SHARING AND DISCOVERING WATER QUALITY MONITORING DATA

Dwane Young, U.S. EPA Office of Water

OUTLINE

- The Importance of Sharing Data
- Role of the Water Quality Exchange
- Data sharing through the Water Quality Portal
- Future data sharing opportunities through the use of sensors

THINKING ABOUT DATA AND INFORMATION

- Electronic data are more valuable than data in file cabinets
- The more data are re-used, the more valuable they become
  - Collect once – use multiple times
- Shared data are of even higher value
  - Provide for better planning decisions
  - Incentivize collaborative efforts
  - Make the most use of the data collection resources being invested

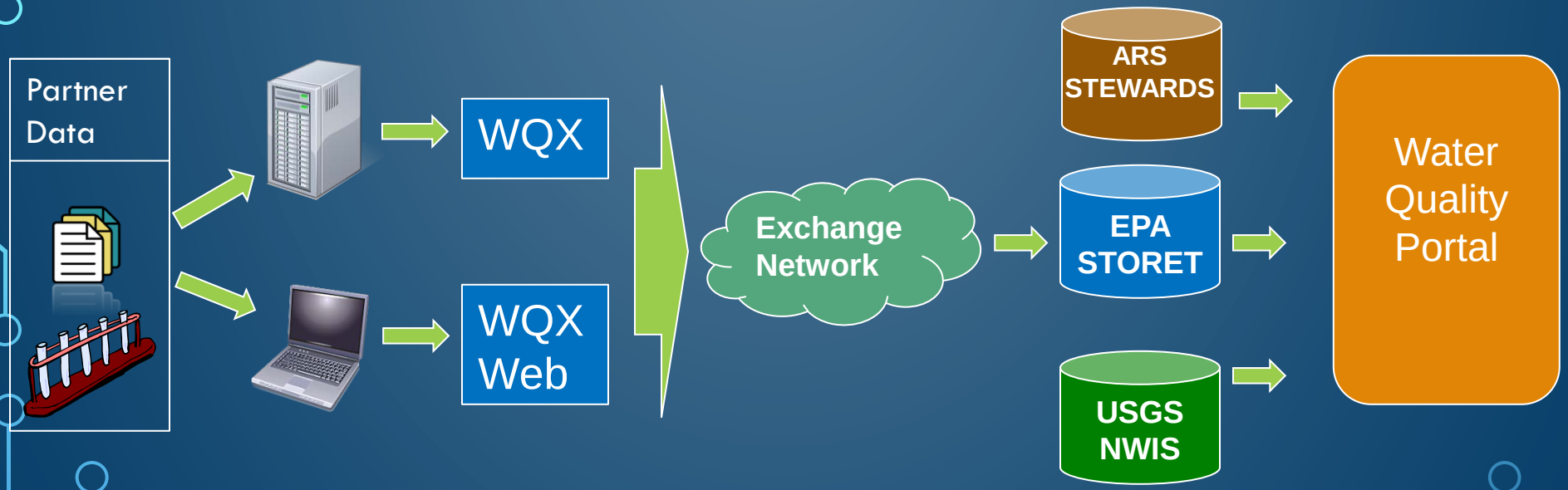
WHAT IS WQX?

- WQX is a 'standards' based approach for sharing water quality monitoring data
- WQX defines a common data model for communicating water quality data (sample data)
- Designed to be automated
- The structure of partner data systems don't matter, so long as they can map to WQX
- WQX also provides a standard format for publishing data

WHY USE A STANDARDS-BASED APPROACH?

- WQX is not dependent on a particular technology
  - The data sharing model is based on the science of water quality monitoring, which doesn't change that much
- Partners don't need to run EPA's software, but rather just need to map their data systems to WQX
- EPA could focus on the 'core' data elements that were needed for someone to communicate water quality monitoring data

THE ROLE OF WQX IN DATA SHARING



For more information on the portal see: www.waterqualitydata.us

WHAT IS THE WATER QUALITY PORTAL?

