IDEM's Water Quality Monitoring Programs

Presented for the Indiana Watersheds Webinar Series July 24, 2012

Indiana Watershed Leadership Academy

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The Importance of Demonstrating Water Quality Improvements

- Limited resources demand accountability: Are we getting the biggest bang for our buck?

- Are our programs effective?

- Demonstrate that our watershed planning and conservation practices merit continued funding.
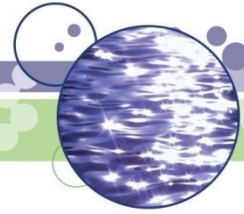
Design of a Monitoring Program

- Program design is determined by the monitoring objectives and data requirements

- Water Quality Monitoring Strategy (WQMS) is required by the Clean Water Act (CWA) Section 106 and includes 10 elements

- Priorities have changed over time, driving different monitoring designs
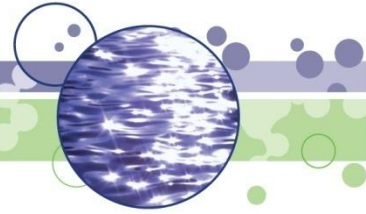
Why Does IDEM Monitor Water Quality?

- State agency with CWA authority to implement programs to protect and restore water quality

- CWA requires monitoring to determine if waters are meeting water quality standards and to report on status every two years in Integrated Report and the 303(d) List of Impaired Waters

- To support other CWA programs such as drinking water and National Pollutant Discharge Elimination System (NPDES) permitting and compliance, and more recently, grant program watershed restoration activities
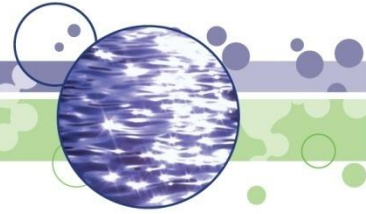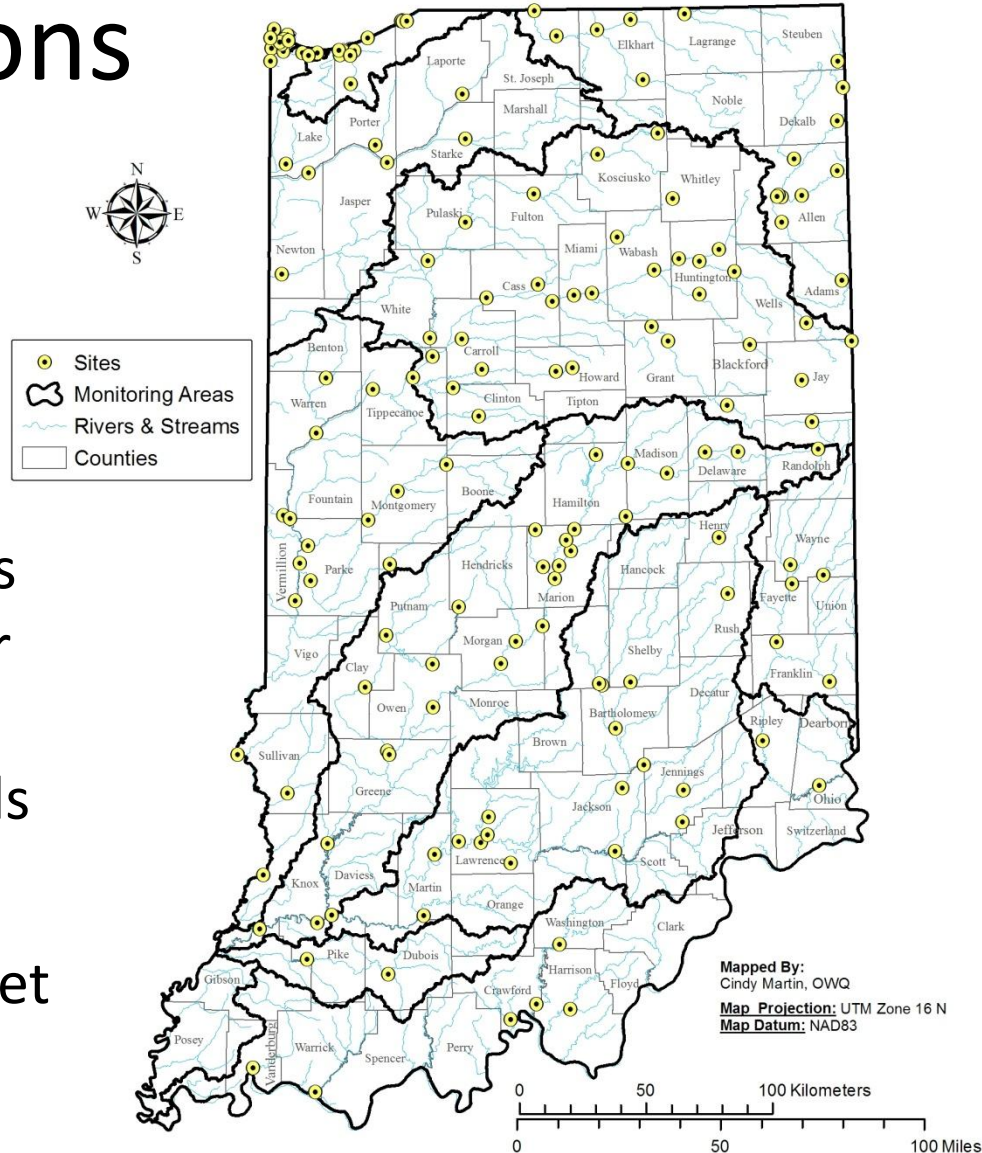
Water Quality Monitoring:
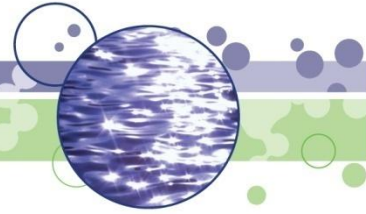# Three General Approaches

