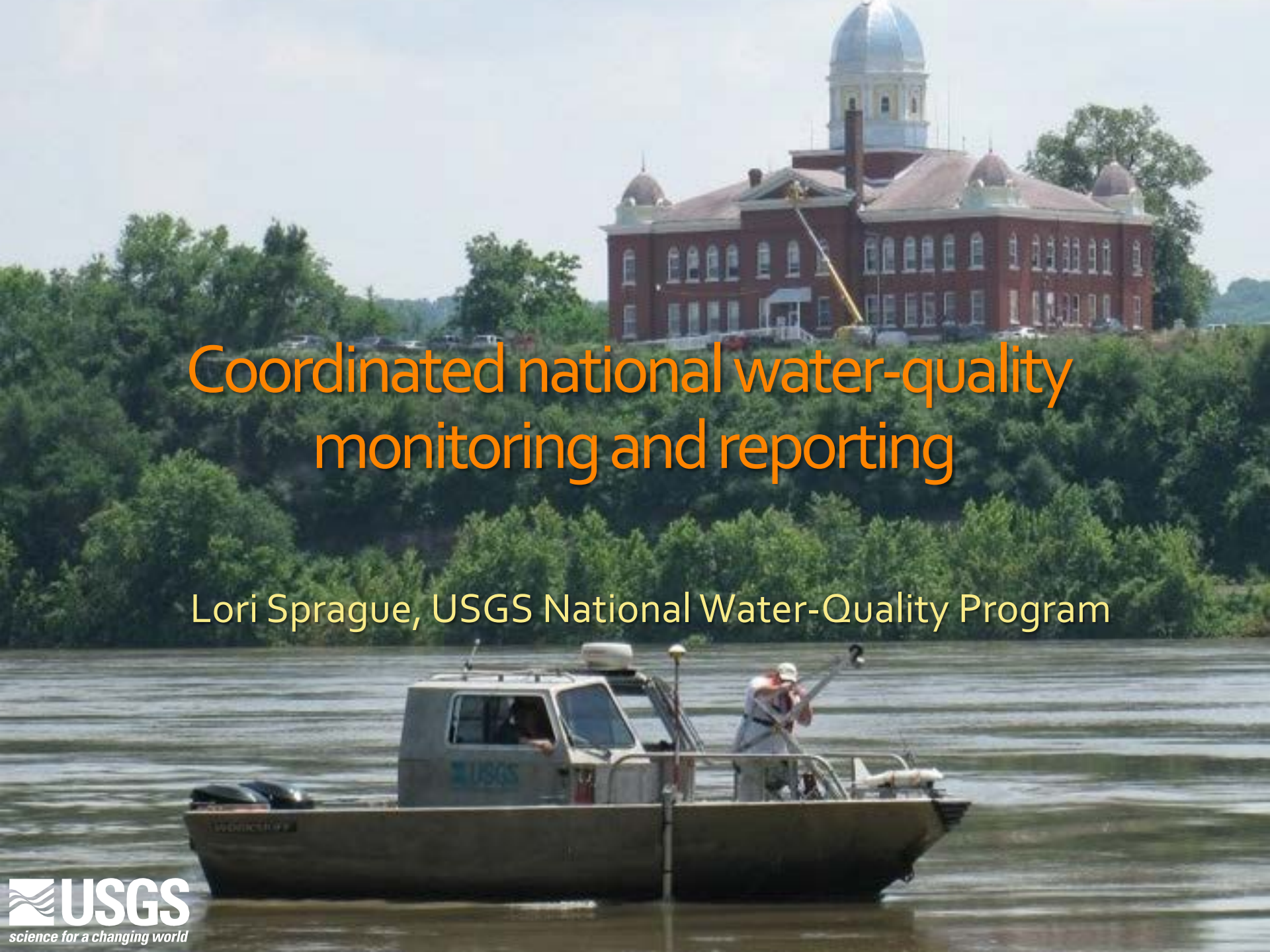

Coordinated national water-quality monitoring and reporting

Lori Sprague, USGS National Water-Quality Program

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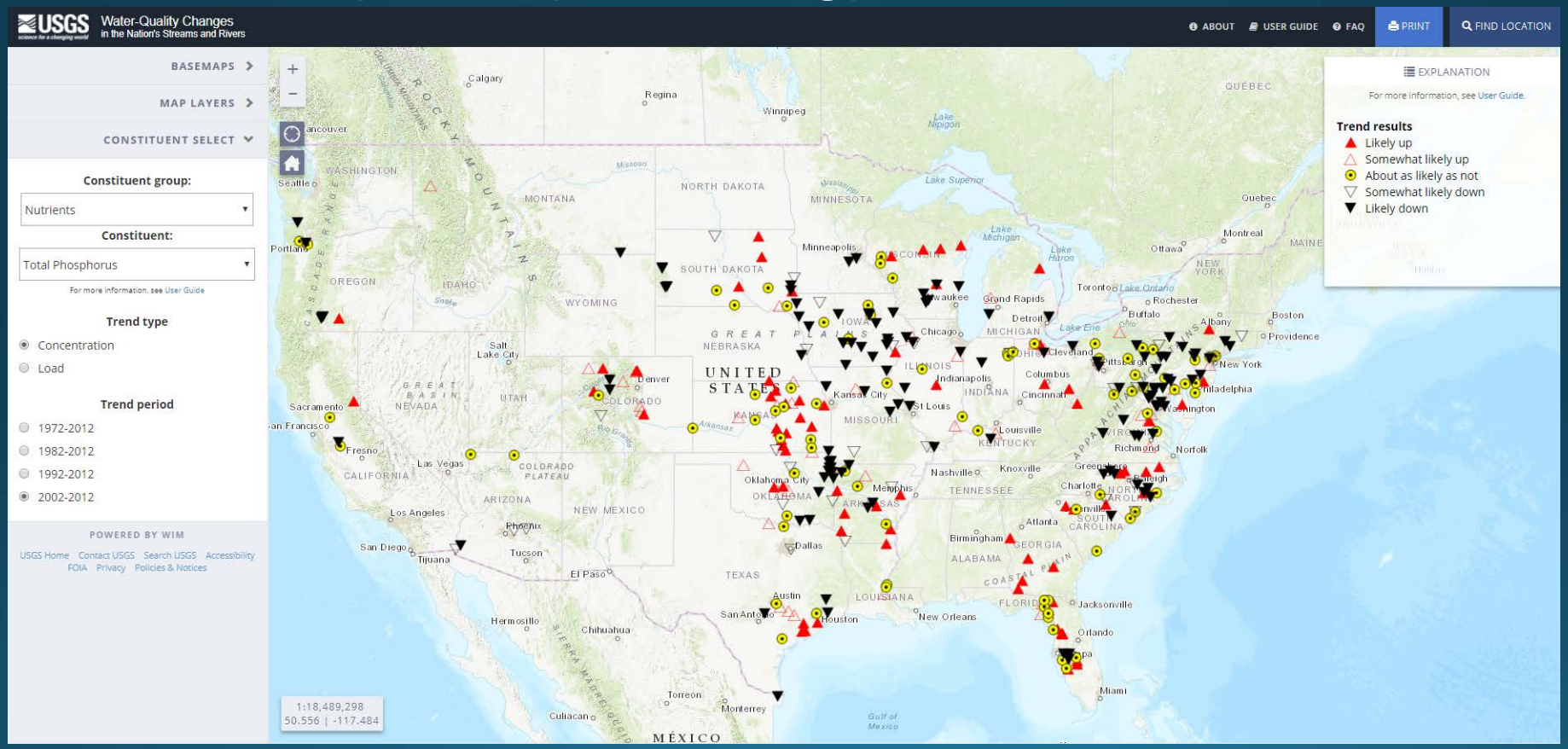
Interagency collaboration

December 2017 meeting was held to (1) discuss current efforts and future possibilities for increased coordination of water-quality monitoring and reporting and (2) identify goals for further collaboration.

Association of Clean Water Administrators
National Institute of Standards and Technology
National Park Service
National Water-Quality Monitoring Council
New Jersey Department of Environmental Protection
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Forest Service
U.S. Geological Survey
Virginia Department of Environmental Quality

USGS NAWQA Trend Analysis

Stream and river trends in nutrients, pesticides, sediment, carbon, salinity, and aquatic ecology between 1972 and 2012



https://nawqatrends.wim.usgs.gov/swtrends/

USGS NAWQA Trend Analysis

Data sources

- NWIS, STORET, and other Federal, State, and local databases
- 185 million water-quality records from 480,000 sites and over 600 organizations

