

August 19, 2014
ACWI Annual Meeting

Open Water Data Initiative

Kevin T. Gallagher
USGS, Associate Director, Core Science Systems

Nate Booth
USGS, Chief, Office of Water Information

Open Water Data Ad Hoc Working Group

- Anne Castle, Department of Interior, Assistant Secretary for Water and Science
- Lori Caramanian, Department of the Interior, Deputy Assistant Secretary for Water and Science
- Jerry Johnston, Department of the Interior, Geospatial Information Officer, Managing Partner representative for the Geospatial Platform
- Bill Werkheiser, USGS, Associate Director for Water
- Jerad Bales, USGS Chief of Research and Science for Water and representative to IWRSS
- Nate Booth, USGS, Chief - Office of Water Information
- Don Cline, NOAA, National Weather Service, Chief-Hydrology Laboratory, NWS representative to IWRSS
- James Dalton, US Army Corps of Engineers, Chief of Engineering and Construction, USACE representative to IWRSS
- David Maidment, University of Texas, Professor of Civil Engineering
- Kevin T. Gallagher, USGS, Associate Director for Core Science Systems
- Ivan DeLoatch, USGS, Executive Director, FGDC Secretariat

Background & Motivation

- Quantifying the availability, use, and risks to our national water resources is an issue of national importance for the present and the foreseeable future.
- Improving access to data and enabling open exchange of water information is foundational to identifying and understanding existing water resources issues - **particularly in the face of climate change and unprecedented drought.**

Background & Motivation

- There have been numerous studies, reports, and publications indicating fragmentation of water information.
- "Foundational to [meeting the global water challenge] is the need to **improve access to and exchange of water data and information**, including better modeling of the hydrologic cycle, to include the impact of human-use decisions." – John Holdren

Open Data Access Policy - Background



- White House Strategy – May 2012
 - Digital Government: “Building a 21st Century Platform to Better Serve the American People”
- OSTP Memorandum – February 2013
 - “Increasing Access to the Results of Federally Funded Scientific Research”
- Executive Order – May 2013
 - “Making Open and Machine Readable the New Default for Government Information”
- OMB Memorandum – May 2013
 - Open Data Policy– “Managing Information as an Asset”
- Big Earth Data Initiative – 2014 President’s Budget
 - improve the *Discoverability*, *Accessibility* and *Usability* of Earth science data

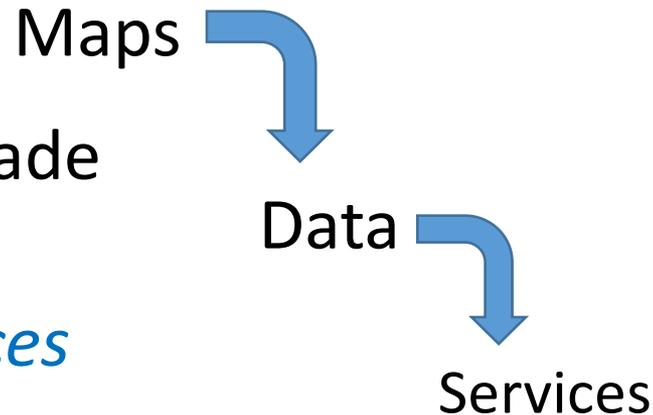
White House Climate Data Initiative (March 2014)

- Assembly and exposure of federal government information to **communities and private sector**
- Engagement to develop new applications for **citizens and industry**



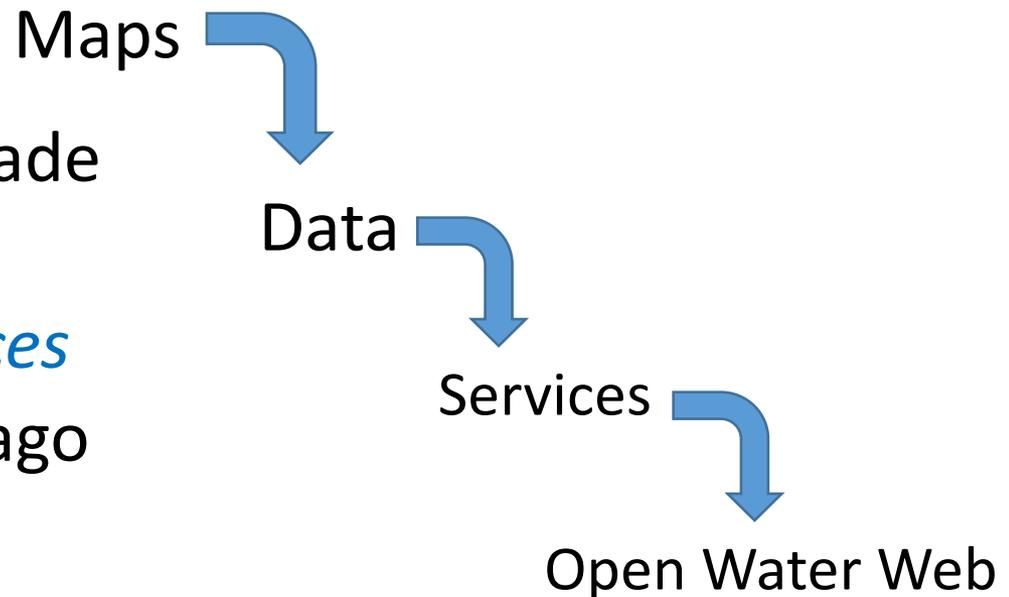
Major Transitions in Geospatial Info

- *Paper maps to digital data*
 - National Spatial Data Infrastructure development
 - Started in 1990's
 - Took more than a decade to complete
- *Digital data to web services*
 - Started several years ago
 - Will take years to complete



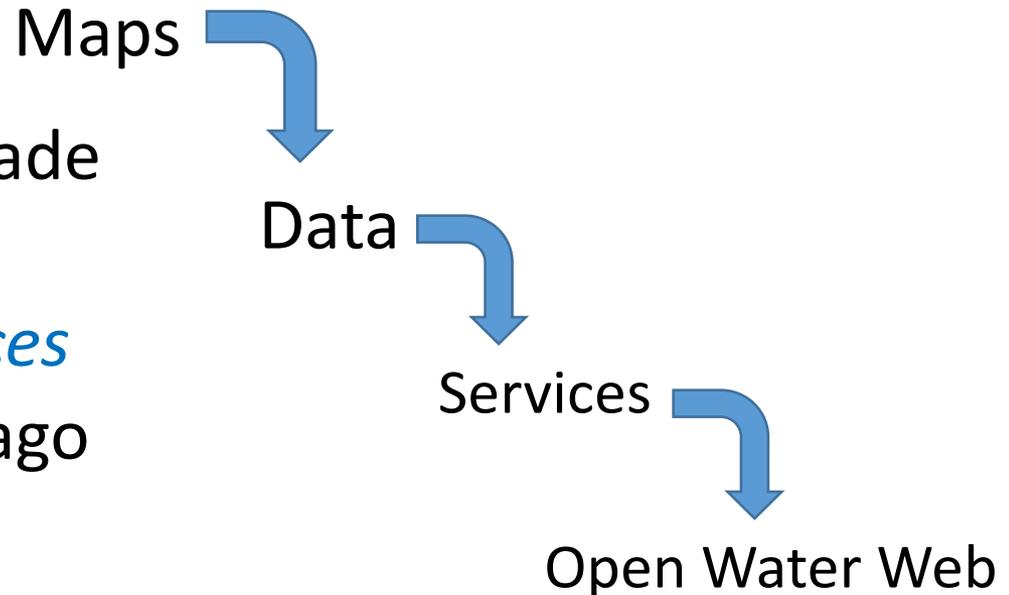
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What would that look like?

