

# Great Miami River Citizens' Water Quality Monitoring

2012 Data Sharing Event  
February 23, 2013



# Historic 1913 Great Miami River Flood Hamilton, Ohio - March 25, 1913

High Street bridge –  
10 minutes before collapse



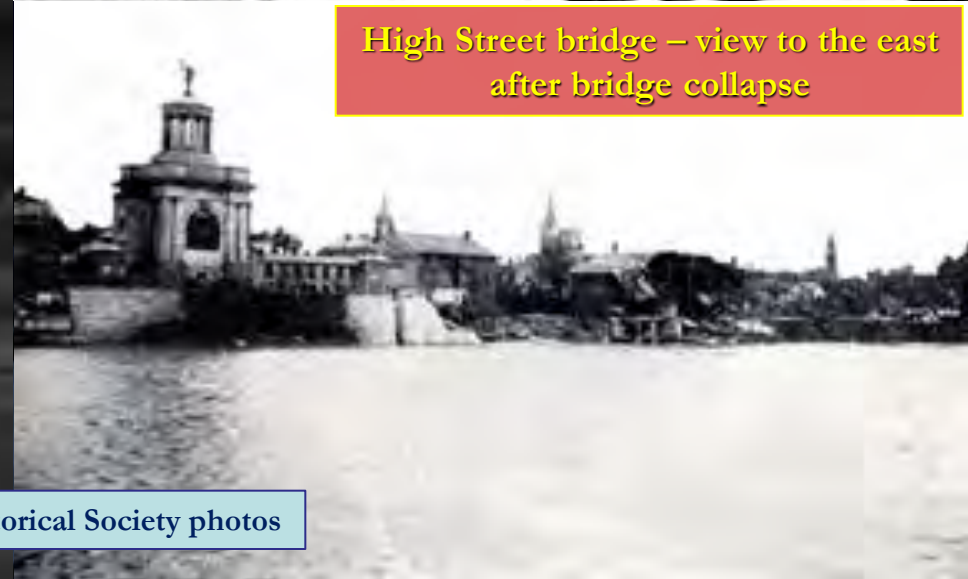
High Street bridge collapsing



High Street bridge – view to the west



High Street bridge – view to the east  
after bridge collapse



# Great Miami River Citizens' Water Quality Monitoring Program

## □ Program development

- Purpose
- Chemical parameters
- Equipment
- Funding
- Sampling strategy

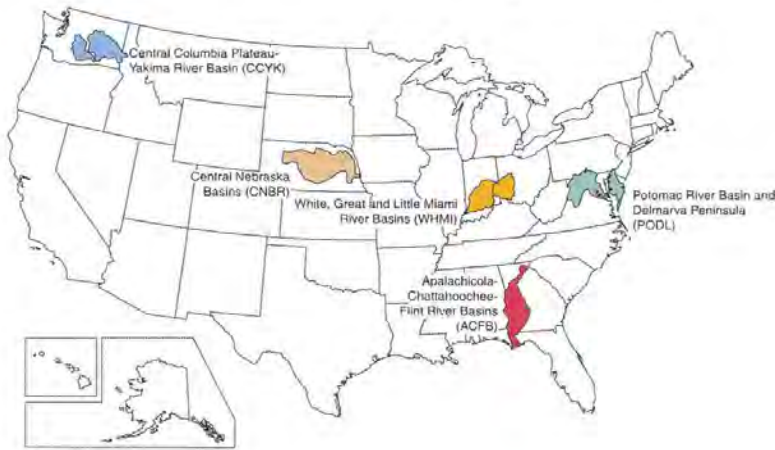
## □ Data collection and assessment

- River versus tributary comparisons
- Upstream-downstream correlations
- Seasonal correlations
- Sub-watershed studies
- Land uses/water quality impact areas
  - NPDES/industrial dischargers
  - Agricultural practices and BMPs
  - Restoration projects
  - Septic system hotspots/septic removal areas
  - Landfill areas
  - Urban land uses and storm water BMPs

18.05.2007

Ohio River – Great Miami River confluence at the Oxbow wetlands

# Watersheds of Southwest Ohio and Southeast Indiana

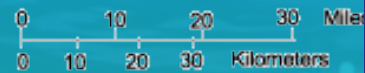


Source: Munn & Hamilton, "New Studies Initiated by the U.S. Geological Survey – Effects of Nutrient Enrichment on Stream Ecosystems."



