



National Ground-Water Monitoring Network

Advisory Committee on Water Information—Subcommittee on Ground Water

Status Report from the Subcommittee on Ground Water

Bill Cunningham, USGS; Co-Chair SOGW

Bob Schreiber, CDM Smith; Co-Chair SOGW

Lauren Schapker, NGWA; Executive Secretary, SOGW

Daryll Pope, USGS; NGWMN Manager

Candice Hopkins, USGS; NGWMN Portal Lead

Selected State Agency Groundwater Data Providers

Janie Hopkins (TWDB), Janae Wallace (UGS), Kevin Donegan (CDWR), John LaFave (MBMG), and Sharon Kroening (MPCA)



Presentation Outline

- Introduction
- Background/Purpose
 - Bob Schreiber
- Cooperative Agreements and Network Growth
 - Daryll Pope
- NGWMN Portal
 - Candice Hopkins
- Data Provider Benefits
 - TWDB, UGS, CDWR, MBMG, MPCA
- Use of NGWMN data
 - Daryll Pope
- New activities of the SOGW
 - Lauren Schapker



Acknowledgements

- SOGW Members and contributors
 - NGO's, States, Feds, Consultants, and Corporations
- ACWI & other ACWI groups:
 - Ongoing support, guidance, & interaction
- Executive Secretary & admin support
 - NGWA
 - USGS HQ
- State Agency data providers
- Many others



Subcommittee on Groundwater (SOGW) within ACWI

- Co-Chairs – Federal & Non-Federal
- SOGW Members:
 - ACWI Representatives & Alternates
 - Interested Individuals
 - “Listeners”



National GW Monitoring Network (Sole Initial Task for SOGW)

- Network Definition and Purpose
- Network Development
 - Timeline
 - Participants
 - Design Criteria
 - Implementation



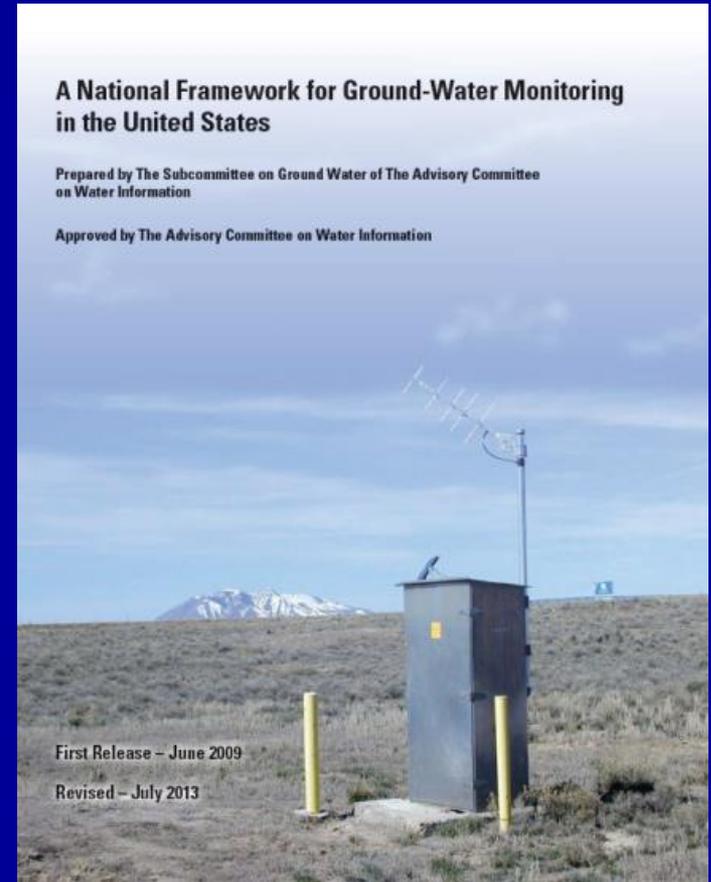
Purpose & Scope (Authorized in SECURE Water Act)

- Long-term ground-water quantity and quality monitoring framework for...
 - Planning, management, and development of GW supplies
 - To meet ...water needs, and ecosystem requirements.
- Monitoring and collaboration to assist in....
 - Assessing quantity of U.S. GW reserves
 - **As constrained by GW quality.**



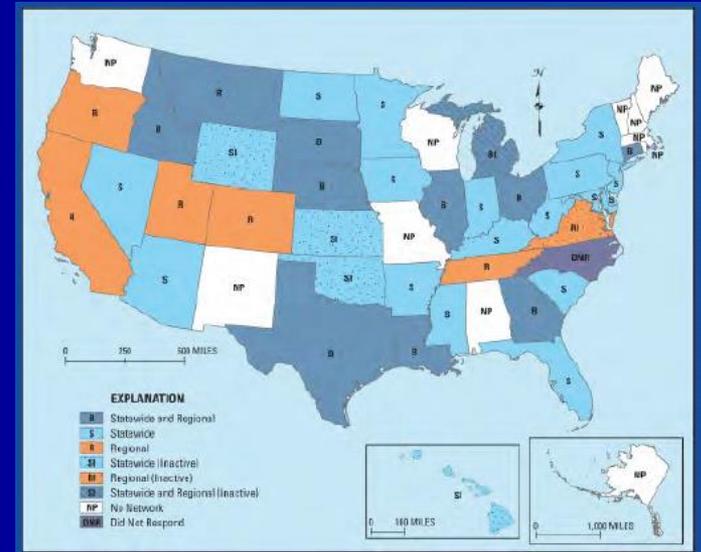
Definition of “Network”

- **Selected, Key:**
 - Monitoring Points
 - Parameters
- **Purposes in Design →**
- **NOT a “Repository”**
- **Can Access Repositories:**
 - Federal: NWIS, STORET
 - States’ and Other Entities’



Why Do We Need the Network?

- Trend-Tracking
- Impacts-Identification
- Analysis & Assessment
- Planning & Management
- “Patchwork Quilt” →
 - Data Provider Differences
 - Interstate Contrasts
- Fill Data Gaps
- Transboundary Issues



Timeline

- Long Process
- But, Worthwhile
- Leveraged:
 - Prior Attempts
 - “GW Vacuum”

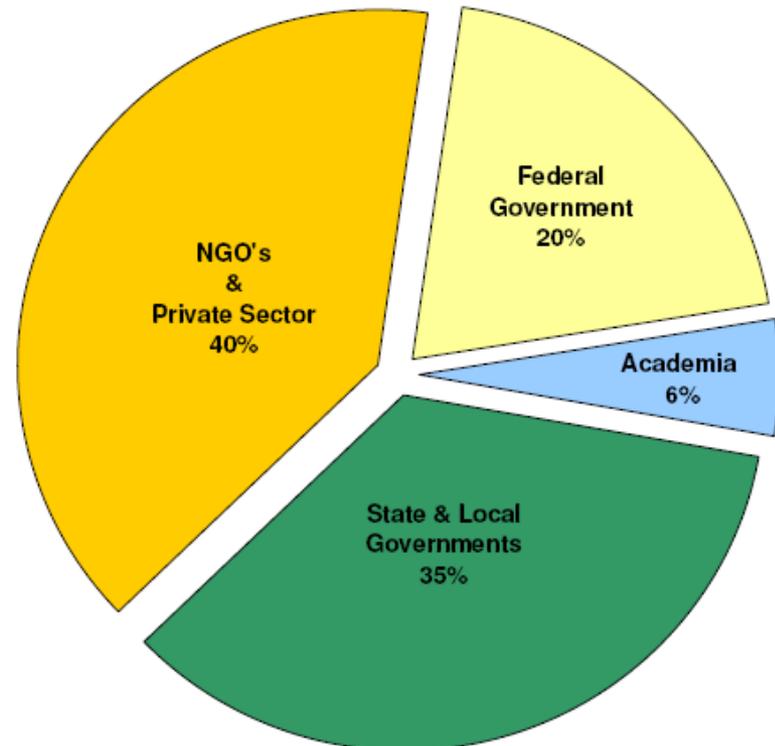
2005-6	NGWA White Paper
2007	SOGW formed by ACWI
2009	Framework Document
2009-11	Five pilot projects
2011	Web portal version 1
2013	Framework Document revisions
2013-17	Web portal updates
2014	WQ piloting – 2 States
2015	Federal Funding Approved
2015+	Formal Implementation

