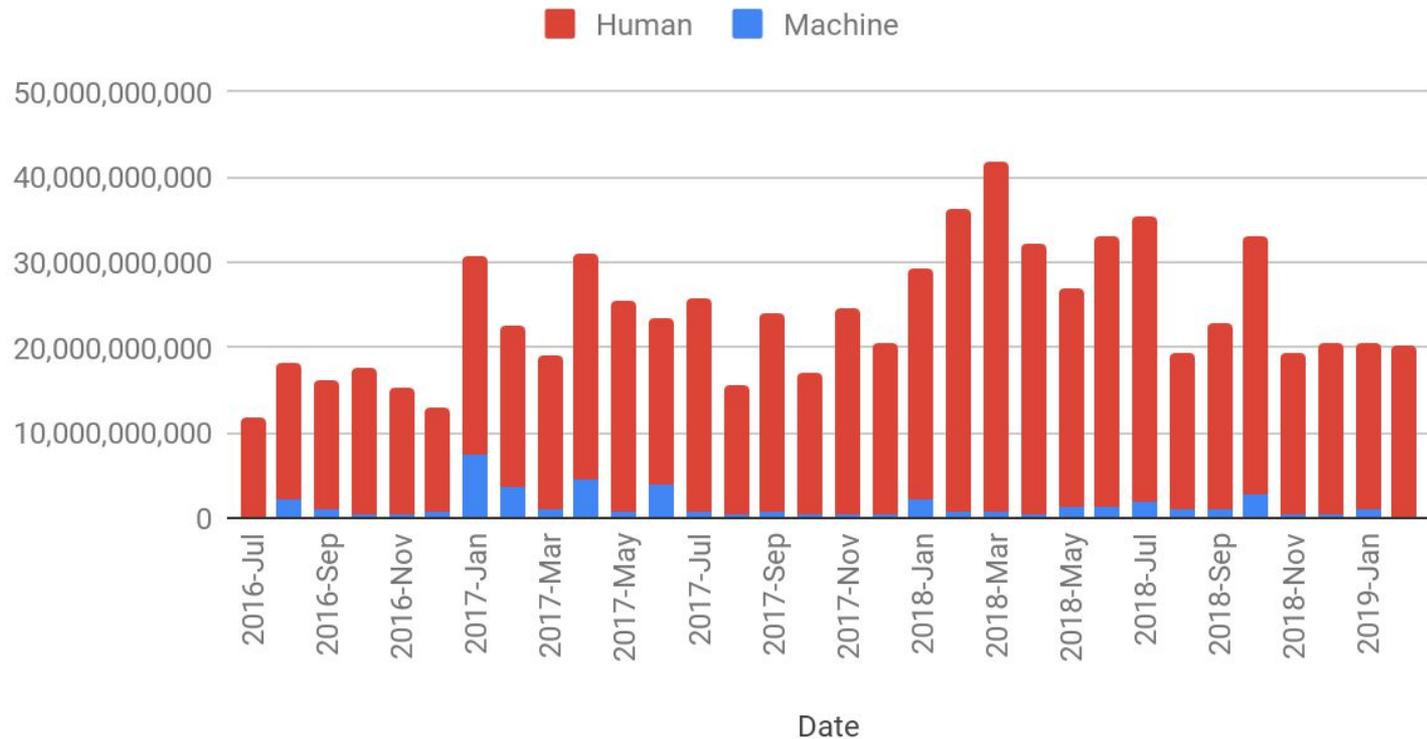
Hundreds of thousands of downloads monthly

Number of Machine downloads vs. Human downloads



Tens of billions of rows served monthly

Machine and Human



What have we done recently?

- Variety of new endpoints
 - Activity
 - Biological Habitats and indices
- New query parameters
- Upstream-downstream queries
- Coming soon
 - Summary Services
 - Cloud Migration

More types of data and query tools

The screenshot shows a web-based query tool interface with several sections:

- LOCATION**: Includes fields for Country, State, and County, and a map of the United States. There are also fields for Point Location, Bounding Box, Within, North, South, East, West, Lat, Long, and a 'Use my location' button.
- SITE PARAMETERS**: Includes fields for Site Type, Organization ID, and Site ID.
- SAMPLING PARAMETERS**: Includes fields for Sample Media, Characteristic Group, Characteristics, Project ID, Parameter Code (NWS ONLY), Minimum results per site, Date range (from and to), Biological sampling parameters, Assemblage, and Taxonomic Name.
- DATA SOURCE**: Includes a 'Select database' dropdown.
- Download Section**: Includes a 'Show sites on map' button, a 'Style sites' dropdown, and a 'Select data to download' section with radio buttons for:
 - Organization Data
 - Site data only
 - Project Monitoring Location Weighting data
 - Sample results (physical/chemical metadata)
 - Sample results (biological metadata)
 - Sample results (narrow)
 - Sampling Activity
 - Sampling Activity Metrics
 - Result Detection Quantitation Limit Data
 - Biological Habitat Metrics
- File format**: Includes radio buttons for Comma-separated, Tab-separated, MS Excel 2007+, and KML (Keyhole Markup Language - for Google Earth).
- DOWNLOAD**: A red button at the bottom.

Site ID autocompletes

Minimum number of Results

Minimum # of sampling activities at a site

Upstream/Downstream Queries

Project Data

Sampling Activity data

Result Detection Condition data

Project Monitoring Location Weighting data

Sampling Activity Metrics data

Biological Habitat Metrics data

Bookmarkable/shareable portal page

DOWNLOAD

Copy to clipboard

```
https://www.waterqualitydata.us/portal/#statecode=US%3A55&countycode=US%3A55%3A025&siteType=Stream&minactivities=5&sampleMedia=Water&characteristicType=Nutrient&mimeType=csv
```

Share this!

Web Service Calls

GET

Station

```
https://www.waterqualitydata.us/data/Station/search?
statecode=US%3A55&countycode=US%3A55%3A025&siteType=Stream&minactivities=5&sample
Media=Water&characteristicType=Nutrient&mimeType=csv&zip=yes
```

POST

cURL

```
curl -X POST --header 'Content-Type: application/json' --header 'Accept: application/zip' -d
 '{"statecode":["US:55"],"countycode":["US:55:025"],"siteType":
 ["Stream"],"minactivities":"5","sampleMedia":["Water"],"characteristicType":["Nutrient"]}'
 'https://www.waterqualitydata.us/data/Station/search?mimeType=csv&zip=yes'
```

WFS

WFS GetFeature

```
https://www.waterqualitydata.us/ogcservices/wfs/?
request=GetFeature&service=wfs&version=2.0.0&typeName=wqp_sites&SEARCHPARAMS=statec
ode%3AUS%3A55%3Bcountycode%3AUS%3A55%3A025%3BsiteType%3AStream%3Bminactivit
ies%3A5%3BsampleMedia%3AWater%3BcharacteristicType%3ANutrient&outputFormat=applicati
on%2Fjson
```

Web services drive everything

- Focus on high performance
- Do not limit query size or complexity
- Build clients to support core use cases

Future Work

Focus on discoverability and linkages

- The majority of WQP traffic comes from search engines
 - Build summary pages and services
 - Watersheds
 - Organizations
 - States
 - Networks
 - Build out linkages with the broader Internet of Water
 - Additional data quality work
 - Data sets and data citation

Questions?

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