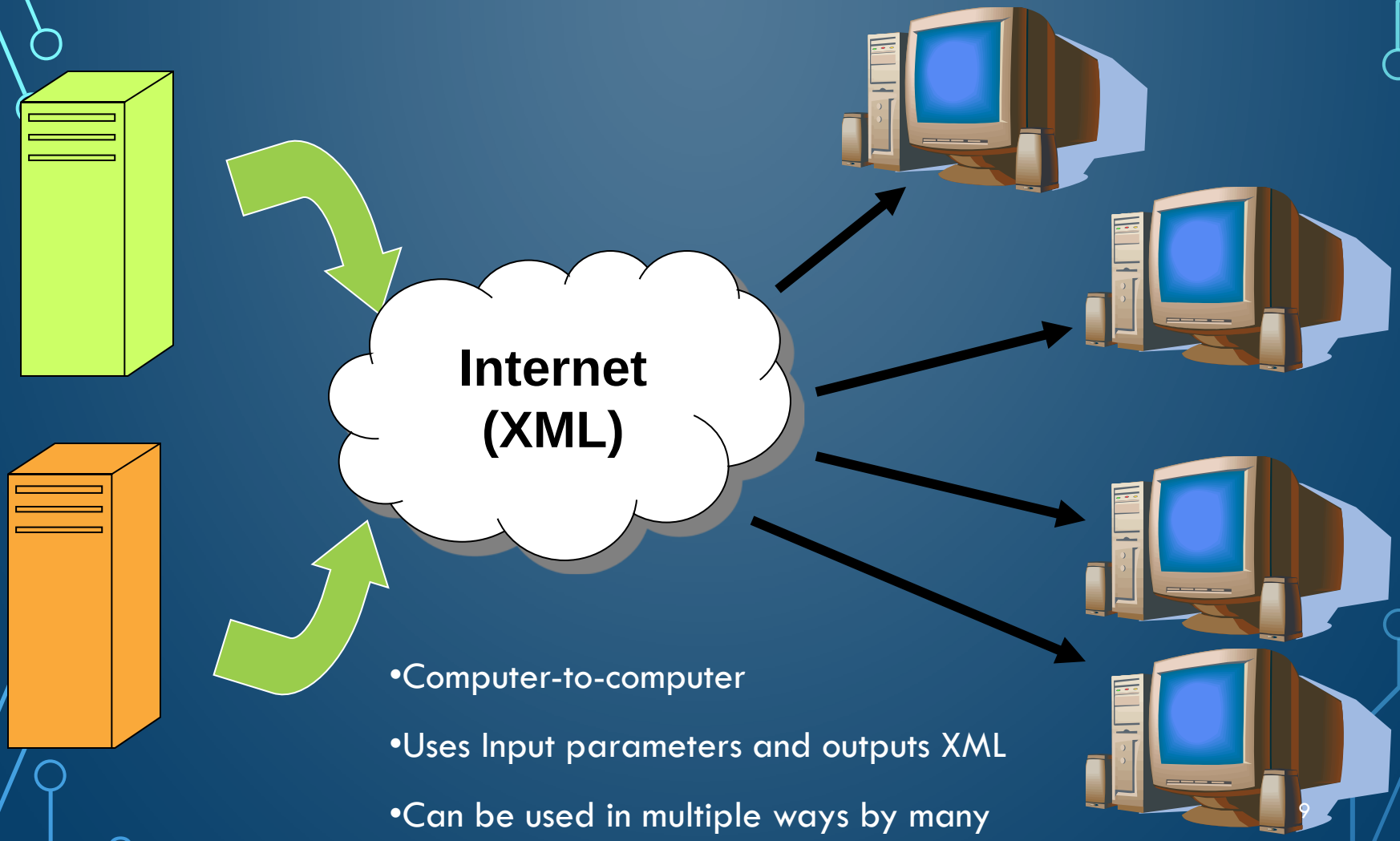
- One-stop shop for water quality monitoring data (both data shared with EPA through WQX (over 400 partners) and USGS data)
- Contains over 298 million water quality results collected at over 2.3 million monitoring locations
- Data use common terminology across USGS and EPA data
- Partnership led by the National Water Quality Monitoring Council

HOW DO YOU GET DATA FROM THE PORTAL

- Simple user interface available at http://waterqualitydata.us
- Provides data back in multiple formats (Excel, tab separated, comma separated, KML, and WQX format)

Water Quality
Portal Demo

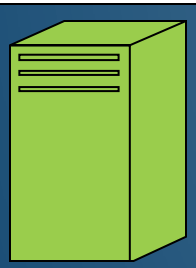
WHAT IS A WEB SERVICE



- Computer-to-computer
- Uses Input parameters and outputs XML
- Can be used in multiple ways by many applications