Initial Involvement

- *All Sectors*
- *Significant Commitment*
- *Dedicated Volunteers*

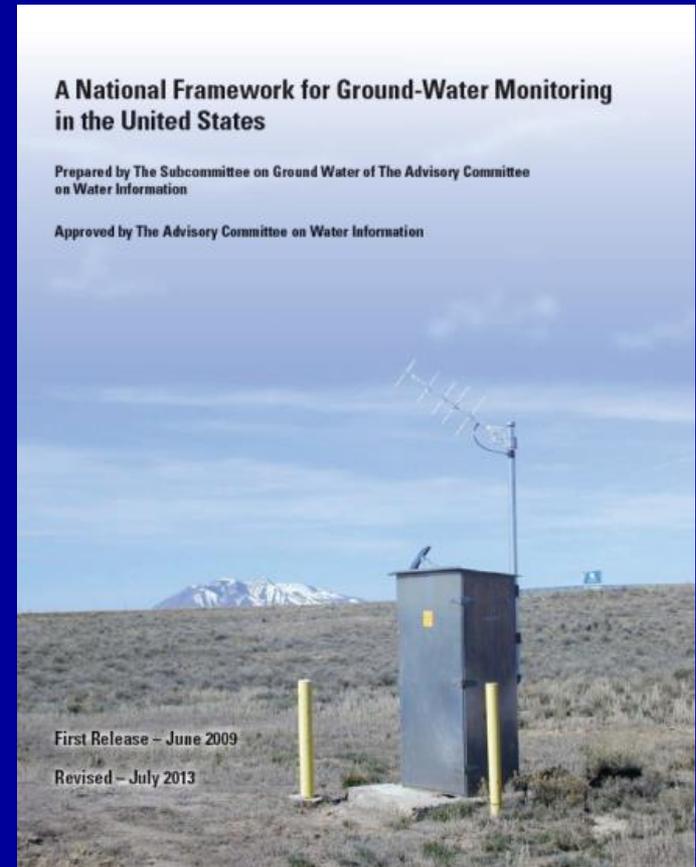
- *ASCE*
- *GWPC*
- *ICWP*
- *AASG*
- *NGWA*
- *TCEQ*
- *USGS*
- *USEPA*
- *ASDWA*
- *WEF*
- *USDA*
- *ASIWPCA*
- *And more....*

>70 people from >54 organizations



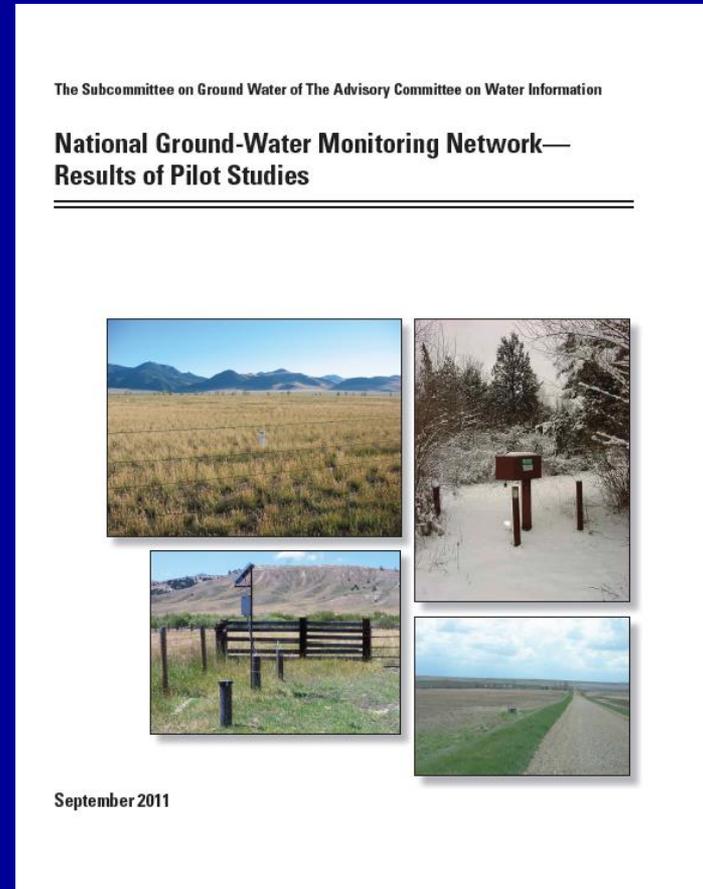
Key NGWMN Design Criteria

- **Network**
 - Not a repository
- **Flexibility**
 - With basic requirements
- **Inclusivity**
 - Fostering partnerships
- **Ownership**
 - By data providers
 - Not by federal agencies



Approach

- Framework Design
- Pilot Testing →
- Web Portal
- Operations
 - By USGS
- Oversight
 - Program Board
 - ACWI-SOGW



Progress since last meeting

- Cooperative Agreements status
 - Data Provider status
 - 2017 Funding opportunity status
 - Future cooperative agreements plans
- New Data Provider meeting in Dec 2017
- NGWMN Network status and growth

2017 NGWMN Cooperative Agreements

- Program Board evaluated 19 proposals received in 2017.
- 2017 work funded
 - 5 New Data Providers
 - CO, IA GS, IA DNR, NM, WY
 - Ongoing support to 13 agencies
- Summary of work funded is available at:
https://cida.usgs.gov/ngwmn/doc/NGWMN_FY17_ProjectSummary.pdf
- Awards were made in late spring to early summer

2018 Program Announcement

- Program Announcement opened on September 1st, 2017 and closed on November 30th, 2017
- Provides support for:
 - New data providers:
 - Ongoing support to existing data providers
- Received 26 proposals. Seven are for new data providers.
- Program Board meeting to review proposals scheduled for January.
- Anticipate projects starting in late spring/summer.

New Data Provider Meeting

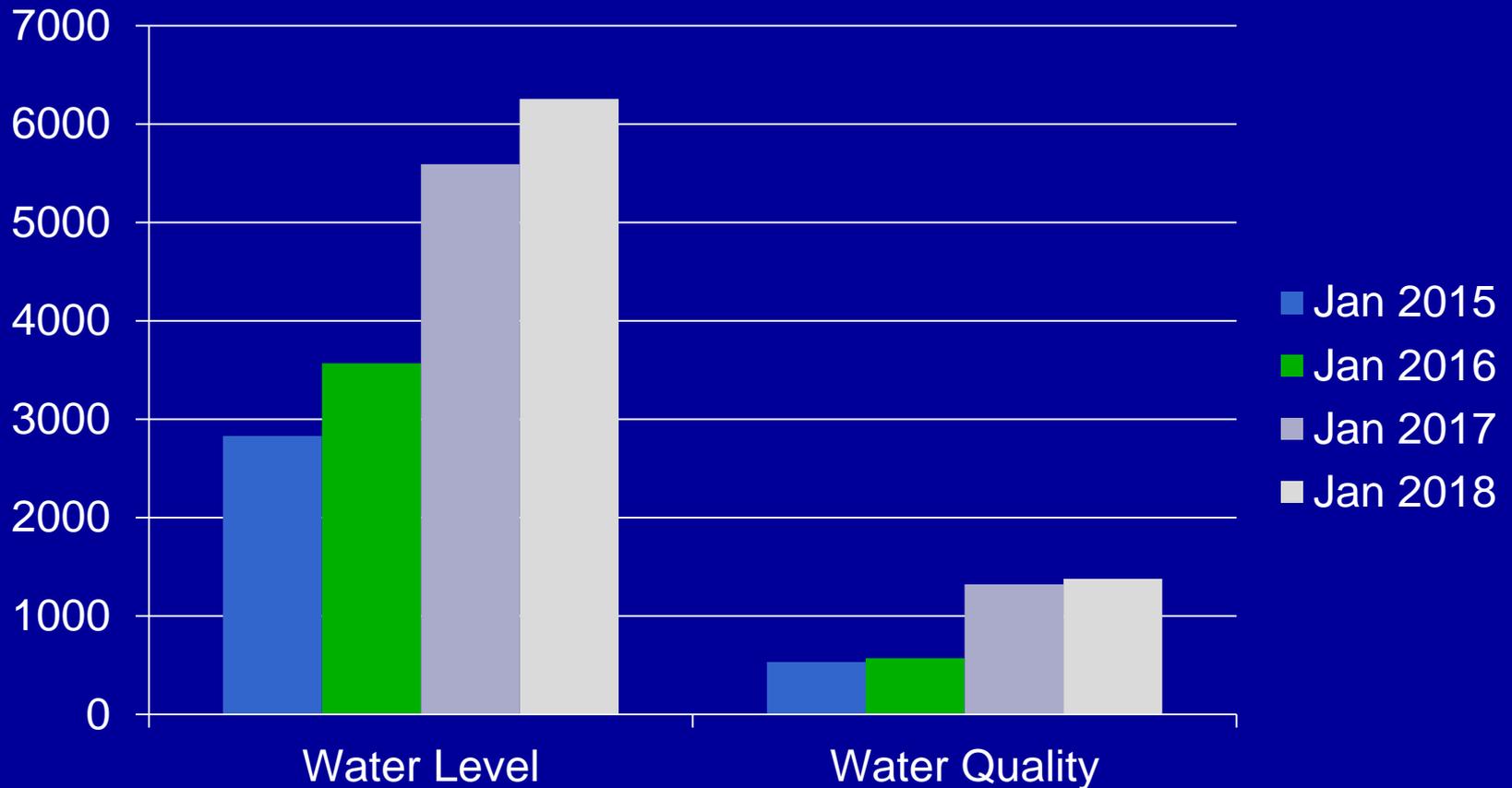
- A meeting with the seven new data providers from the 2017 round of funding was held in Nashville in December, 2017.
- USGS staff working with new data providers also participated.
- Current data providers from Montana and Utah attended to share their experiences.
- Meeting was held in conjunction with the NGWA Groundwater Summit. Several talks related to the NGWMN were presented at the Summit.