Challenges

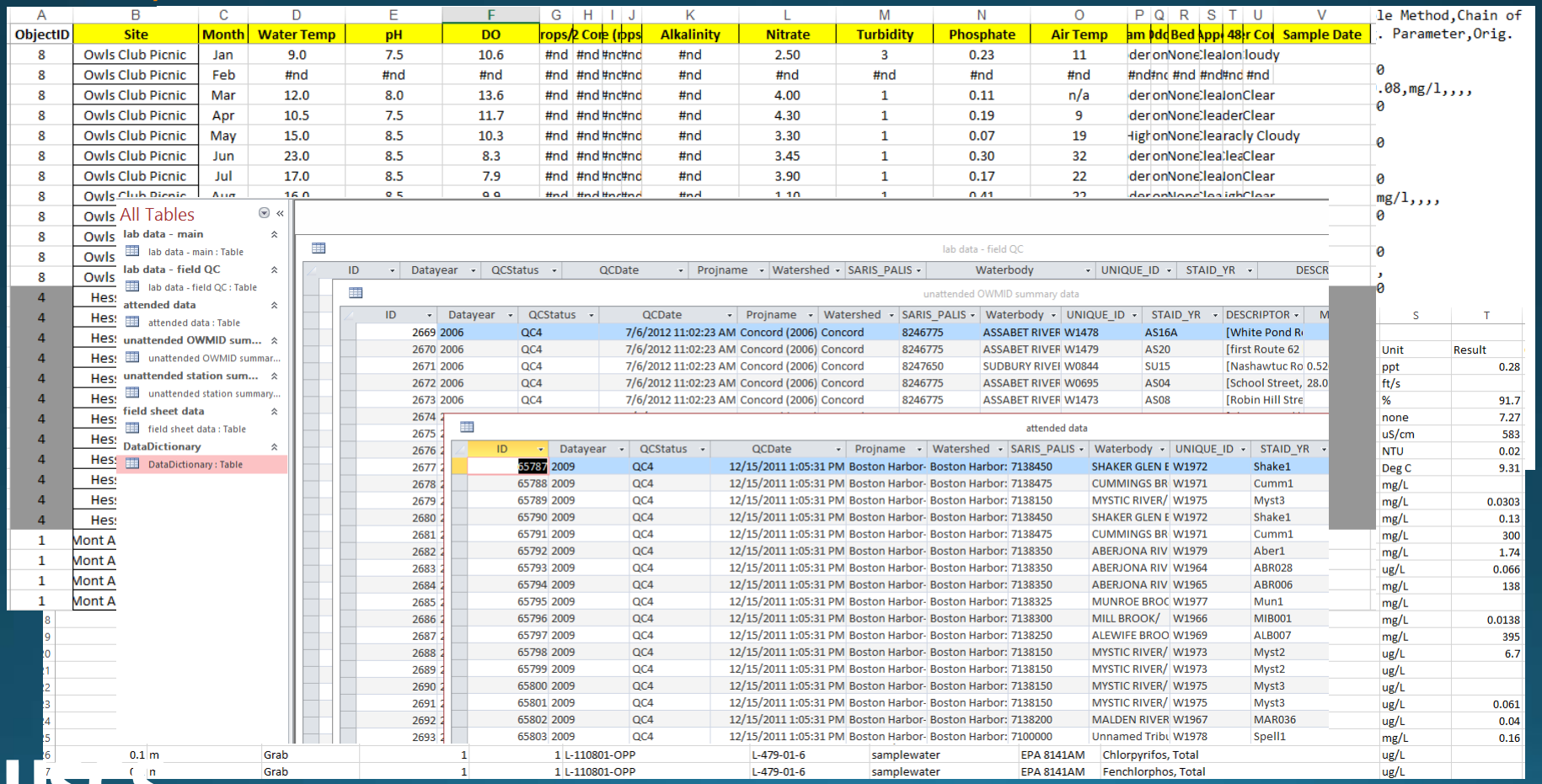
- Data access and discoverability
- Metadata gaps and inconsistencies
- Data coverage

Challenges

1. Data access and discoverability
2. Metadata gaps and inconsistencies
3. Data coverage

Data access and discoverability

- Approximately 130 individual databases
- Many others were not included because we did not know about them



Challenges

1. Data discoverability
2. Metadata gaps and inconsistencies
3. Data coverage

Metadata gaps and inconsistencies

Of the 25,125,379 original nutrient records, 14,453,492 had missing or ambiguous information for one or more of the key metadata elements