WEB SERVICE EXAMPLE

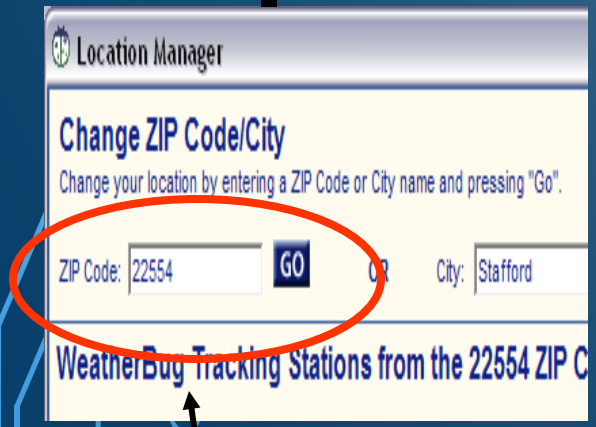
Weather Network

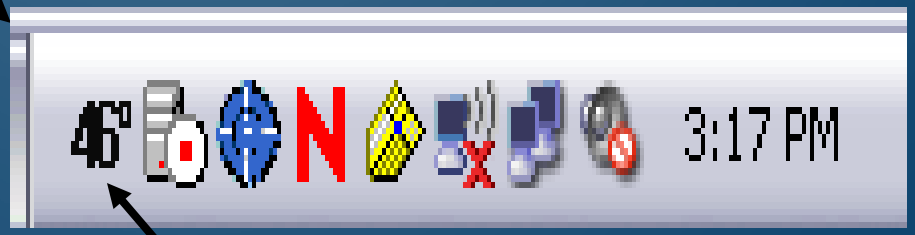


Weatherbug is an example that many are familiar with

This is all done via a Web Service

Returns XML

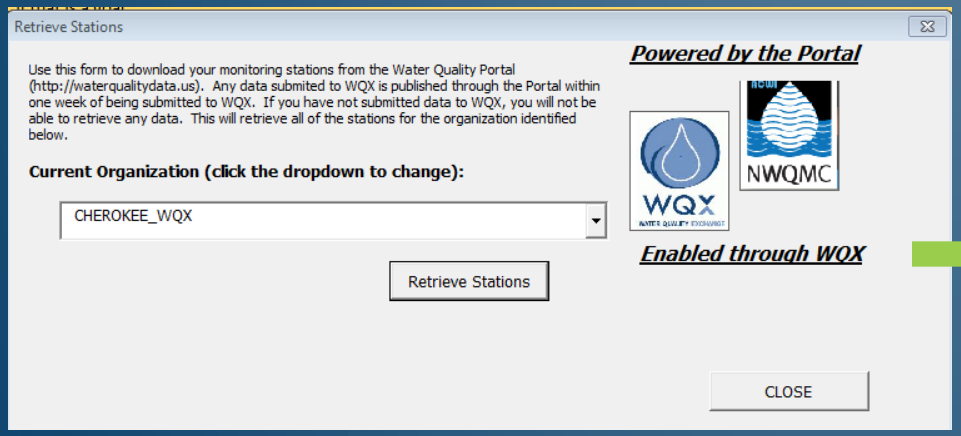


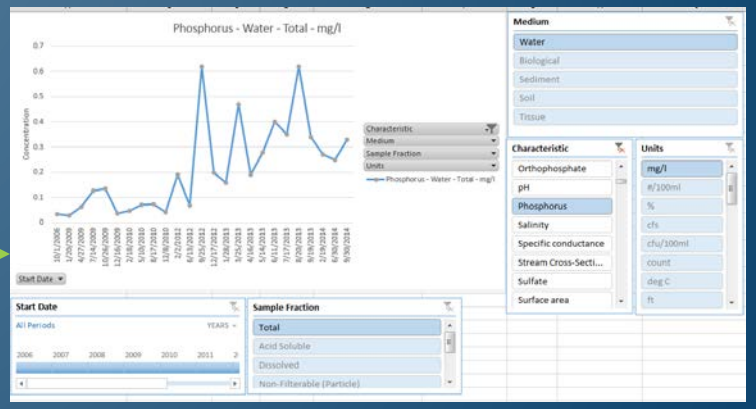


Weatherbug translates XML into information for the task bar

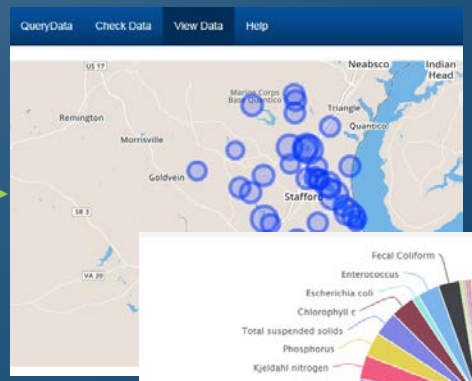
Input Parameter: Zip Code

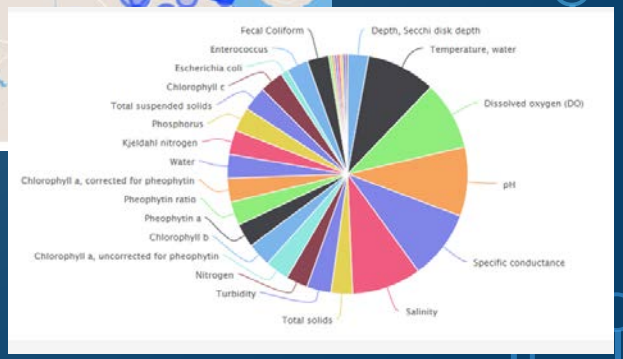
WEB SERVICES ALLOW FOR OTHER APPLICATIONS TO ACCESS THE DATA





Excel, R, other Web applications, etc.

