WQX and Sharing Water Quality Monitoring Data

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Exchange Network National Meeting

Denver, April 2011

National Monitoring Priorities

- Reporting on water quality conditions at national, state, and watershed levels…
  - …through partnering with states, tribes, and other federal agencies
    - WQX and the STORET Data Warehouse
    - National Aquatic Resources Surveys
    - National Water Quality Monitoring Council
- Implementation of the state and tribal monitoring strategies
- Tracking program performance over time

Monitoring & Assessment

- Drinking Water
- Education & Training
- Grants & Funding
- Laws & Regulations
- Our Waters
  - Drinking Water
  - Ground Water
  - Lakes
  - Oceans, Coasts, Estuaries & Beaches
  - Rivers & Streams
  - Stormwater
  - Wastewater
  - Watersheds
  - Wetlands
  - Where You Live
- Pollution Prevention and Control
- Science & Technology
- Water Infrastructure
- What You Can Do

Monitoring and Assessing Water Quality

Our nation's waters are monitored by state, federal, and local agencies, universities, dischargers, and volunteers. Water quality data are used to characterize waters, identify trends over time, identify emerging problems, determine whether pollution control programs are working, help direct pollution control efforts to where they are most needed, and respond to emergencies such as floods and spills.

- National Aquatic Resource Surveys (Statistical Surveys of the Quality of U.S. Waters)
- Water Quality Conditions Report by the States (ATTAINS database)
- National Water Quality Inventory Reports (Section 305(b) reports)
- Storing and Managing Water Quality Data (EPA's STORET/WQX System)
- Mapping and Displaying Water Quality Information (EPA's WATERS Website)
- Monitoring, Assessment and Reporting Guidelines (for States)
- Assessing the Biological Condition of Waters
- Volunteer Water Monitoring (Resources for Citizen Volunteer Monitoring Programs)
- Outreach and Educational Materials/World Water Monitoring Day

Find Your Watershed

Enter your 5-digit ZIP code:

GO

Features

- National Lakes Assessment Report
- Seventh National Monitoring Conference, April 25–29, 2010
- Proceedings of the Sixth National Monitoring Conference, 2008
- National Aquatic Resource Surveys
- Submitting and Sharing Water Quality Data
- Electronic Integrated Reporting under Sections 305(b)/303(d) (ATTAINS)
- 2004 Water Quality Report to Congress
- Volunteer Monitor, Volume 21, Number 1, Spring 2010. (PDF) (20 pp, 1.8MB, About PDF)

What is WQX?

- WQX defines the framework by which EPA compiles water quality monitoring data in the STORET Data Warehouse
- WQX is governed by a standardized format, so all data must comply with this format
- The WQX format allows anybody to share data regardless of what the original source of the data was
- WQX provides a common suite of data elements that we can use to share data across sources – NWIS Water Quality and STORET Warehouse data

USGS science for a changing world

WQX WATER QUALITY EXCHANGE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Today's Status

- 37 State agencies have successfully flowed data via WQX or WQX Web since 2007
- Over 80 Tribal organizations have successfully flowed data via WQX or WQX Web since 2007
- Other states and tribes continue to come on-line, and/or have been funded through EPA Exchange Network grant dollars to transition to WQX
- STORET Helpdesk assistance, grant funding, as well as individual consultation and training facilitate the transition to WQX
- EPA Office of Water and Office of Environmental Information continue to partner to provide tools for all data providers

Stakeholders – Data Users

- State and Tribal CWA implementation agencies
  - e.g. water quality assessment reports, Integrated Reporting under CWA sections 305b/303d
- Other Federal Agencies
  - e.g. USGS, National Park Service
- EPA/State/Tribal partnership projects and groups
  - e.g. National Aquatic Resource Surveys
- EPA specific projects
  - e.g. ocean/coastal monitoring, toxicity analysis
- Citizen monitoring groups
- General public
  - e.g. industry, academia