- Fixed: An approach to sampling in which sites do not change from season to season

- Probabilistic: A stratified random approach to site selection

- Targeted: Intentional selection of sampling sites based on specific monitoring objectives or decisions to be made

Fixed Stations

- Water chemistry, bacteria (*E. coli*), and field analytical data collected monthly on rivers and streams

- Established in 1957 with 49 sites located mainly at drinking water intakes and Wastewater Treatment Plant (WWTP) outfalls

- Now 163 fixed locations

- Provides large, long-term data set to reveal water quality trends under changing conditions

Legend:
- Sites
- Monitoring Areas
- Rivers & Streams
- Counties

Mapped By:
Cindy Martin, OWQ

Map Projection: UTM Zone 16 N
Map Datum: NAD83

0   50   100 Kilometers

0   50   100 Miles

Fixed Station Monitoring

- Point source compliance and enforcement effluent monitoring and mixing zone effects

- Data needs to calibrate and verify waste load allocation models for permit and water quality standard violations

- In the 1980s, U.S. Environmental Protection Agency (U.S. EPA) promoted a national fixed station network to characterize ambient water quality in flowing waters
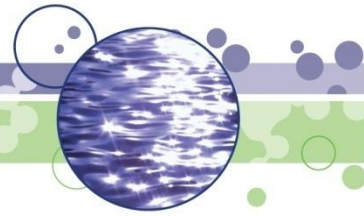
Probabilistic Monitoring

- Randomly generated sites in rotating basins

- The monitoring approach that allows us to meet the CWA Section 305(b) goal of assessing all waters of the state

- Overall trends in water quality within each basin and allows basin-to-basin comparison

- Statistically robust with known level of confidence
  - Can predict water quality conditions for the basin
  - Does not indicate where specific impairments are located or the reasons for impairment
  - Data can also be used to make reach-specific assessments

Probabilistic Monitoring 1996-2011

# The "Problem" with Probabilistic Monitoring: The 303(d) "Listing Machine"

Indiana's 303(d) list continues to grow as a function of an imbalanced approach to monitoring.