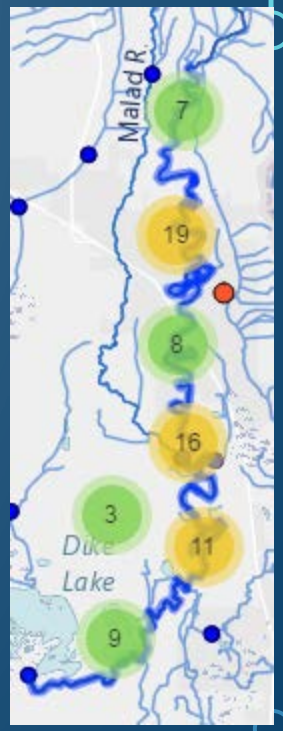




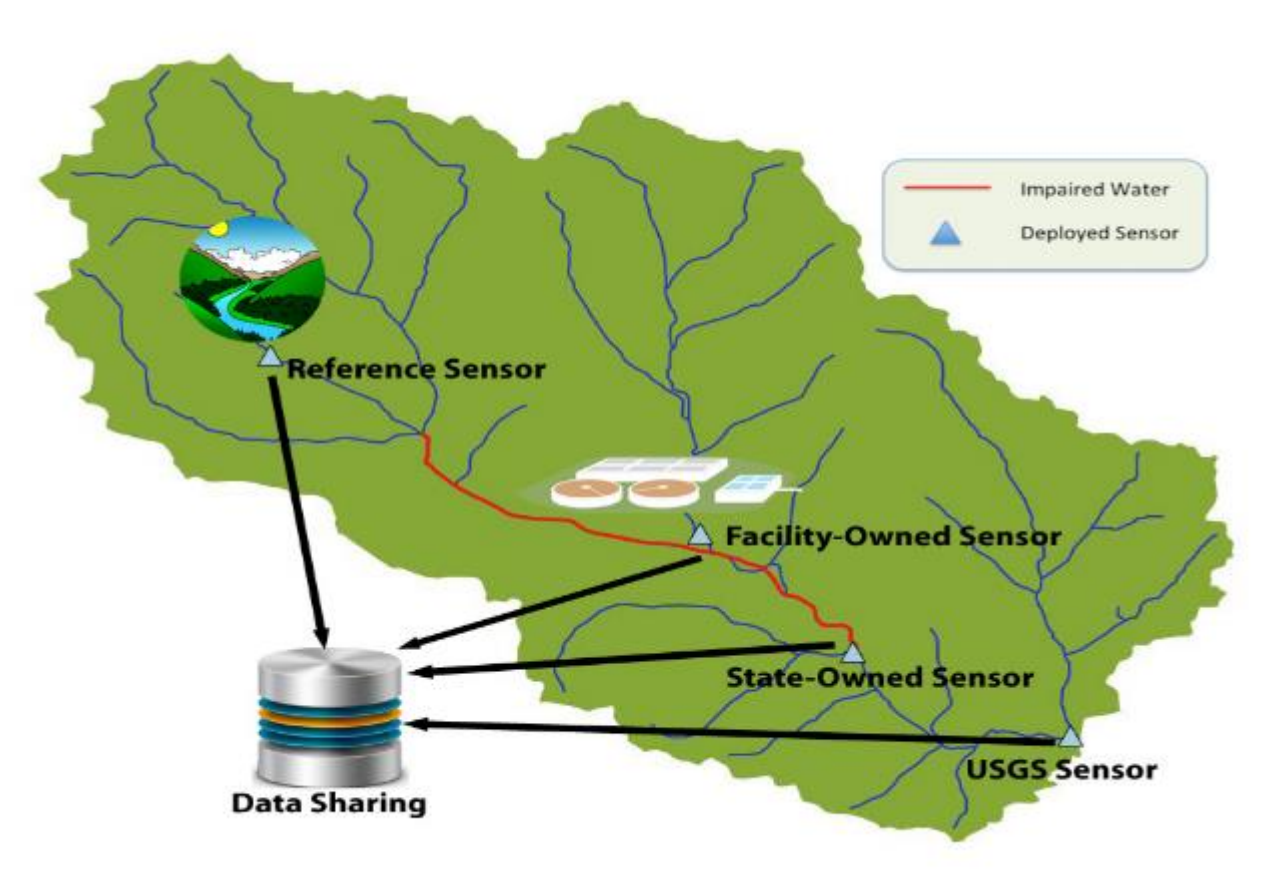
Come by the poster session to see demos of these types of tools

NEW AND COMING SOON TO THE PORTAL

- Upstream/downstream tracing
- Integration across multiple water programs
- Additional open source tools (Data Analysis Tool)
- Integration with sensor data