Stakeholders – Governance

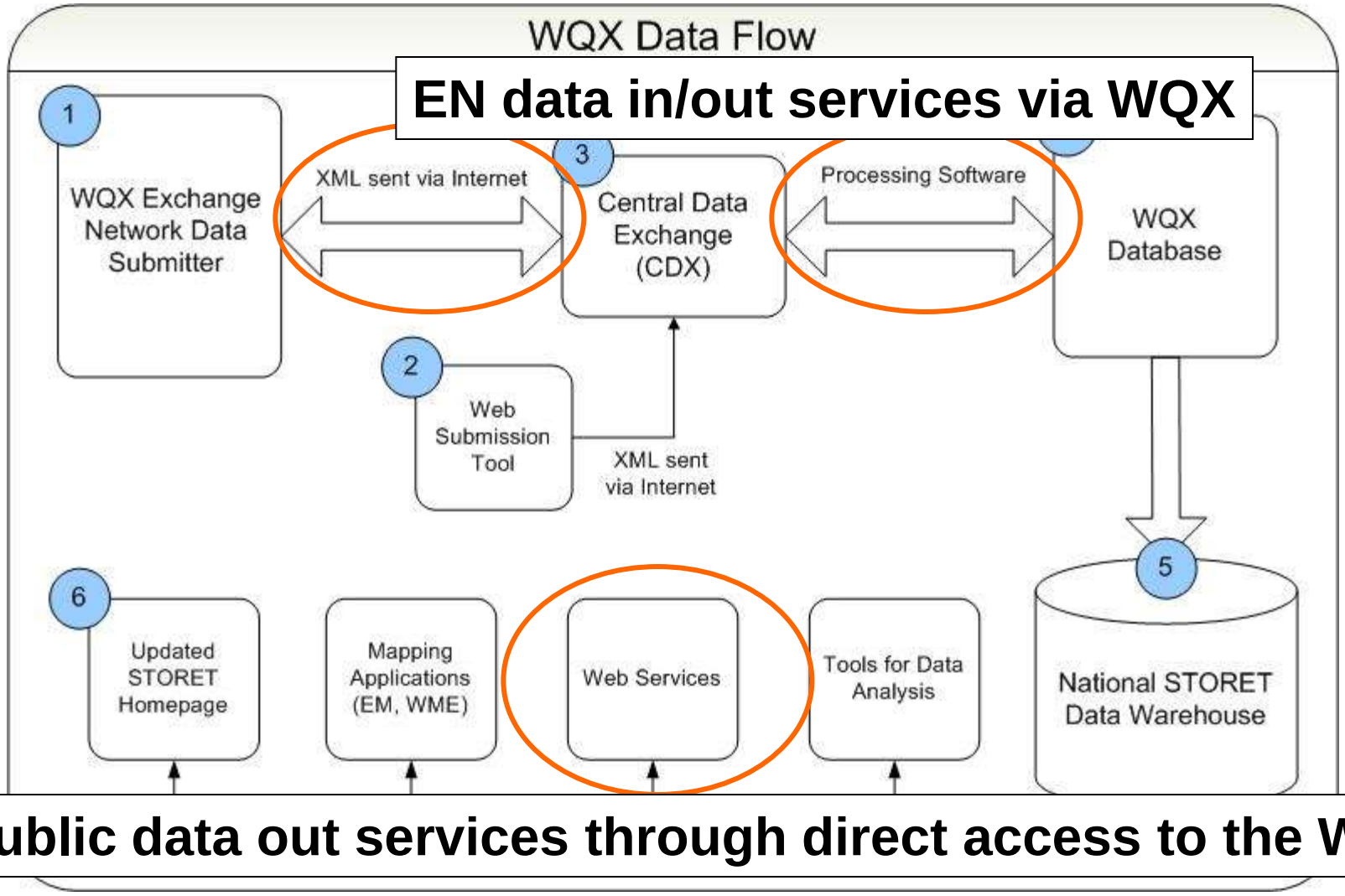
- National Water Quality Monitoring Council
- Exchange Network governance
- Federal frameworks for standards and data sharing

