# Tributary and Nearshore Monitoring for Real-Time Evaluation of Great Lakes Restoration

Great Lakes RESTORATION

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# Outline

- Overview of tributary monitoring program
  - USGS Water Science Centers in MN, WI, IN, MI, OH, NY
- Real-time water-quality in major tributaries
- Edge of field monitoring in priority watersheds
- Future plans

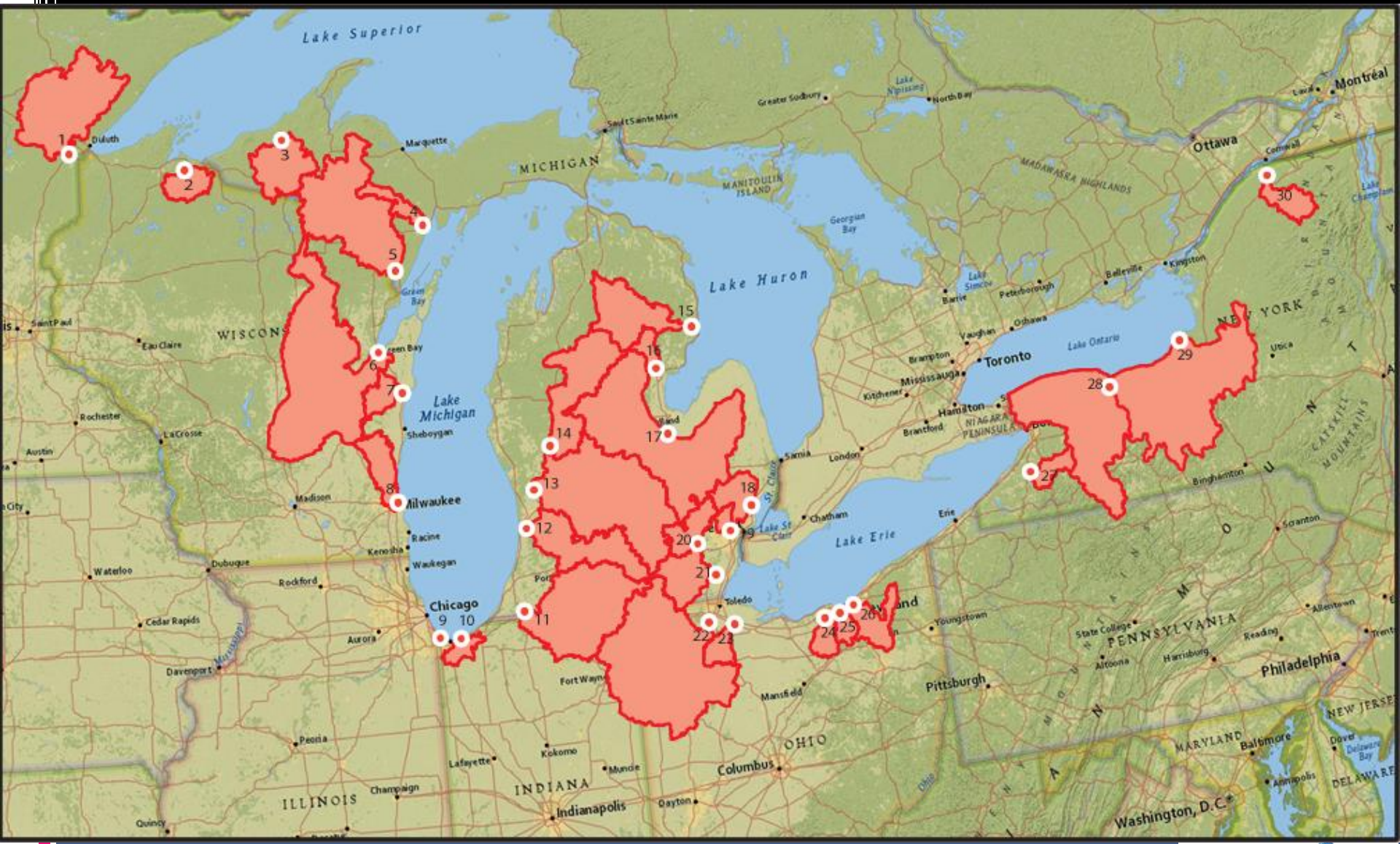
# Overview of tributary monitoring

- Forecast/Nowcast Nutrients and suspended sediment
- Edge of field monitoring in priority watersheds
- Baseline and sources of toxics
- Connecting tributaries to the lakes
- Optical properties of water
- Web-based mapping and data compilation