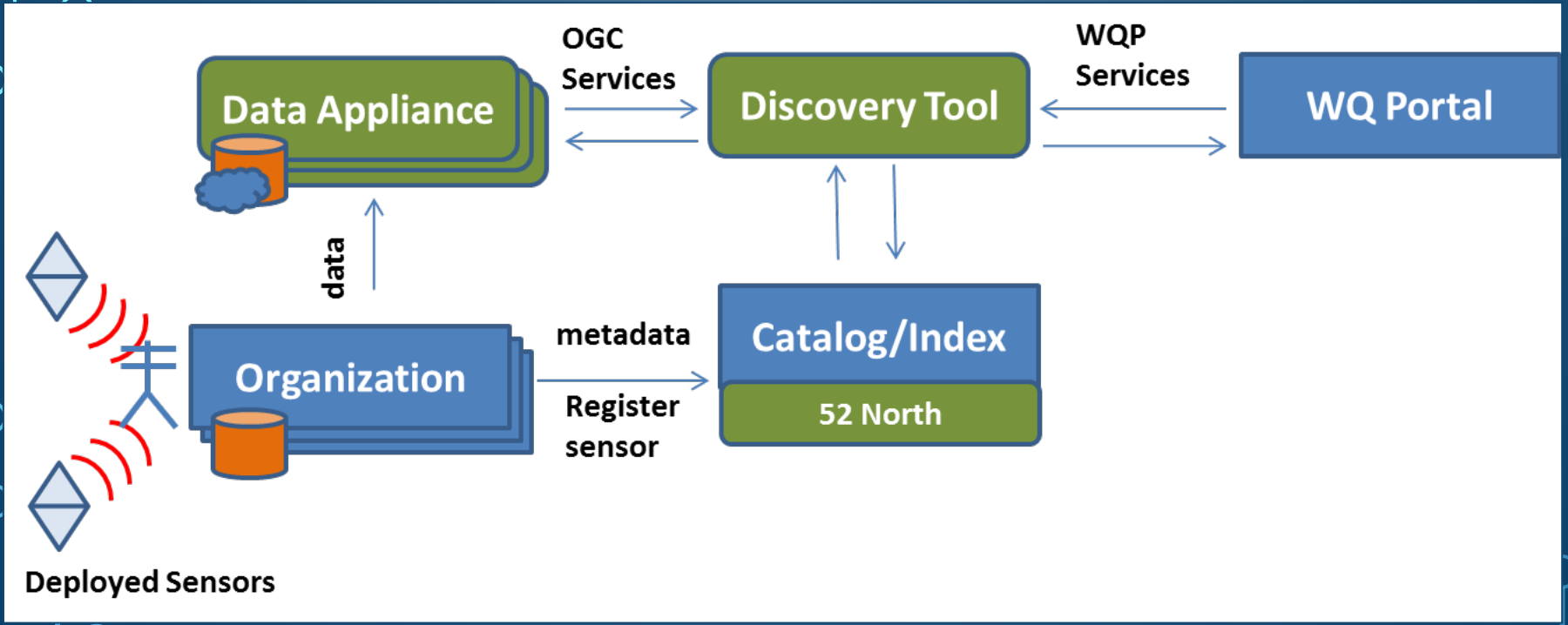


AN INTEROPERABLE SENSOR NETWORK

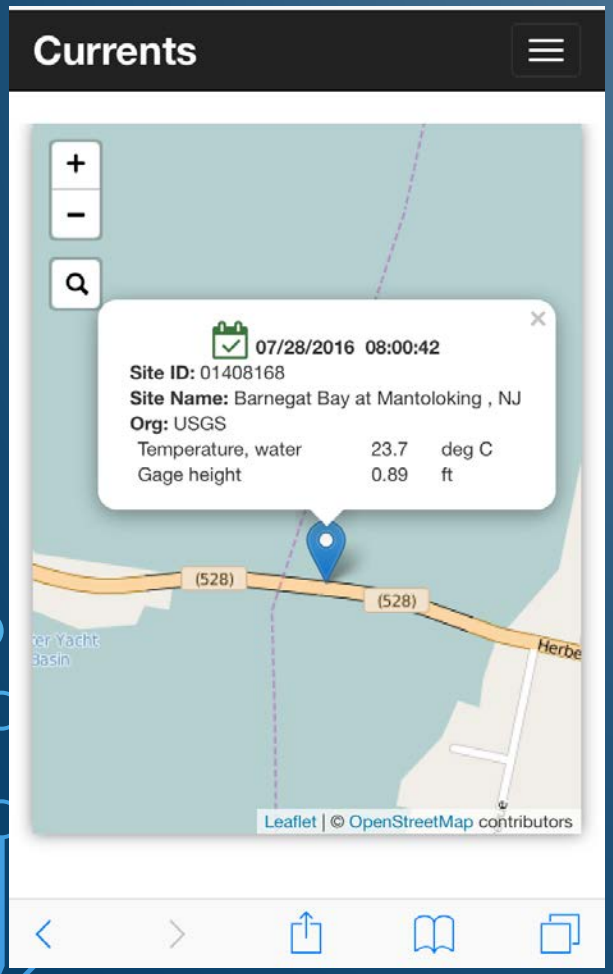


- Sensors are owned/operated by diverse organizations
- Uses data standards to promote data interoperability
- Data can be available real-time, and also archived for future reference

HOW WOULD IT WORK?



DEMONSTRATION



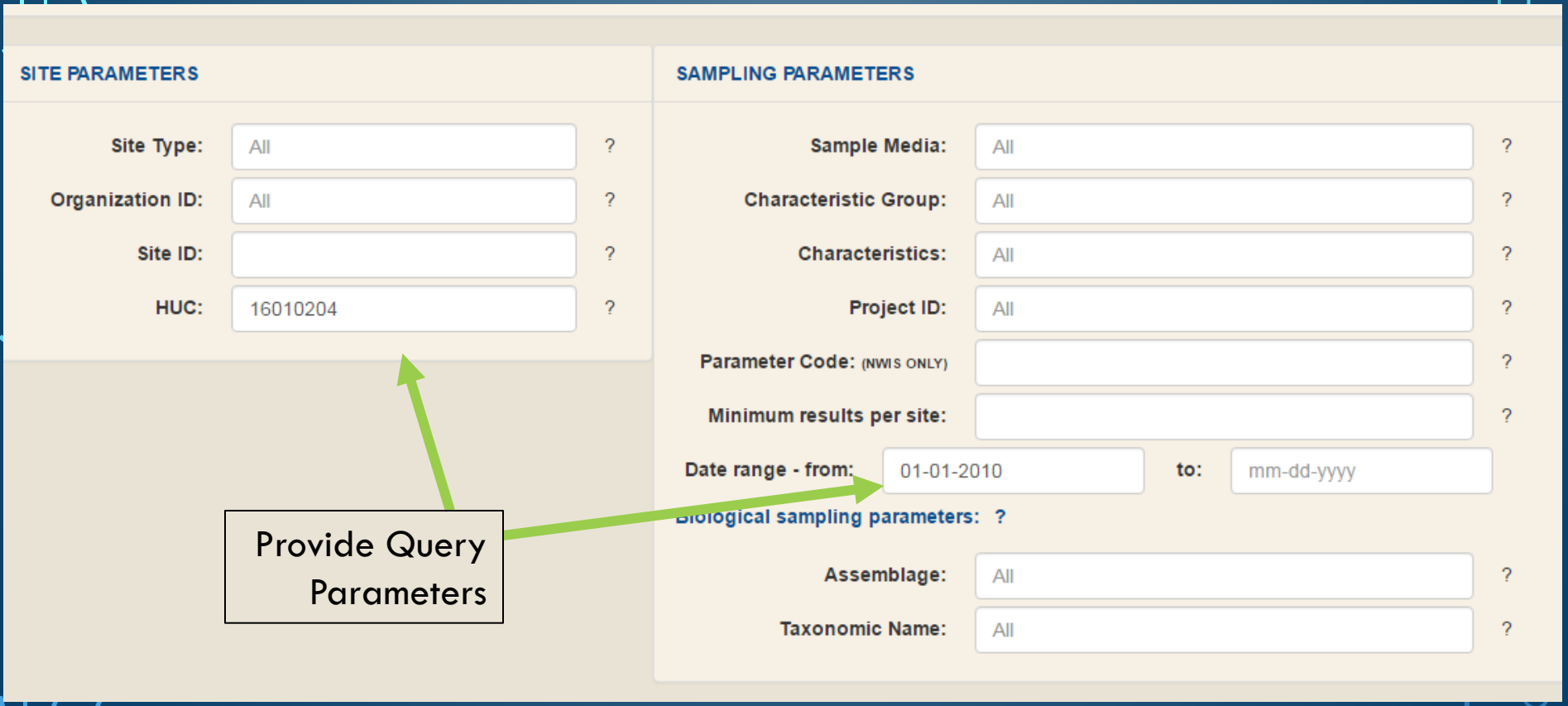
QUESTIONS?