WQX inbound schema v1.0

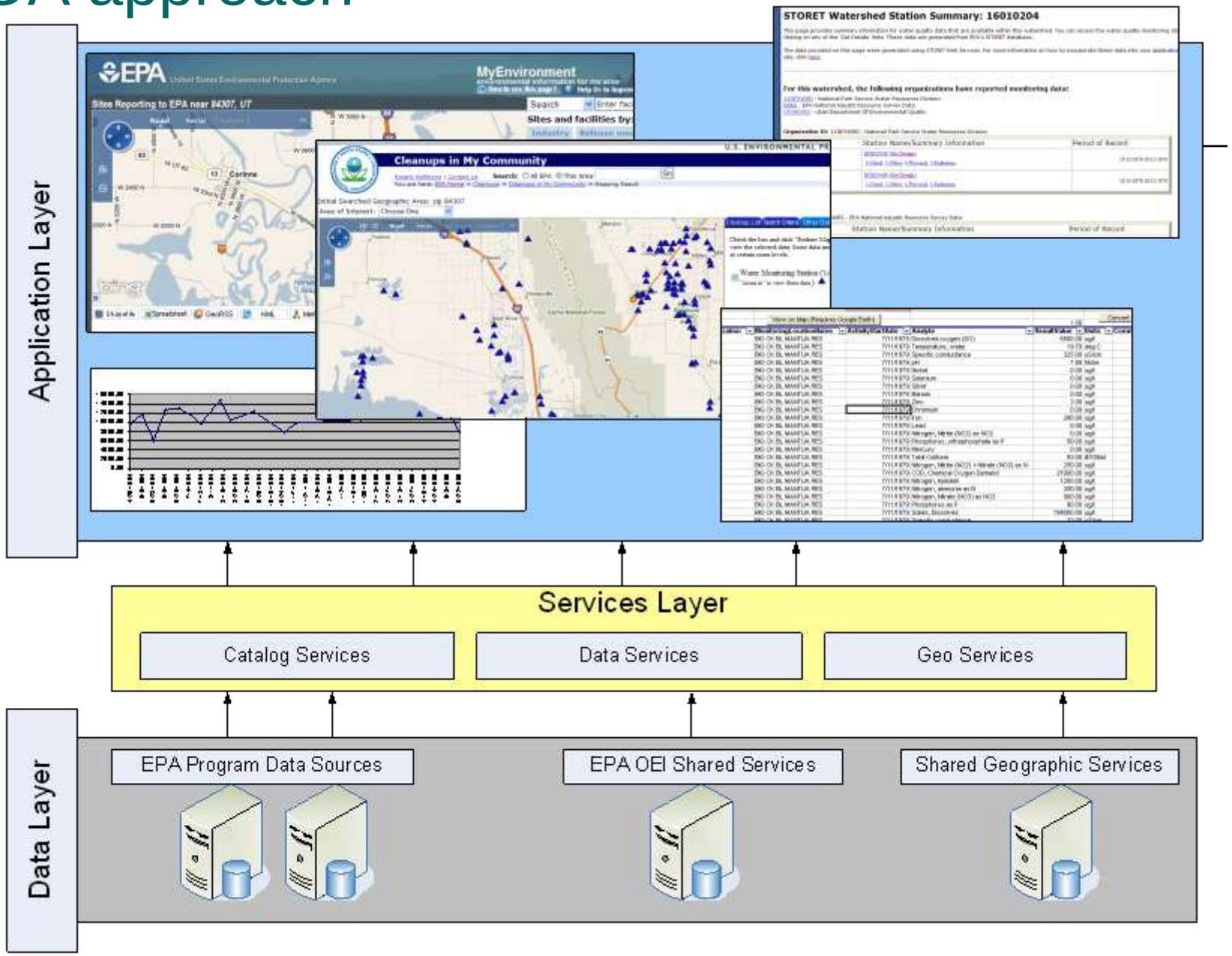
- The physical conditions in the environment at the time of a site visit
- The chemical and bacteriological make-up of the water sampled
- Chemical analyses of fish tissue collected

WQX inbound schema v2.1

- Biological Taxon Abundance data, including population census, frequency class, group summaries, and individual results
- Reference site information
- Toxicity data
- Habitat Assessment scores and their related metric scores
- Biological Index scores and their related metric scores