**EXPLANATION**

- Upper Great Miami River Basin
- Lower Great Miami River Basin
- Whitewater River Basin
- Little Miami River Basin
- Mill Creek Basin

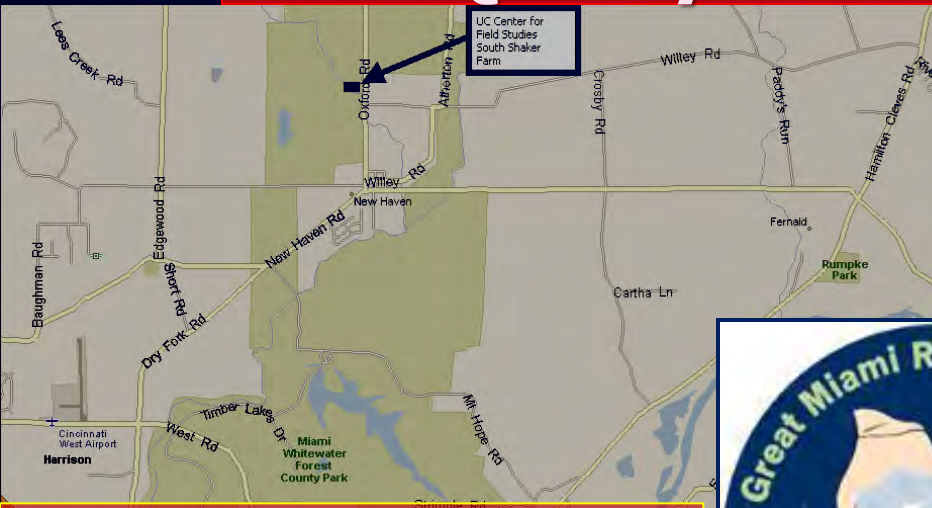


Base from U.S. Geological Survey digital data, 1:100,000, 1983  
 Albers Equal Area projection  
 Standard Parallels 29°30' and 45°30', central meridian -86°