Starting records	Affected records					
	Parameter name	Filtration status	Chemical form	Units	Remark codes	Zero, negative, missing
25,125,379	3,557,821	11,946,455	4,265,615	1,311,096	124,523	636,454

Sprague et al., 2017, Challenges with secondary use of multi-source water-quality data in the United States. Water Research, Volume 110, http://dx.doi.org/10.1016/j.watres.2016.12.024

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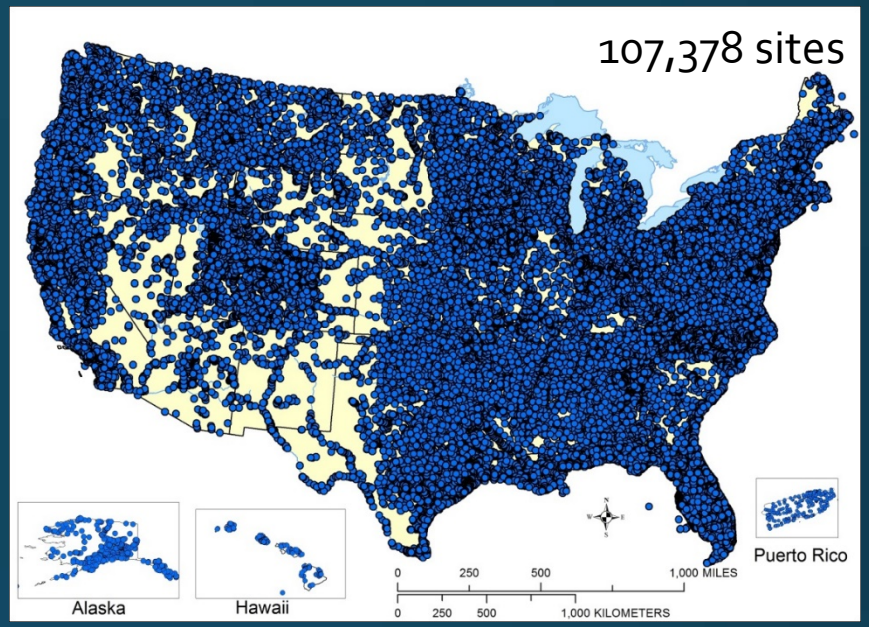
Challenges

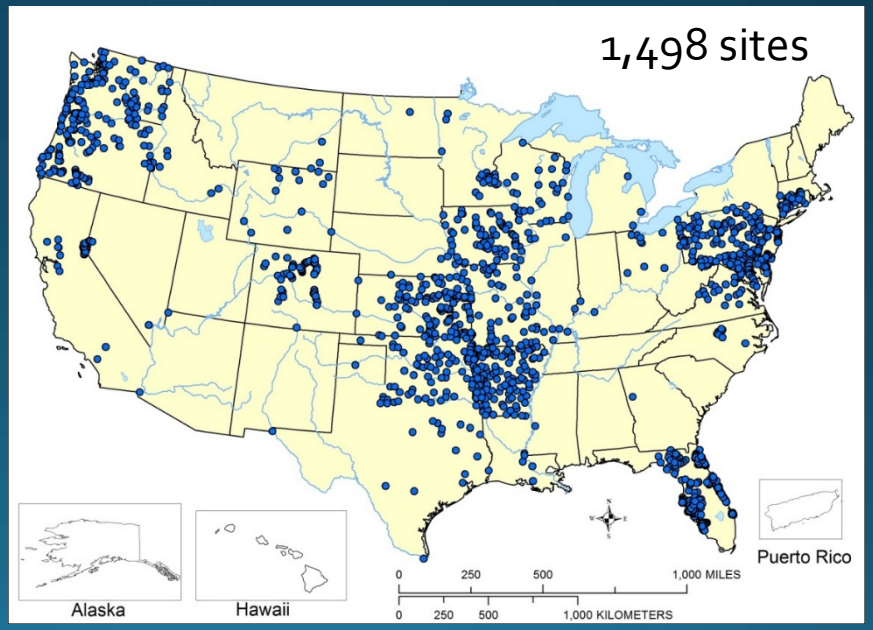
1. Data discoverability
2. Metadata gaps and inconsistencies
3. Data coverage

Data coverage

- 1+ orthophosphate sample



- Complete metadata
- Sampling during NAWQA trend period
  1. Start and end years match trend period (1972-2012; 1982-2012; 1992-2012; or 2002-2012)
  2. At least quarterly sampling during trend period (some gaps allowed)



PROVISIONAL DATA – SUBJECT TO REVISION

Benefits of coordination

- Leverage multiple efforts when funding is more limited
  - reduce redundancy
  - preserve coverage in space or time
- Add value to the data by using it for purposes beyond the original goals of data collection
- Increase our collective ability to address multi-jurisdictional issues at multiple scales

Widely recognized need for coordination

Previous reports have noted that limited budgets prevent monitoring that is adequate to fully assess U.S. waters. They recommended that monitoring agencies work to reduce duplication, promote resource sharing, and enhance collaboration to improve water quality protection.