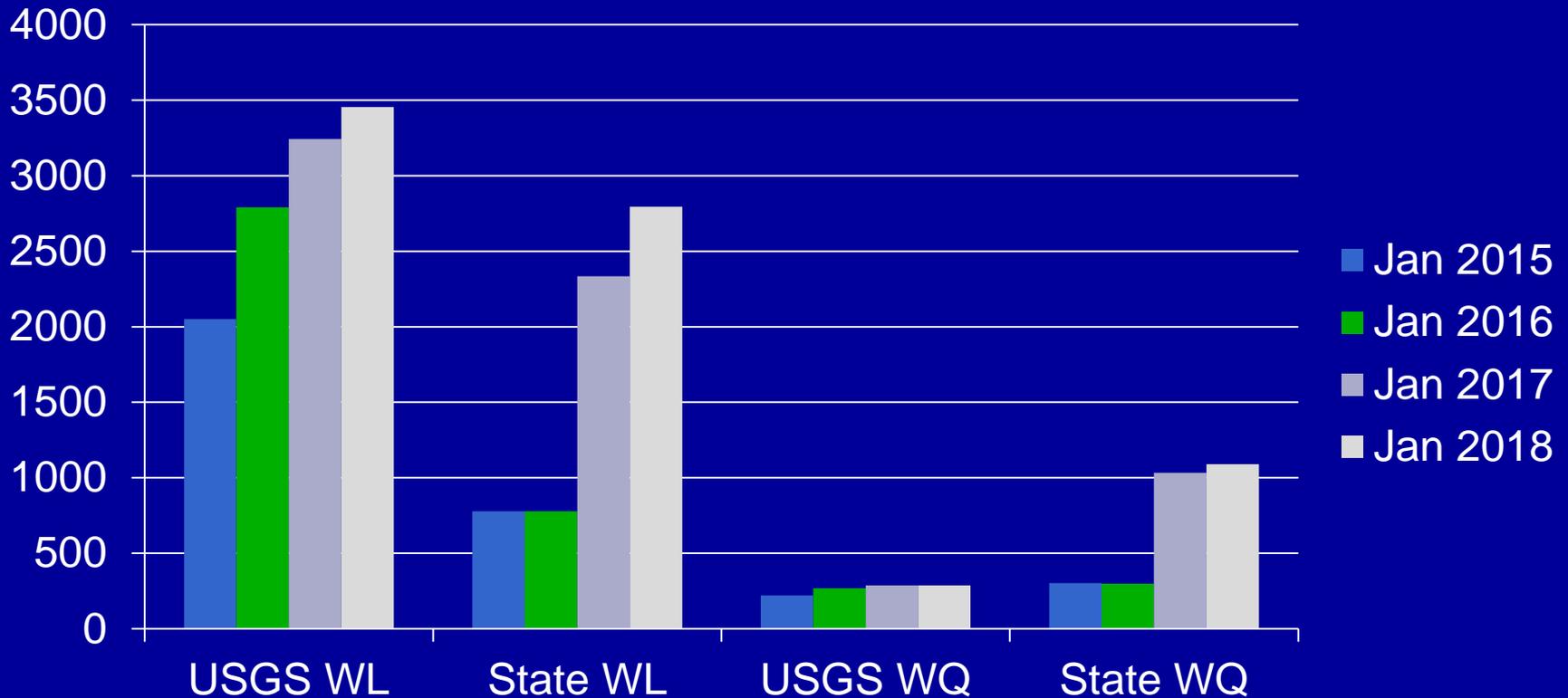
Growth of Network

- Steady Network Growth since 2015
- Initial growth based on pilot studies and USGS water-level sites
- Recent growth due to completion of Cooperative Agreements
- Will show:
 - Graphs of growth
 - Maps of current data providers and projects

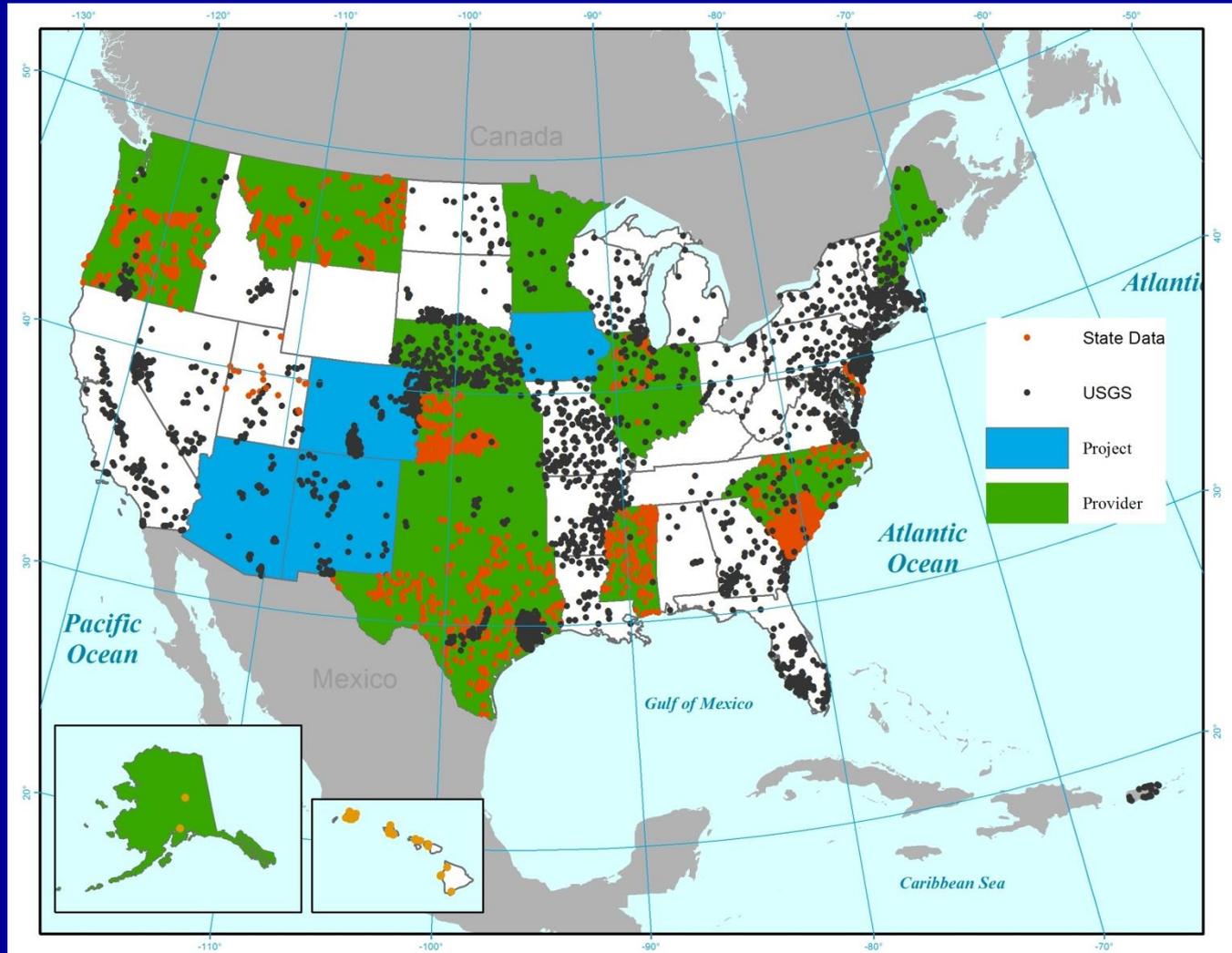
Network Growth



Growth Details by Source



Water-Level Data Providers and Current Projects



Data Portal

ACWI
Advisory Committee
on Water Information

National Ground-Water Monitoring Network

NGWMN NETWORKS

Water level: ?