Dwane Young
U.S. EPA Office of Water
202-566-1214
Young.dwane@epa.gov

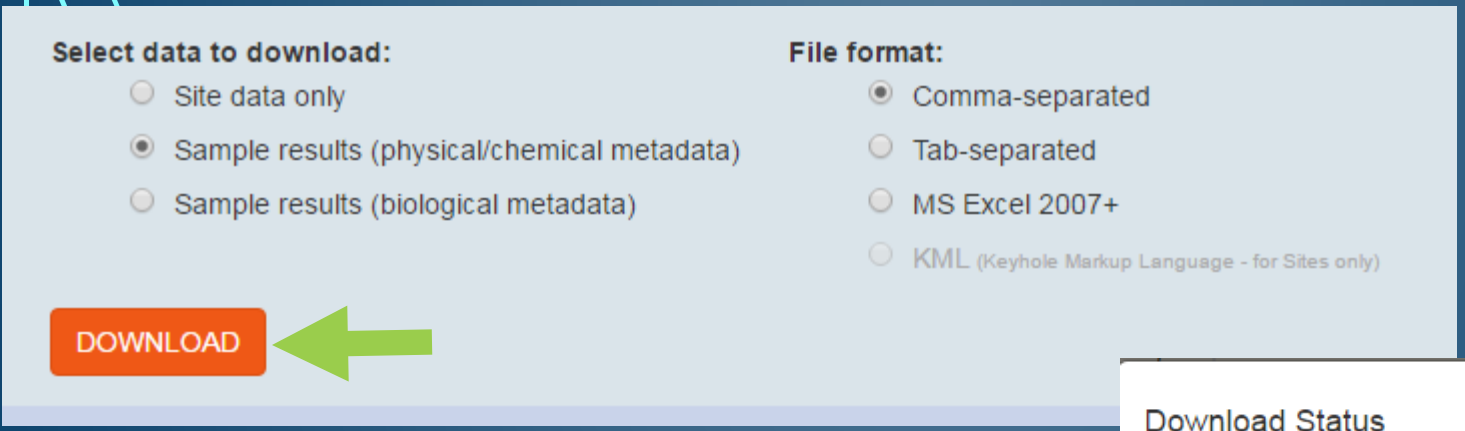
Links of import:

Water Quality Portal: http://waterqualitydata.us
Publishing through WQX: https://www.epa.gov/waterdata/storage-and-retrieval-and-water-quality-exchange
Example Excel Tool (Tribal Roadmap Tool): https://www.epa.gov/sites/production/files/2016-08/road_map_creator_v1.0.xlsm
Data Discovery Tool written in 'R': https://www.epa.gov/waterdata/water-quality-portal-data-discovery-tool

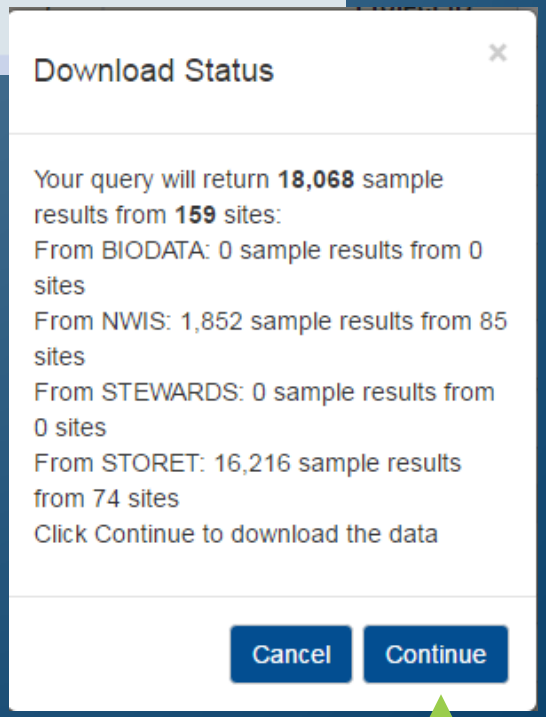
APPENDIX: BACK-UP DEMO SLIDES



Provide Query Parameters



- Choose the type of data to download
- Choose the format for the download
- Hit 'Download'



- Get back a summary of what data will be retrieved
- Hit 'Continue' to download the data

The downloaded data are now ready to be used!

