



National Ground-Water Monitoring Network

Advisory Committee on Water Information—Subcommittee on Ground Water

National Ground-Water Monitoring Network Data Portal

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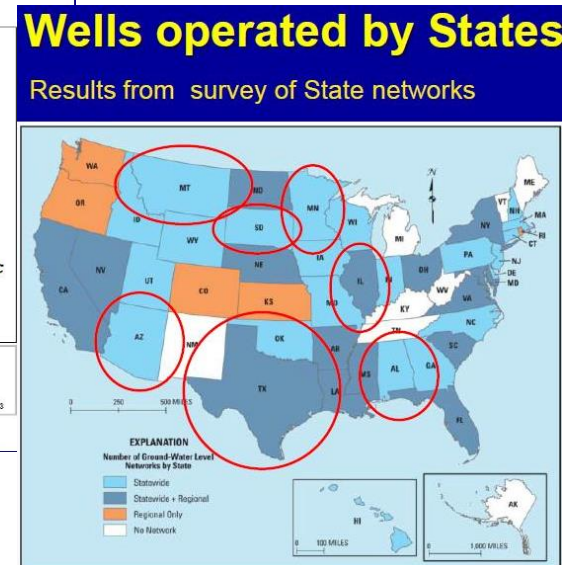
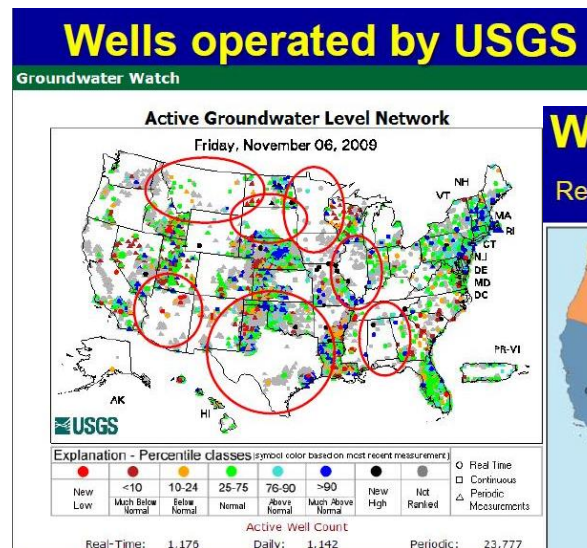
Subcommittee on Ground Water Meeting
September 16th, 2014

Outline:

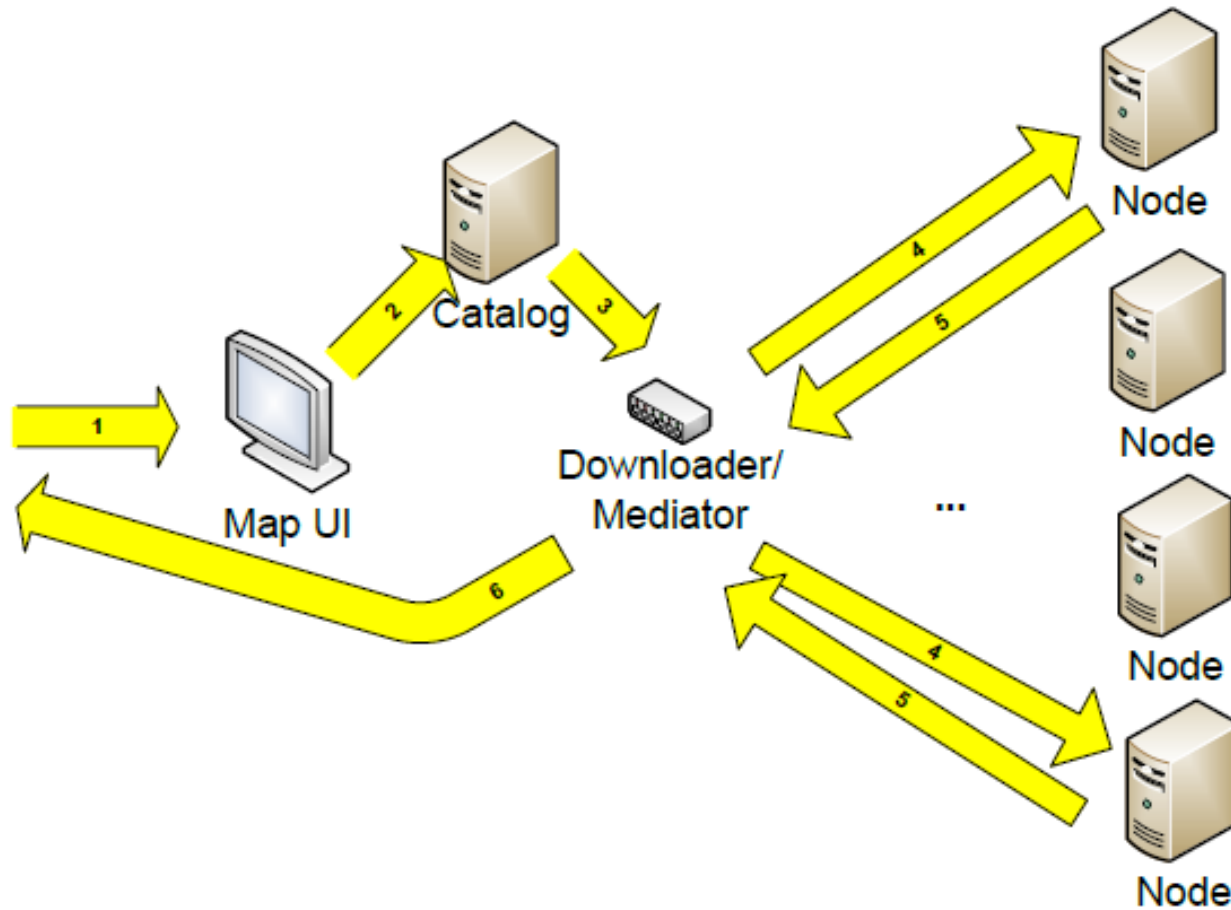
- Background
- Current functionality
- Recent progress
- Development Plans
- The long view
- Q&A

Portal Objectives:

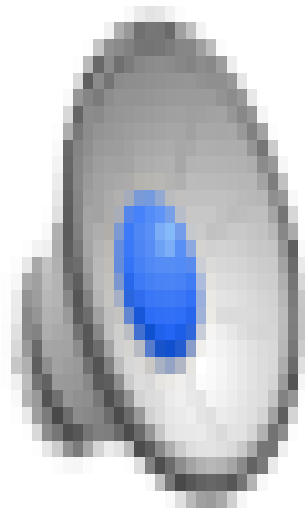
- Integrate National, State and Local GW data
- Make all data available through a single web portal
- Automated data transfer from data providers, through portal, to public user
- Dynamically access data from original source
- Real-time or near real-time data available
- Data Available
 - Well characteristics
 - Water levels
 - Water-quality