Open Water Data Vision

- Foundational **National** Data Sets with **Data Services** to support a wide variety of water user applications
- Water data **metadata, web services** and a **community** accessible on the Federal Geospatial Platform
- Access to integrated **real-time monitoring data**
- Data Assimilation for a **National Modeling** capability
- Water Maps and other **Derivative Products** that integrate geospatial & water observations
 - Such as: current conditions, precipitation estimates, reservoir storage
- **Marketplace of open source applications** (models, data visualizations, etc.) built upon **Open Water Web Services**

National Spatial Data Infrastructure

National Spatial Data Infrastructure Strategic Plan 2014–2016



Federal Geographic Data Committee

Public Comment Draft (Version 2)
July 31, 2013

NOTE:

This revised draft of the NSDI Strategic Plan (Version 2) has been prepared for public review and comment. Instructions on submitting comments are posted at www.fgdc.gov/nsdi-plan. Comments are due by August 21, 2013. For additional information on the NSDI strategic planning process, please visit: www.fgdc.gov/nsdi-plan.

Desired Future State of NSDI

- Create network of resources and services
- Facilitate discovery, access and application of resources
- Leverage shared standard-based services
- Develop core set of information layers that interface with nonspatial data
- Use real-time data feeds and sensor webs

National Spatial Data Infrastructure

Desired Future State of NSDI

Can this vision be realized for water data?

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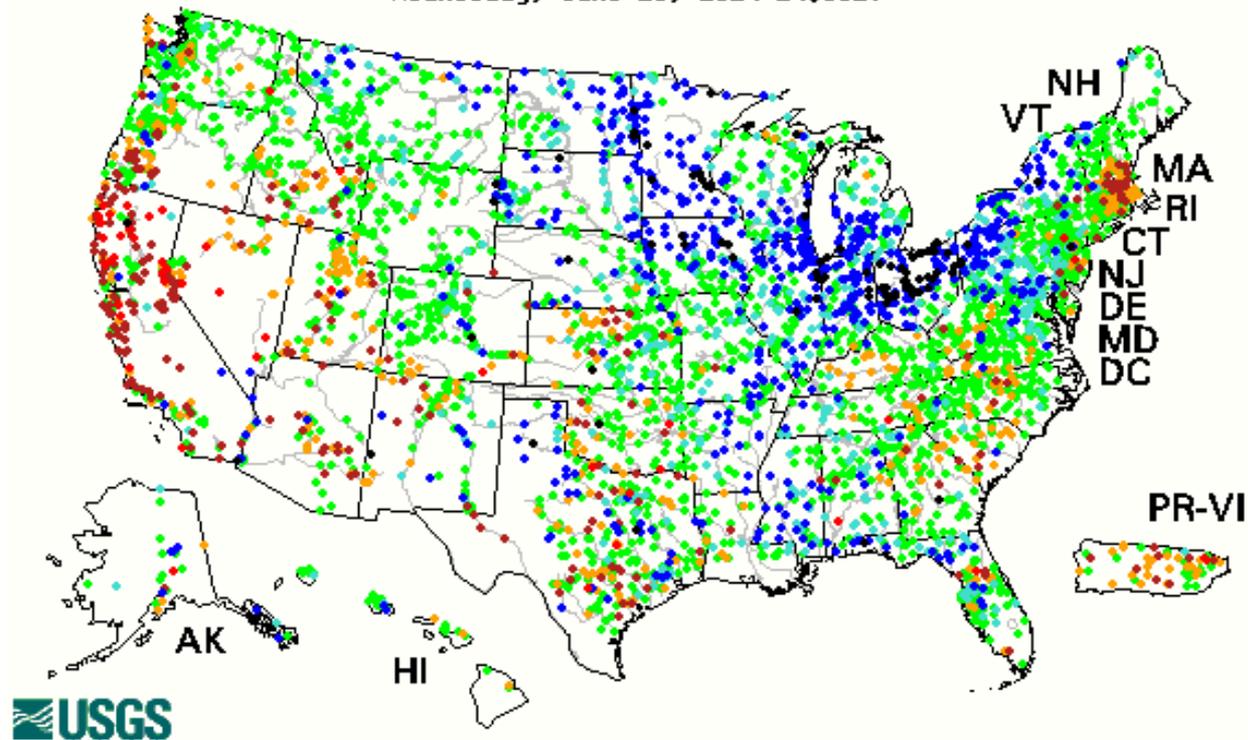
Map of real-time streamflow compared to historical streamflow for the day of the year (United States)