Subnetwork: ?

Monitoring Category: ?

Water quality: ?

Subnetwork: ?

>> FILTER MAP DATA  

CURRENT STATUS

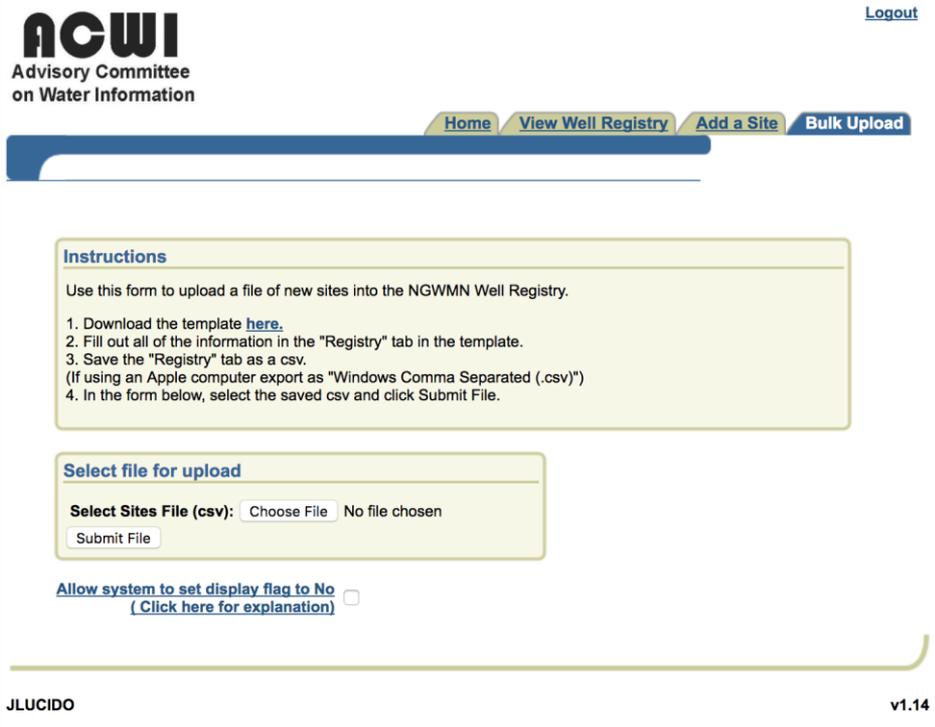
7190 Sites mapped
7190 Sites matching filter
6259 Water-level network wells
1378 Water-quality network wells



-102.080078, 28.920289

New Features (from 2017)

- Data Provider Pages
- Well Registry Bulk Load
- Deletes from Well Registry now supported
- Water Levels web service usage tracking
- Water Level Statistics



The screenshot shows the ACWI (Advisory Committee on Water Information) website interface for bulk uploading sites. The page features a navigation bar with links for Home, View Well Registry, Add a Site, and Bulk Upload. A 'Logout' link is located in the top right corner. The main content area is titled 'Instructions' and provides a step-by-step guide for uploading a CSV file. Below the instructions is a 'Select file for upload' section with a 'Choose File' button and a 'Submit File' button. At the bottom of the form, there is a checkbox labeled 'Allow system to set display flag to No' with a link to '(Click here for explanation)'. The footer of the page includes the text 'JLUCIDO' on the left and 'v1.14' on the right.

ACWI
Advisory Committee
on Water Information

Logout

Home View Well Registry Add a Site Bulk Upload

Instructions

Use this form to upload a file of new sites into the NGWMN Well Registry.

1. Download the template [here](#).
2. Fill out all of the information in the "Registry" tab in the template.
3. Save the "Registry" tab as a csv.
(If using an Apple computer export as "Windows Comma Separated (.csv)")
4. In the form below, select the saved csv and click Submit File.

Select file for upload

Select Sites File (csv): Choose File No file chosen

Submit File

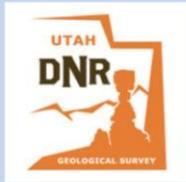
[Allow system to set display flag to No](#)
(Click here for explanation)

JLUCIDO v1.14

Data Provider Pages

<https://cida.usgs.gov/ngwmn/provider/UTGS>

National Ground-Water Monitoring Network Utah Geological Survey (UTGS) Data Provider Information



Link to: [Utah Geological Survey Groundwater Information](#)

NGWMN Contact:

Janae Wallace
801-537-3387
janaewallace@utah.gov

The Utah Geological Survey maintains a water-quality monitoring network that consists of both wells and springs. The network began as a NGWMN water-quality pilot project in 2014 with support from the USEPA. Sites are collected annually and are analyzed by the USEPA Region 8 Laboratory in Denver.

Principal aquifers monitored include the Basin and Range basin-fill aquifer, Basin and Range carbonate-rock aquifers, and Colorado Plateau aquifer.

NGWMN Progress Reports:

[Final report from initial NGWMN project, July, 2015 to July 2016](#)

Current NGWMN Projects:

2016 Round 1: 7/1/2016-6/30/2016

Project to support maintenance of database connections to NGWMN portal

2016 Round 2: 8/14/2016-8/13/2018

Project is to fill site-information gaps and perform well maintenance work. Survey grade GPS locations and land-surface altitudes will be determined at all sites and well construction details will be verified. Gap filling will also include entry of historic water-quality information from paper files and spreadsheets into the agency database. Well maintenance work is to pump 8 monitoring wells to verify the connection between the wells and the aquifer.

NGWMN Presentations:

[December 2016 presentation to SOGW](#)

Site Selection and Classification	Data Collection Techniques	Data Management	Other Agency Information
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Site Selection and Classification	Data Collection Techniques	Data Management	Other Agency Information
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Site Selection and Classification

Utah Geological Survey Site Selection

For the UGS Network, we selected wells and springs in the principal aquifers of Utah (Basin and Range basin-fill aquifers, Basin and Range carbonate-rock aquifers, and Colorado Plateau aquifers) and "other aquifers" that support withdrawals of regionally significant quantities of water. Three important areas that fall into the "other aquifers" on the national aquifer map (U.S. Geological Survey, 2003) are the Navajo Sandstone aquifer in the St. George region (significant also as a state-bounding aquifer), the karst aquifers of the southern Uinta Mountains in Ashley National Forest, and the valley-fill aquifers in the Middle Rocky Mountain Physiographic Province (intermontane basins), which provide much of the water to steadily growing rural "Wasatch Back" (a local term for communities situated east of the more populous Wasatch Front of the Middle Rocky Mountains) water users (similar to the National aquifer system of the Northern Rocky Mountain Intermontane Basins in Montana). We also sampled springs and wells (some of which are monitor wells established by the U. S Geological Survey during the 1970s) in the Uinta Basin, which is within the Colorado Plateau aquifer system and an active hydrocarbon-producing and hydraulic fracturing region.

We chose to include wells and springs from the existing UGS Network. To ensure future accessibility, most of the wells in this network are regularly pumped; they include privately held water sources for consumptive use, irrigation wells from farms and ranches, and public water sources for fish hatcheries. We chose wells with lithologic logs or sufficient aquifer information to ensure that they are representative of the aquifer of interest. We only incorporate a public water supply source into the network if it was the only representative, accessible well in the area or sampled infrequently for limited water quality chemistry (i.e., just nitrate and/or sulfate every few years), and only if the location is widely publicly known and allowed to be disclosed.

Most of the sites selected for the Basin and Range carbonate-rock aquifers are springs because they are the major water source emanating from these aquifers. Much of western Utah and the Wasatch Front, the most populous region of the state, are occupied by Basin and Range basin-fill aquifers, so we selected two representative water quality sites from each basin. For the Colorado Plateau aquifers, we tried to select at least one site per populated region (especially around popular and heavily traveled destinations such as Moab, an area that caters to two national parks) or per region of perceived ecological value.

Although the Pacific Northwest basin-fill aquifers and the Pacific Northwest volcanic-rock aquifers are present in the far northwest corner of Utah, they are not aquifers of significant use in the state. Therefore, we did not target these aquifers as part of the sampling network.

Site Classification

For the Basin and Range basin-fill aquifers, we assigned subnetworks on a basin-by-basin basis. Many of the Basin and Range basin-fill aquifers have undergone hydrologic research, much which is published and freely available. The USGS, in cooperation with the Utah Division of Water Rights (UDWRI), produces a yearly report summarizing the water-level status of the areas of groundwater development. We assigned subnetworks based on these published reports.

Data Provider Pages

National Ground-Water 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 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

Data Providers

Current Data Providers | Resources for New Data Providers | Pending Data Providers

Current Data Providers

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 following agencies are currently contributing to the NGWMN.