- Probabilistic monitoring → Sampling conducted at new sites every season, resulting in newly identified impairments that must be added to the list

- Targeted Monitoring → Needed in order to tell the other side of the story, to identify improvements that may be occurring
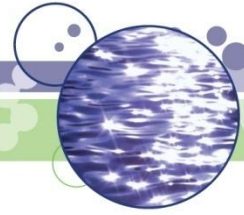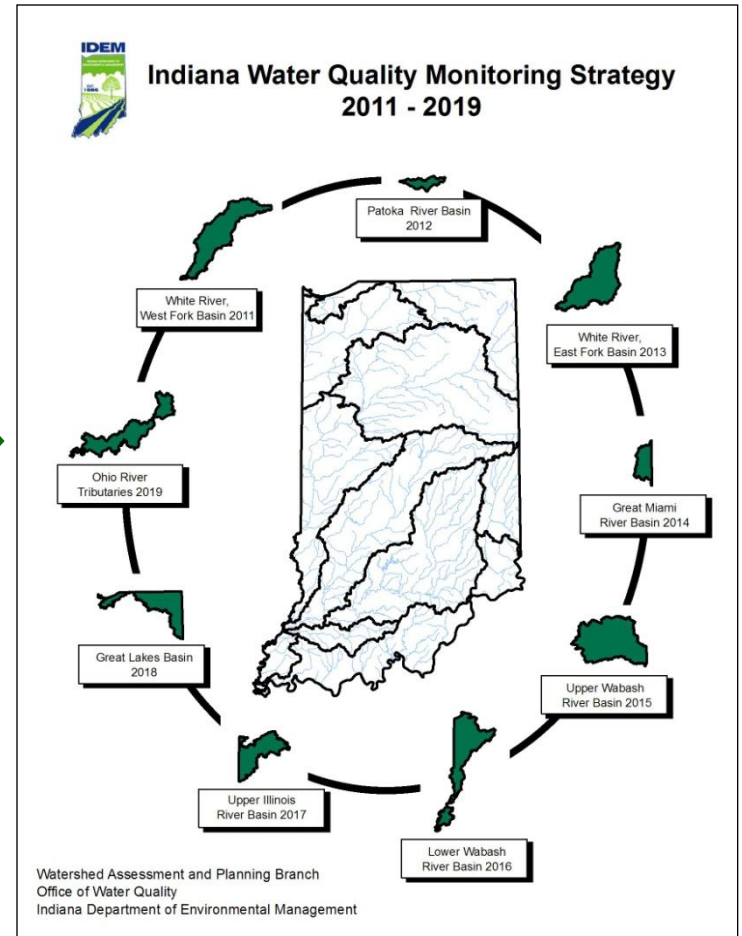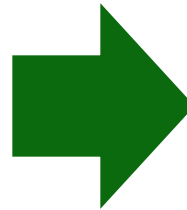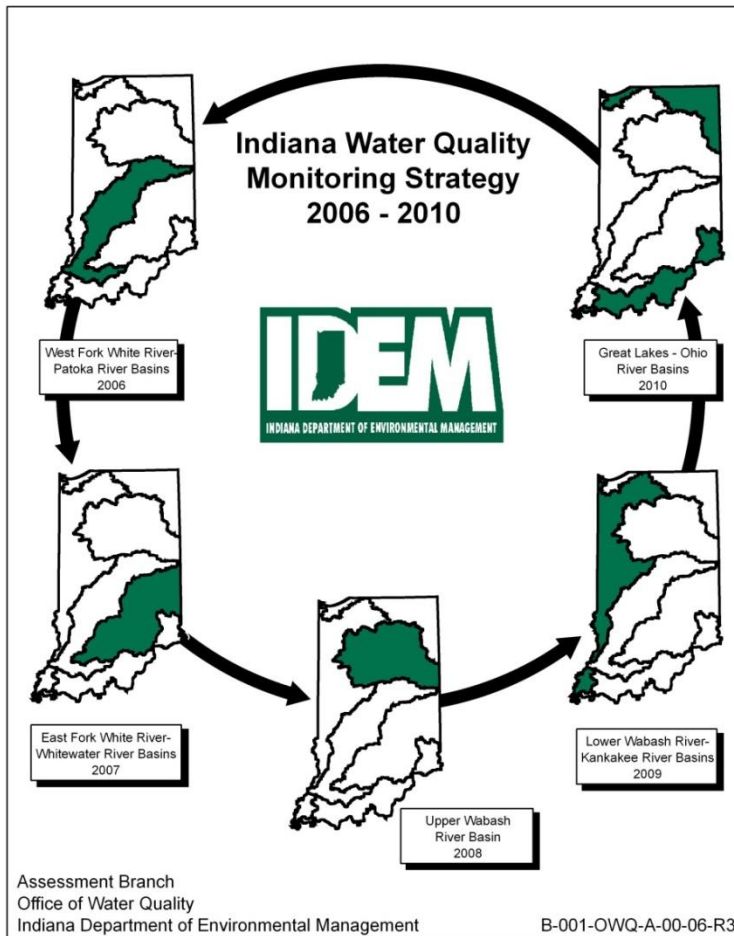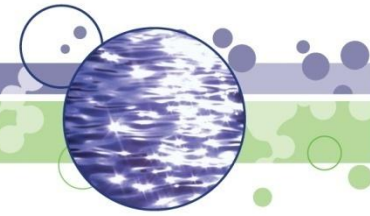
Monitoring Objectives Priority Shift Accountability