SampleCollectionEquipmentName	ResultDetectionConditionText	CharacteristicName	ResultSampleFractic	ResultMeasureValue	ResultMe
Miscellaneous (Other)	Not Detected	Nickel	Dissolved		ug/l
Miscellaneous (Other)	Not Detected	Selenium	Dissolved		ug/l
Miscellaneous (Other)	Not Detected	Silver	Dissolved		ug/l
Miscellaneous (Other)		Carbon dioxide	Total	3	mg/l
Miscellaneous (Other)		Chloride	Total	309	mg/l
Miscellaneous (Other)		Lead	Dissolved	0.227	ug/l
Miscellaneous (Other)		Phosphate-phosphorus	Dissolved	0.052	mg/l
Miscellaneous (Other)		Phosphate-phosphorus	Total	0.0756	mg/l
Miscellaneous (Other)		Dissolved oxygen (DO)		15.96	mg/l
Miscellaneous (Other)		pH		8.26	None
Miscellaneous (Other)		Specific conductance		4118	umho/cm
Miscellaneous (Other)		Dissolved oxygen saturation		99.6	%
Miscellaneous (Other)		Inorganic nitrogen (nitrate and nitrite)	Dissolved	12.2	mg/l
Miscellaneous (Other)	Not Detected	Ammonia-nitrogen	Total		mg/l
Miscellaneous (Other)	Not Detected	Iron	Dissolved		ug/l
Miscellaneous (Other)	Not Detected	Cadmium	Dissolved		ug/l
Miscellaneous (Other)	Not Detected	Chromium	Dissolved		ug/l
Miscellaneous (Other)	Not Detected	Lead	Dissolved		ug/l
Miscellaneous (Other)	Not Detected	Lead	Dissolved		ug/l
Miscellaneous (Other)	Not Detected	Nickel	Dissolved		ug/l
Miscellaneous (Other)	Not Detected	Nickel	Dissolved		ug/l
Miscellaneous (Other)		Total suspended solids	Total	92.4	mg/l
Miscellaneous (Other)	Not Detected	Boron	Dissolved		ug/l

DATA ARE ALSO AVAILABLE VIA WEB SERVICES

Show Web Service Calls ?