Distributed Architecture



Distributed Architecture

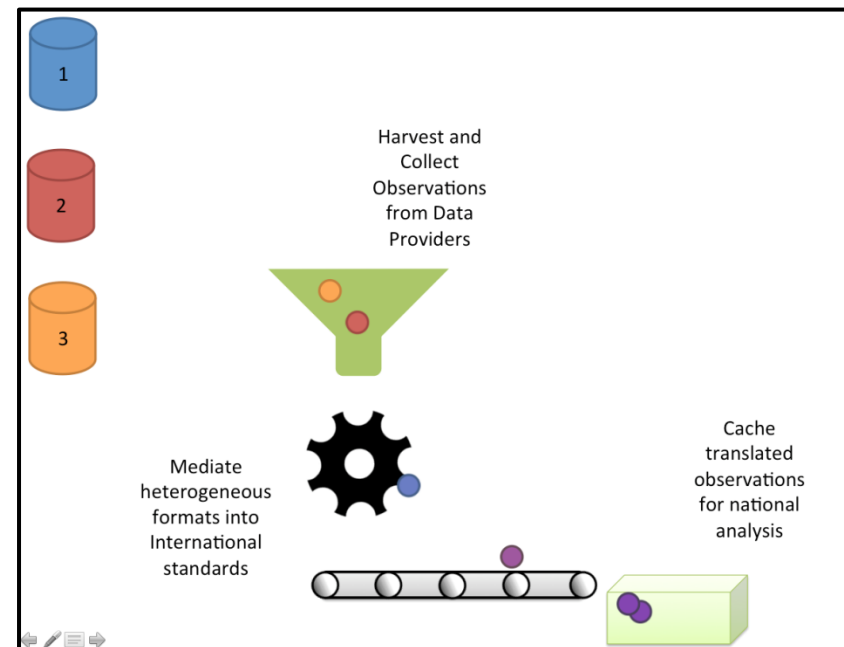


Lessons Learned & Challenges

- Data provider technical capabilities vary
- Complicated organizational structures
- Some missing data elements (minimal)
- Structure of well log data varies greatly
- Some spatial and temporal data gaps
- Consistent data quality
- Outages, reliability of services
- Large number of services to mediate

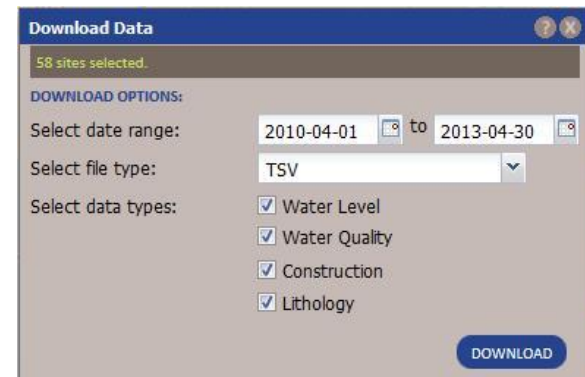
Infrastructure Enhancements:

- Scale-up service infrastructure to support full implementation
 - Performance
 - Reliability
 - Stability
- Data availability filtering
- Multi-site download
- Advanced query support

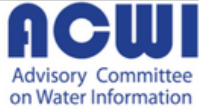


New User Interface:

- New Look & Feel
- Fine tuned control of site selection for download
- Intuitive map controls (zooming, panning, selecting)
- Enhanced filter – map interaction
- Built-in help & explanations
- New filter options
 - Data availability
 - State / county
 - Filter refresh
- New download options
(date filter, file type selector)



NGWMN Data Portal Today



National Ground-Water Monitoring Network

The **National Ground-Water Monitoring Network (NGWMN)** is a compilation of selected groundwater monitoring wells from Federal, State, and local groundwater monitoring networks across the nation.

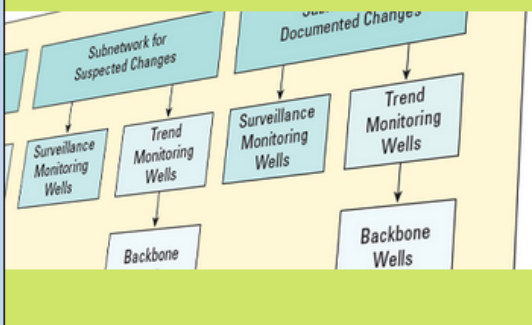
The **NGWMN** is a product of the [Subcommittee on Groundwater](#) of the Federal Advisory Committee on Water Information ([ACWI](#)).

The **NGWMN Data Portal** provides access to groundwater data from multiple, dispersed databases in a web-based mapping application. The portal contains current and historical data including water levels, water quality, lithology, and well construction. The NGWMN is transitioning from a pilot phase into full implementation. In the future we will be adding additional data providers to the network.

NETWORK STATUS:

- 3,023 wells
- 29 states
- 48 Principal Aquifers
- 4,587,063 Water Levels
- 215,912 Water Quality Samples

LEARN about the Network



EXPLORE the Network



National Groundwater Monitoring Network

The **National Ground Water Monitoring Network (NGWMN)** is a compilation of selected wells monitoring groundwater aquifers all around the nation. The **NGWMN Data Portal** brings real-time groundwater data together in one place to provide users with current and reliable information for the planning, management, and development of groundwater resources.