WQX Data Flow
EN data in/out services via WQX
1
WQX Exchange Network Data Submitter
XML sent via Internet
3
Central Data Exchange (CDX)
Processing Software
WQX Database
2
Web Submission Tool
XML sent via Internet
5
6
Updated STORET Homepage
Mapping Applications (EM, WME)
Web Services
Tools for Data Analysis
National STORET Data Warehouse
Public data out services through direct access to the WH

SOA approach



Water-Quality Data Exchange

- Data format based on USEPA Water Quality Exchange (WQX) (NWQMC WQ Data Elements)
- Common definitions and semantics
- Common web services for serving Monitoring Locations and Water-Quality Results
- A portal is under development for unified search across USGS and USEPA

"An investigator will be able to explore the entire USGS and USEPA water-quality data holdings without needing to know which agency manages the desired data."

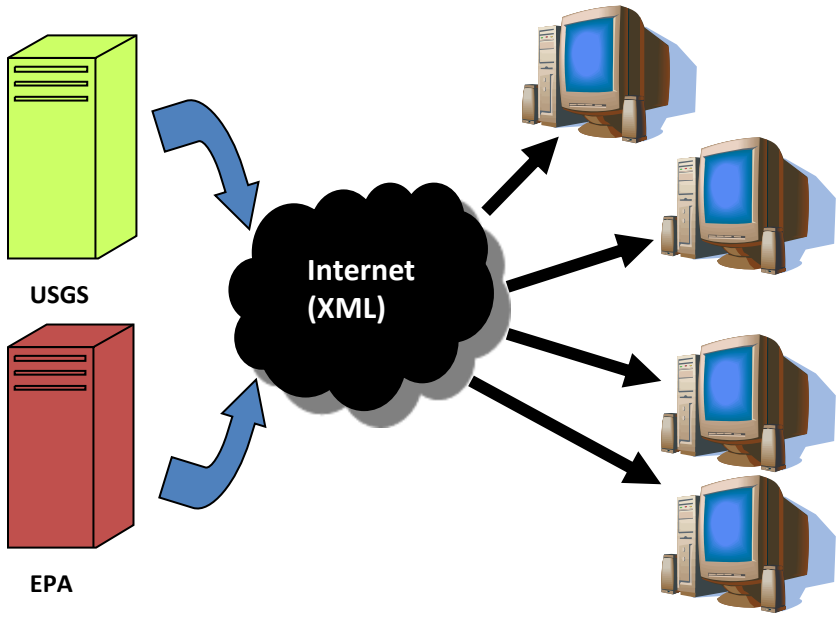
EOS: Scott et al, 2008

USGS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

U.S. Water Data Portal Project: Integrating Water Information

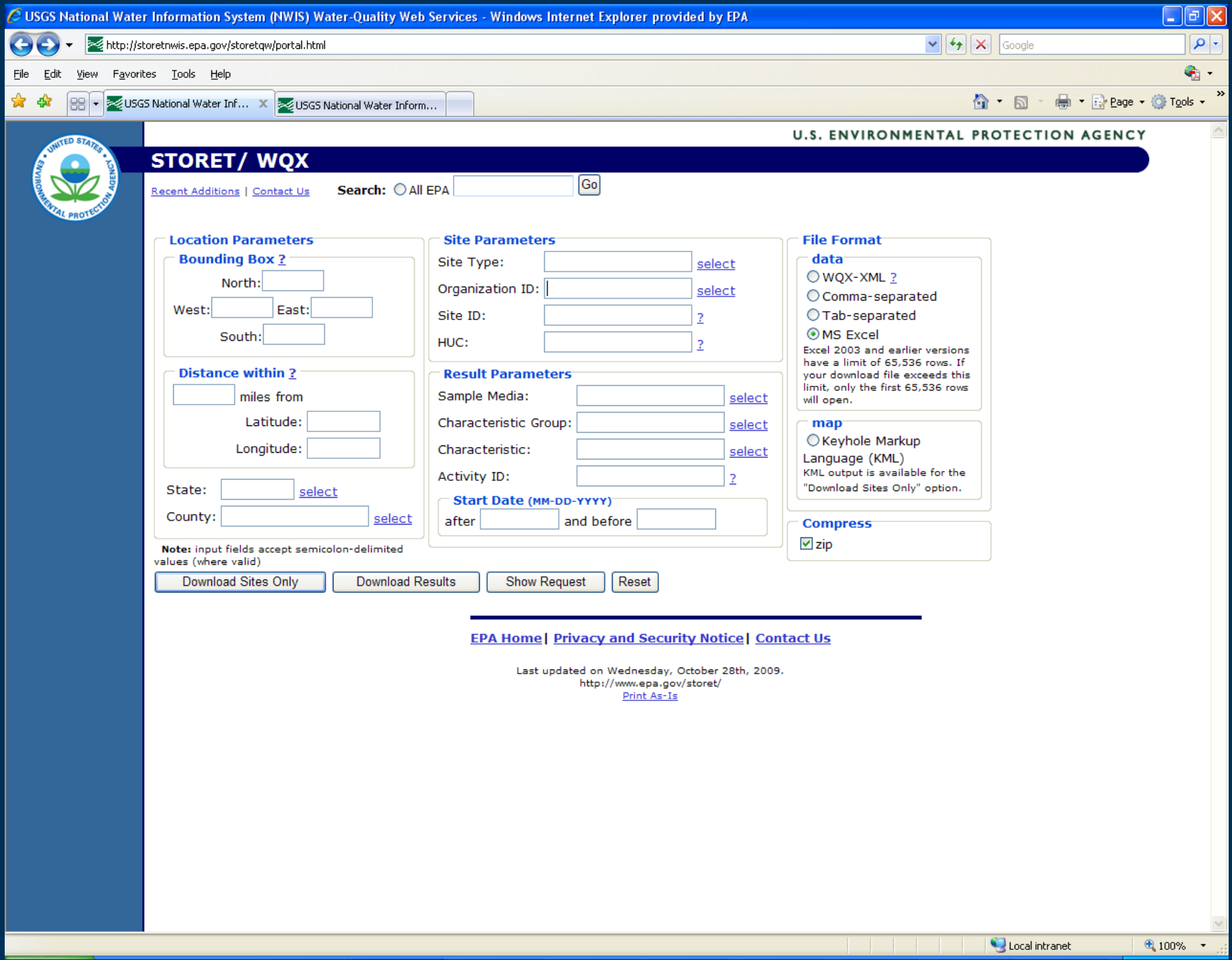
- The United States Geological Survey (USGS) and the United States Environmental Protection Agency (USEPA) have enhanced water quality monitoring data access
- Common data standards and web services improve on the historical approach
- Water managers and the public will access integrated water quality monitoring data from multiple agencies through a singular data portal



What is a web service?

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

- For more information, please visit: http://qwwebservices.usgs.gov/ and http://www.epa.gov/storet/web_services.html