# Tributary monitoring objectives

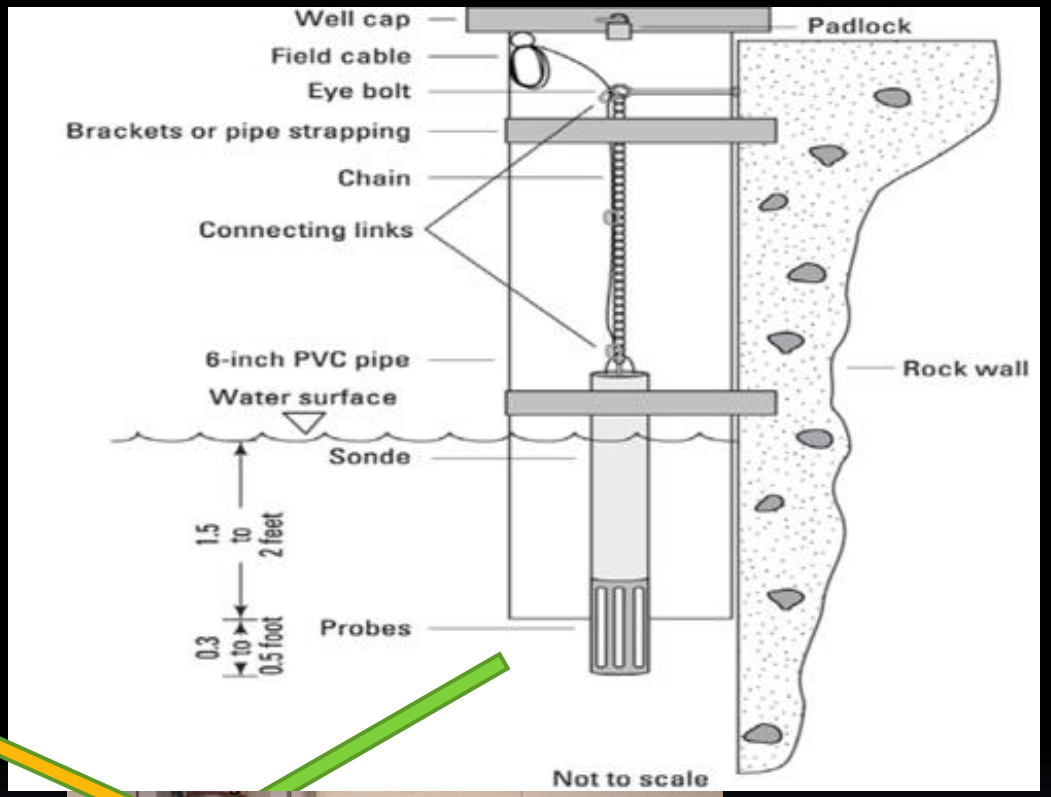
- Begin to implement the National Monitoring Network (NMN) design for the Great Lakes
- Contaminant loads (baseline)
- Provide quantifiable measures of restoration progress on major Great Lakes tributaries
- Model potential load changes throughout the Great Lakes

# Nutrients and Susp. Sediment sites



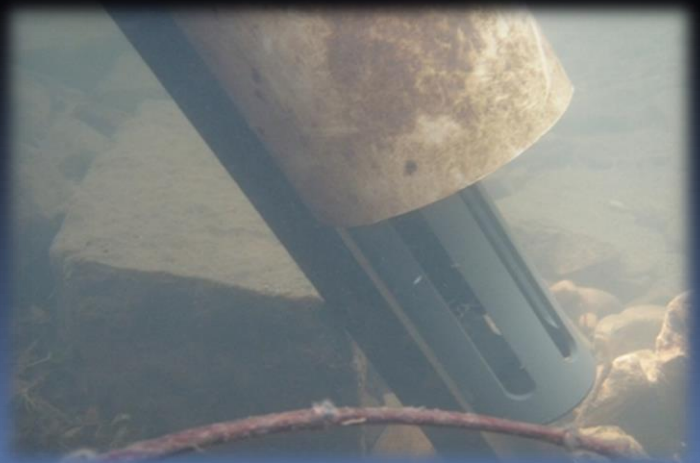
# Instrumentation

- Streamgage
- Automated water sampler
- Real-time QW




# Sampling Overview

- 30 sites:
  - Automated monthly samples plus events
  - Nutrients, CEC, bacteria
- Continuous sensor measurements:
  - temperature, D.O., pH, specific conductance, and turbidity to forecast/nowcast sediment and nutrient loads