State

OR

Water-Resources Regions

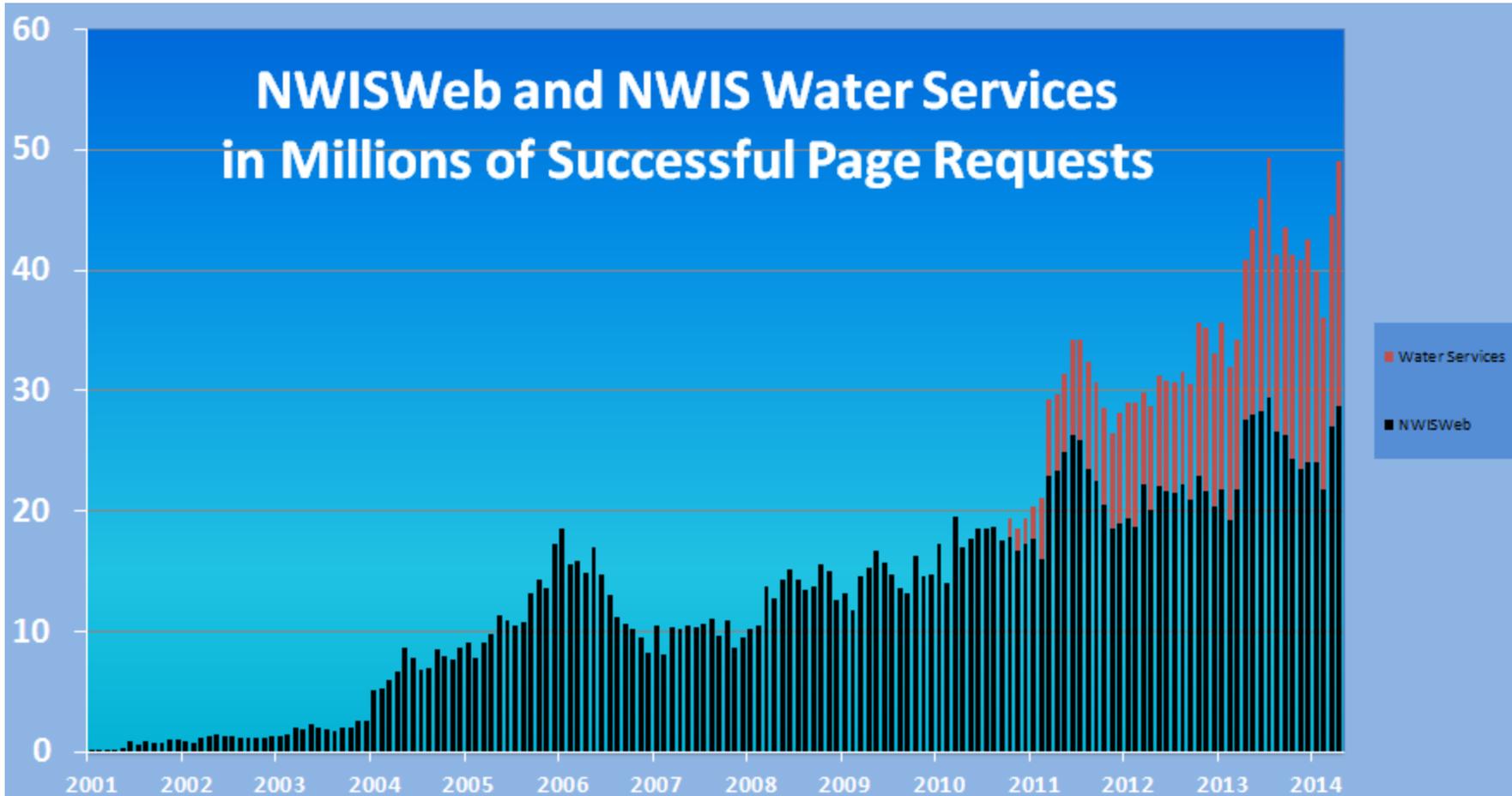
Wednesday, June 25, 2014 14:30ET



Choose a data retrieval option and select a location on the map

List of all stations in state, State map, or Nearest stations

Explanation - Percentile classes						
<input checked="" type="radio"/>	<input type="radio"/>					
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	



Foundational Water Data Sets

- Streamflow
- Groundwater levels
- Aquifers
- Water quality
- Reservoir storage
- Elevation
- Hydrography – NHD/WBD
- Landscape Variables
- Climate/Weather/ET
- Soil moisture
- Human water use
 - Withdrawals
 - Return flows
 - Diversions
 - Losses



Building Upon Success

OGC/WMO Hydrology Domain Working Group

4-Year International Effort – WaterML

A time series for one variable at one location

WaterML2

Hydrology Domain Working Group formed
OGC observer at CHy-13

November 2009

*MEMORANDUM OF UNDERSTANDING
BETWEEN
THE WORLD METEOROLOGICAL
ORGANIZATION
AND
THE OPEN GEOSPATIAL CONSORTIUM, INC.*

Technical Meetings Every 3 Months
Three Interoperability Experiments
(surface water, groundwater, forecasting)
Annual week-long workshops
Involvement by many countries