ABOUT THE NETWORK	THE DATA PORTAL	DATA PROVIDERS	GET INVOLVED
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About the Network

BACKGROUND

Background

The NGWMN network is sponsored by the Advisory Committee on Water Information's ([ACWI](#)) Subcommittee on Ground Water ([SOGW](#)) and was established in 2009 with a pilot network.

The goal of the National Ground Water Monitoring Network (NGWMN) is to provide information needed for planning, management, and development of groundwater supplies to meet current and future water needs and ecosystem requirements. This will be accomplished by aggregating suitable groundwater data from local, State, and Federal organizations. A consensus-based framework document (<http://acwi.gov/sogw/pubs/tr/>) was developed to provide guidance to ensure that the data are comparable and can be included in a nationally consistent network. The framework design focuses on providing information needed to assess the quantity of groundwater reserves as constrained by quality. The scale of the network focuses on Principal and Major Aquifers of the United States.

Network Design

The network is composed of selected wells from existing Federal, multistate, State, Tribal, and local groundwater monitoring networks. The scale of the network will focus on Principal and Major Aquifers of the United States. Well classification subnetworks and monitoring categories are defined in the framework document (<http://acwi.gov/sogw/pubs/tr/index.html>) and are briefly described here:

Well Classification Subnetworks:

Wells in the NGWMN will be designated as being in one of three subnetworks. These are 1) the Background subnetwork, 2) the Suspected Changes subnetwork, and 3) the Documented Changes subnetwork.

Background subnetwork:

Monitoring points that provide data from aquifers or parts of aquifers with no (or minimal)

Methods of Site Selection

The screenshot displays the National Ground-Water Monitoring Network (NGWMN) website interface. The main map shows the United States with numerous blue dots representing monitoring sites. The interface includes several filter panels on the left and top, and a list of contributing agencies and principal aquifers on the right.

Left Panel (NGWMN NETWORKS):

- Water level:** Subnetwork: All, Background, Suspected Changes, Documented Changes; Monitoring Category: All, Surveillance, Trend, Special.
- Water quality:** Subnetwork: All, Background, Suspected Changes, Documented Changes; Monitoring Category: All, Surveillance, Trend, Special.

Top Panel (Filters):

- State and County:** Multiple states, One state, multiple counties; States: All, ALABAMA, ARKANSAS, CALIFORNIA, CONNECTICUT, FLORIDA, GEORGIA.
- Contributing Agency:** Illinois Environmental Protection Agency, Illinois State Water Survey, Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, Montana Bureau of Mines and Geology, Texas Water Development Board, U.S. Geological Survey.
- Principal Aquifer:** Ada-Vamoosa aquifer, Alluvial aquifers, Arbuckle-Simpson aquifer, Basin and Range basin-fill aquifers, Biscayne aquifer, California Coastal Basin aquifers, Cambrian-Ordovician aquifer system, Castle Hayne aquifer, Central Oklahoma aquifer, Central Valley aquifer system, Coastal lowlands aquifer system, Columbia Plateau basaltic-rock aquifers.

Bottom Panel (Available Data):

- Water Level:** (Icon: Line graph)
- Water Quality:** (Icon: Test tube)
- Well Log:** (Icon: Well log)

Bottom Left Panel (FILTER MAP DATA):

- CURRENT STATUS:** 3022 Sites mapped, 3022 Sites matching filter, 2806 Water-level network wells.

NGWMN NETWORKS

Water level:

☒ ?

Subnetwork:

All

Background

Suspected Changes

Known Changes

Monitoring Category:

All

Surveillance

Trend

Special

Water quality:

☒ ?