- Is water quality improving; are our waters getting better?

- Are IDEM's programs effective at protecting, restoring or improving water quality?

- Are grant program monies for watershed restoration programs working or effective?
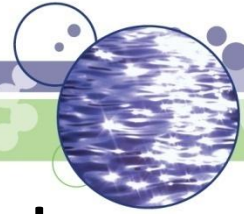
Five-Year Rotation Compared to a Nine-Year Rotation

Baseline Monitoring

- Comprehensive information to identify sources of impairment and designate critical areas for planning purposes

- Targeted sites in small watershed based on a progression of drainage area "snapped" to the nearest bridge

- Physical, chemical and bacteriological data collected monthly for one year and biology once per year

- Human health recreational use, drinking water use and aquatic life use

- Baseline data for measuring performance of best management practices

Watershed Improvements

- Must identify changes in water quality to receive federal CWA funds

- Targeted monitoring of waters previously impaired (sufficient recovery time)

- Sampling sites and parameters monitored vary based on original impairment (up to 20 sites)

- Human health recreational use, drinking water use and aquatic life use
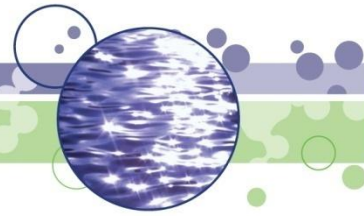
Success Stories:
Showing Water Quality Improvements

- **Pigeon Creek** from pollutant and sediment impaired to measurable improvement in water quality

  www.watersheds.IN.gov/files/watershed_success_epa_pigeon.pdf

- **Clifty Creek** from impaired for bacteria to meeting WQS
  www.watersheds.IN.gov/files/watershed_success_epa_clifty.pdf

- **Big Walnut Creek** from impaired for bacteria to meeting WQS

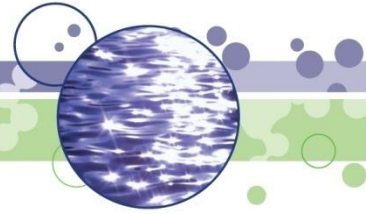 www.watersheds.IN.gov/files/watershed_success_epa_bigwalnut.pdf

- **Bull Run** from impaired biotic communities to a well-balanced biotic community
  http://water.epa.gov/polwaste/nps/success319/upload/in_bull.pdf

Questions?

Office of Water Quality

Watershed Assessment and Planning Branch

www.idem.IN.gov/5512.htm

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