National Aquifer Name	UNCLASSIFIED
Aquifer Type	CONFINED
Water Level Network	Special -
Water Quality Network	-
Additional Info	link

SELECT FOR DOWNLOAD

National Ground-Water Monitoring Network Alaska Department of Natural Resources (AKDNR) Data Provider Information



Link to: [Alaska Department of Natural Resources Groundwater Information](#)

NGWMN Contact:

Melissa Hill
(907) 369-8646
melissa.hill@alaska.gov

Description of agency network. The AKDNR is currently working on a project to become a new NGWMN data provider.

Wells in the Alaska unconsolidated-deposit aquifers Principal aquifer are currently monitored.

NGWMN progress reports:

None

Current NGWMN Projects

2016 Round 1: June 2016 to June 2018

Project is to become a data provider to the NGWMN in year 1 and to provide persistent data services in year 2. A network of 23 trend water-level sites and 10 water-quality sites are proposed.

2016 Round 2: October 2017 to October 2017

Project is to perform well maintenance at an existing NGWMN well and to drill a replacement for a NGWMN monitoring well.

NGWMN presentations

[December 2016 presentation to SOGW](#)

Miscellaneous Enhancements (coming 2018)

- Display missing fields
 - Accuracy of water-level measurement
 - Horizontal Location method
 - Horizontal Location Accuracy
 - Altitude Accuracy
 - Method of altitude measurement
- Search Engine Optimization
- Improve cache performance
- Dual attribution of sites

Dual Attribution of Sites

Hallsville

SUMMARY WELL LOG WATER LEVELS

Agency	U.S. Geological Survey
Site Name	Hallsville
Site #	390651092125101
Site Type	WELL
Lat/Long(NAD83)	39.1142,-92.2139
Well Depth	1045 ft
Local Aquifer Name	Canadian Series
National Aquifer Name	Cambrian-Ordovician aquifer system
Aquifer Type	CONFINED
Water Level Network	Trend - Suspected / Anticipated Changes
Water Quality Network	-
Additional info	link


MISSOURI DEPARTMENT OF NATURAL RESOURCES
Missouri Geological Survey


USGS
science for a changing world

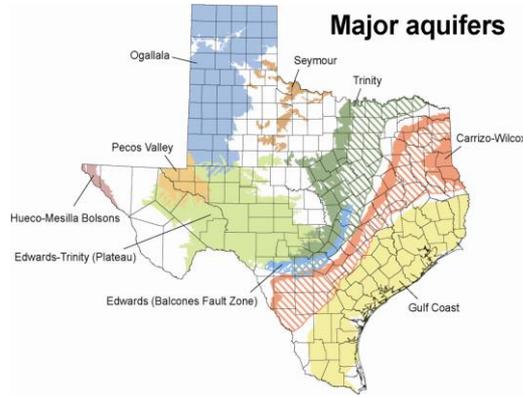
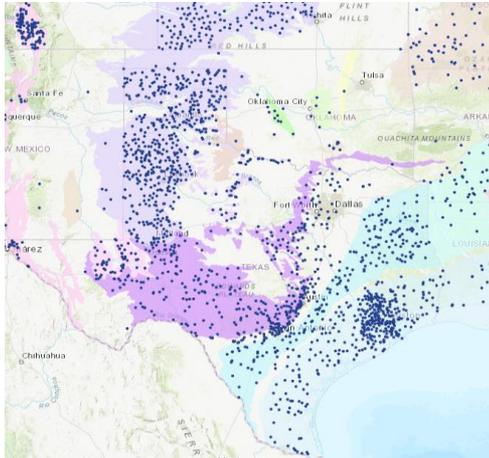
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Attribution of
Agencies with
USGS
Cooperative
Matching Funds

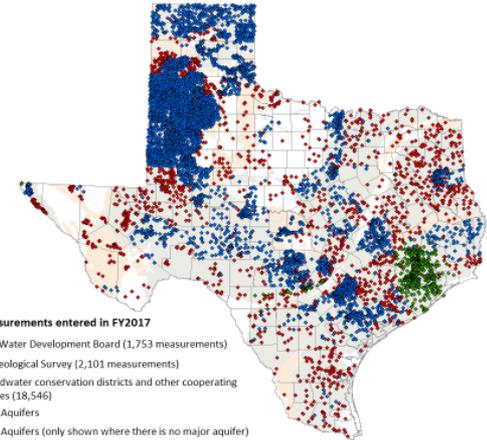
Data Provider Remarks

- Texas Water Development Board
 - Janie Hopkins
- Utah Geological Survey
 - Janae Wallace
- Colorado Division of Water Resources
 - Kevin Donegan
- Montana Bureau of Mines and Geology
 - John LaFave
- Minnesota Pollution Control Agency
 - Sharon Kroening

Texas Water Development Board (TWDB) sites in the NGWMN

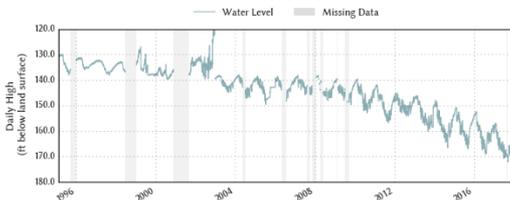


Wells measured by TWDB & Cooperators in the TWDB Groundwater Database



Benefits of TWDB* participation in the NGWMN

- Reiteration of importance of statewide data collection & promotion of our presence within a national network to our Legislators
- Revision of TWDB Water-Level Measuring Manual
- Creation of first web services at the TWDB
- Incorporation of lithology data into TWDB groundwater database

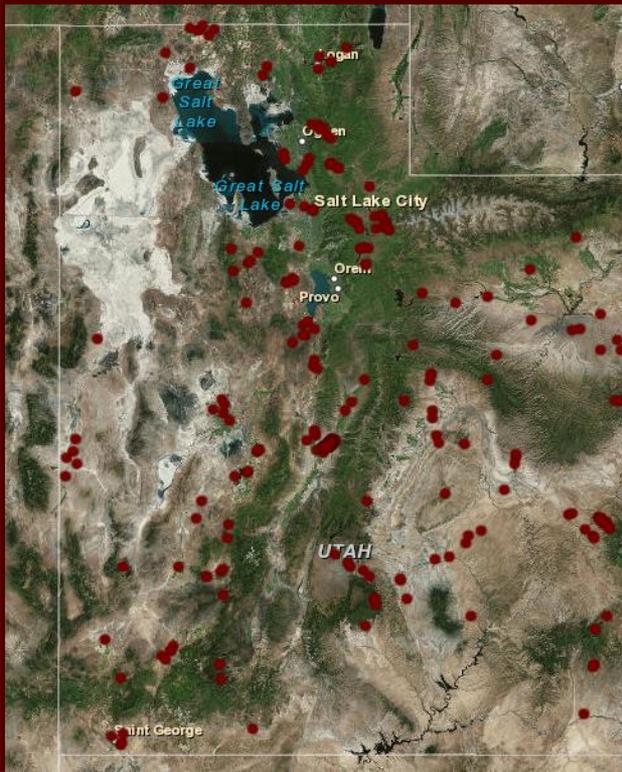


Calibration of trend well, Wheeler Co.

*Unless specifically noted, this presentation does not necessarily reflect official Board positions or decisions.

NGWMN Benefits for UGS (~100 WQ sites)