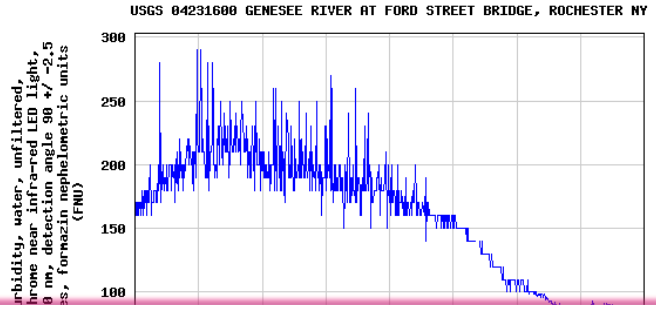
# Real-time data on the web

- http://waterwatch.usgs.gov/wqwatch/
- http://nrtwq.usgs.gov/wi/
- SiGL Mapper (beta testing)

# Example real-time output

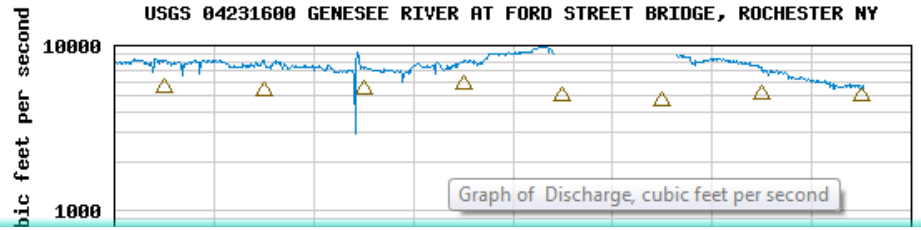
**Turbidity, water, unfiltered, monochrome near infra-red LED light, 780-900 nm, detection angle 90 +/ -2.5 degrees, formazin nephelometric units (FNU)**