Subnetwork:

All

Background

Suspected Changes

Known Changes

Monitoring Category:

All

Surveillance

Trend

Special

FILTER MAP DATA

Principal Aquifer

Available Data

Water Level

Water Quality

Well Log

CURRENT STATUS

3022 Sites mapped

2806 Water-level network wells

TIPPECANOE 17 (TC 17)

SUMMARYWELL LOGWATER LEVELSWATER QUALITY

Agency

U.S. Geological Survey (National Water Information System)

Site Name

TIPPECANOE 17 (TC 17)

Site #

402734087033401

Lat/Long(WGS84)

40.4595,-87.0595

Well Depth

212.54 ft

Local Aquifer Name

Outwash

National Aquifer Name

Sand and gravel aquifers (glaciated regions)

Water Level Network

Surveillance - Background

BIG SPRING FISH HATCHERY - WELL FWPL 06

SUMMARYWELL LOGWATER LEVELS

Depth of water level, feet below land surface

Month/Year

SMITH AL

SUMMARYWELL LOGWATER LEVELS

Longitude: 47.3237

Latitude: -106.9149

Elevation: 2638.00 ft.

Well Depth: 145.00 ft.

140.00 ft. CLAY

110.00 ft. SAND

20.00 ft. SHALE

15.00 ft. COAL

12.00 ft. ROCK

0.00 ft. SAND

Depth From (ft)	Depth To (ft)	Lithology	Description
140.00	145.00	CLAY	CLAY
110.00	140.00	SAND	SAND
20.00	110.00	SHALE	SHALE
15.00	20.00	COAL	COAL
12.00	15.00	ROCK	ROCK
0.00	12.00	SAND	SAND

Site Selection

Site Name	Agency	WL	WQ	Log
<input type="checkbox"/> BENTON 4 (BE 4)	USGS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> VER-94D (Hoopeston)	ISWS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> CRESCENT CITY #2 (MTBV 2)	IL EPA	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> SMITH AL	MBMG	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> GRANT 10 (GT 10)	USGS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> MPCA Ambient Network Site 1152	MPCA	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 66018	MN DNR	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7 sites selected.

REMOVE SELECTED

DOWNLOAD

1000 km1000 mi

45.126953, 67.642093

Well Registry Management

- Data Providers can manage well information
- Logging of changes to well classification
- Review of well data for managers

[Logout](#)

[Home](#) [View Well Registry](#) [Import Wells from NWIS](#)

Page 1

Welcome to the Well Registry Management Interface: (USGS Employees Only)

Menu

- [View Well Registry](#)
- [Import from NWIS](#)
- [User Documentation](#)

In this application you can view the wells and their respective metadata that are currently part of the NGWMN network. You may also turn wells on and off by changing the 'display' designation without having to remove them from the system. Lastly, you are able to add new wells and edit existing ones. For a detailed description of the well registry fields, see the [Well Registry Guidance Document](#) and the [User Documentation](#). For more information on well selection and well classification see the [Framework Document](#).

Well Classification Definitions:

WL Sub-Network:

Is the well part of the WL network (default is "Yes")? All wells marked as "Yes" will be included in the NGWMN WL network. This is not too important now, but will become more important when Water Quality wells from NWIS are also added to the Network. A well could be a QW site, but not a WL site, etc.

WL Well Purpose:

A two category classification of the well to document the well's original purpose (a) 'Dedicated Monitoring/Observation', or (b) 'Other' (i.e. not a dedicated monitoring well).

WL Well Type:

Three choices are possible; Trend, Surveillance, or Special Studies. 'Trend' wells have a monitoring frequency appropriate to determine long-trends and seasonal variability (typically quarterly at least), 'Surveillance' wells are 'synoptic' snapshots of data used to tie together the 'Trend' wells. 'Special Studies' wells are likely to be local areas of depletion or impairment.