Acknowledgements: OGC, WMO, GRDC, NWS, CUAHSI,
BoM/CSIRO, USGS, GSC, Kisters,

2008

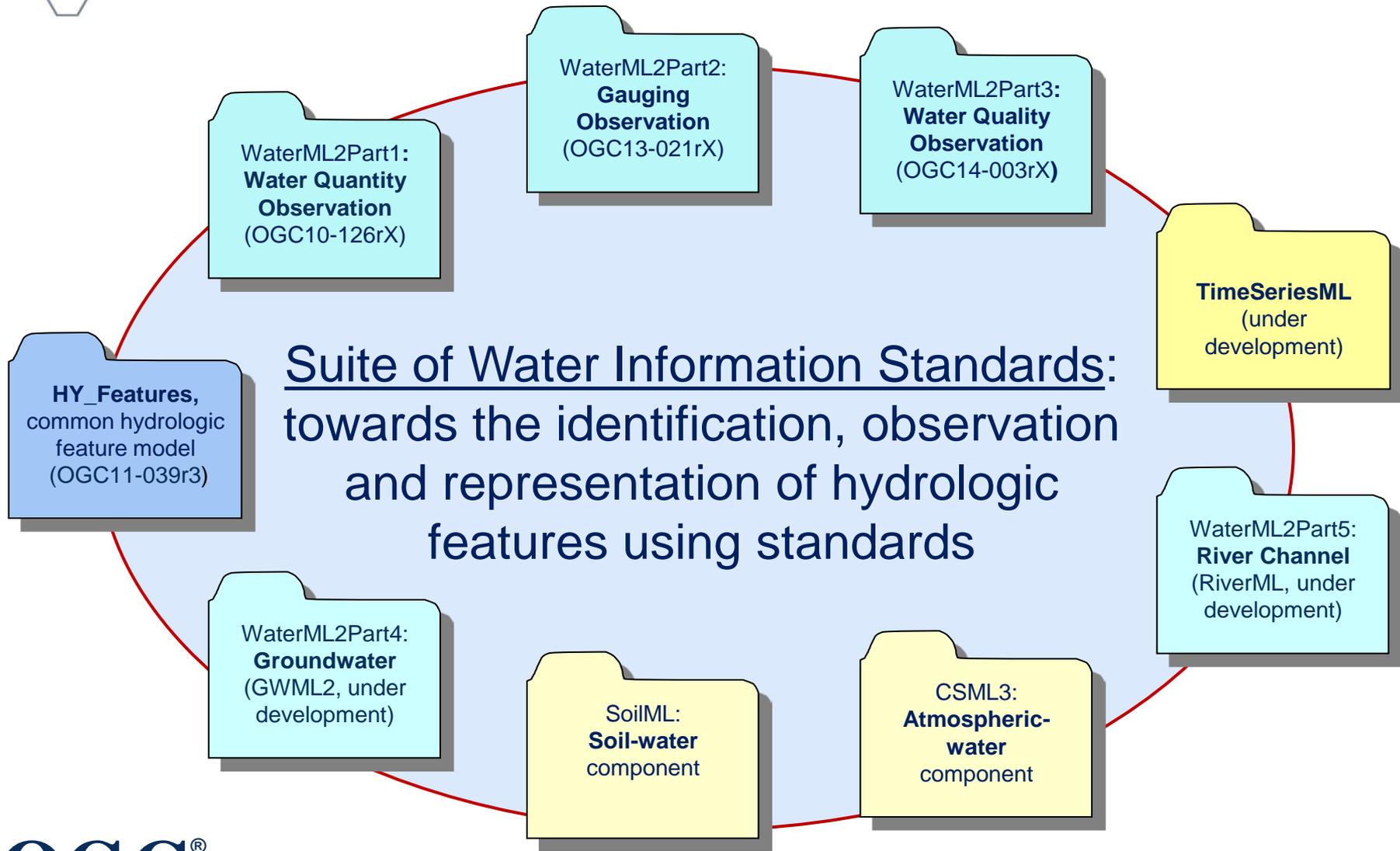
2009

2010

2011

2012

Suite of Water Information Standards





CUAHSI Water Data Center



[Home](#) [Data Services](#) [Technology](#) [Community](#) [About](#) [Contact](#)



Welcome to the CUAHSI Water Data Center

The WDC provides data services to the hydrologic science community and other critical-zone science communities that require access to various sources of water data to perform research on fundamental challenges in hydrology and Earth System science. We enable the water research community through supporting data access and publication, software development and curation, in addition to the development of standards.

Tweets [Follow](#)

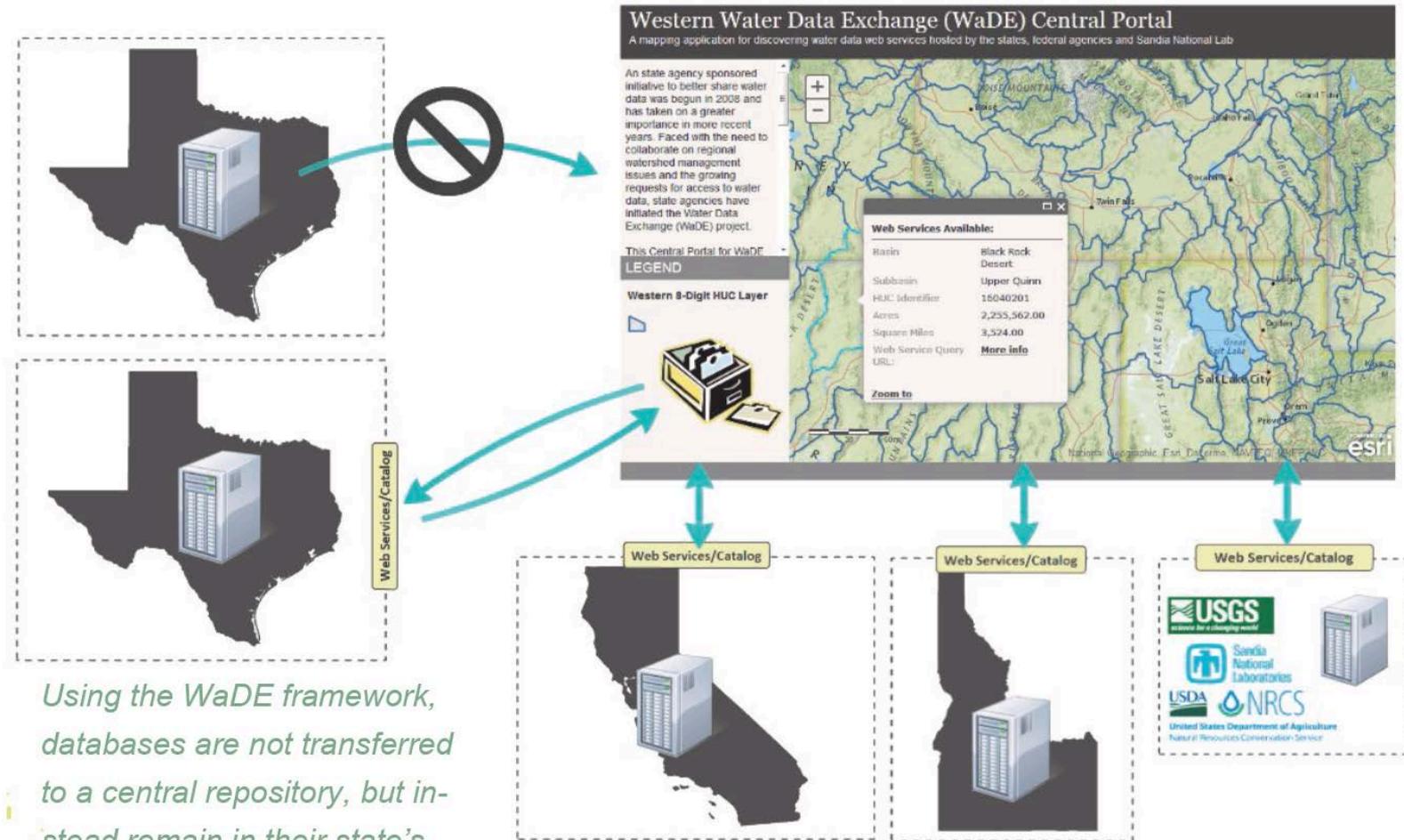


CUAHSI
@CUAHSI

7h

thanks to all who joined our cyberseminar yesterday! stay tuned for more sessions and send us your ideas on what you'd like to see next!

Western Water Data Exchange (WaDE)



Using the WaDE framework, databases are not transferred to a central repository, but instead remain in their state's