Most recent instantaneous value: 87 04-17-2011 12:30 EST



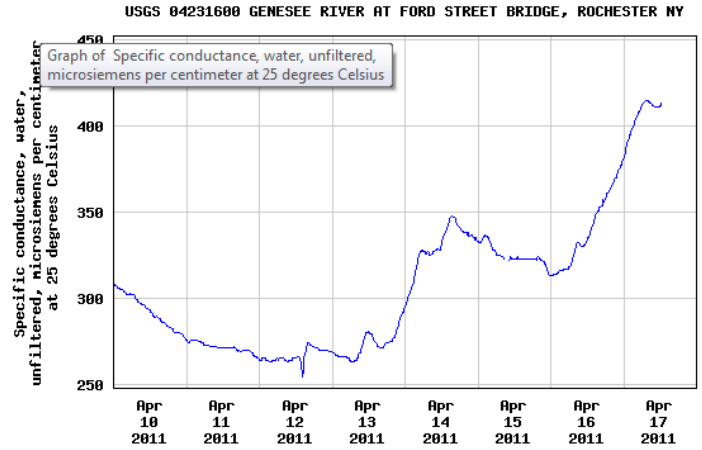

**Discharge, cubic feet per second**

Most recent instantaneous value: 5,740 04-17-2011 12:30 EST



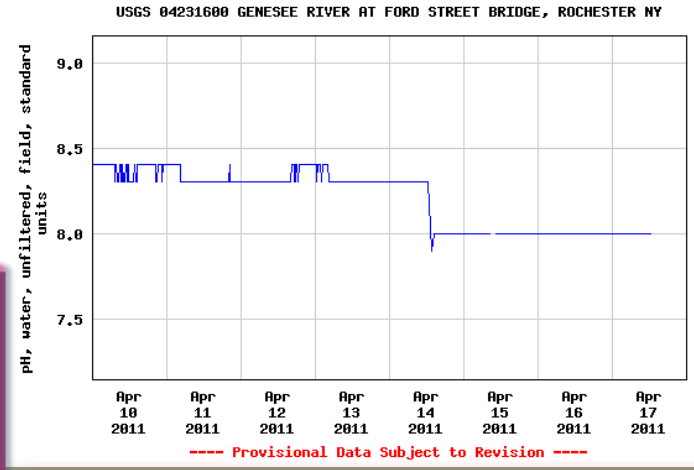

**Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius**

Most recent instantaneous value: 413 04-17-2011 12:30 EST



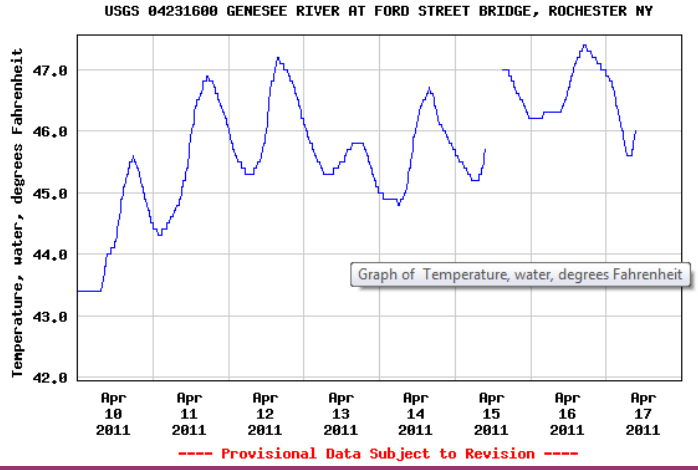

**pH, water, unfiltered, field, standard units**

Most recent instantaneous value: 8.0 04-17-2011 12:30 EST