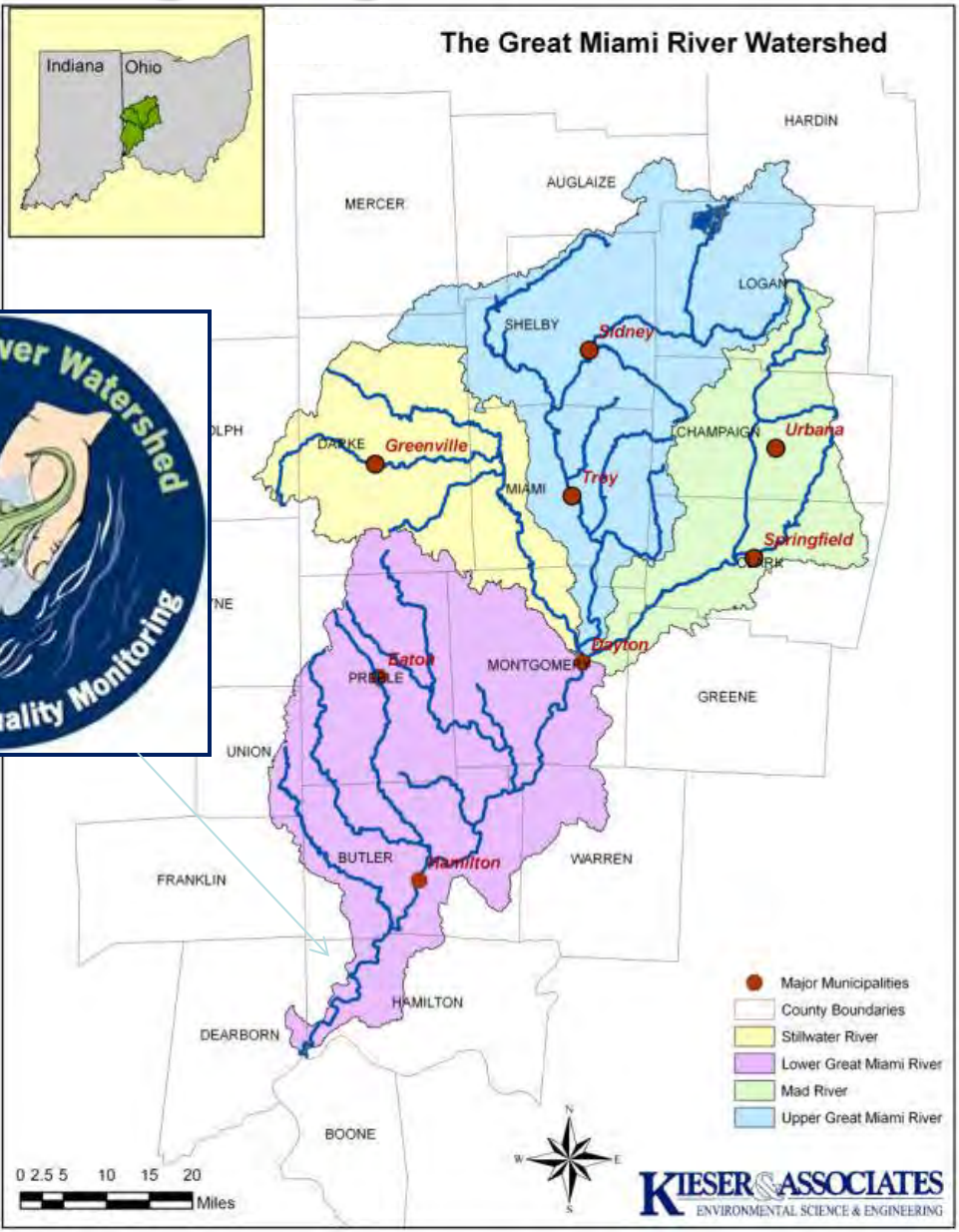
Source: United States Geological Survey:  
[http://oh.water.usgs.gov/miam/Maps/hucs\\_big.gif](http://oh.water.usgs.gov/miam/Maps/hucs_big.gif)

Location map of the Great and Little Miami River Basins, Ohio and Indiana showing 8-digit hydrologic units.

# Great Miami River Citizens' Water Quality Monitoring Program



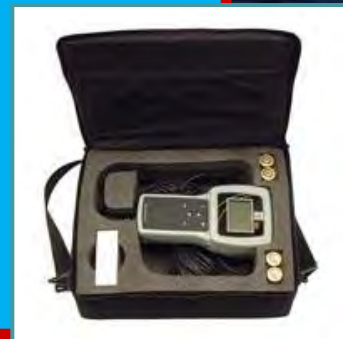
University of Cincinnati Center for Field Studies, 10053 Oxford Rd., New Haven, OH.