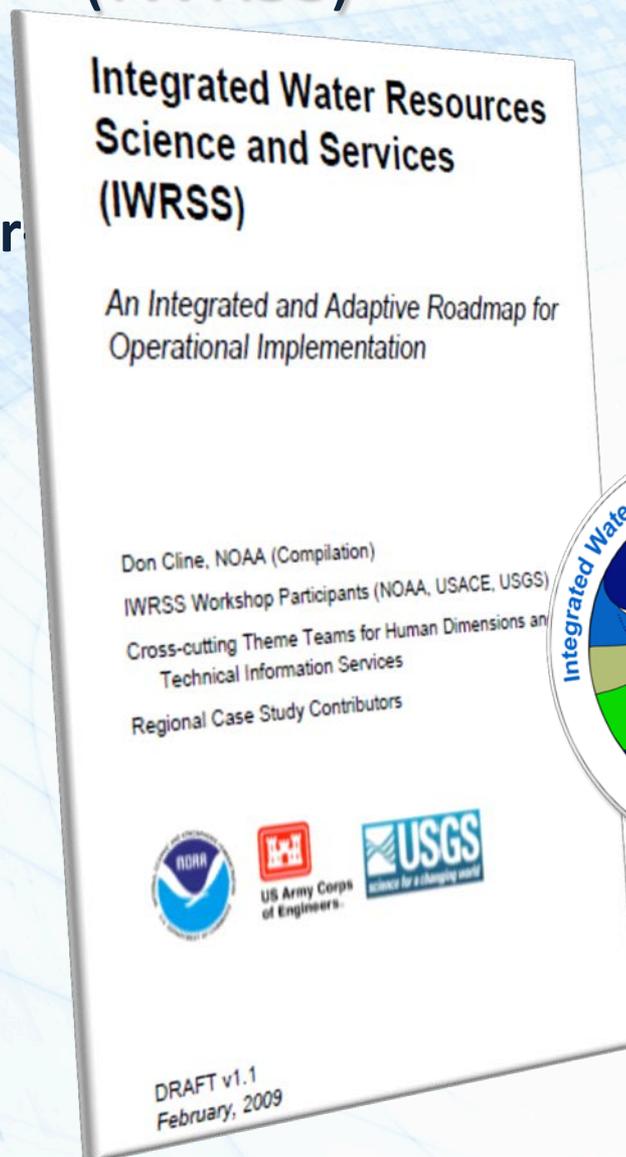
home IT environment. A listing of the data housed by each state is provided via a "Central Catalog." Once the desired data are found, they are accessed using web services, which looks like a web browser address: <http://www.state.gov/water/webservices/GetCatalog>.

Integrated Water Resources Science and Services (IWRSS)

Aligns multiple agencies with complimentary water related missions to:

- Integrate services and service delivery
- Improve river and flood forecasts
- Provide new summit-to-sea water resources analyses and forecasts
- Enable more effective use of resources

**Roadmap Document
(February 2009)**





Overview: National Water Center (NWC)

- Common Operating Picture for Water Resources
- Geo-Intelligence Laboratory
- Science and software studio
- Systems proving ground



INTEGRATED WATER RESOURCES
SCIENCE AND SERVICES (IWRSS)

SUMMIT TO SEA

ACWI – Advisory Committee on Water Information

WICP Water Information Coordination Program
ACWI Advisory Committee on Water Information

Advisory Committee on Water Information

[▶ About Us](#) ▶ [Members](#) ▶ [Meetings](#) ▶ [Contacts](#) ▶ [Products](#) ▶ [Old Features](#)

Features:
Mark your calendars

9th National Monitoring Conference

April 28 - May 2, 2014

Location:
Cincinnati



Water Information Coordination Program
The WICP ensures collaborative efforts among Federal Agencies to improve water information for decisionmaking about natural resources management and environmental protection.

Advisory Committee on Water Information
The ACWI represents the interests of water-information users and professionals in advising the Federal Government on Federal water-information programs and their effectiveness in meeting the Nation's water-information needs. ([ACWI Fact Sheet](#))



Open Water Data Initiative

Water Data Catalog	Water Data As a Service	Enriching Water Data	Water Data and Tools MarketPlace
Find Source Data	Consensus standards	River routing	Community exercise of tools & data
Create water & climate themes	Water Map Themes	Coupling with models	Data usage tracking
Recruit/engage partners	High performance data delivery	Grounded to geofabric	Community-built extensions



Technical: National Water Data Infrastructure

Social: Open Water Web

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**

TIPPECANOE 17 (TC 17)

SUMMARY WELL LOG WATER LEVELS WATER 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)

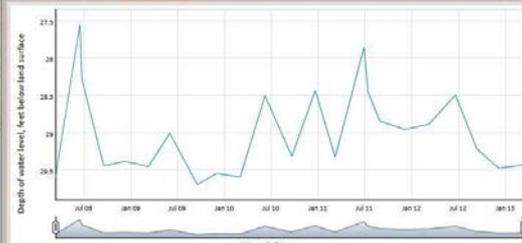
Water Level Network: Surveillance - Background

DNR INDIANA DEPARTMENT OF NATURAL RESOURCES

SELECT FOR DOWNLOAD

BIG SPRING FISH HATCHERY - WELL /WPL-06

SUMMARY WELL LOG WATER LEVELS



Depth of water level, feet below land surface

Month/Year

SELECT FOR DOWNLOAD

SMITH AL

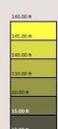
SUMMARY WELL LOG WATER LEVELS

Longitude: 47.3237

Latitude: -106.9149

Elevation: 2630.00 ft.

Well Depth: 145.00 ft.



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

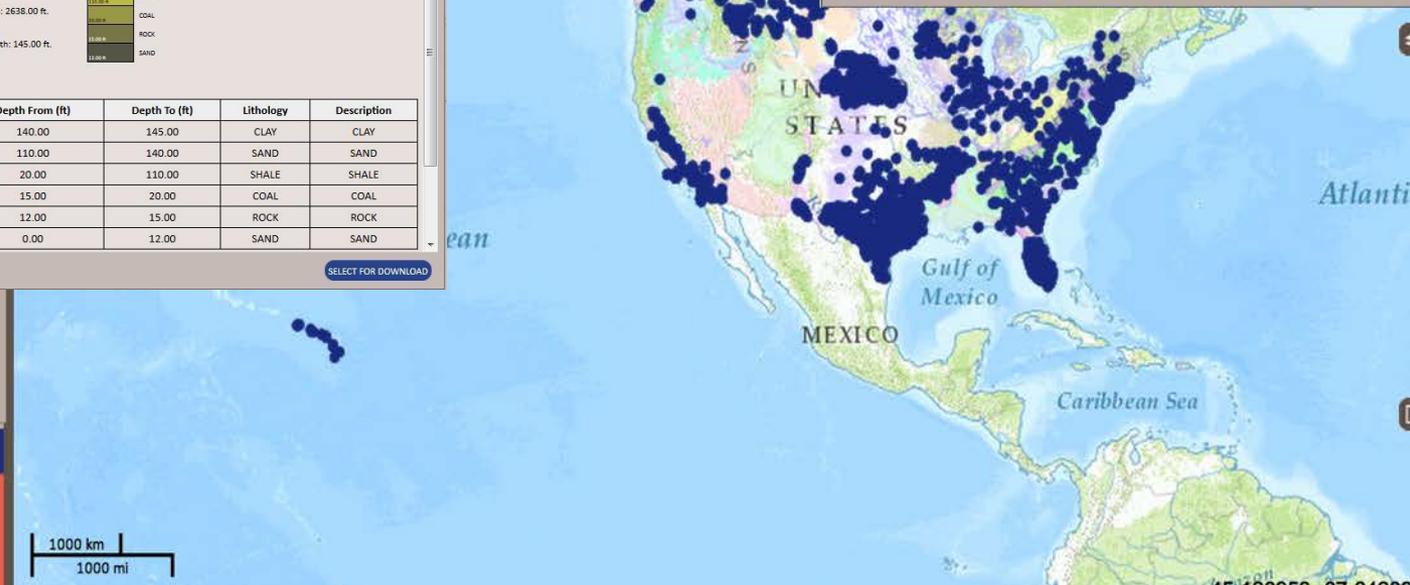
SELECT FOR DOWNLOAD

Site Selection

Site Name	Agency	WL	WQ	Log
GREAT NORTHERN RAILWAY COMPA...	MBMG	●	●	●
PIA-2000A Cisco	ISWS	●	●	●
TWDB-7764401	TWDB	●	●	●
250790-- lmaystown MW1	USGS	●	●	●
GRANT 10 (GT 10)	USGS	●	●	●
66018	MN DNR	●	●	●
MPCA Ambient Network Site 1152	MPCA	●	●	●

7 sites selected.