**Temperature, water, degrees Fahrenheit**

Most recent instantaneous value: 46.0 04-17-2011 09:30 EST

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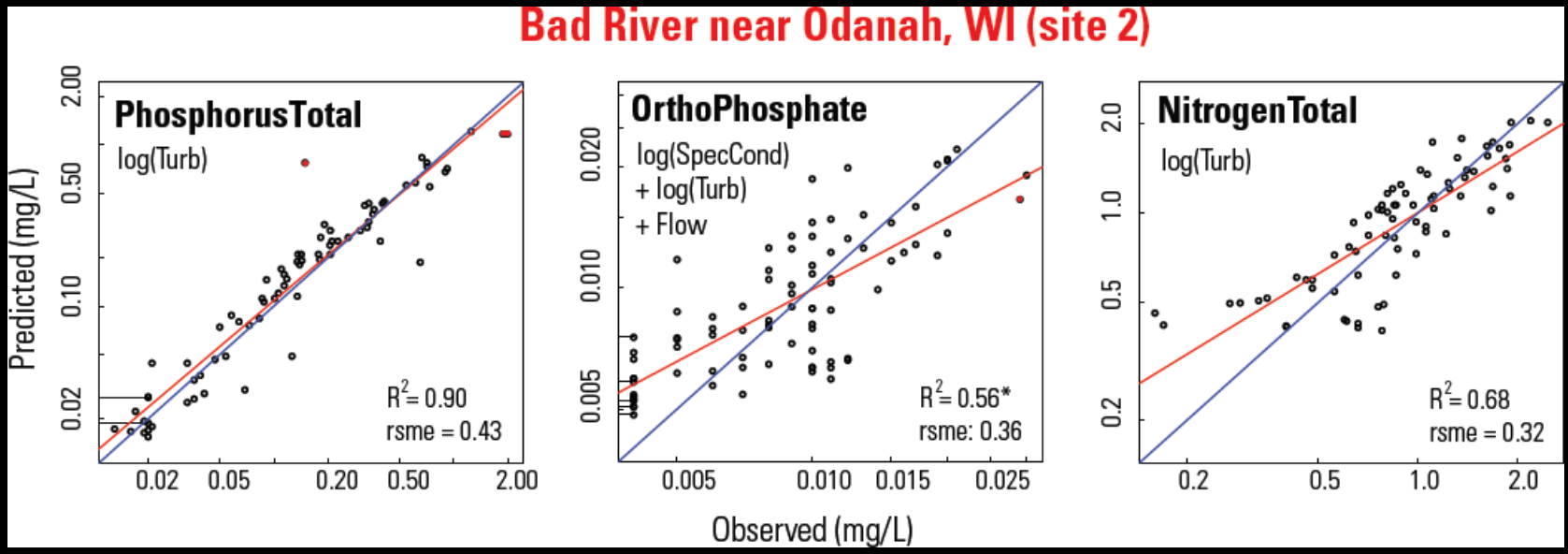
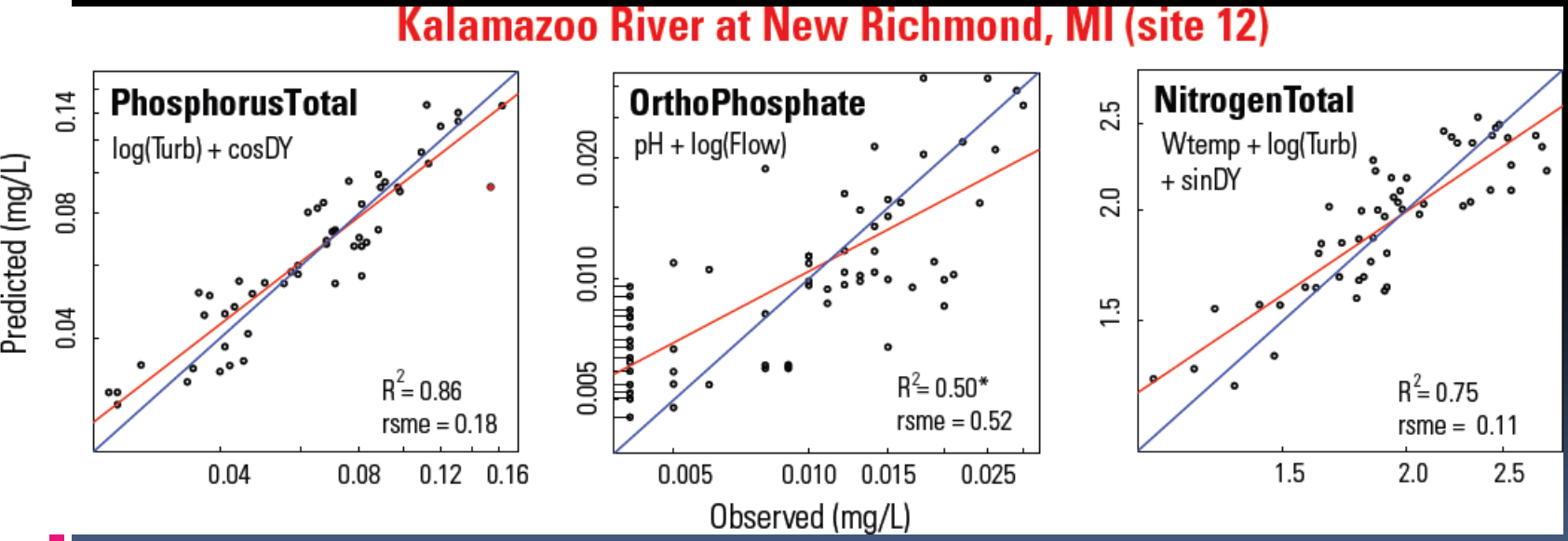
# Real-time surrogates

- Sensor data will be used to develop regression models to predict other water-quality analytes. Modeled analytes may include:
  - Suspended sediment
  - Phosphorus
  - Nitrogen
  - Emerging contaminants
  - Mercury