WL Baseline:

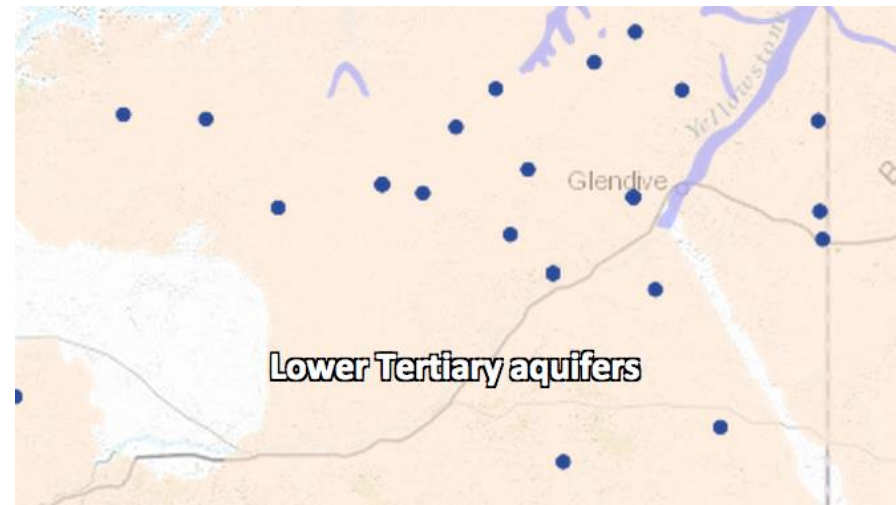
A 'baseline' period of at least 5 years of data must be available to achieve the 'baseline period' for a well or spring. Has the baseline period for water-levels been satisfied (are there 5 years of data) (Y/N)? All wells that are classified as 'Baseline' wells need to have the WL_Well_Characteristics field populated.

WL Well Characteristics:

The characteristics of the aquifer that the well represents: 'Background', 'Suspected/Anticipated Changes', or 'Known Changes'. This column is required if the WL_Baseline_Flag is set to 'Yes'. Wells that represent background conditions and have not changed substantially over time can be classified as 'Background'. Wells that have definitely been affected can be classified as demonstrating 'Known changes'. The final category is for wells for which clear changes cannot be identified or for which changes are expected. These wells can be classified as 'Suspected / Anticipated Changes'.

FY14 Portal Improvements

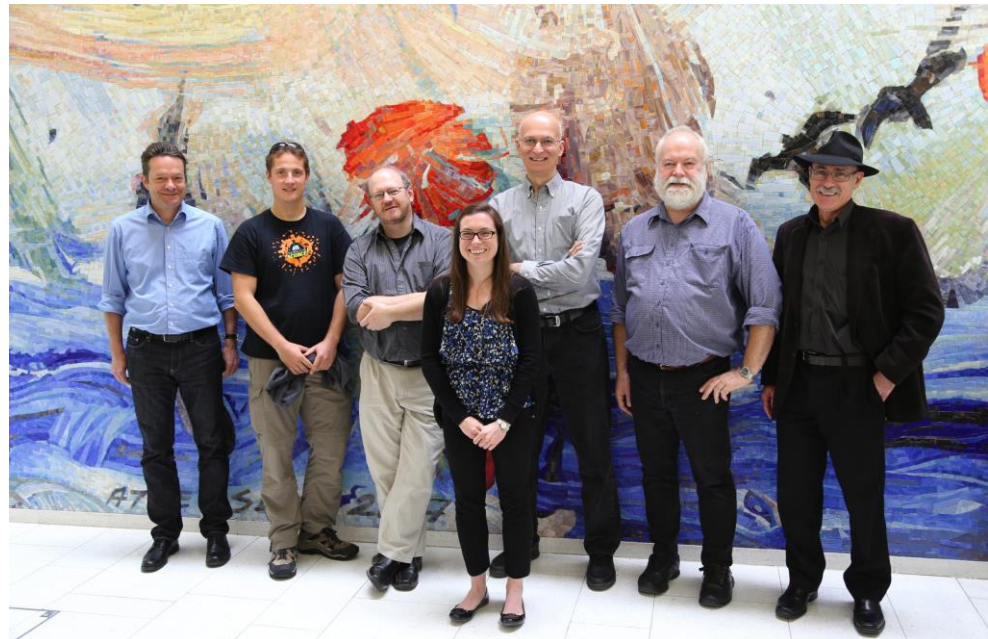
- Hooked-up MBMG services for QW & daily WL's
- Developed WaterML2 Sensor Observation Service
- Provider service outage notifications
- Improvements to data download
- Alluvial aquifers layer & aquifer ID
- Aquifer lithology filter
- Involvement with GWML2 standard development