REMOVE SELECTED DOWNLOAD



CURRENT STATUS

3022 Sites mapped

2806 Water-level network wells

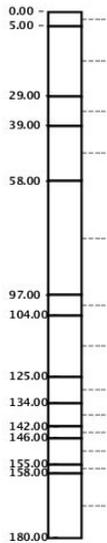


North American interoperability

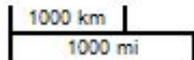
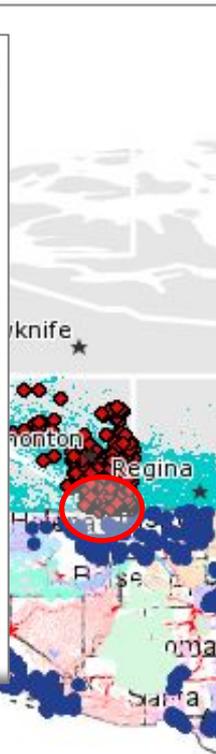
GIN Water Well

Identity :
Provincial id : US GEOLOGICAL SURVEY
OBSERVATION WELL
Source : USGS CIDA
Online resource : [Montana Bureau of Mines and Geology](#)
Length : 180ft
Elevation : 2580ft
Elevation (Google Maps) : above sea level
Well purpose : Dedicated Monitoring/Observation
Well status : Unknown
Well type : Surveillance

Report an error



DEPTH FROM (M)	DEPTH TO (M)	GIN LITHOLOGY	ORIGINAL LITHOLOGY
0.00	5.00	(More Info)	SOIL- STICKY
5.00	29.00	(More Info)	CLAY- BROWN; CONTAINS PEBBLES
29.00	39.00	(More Info)	CLAY- YELLOW; CONTAINS PEBBLES
39.00	58.00	(More Info)	CLAY- SANDY- YELLOW; CONTAINS PEBBLES
58.00	97.00	(More Info)	CLAY- SANDY- BLUE-GRAY CONTAINS PEBBLES AND FRAGMENTS OF COAL
97.00	104.00	(More Info)	GRAVEL
104.00	125.00	(More Info)	CLAY- SILTY- VERY SOFT
125.00	134.00	(More Info)	CLAY- SANDY- BLUE-GRAY; CONTAINS GRAVEL

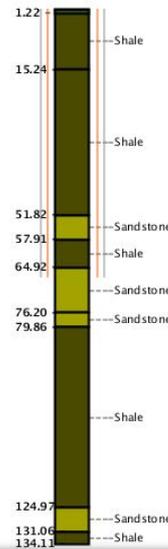


-148.42500, 66.55000 | EPSG:4326

GIN Water Well

Identity : ca.ab.waterWell.164979
Provincial id : 164979
Source : Alberta Environment
Online resource : [Alberta Water Well Database](#)
Date of drilling : 1985-03-13
Length : 134.11m
Elevation : 887.73m
Elevation (Google Maps) : 885.74m above sea level
Water level : 20.39m 1985-03-13
Water use : Observation
DLS well location : 04-8-2-2-4
Well purpose : Observation
Well status : Missing
Well type : Missing

Report an error

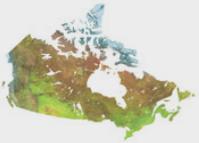


Well casings :
 • from 0 to 67.36m Steel
Sealing components :
 • from 0 to 67.36m Cement/Grout

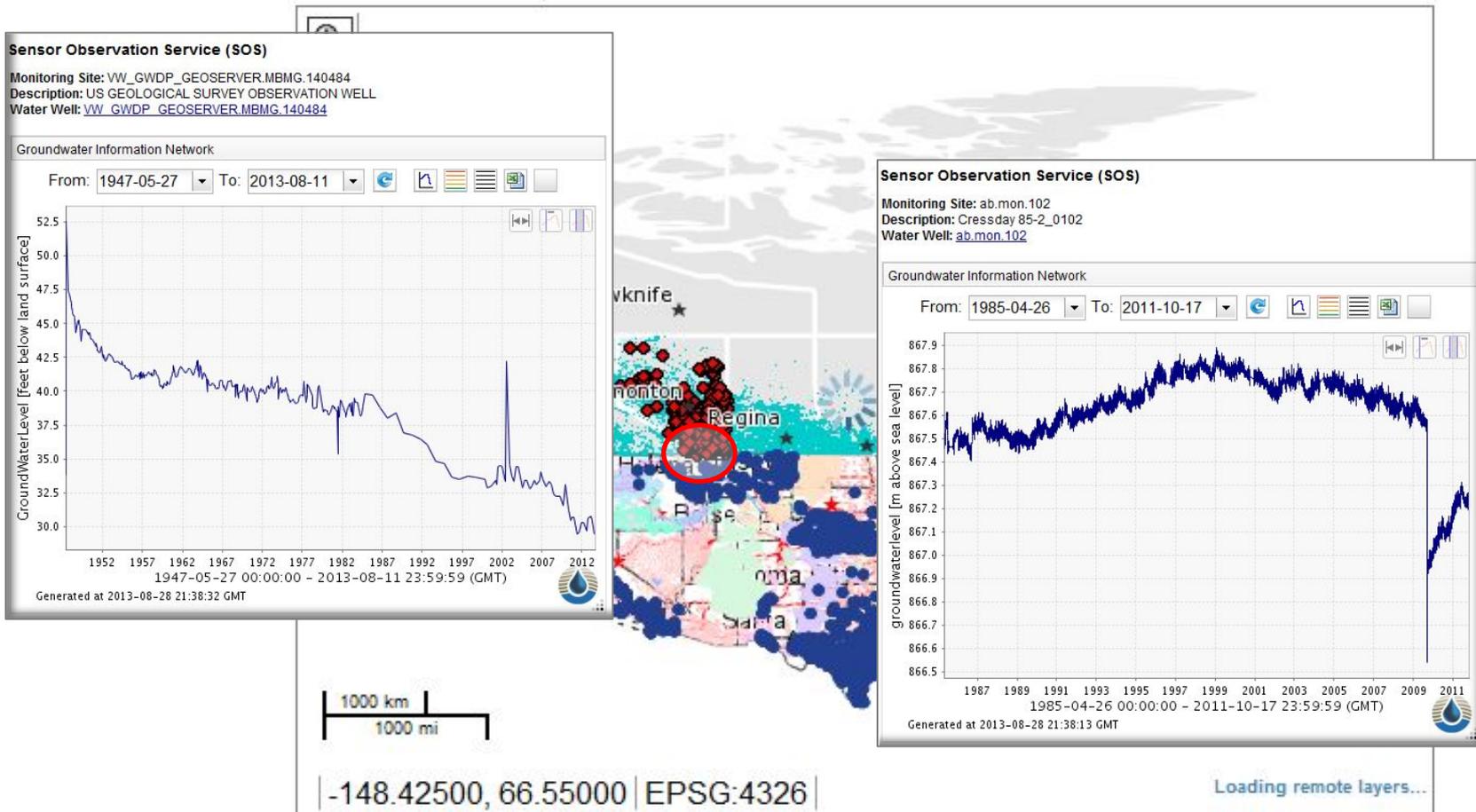
Well log. (*Notice: Values taken from literature)