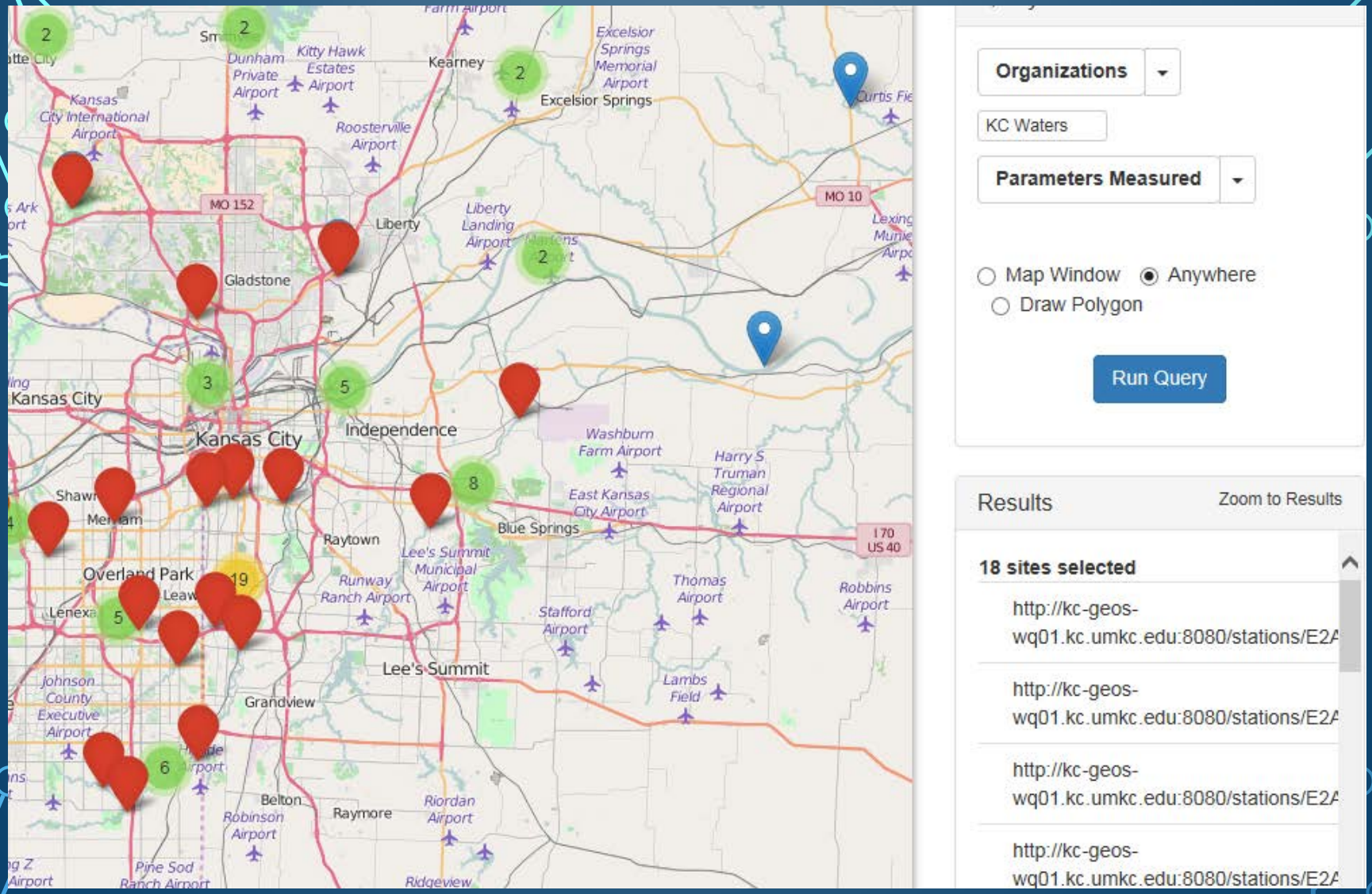
Sites

http://www.waterqualitydata.us/Station/search?huc=16010204&startDateLo=01-01-2010&mimeType=csv&zip=yes&sorted=no

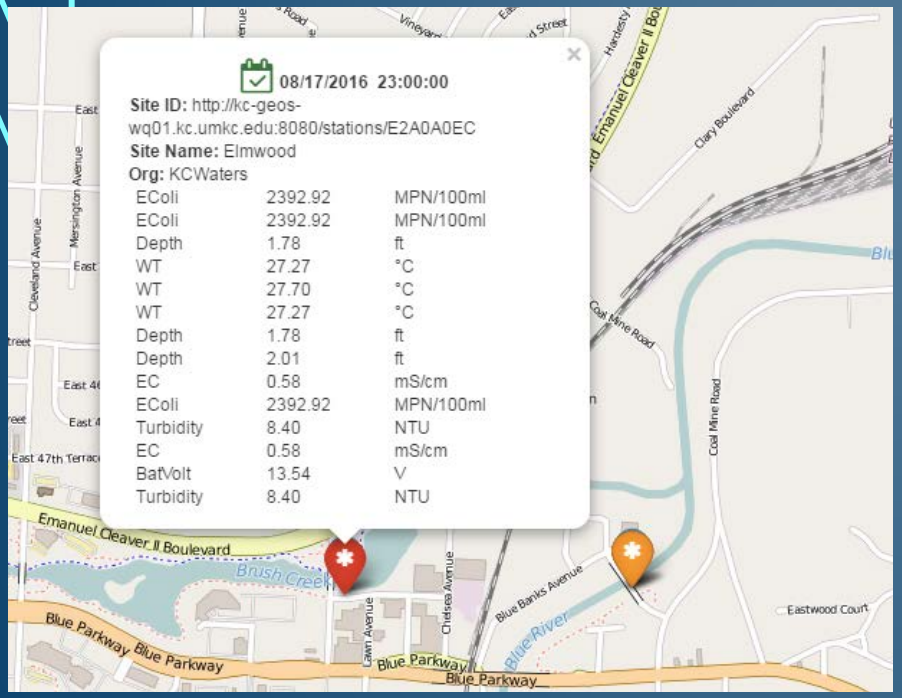
Results

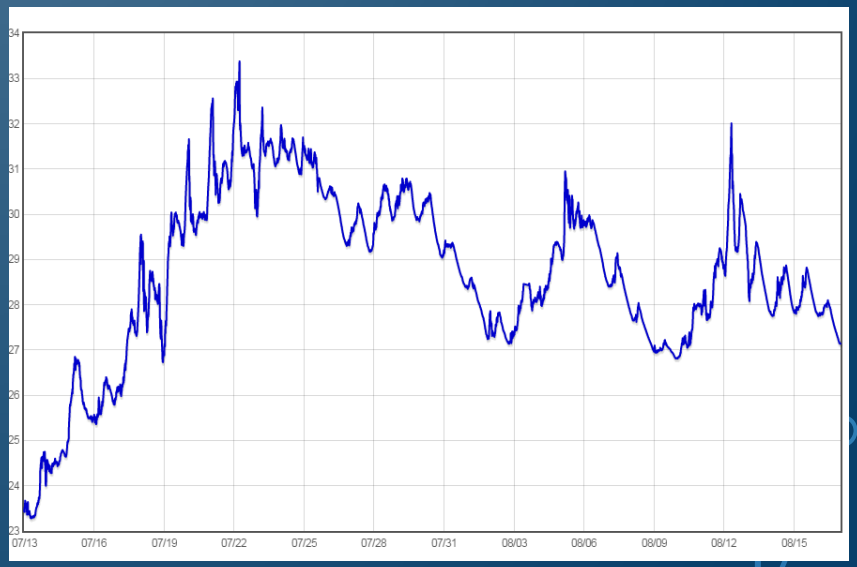
http://www.waterqualitydata.us/Result/search?huc=16010204&startDateLo=01-01-2010&mimeType=csv&zip=yes&sorted=no

Allows for direct access to the data from the Portal



Query the sensor catalog for sensors that meet your criteria



Retrieve current values

Retrieve data for a graph