# Great Miami River Citizens' Water Quality Monitoring Program

## *What Data are Collected and Why?*

- **Nitrates**
  - Sources: Agricultural and urban fertilizers, manure, septic tanks and vehicle exhaust.
  - Effects: Excessive algal growth, eutrophication (low oxygen conditions), Blue Baby syndrome and brown blood disease in fish.
- **Total Phosphorous**
  - Sources: Excess from WWTP, agricultural and urban fertilizers, manure, septic tanks and soil erosion.
  - Effects: Excessive algal growth and eutrophication (low oxygen conditions).
- **pH**
  - Sources: Natural stream bed minerals ( $\text{CaCO}_3$ ,  $\text{MgCO}_3$ ), WWTP discharge and soils ( $\text{NH}_3$  will elevate pH); elevated by algal photosynthesis and warm waters.
  - Effects: Low pH allows toxic compounds to become more available to aquatic organisms.
- **Conductivity (dissolved ions)**
  - Sources: Elevated by WWTP discharge, septic systems, agricultural discharge, road salt and warm water.
  - Effects: Toxic to aquatic organisms at elevated levels. Nature of toxicity dependent upon ionic presence.
- **Turbidity (cloudiness of water)**
  - Sources: Elevated by runoff erosion from row crops, pastures, stream bank erosion, construction sites and high algal content.
  - Effects: Inhibits growth of submerged aquatic plants and food supply of aquatic organisms and affects the ability of fish gills to absorb oxygen.
- ***E. coli* (bacteria)**
  - Sources: Elevated by human and animal feces from WWTPs, septic systems and storm water runoff.
  - Effects: Gastroenteritis, ear infections and Hepatitis A in humans. Low oxygen due to decomposition.
- **Dissolved Oxygen (DO - % saturation and concentration)**
  - Sources: Elevated in cooler temperatures, but can be extremely high with excessive algal growth and photosynthesis due to nutrients. Low dissolved oxygen associated with algal die-off and elevated bacterial concentrations.
  - Effects: Over 100% is supersaturated or more oxygen than the maximum amount that the water column can hold at a given temperature and pressure. Above 100%, there will be small gas bubbles. Values between 80%-120% are optimal. Species such as trout and salmon can't tolerate much above 105% for an extended period. Most fish species can't survive DO concentrations below 3 mg/L for extended periods.



# Great Miami River Citizens' Water Quality Monitoring Program

*How Do We Measure the Data Parameters?*

- ▣ **Nitrates**
  - Instrumentation: Portable Spectrophotometer
  - Method: Cadmium Reduction Method – Hach 8171
- ▣ **Total Phosphorous**
  - Instrumentation: DR 2800 Portable Spectrophotometer
  - Method: Acid Persulfate Digestion – Hach 8190
- ▣ **pH**
  - Instrumentation: Oakton 650 pH Meter
  - Range: 0-14
  - Accuracy (0.002), Precision (0.001-0.1)
- ▣ **Conductivity (dissolved ions)**
  - Instrumentation: Hach sensION5 Conductivity Meter
  - Range: 0-19,999 uS/cm
  - Accuracy (0.5%), Precision (1 uS)
- ▣ **Turbidity (cloudiness of water)**
  - Instrumentation: Hach 2100Q Turbidity Meter
  - Method: U.S. EPA method 180.1
  - Accuracy (2%), Precision (0.01 NTU)
- ▣ **E. coli (bacteria)**
  - Method: Total Coliform and E-coli screening using Membrane Filtration, Hach 10029, U.S.EPA 1603
- ▣ **Dissolved Oxygen**
  - Instrumentation: YSI 556 multi-probe meter
  - Range: 0-50 mg/L, 0-500% air saturation
  - Accuracy: (2% or 0.2 mg/L; ), Precision (0.01 mg/L, 0.1% saturation)



# Great Miami River Citizens' Water Quality Monitoring Program

*Quality Assurance/Quality Control (QA/QC)*

Didn't we already run this sample?

Why do we have to do this?

QC = Quirky Coliforms right??????