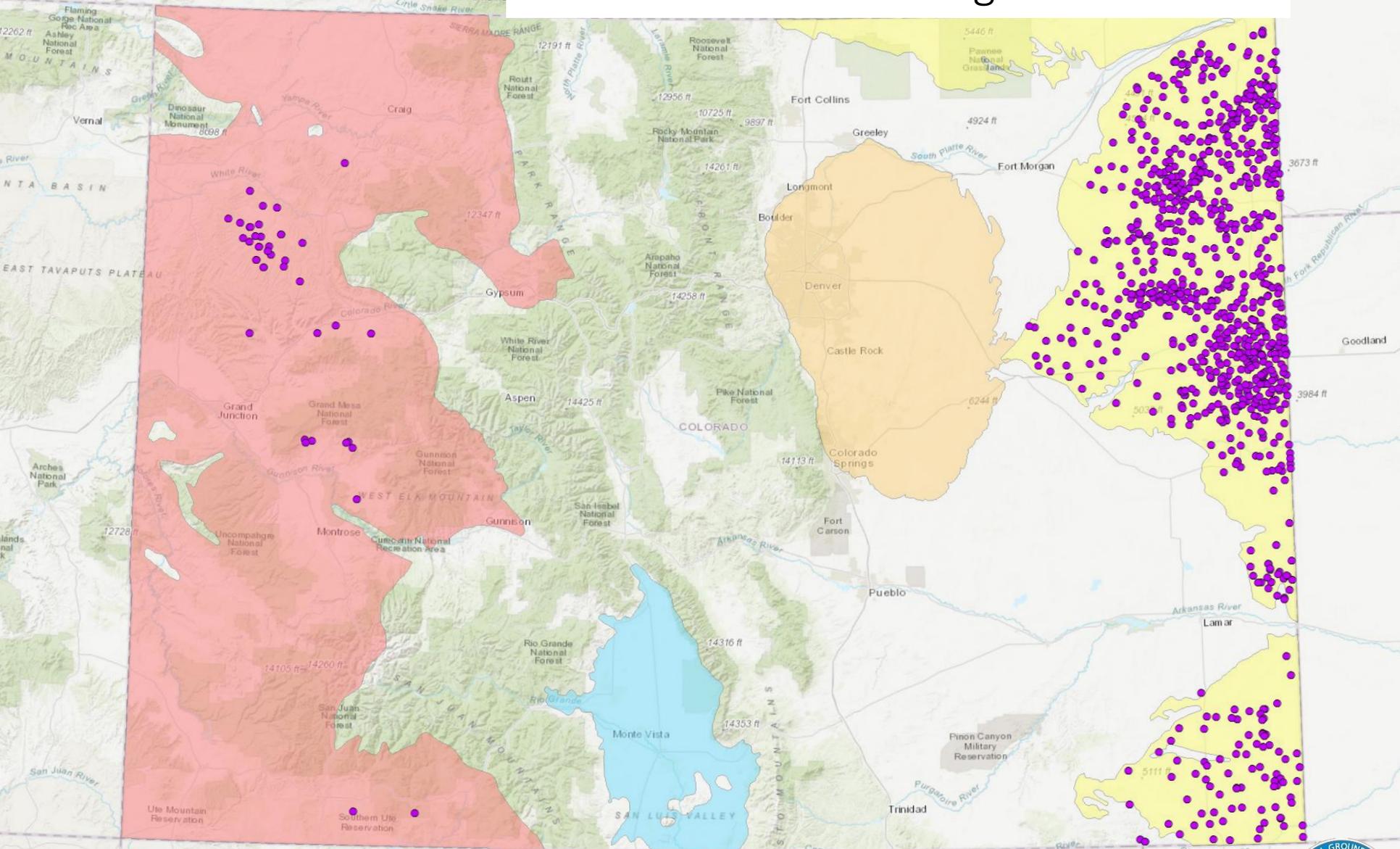
- Prior Sampling Data augmented by new sites
- Site selection – previous studies with regularly monitored wells (Snake Valley and Castle Valley; Uinta Basin);



additional sites selected to fill in gaps in Utah aquifers (USGS)-geographically

-Financial support of lab analysis by U.S. EPA Reg.8 (2014 to present)

-Participation has expanded our network and facilitated the development of a UGS data portal



Legend

- Observation Well
- Colorado Plateaus aquifers
- Denver Basin aquifer system
- High Plains aquifer
- Rio Grande aquifer system



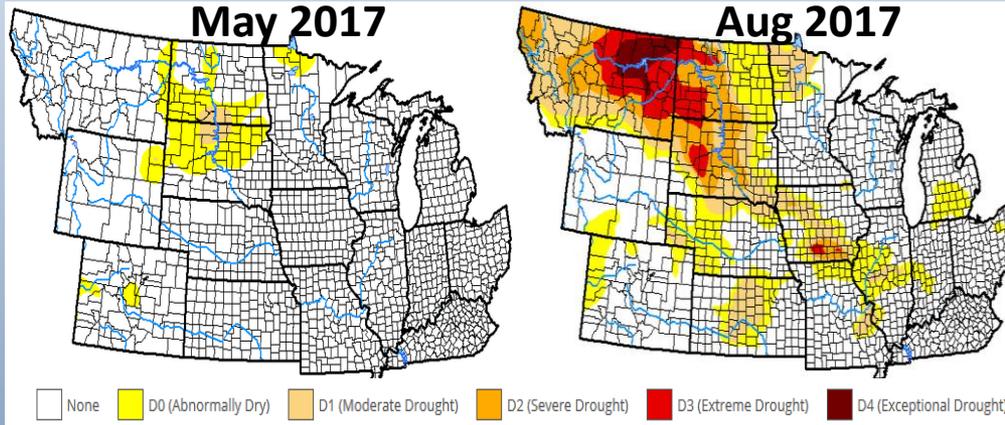
Montana in the NGWMN Drought Impacts

News & Features

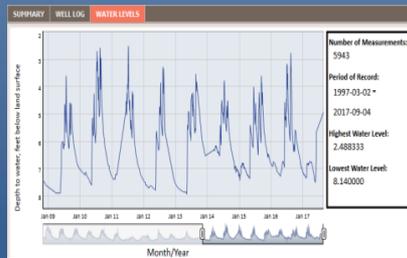
'Flash Drought' Spreads Across Montana in Less Than 3 Months

More than a third of the entire state is now in severe, extreme or exceptional drought

BY ASSOCIATED PRESS // AUG 3, 2017

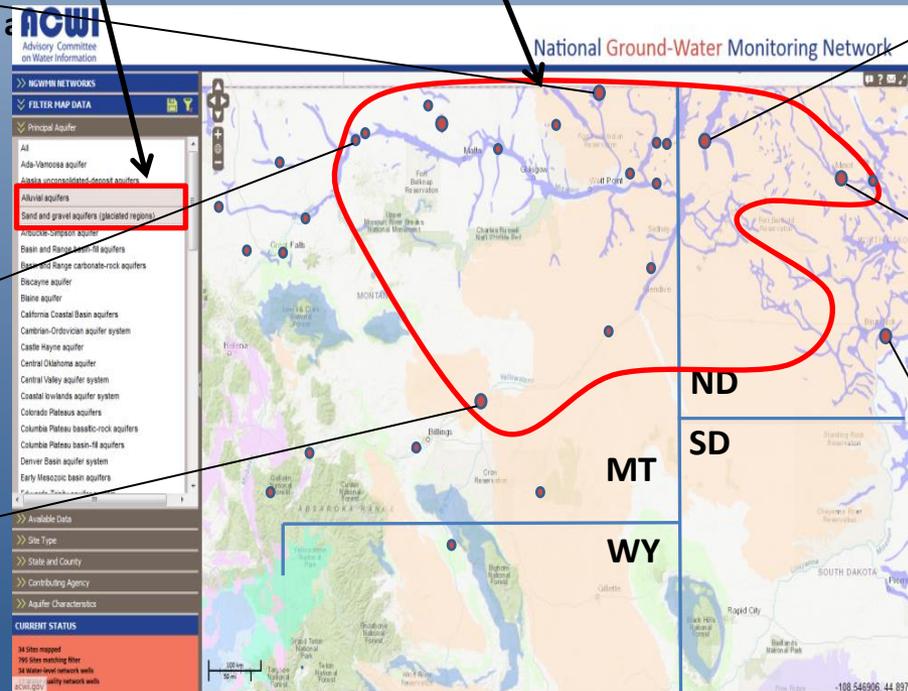


None D0 (Abnormally Dry) D1 (Moderate Drought) D2 (Severe Drought) D3 (Extreme Drought) D4 (Exceptional Drought)