DEPTH FROM (M)	DEPTH TO (M)	GIN LITHOLOGY	ORIGINAL LITHOLOGY	POROSITY*	HYDRAULIC CONDUCTIVITY*
0.00	0.30	Soil (More Info)	Topsoil		
0.30	1.22	Till (More Info)	Till		[1E-12,2E-6]m/s
1.22	15.24	Shale (More Info)	Shale	[1,10]%	[1E-13,2E-9]m/s
15.24	51.82	Shale (More Info)	Shale	[1,10]%	[1E-13,2E-9]m/s

Loading remote layers...



North American interoperability



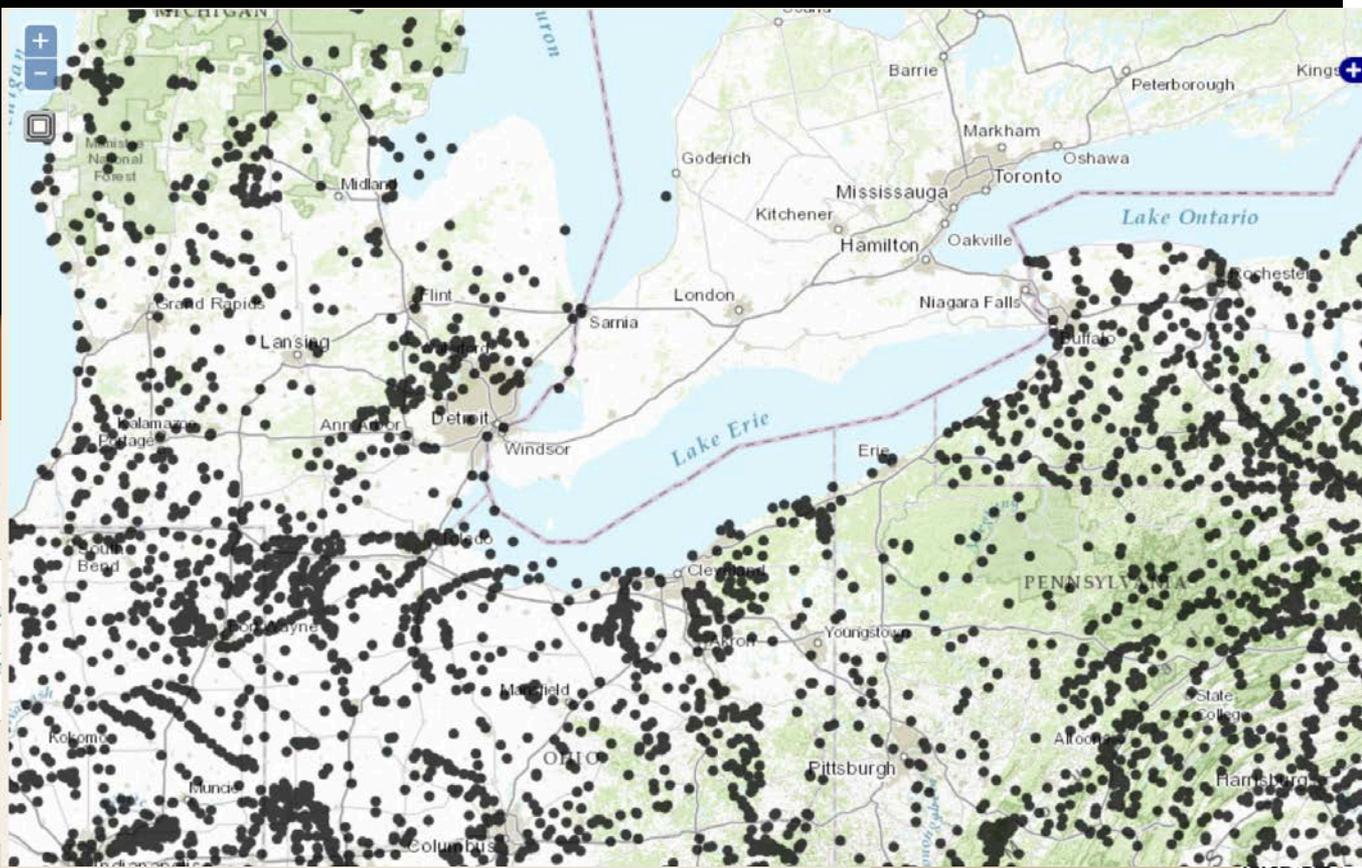
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Technical: National Water Data Infrastructure

Social: Open Water Web



LOCATION

Place:

Country:

State:

County:

SITE PARAMETERS

Site Type: ?

Organization ID: ?

Site ID: ?

HUC: ?

SAMPLING PARAMETERS

Sample Media: ?

Characteristic Group: ?

Characteristics: ?