Groundwater Data Standards

- GWML2 in development (4 packages)
 - main, groundwater flow, groundwater well and groundwater constituent
- Groundwater Interoperability Experiment 2
- 5 Use Cases:
 - Commercial
 - Policy
 - Environmental
 - Scientific
 - Technologic

GW2IE Meeting -- May 5-8, 2014



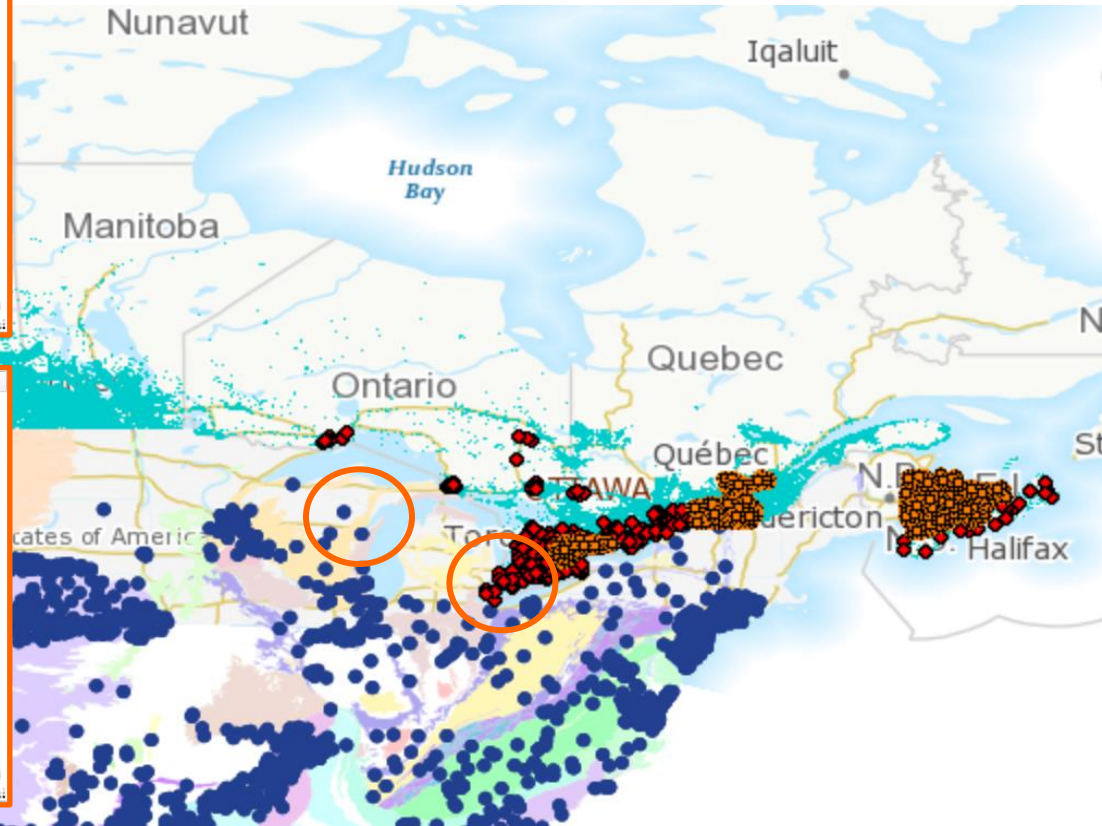
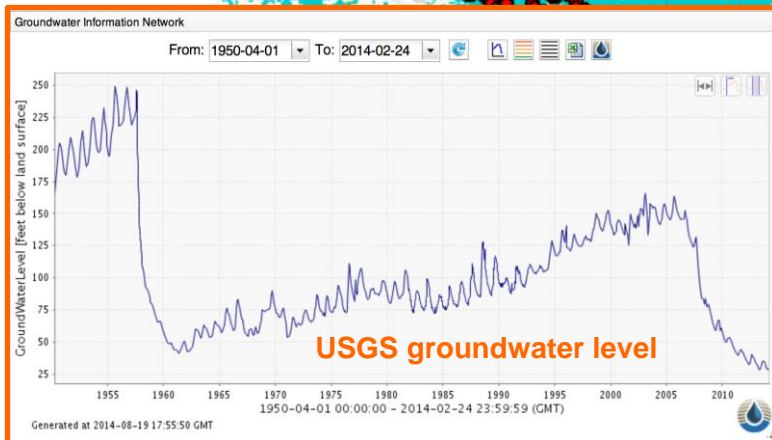
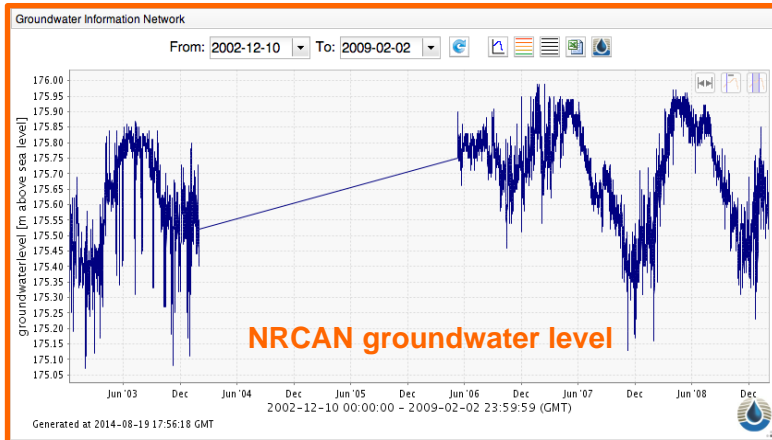
From left to right: Bernhard Wagner (GSG), Alex Kmoch (U Salzburg), Eric Boisvert (NRCAN), Jessica Lucido (USGS), Boyan Brodaric (NRCAN), Peter Dahlhaus (FedUni), Bruce Simmons (CSIRO)