http://nrtwq.usgs.gov/wi/

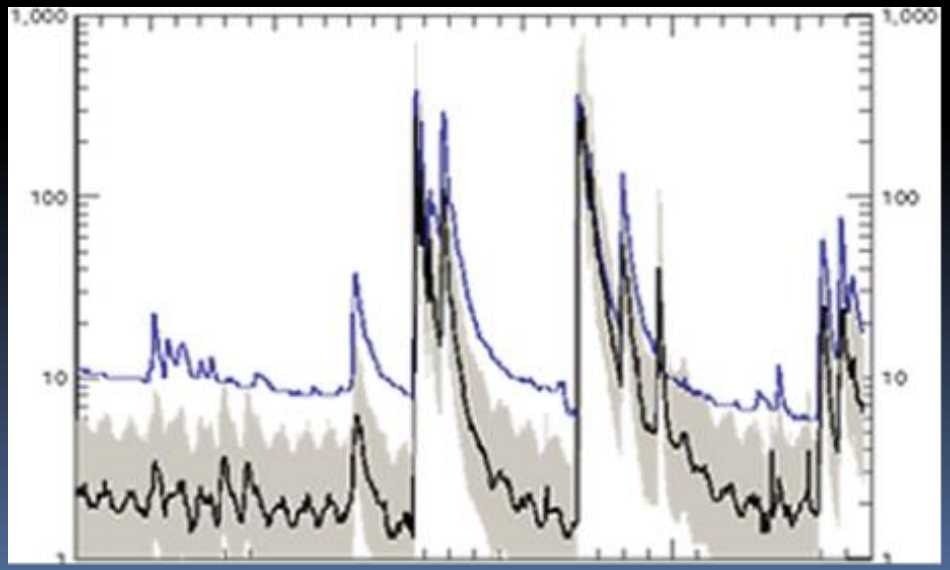
# What is a surrogate?



# Goals of surrogate development

- Real-time information for many parameters
- Reduce # of samples sent to lab
- Expand to other parameters as technology advances



# Edge of field monitoring

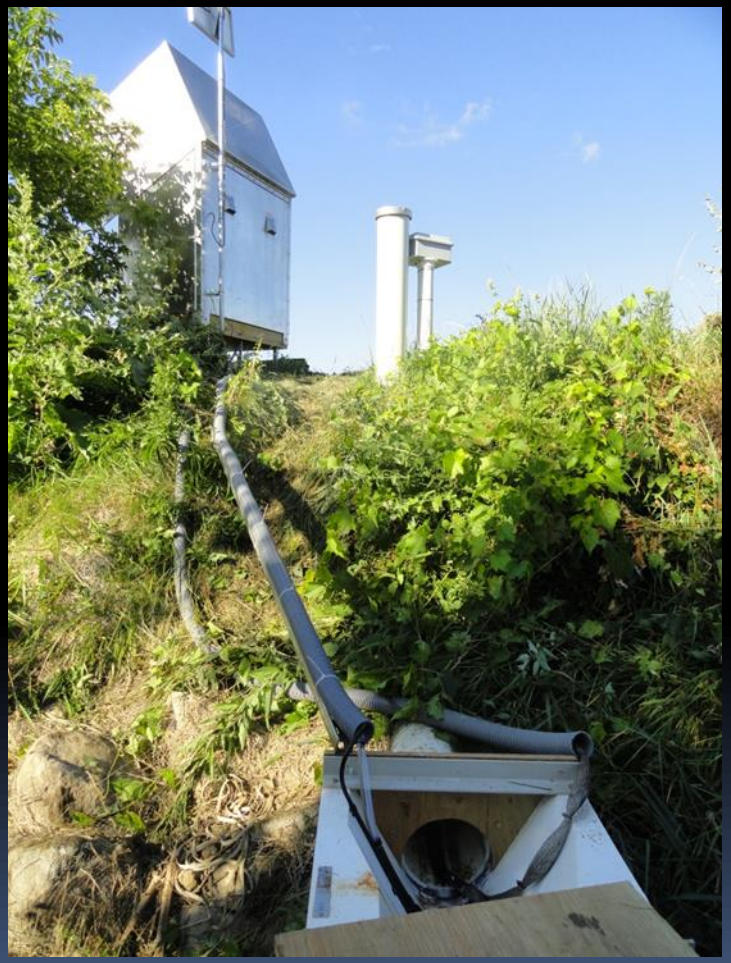







Priority Watersheds

# Edge of field monitoring



- Sampling will target both surface drainage and tile drains
- Models will be developed to apply to non-monitored areas

# Tributary Monitoring - Future Plans

- Continuous water quality on web (nrtwq.usgs.gov)
- Compute loads (continuous and annual)
  - examine for potential biases
  - compare results to other load estimation methods
- Extrapolate loads for the entire Great Lakes basin

# Contacts

- Nutrient monitoring network
  - Dale Robertson (dzrobert@usgs.gov)
  - Austin Baldwin (akbaldwi@usgs.gov)
  - Dan Sullivan (djsuliv@usgs.gov)

- Priority Watersheds
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# Thank You

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