2000—Government Accountability Office

2001—National Research Council

2002—National Academy of Public Administration

2004—U.S. Commission on Ocean Policy

2006—Heinz Center

Past efforts to increase coordination

1995—Intergovernmental Task Force on Monitoring Water Quality (19 Federal and state agencies)

- Recommended collaborative expansion of on-going monitoring
- Led to the National Water Quality Monitoring Council , the National Environmental Methods Index, the National Aquatic Resource Surveys, the Water Quality Portal, and a national reference site network
- Full implementation of a national monitoring network not yet achieved

2006—National Water-Quality Monitoring Council and more than 80 stakeholders

- Recommended a network of networks of Federal, State, Tribal, and local monitoring
- Led to several regional pilot efforts
- Full implementation of a national monitoring network not yet achieved

Barriers to coordination

- Not visibly supported by organizational management over the long periods needed
- Can be viewed as a risk to an organization's own goals
- Organizations may worry about loss of resources or autonomy
- COST

The H. John Heinz III Center for Science, Economics, and the Environment. 2006. Filling the Gaps: Priority Data Needs and Key Management Challenges for National Reporting on Ecosystem Condition. https://www.heinzctr.org/ecosystems.

Solutions to these barriers

- Coordination must go beyond federal programs to include States, Tribes, industry, nongovernmental organizations, volunteer organizations, and the research community
- High-level organizational commitment is needed
- Oversight should not imply control over every element
- Increased coordination does not negate the need for increased resources
- Proceed slowly and incrementally—attempting a grand synthesis that addresses all needs is likely to fail

The H. John Heinz III Center for Science, Economics, and the Environment. 2006. Filling the Gaps: Priority Data Needs and Key Management Challenges for National Reporting on Ecosystem Condition. https://www.heinzctr.org/ecosystems.

Focus of new effort

- Small changes that build off of current and previous efforts and lessons learned
- Avoids extensive modification to current monitoring efforts
- Does not rely on large new sources of funding

Focus of new effort

1. Consistency in data discoverability

Goal 1: Water-quality data collected in the United States are available from a single unified database.

- Identify steps to promote incorporation of more data into the Water Quality Portal via the Water Quality Exchange (WQX)
- Develop recommendations for how monitoring organizations could develop public-facing customized entry points into the Water Quality Portal
- Suggest funding sources that could be targeted to fund these efforts, and identify a pilot effort to use for marketing this idea

National Water Quality Monitoring Council

Working together for clean water

Water Quality Portal

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Focus of new effort

2. Consistency in data reporting quality

Goal 2: Water-quality data collected in the United States are presented with consistent qualifying information on data completeness and quality.

- Develop tiered system to categorize data based on metadata completeness, availability of QAPP and(or) QA/QC data, or other characteristics
- Develop plans for an on-line application to show the initial tier status of data in the Water Quality Portal
  - This could build off of work already being done through the USEPA "Water Quality Indicators Data Usability Improvement Project"

Focus of new effort

3. Consistency in data collection

Goal 3: The United States has a core set of sites that are sampled over the long term by multiple monitoring organizations using a minimum set of common design elements.

- Identify a set of broad objectives
- Identify a minimum set of common design elements
  - Identify sites that already incorporate these elements
  - Identify sites that could incorporate these elements with only small changes to the current design
  - Identify any remaining large spatial gaps
- Develop plans for an on-line mapping application to show these sites and gaps and market the network concept

Next steps

A workgroup is being formed for each goal

1. Consistency in data discoverability
   (lead Dwane Young, USEPA)
2. Consistency in data reporting quality
   (lead Brian Pellerin, USGS)
3. Consistency in data collection
   (lead Lori Sprague, USGS)

We would like your help!

NWQMC activities

- The Council is also working to promote water quality coordination
- Discussion – how can we best collaborate on these goals?

Acknowledgements

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