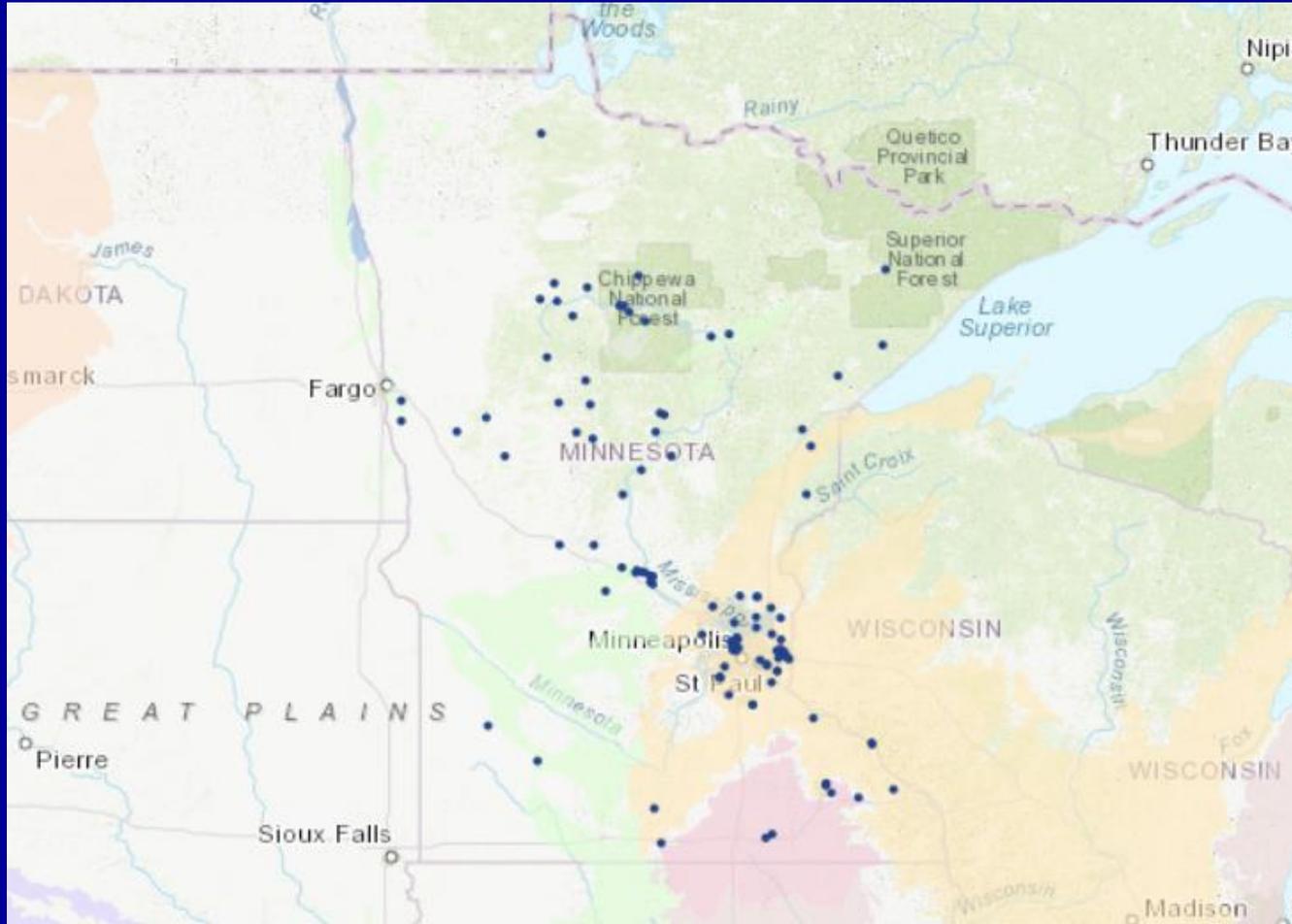
Alluvial aquifers
Sand and Gravel

Extreme/Exceptional Drought

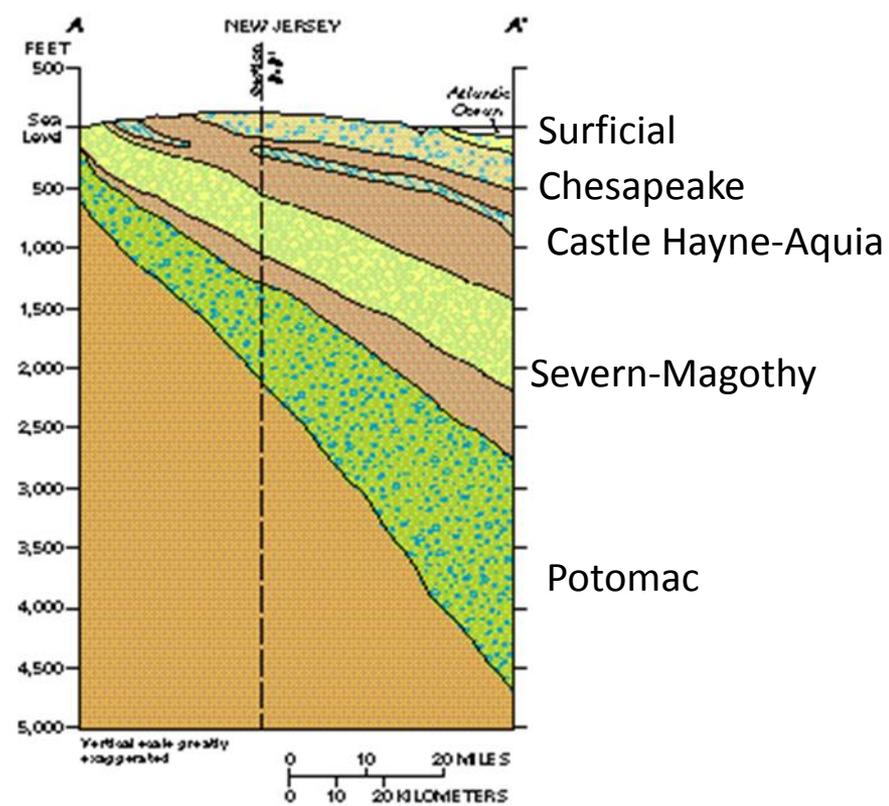
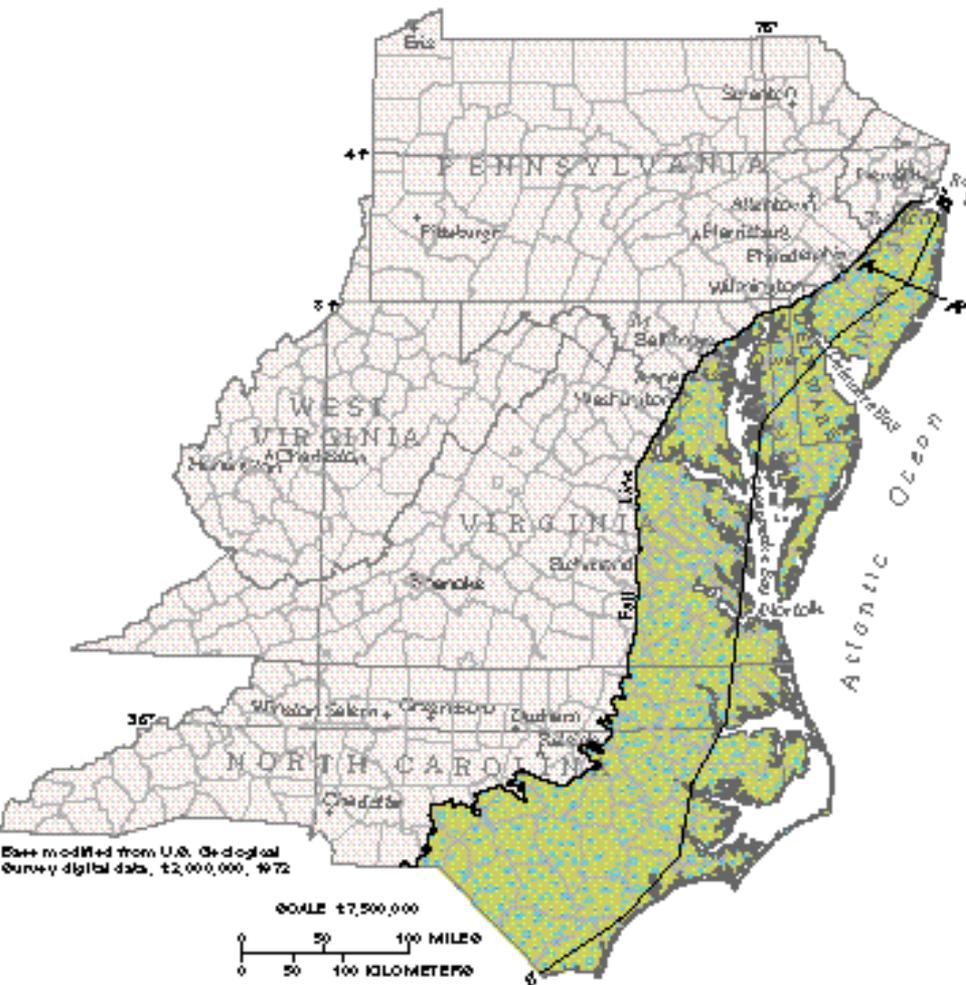