USGS National Water Information System (NWIS) Water-Quality Web Services - Windows Internet Explorer provided by EPA
http://storetnwis.epa.gov/storetqw/portal.html
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Location Parameters
Bounding Box ?
North:
West: East:
South:
Distance within ?
miles from
Latitude:
Longitude:
State: select
County: select
Site Parameters
Site Type: select
Organization ID: select
Site ID: ?
HUC: ?
Result Parameters
Sample Media: select
Characteristic Group: select
Characteristic: select
Activity ID: ?
Start Date (MM-DD-YYYY)
after and before
File Format
data
WQX-XML ?
Comma-separated
Tab-separated
MS Excel
Excel 2003 and earlier versions have a limit of 65,536 rows. If your download file exceeds this limit, only the first 65,536 rows will open.
map
Keyhole Markup Language (KML)
KML output is available for the "Download Sites Only" option.
Compress
zip
Note: input fields accept semicolon-delimited values (where valid)
Download Sites Only
Download Results
Show Request
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EPA Home | Privacy and Security Notice | Contact Us
Last updated on Wednesday, October 28th, 2009.
http://www.epa.gov/storet/
Print As-Is
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USGS National Water Information System (NWIS) Water-Quality Web Services - Windows Internet Explorer provided by EPA

http://qwwebservices.usgs.gov/portal.html

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National Water Information System (NWIS) Water-Quality Web Services

Location Parameters

Bounding Box ?