International Coordination

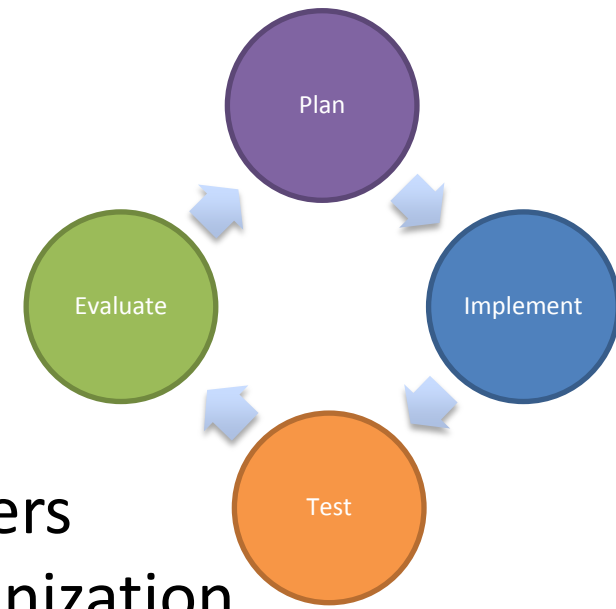
Data Interoperability

CAN: water wells (NRCAN); groundwater levels

USA: water wells (USGS); groundwater levels



FY15 Plans



- Work with new data providers
- Document provenance of data providers
- Attribute datasets to appropriate organization
- Streamline data service mediation process
- Summary statistics of data selected by user
- Implement saved filters and site selections
- Display figure of well construction data
- Visualizations of current groundwater quality or quantity at a glance
- Additional site filters (data POR, QW result, etc...)
- Improve & document portal data services (output)

The Long View...

- Work with new & existing data providers to add new datasets
- Streamline data cross-walking process
- Portal mobile compatibility
- Inclusion in the Open Water Data Initiative
- Include remotely sensed or modeled data sources
- Include aquifer information

Questions?

<http://cida.usgs.gov/ngwmn/>