Parameter Code: ?
(NWIS ONLY)

Date range - from: to:

Quality data
USEPA,

Toledo, OH Water Ban

Issue: Excess nutrient loading to Lake Erie causes toxin-producing harmful algal blooms (HAB)



Photo Credit: International Joint Commission 2014 LEEP Report

Locate relevant data: Maumee River watershed streamflow and phosphorus concentrations

Environmental Data Discovery and Transformation - Version 1.3.23

Access and Integrate Environmental Observations for Coastal Decision Support

Choose Data Create Project Location EnDDAT Information

USGS Time Series (TWIS, Plotting Tool) 6-hr Quantitative National Precipitation National Data Buoy Center (NDBC)

Great Lakes Coastal Forecasting System (GLCFS) 1-hr Quantitative North Central Precipitation

USGS Water Quality (Water Quality)

Search within a 10 mile bounding box from selected project (click marker to identify)

NWIS GLCFS Water Quality Precipitation NDBC

Overview Active Station

Maumee River at Waterville OH
Station ID: 04193500
Approximate distance to active project: 7.890 miles

Available Data:

Property	Begin Time	End Time
<input type="checkbox"/> Temperature, water, degrees Celsius Daily Maximum	1951-10-01	1974-09-30
<input type="checkbox"/> Temperature, water, degrees Celsius Daily Minimum	1951-10-01	1974-09-30
<input type="checkbox"/> Discharge, cubic feet per second Daily Mean	1890-11-20	2014-08-10
<input type="checkbox"/> PCode 80154 Daily Mean	1950-04-12	2003-09-30
<input type="checkbox"/> PCode 80155 Daily Mean	1950-04-12	2003-09-30
<input type="checkbox"/> Discharge, cubic feet per second Instantaneous	2007-10-01	2014-08-11
<input type="checkbox"/> Caseb height, feet Instantaneous	2014-04-13	2014-08-11

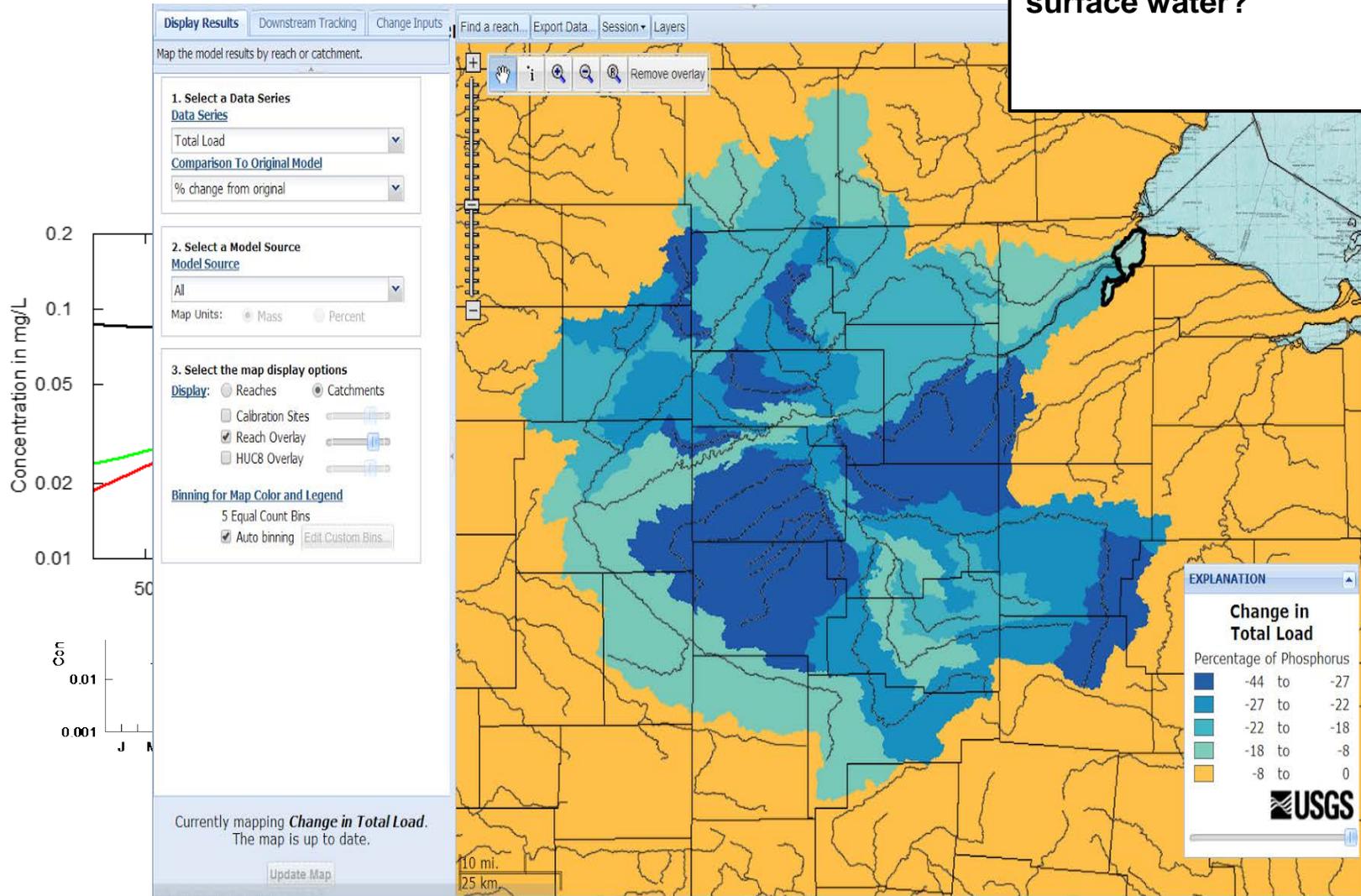
Powered by Leaflet - Tiles © Esri - Source: Esri, DeLorme, NAVTEQ, USGS, Intermap, PC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Swis (Tailand), Swis (Tailand), Swis (Tailand), Swis (Tailand)

Public Reach USGS Modeling Reach GARI Tributary NAWQA Sites

Submit

Toledo, OH Water Ban

How would a 50% reduction in fertilizer application in the Maumee River watershed impact phosphorus loads to surface water?



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Proposal

- We are proposing an Open Water Data Initiative that will:
 - Build on the work of ACWI, FGDC, OGC, IWRSS, CUAHSI, WSWC and others to integrate water information into a connected, national water data framework
 - Capitalize on cross-government interest in big data, IT innovation, Open Data, Data.gov, etc.
 - Provide a platform for innovation, modeling, data sharing and solution development.

Charge for ACWI

- Revive and populate the joint Subcommittee on Spatial Water Data to design a national water data infrastructure;
 - *Meeting scheduled for next Wed., August 28.*
- Work with IWRSS consortium members in the scoping and implementation of pilot activities;
- Create an integrated water data portfolio for specific hydrologic regions or basins;
- Develop a technical reference architecture that supports the sharing of water data and links observations to geospatial data;
- Leverage the Geospatial Platform to make water data more accessible and to support water data community collaboration;

Charge for ACWI cont.

- Identify how existing investments in water data sharing can be integrated and leveraged;
- Engage the international community in standards and technology development including the Open Geospatial Consortium;
- Identify and prioritize improvements to relevant framework geospatial data (National Hydrographic Dataset, Watershed Boundary Dataset, National Elevation Dataset, National Geologic Map Database, and the National Cooperative Soil Survey);
- Utilize the ACWI coordination and governance structure to support related activities in the federal / academic / commercial water sector.

Questions?

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Nate Booth
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