North:

West: East:

South:

Distance within ?

miles from

Latitude:

Longitude:

State: select

County: select

Note: input fields accept semicolon-delimited values (where valid)

Site Parameters

Site Type: select

Organization ID: select

Site ID: ?

HUC: ?

Result Parameters

Sample Media: select

Characteristic Group: select

Characteristic: select

NWIS PCODE: 5-digit

Activity ID: ?

Start Date (MM-DD-YYYY)

after and before

File Format

data

- WQX-XML ?
- Comma-separated
- Tab-separated
- (•) MS Excel

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

map

- Keyhole Markup Language (KML)

KML output is available for the "Download Sites Only" option.

Compress

☑ zip

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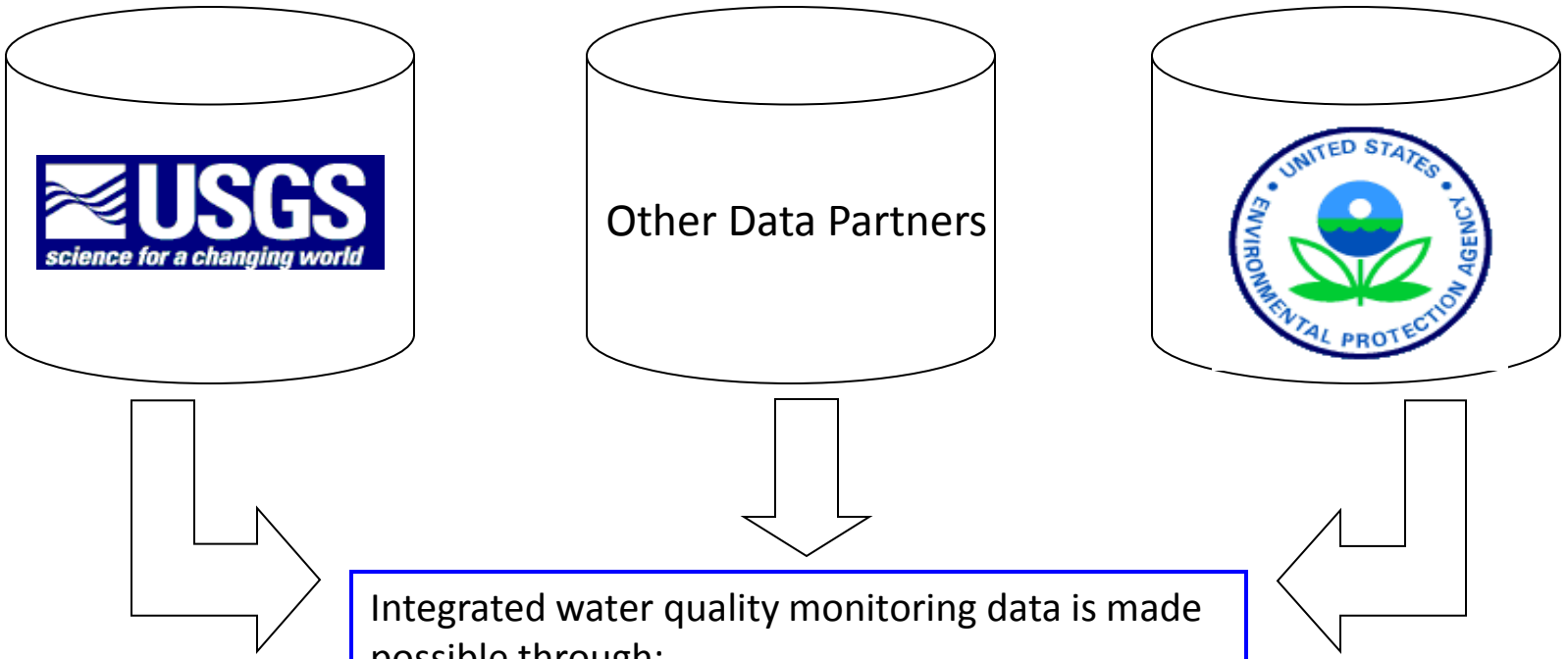
Components of Longer Term Data Integration



Integrated water quality monitoring data is made possible through:

- Web services technology
- Standardized metadata
- Compatible search parameters
- Common vocabularies