Region 10
Sharing Analytical Data

Office of Water - Water Quality Exchange (WQX Schemas)

WQX/STORET Outbound Web Service (Schemas)

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Topics

- Region 10 - data management
- Analytical data - what do analysts need
- Hidden Gem for Superfund Data:
  - WQX Schema - possible solution for data sharing
  - WQX / STORET System - R10 uses
- Examples - potential of WQX
  - WQX/STORET System as a data repository
    - Superfund and Scribe data
  - WQX outbound XML web services / schema
    - Means for sharing data between systems
Region 10 Data Management

- Resources are limited compared to other EPA regions: no EQUIS, no Response Manager.
- Tend to leverage HQ expertise and products

Region 10 - Data Sharing is Essential

- Large Superfund Sites - CDA Basin
- Regional Initiatives - Puget Sound Partnership
- Emergency Response
- Daily Work – regularly incorporate analytical data into tools (GIS, spreadsheets…). This analytical data can originate from external systems
Analytical Data for Decision Making

- What basic information is necessary?
  - Project Information
  - Sample Locations
  - Sample Results - analytes, media ....
  - QA, QAPP information

- What would be nice – easy means of exchanging data between different data originators:
  - Data Schema (format) that is simple, versatile
  - Schema/tools that are adaptable to different data sources
If we can map data to a simple common schema - data from different sources can be combined for analysis.
What is WQX?

- A framework that facilitates the storage and retrieval of environmental monitoring data
- WQX uses standard data sharing templates (schemas) that specify data elements and data structure (XML)
- The WQX schema is an implementation of the ESAR (Environmental Sampling, Analysis and Results) data standard – Nationally Accepted Standard
- WQX based on the Environmental Data Standards Council (EDSC) Standards, EPA Standards - Uses EPA’s Substance Registry System (SRS), IT IS

More Info - [http://www.epa.gov/storet/wqx.html](http://www.epa.gov/storet/wqx.html)
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WQX Schema

- Primary components: Organization, Project, Monitoring Location, Monitoring Activity - **Samples, and Results**
- Data elements currently accommodate physical, chemical, fish tissue, biological, habitat monitoring data
  - **Superfund:** field and analytical results, methods, media/matrices
    - water, soil, sediment, tissue, …. QA information (up to a SEDD 2a), References to QAPPs …. 
WQX History

- February 2007 – WQX version 1.0
  - Physical, chemical, fish tissue schemas
- May 2008 Version 2.0
  - Biological, Habitat released
- EPA’s WQX/STORET System: 2 Methods are now supported for submitting data – using the Inbound Schemas
  - Node on the NEIEN – states or large organizations with IT staffs
    - PNW Node, State nodes - exchange XML
  - WQX Web – smaller organizations without IT staff
    - A flat file (excel or access) is imported into WQX Web where it is converted and corrected to make it compatible with WQX
    - Data is submitted through CDX into WQX database/STORET Warehouse (Region10 – CDA)

- WQX Outbound Schemas/web services for retrieving data ~ 2008-2009
- USGS Web Services - implementation of WQX outbound schema for analytical data from NWIS - 2009
R10 Superfund and WQX – Why Now?

Efficient – WQX is a headquarters system developed by OW
- Technically state of the art - well designed, standardized, non-proprietary
- Data repository - it can house historical and current site data
- Leverage CLP - house a subset of CLP data in WQX and use it for data analysis.

Data is Accessible
- Site Stakeholders can have access to the data
- Facilitates Secondary Use of Superfund Data – Puget Sound Partnership
- Mega Sites – multiple: site managers; operable units; agencies; contractors
- Data download is available via the web – WQX/STORET outbound web services

Data Analysis - Utilize WQX/STORET Outbound Web Services
- Retrieve data for mapping, data analysis, and reporting in a simple schema
- Access and use other data both in and outside of WQX using simple schema
  - Data submitted to WQX by Tribes, States, other EPA offices, other agencies
  - USGS NWIS web services – WQX schema
  - By Mapping to a common schema - data from disparate sources can be combined for analysis
Examples Uses of WQX/STORET
Inbound Web Services and WQX Web
Requirements:
- Minimum set of required data elements
- Domain lists for certain elements
Create a New Dataset

To Insert or Update Data:

- Import a File of Projects
- Import a File of Monitoring Locations
- Import a File of Activities and Results

To Delete Data:

- Import a File of Project Identifiers to be deleted
- Import a File of Monitoring Location Identifiers to be deleted
- Import a File of Activity Identifiers to be deleted
- Flag specific Projects from WQX to be deleted
- Flag specific Monitoring Locations from WQX to be deleted
- Flag specific Activities from WQX to be deleted
Lab Results
- Superset/CLP
- SEDD
- Forms 2 Lite

Provide:
- Organization - F2L
- Project - F2L
- Monitoring Location - F2L
- Results (example below)
R10 Scribe to WQX Pilot (ERU)

ERU Scribe
- Custom Data Views: WQXViews
- Lab Results
- Custom Lists - WQX Domain Values

WQX Web Data Submission Tool
WQX/STORET Outbound Web Services
WQX/STORET Outbound Web Services
http://www.epa.gov/storet/web_services.html

- Four Core Services based upon schemas:
  - **Stations service** – provides specific station information
  - **Results service** – provides results data
  - **Watershed/Station Catalog service** – provides summary information
  - **Project Catalog service** – provides summary information by projects based on an input of min/max latitude/longitude

- USGS NWIS database is implementing similar stations and results services based upon the WQX Outbound Schemas
WQX/STORET Outbound Web Services

- WQX & STORET Warehouse
- Other Data Generators?
- USGS NWIS Warehouse

Outbound Web Services
Retrieve the Data

Share data with Stakeholders

- Web Reports, Query Tools
- GIS ESRI, VE, Google
- Local dbs and programs Excel, Word
- Models GW or 3D Stats, Risk
Mapping WQX/STORET Stations

Call: Get Stations For Map
Supply Lat - Long

Process: Converts data to different mapping formats

Virtual Earth

Google Earth

ESRI Products

Example of a scheduled, automated process that runs against the outbound web services and populates a GIS database
Web Service: Get Results (Using Mouse Click)

Example of an interactive real-time request to the outbound web service
Example of an interactive real-time request to the outbound web services from Excel
Region 10 Beta Mapping Application
Calls WQX, USGS Web Services, Google Street View
Beta Tabular Query Tool using the Get Results Web Service
Google Earth Screen Captures
WQX Get Result – Visualize Categorized Data Over Time

Advanced analytical use of outbound web services
Summary - Looking Forward

- Urge OSWER and other data providers to investigate the WQX schema and database
  - Emergency Response Data
    - Investigate Scribe - WQX Schema crosswalk
    - WQX version of Scribe with custom lists and views
  - Superfund Data
    - Investigate SEDD /WQX Schema similarities
    - Pilot flow of data from SMO/CLP to WQX
    - WQX version of Forms 2 Lite

- Leverage the expertise of the Office of Water
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Extra Informational Slides Follow
Example of data returned from the outbound web services XML (USGS)