Minnesota Pollution Control Agency

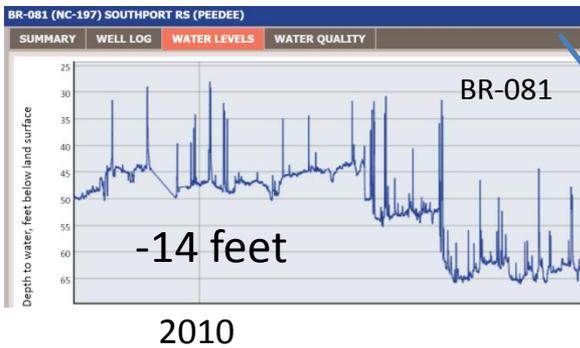
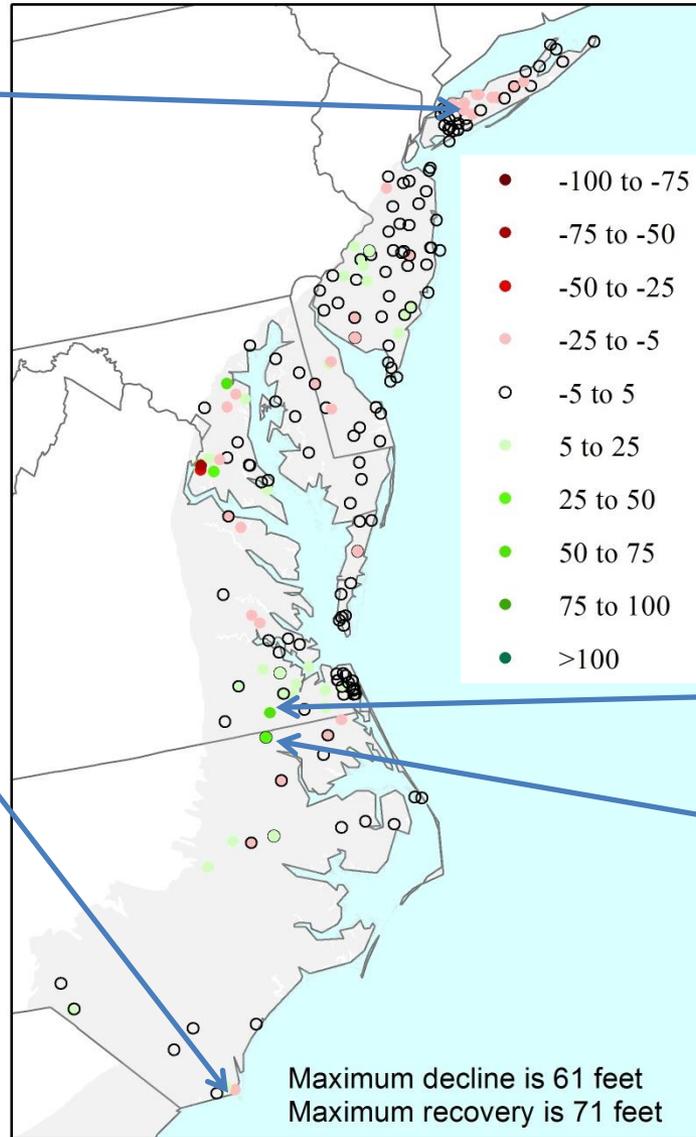
Sharon Kroening



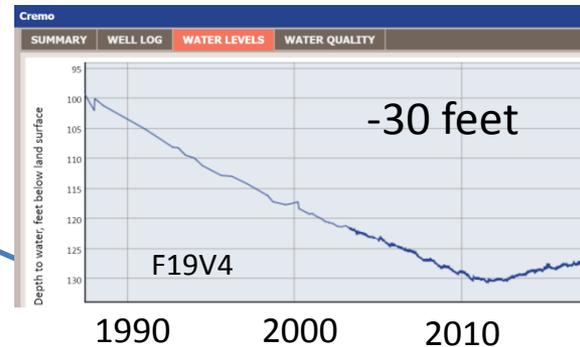
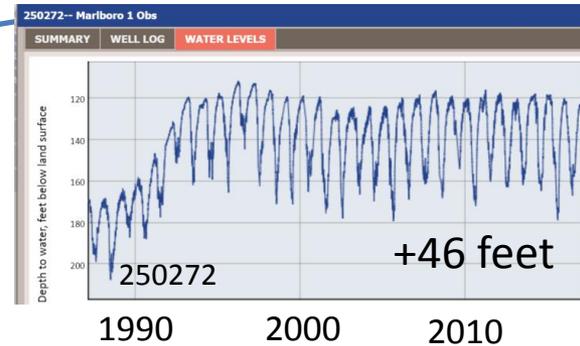
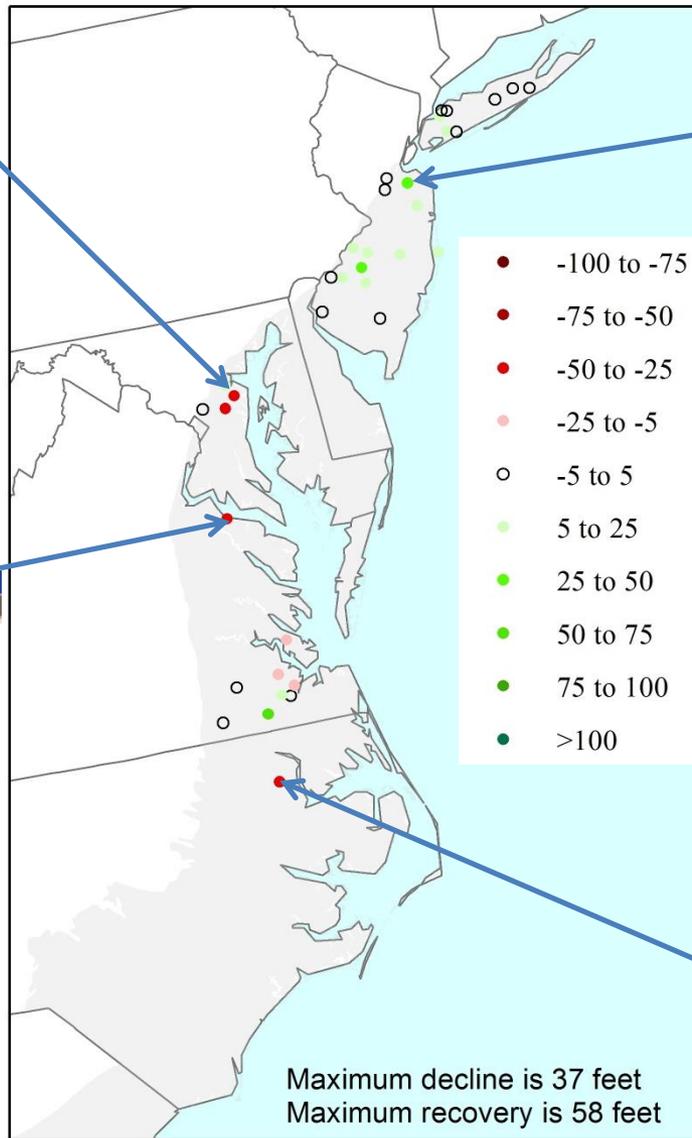
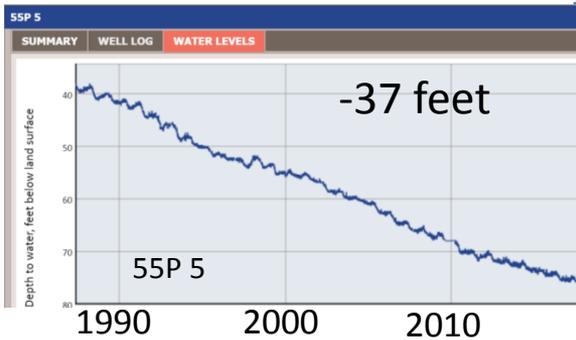
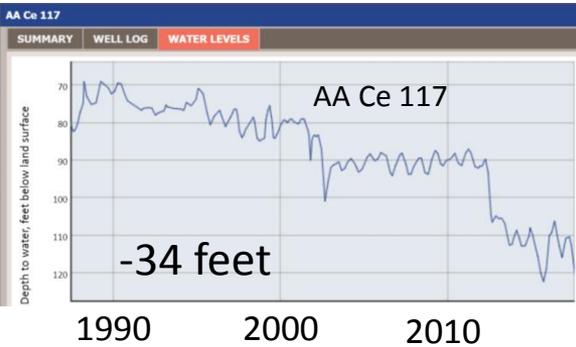
Evaluation of water-levels from the Northern Atlantic Coastal Plain



10-year change



30-year change in the Potomac aquifer



New Activities of the SOGW



New Activities of the SOGW

1. Groundwater usage/quantity
2. GW/SW Interaction
3. Data Preservation
4. Regional Issues
5. Transboundary Themes
6. Integrated modeling and monitoring
7. Innovative Monitoring Techniques
8. PWS Wells
9. Groundwater modeling
10. Remote sensing

New Activities of the SOGW

- Next Steps:
 - Subcommittee ranked preferences independently
 - Monthly calls to flesh out topics and determine paths forward
 - Expect to come to ACWI with ‘Work Groups’ once we select future directions
 - Potential collaboration with other ACWI subcommittees

Thank you!

Questions?