# Great Miami River Citizens' Water Quality Monitoring Program

*Quality Assurance/Quality Control (QA/QC)*

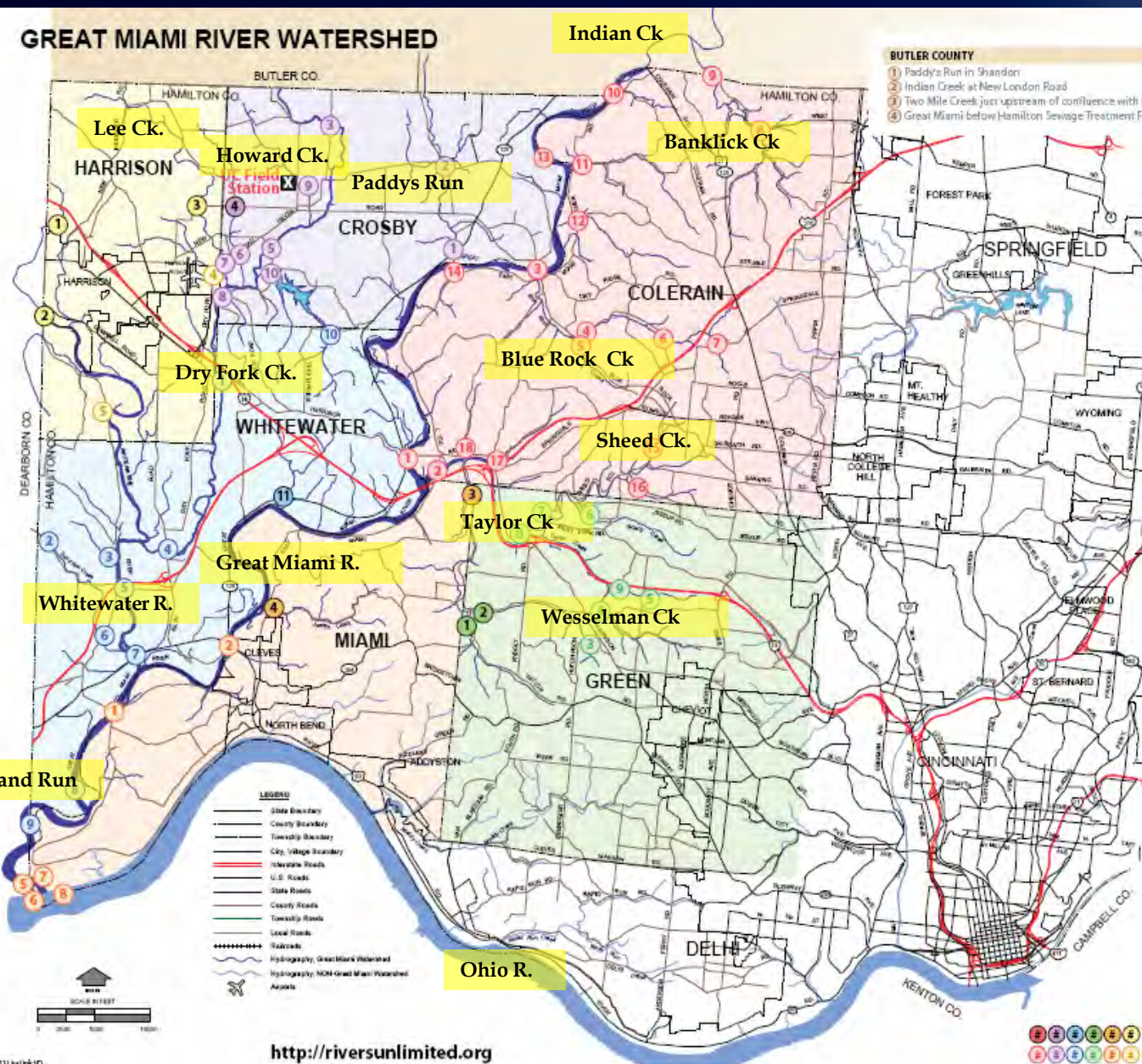
<b>Chemical Parameter</b>	<b>Percent of Lab Duplicate Samples</b>	<b>Median % Difference in Lab Duplicates</b>	<b>Percent of Field Duplicate Samples</b>	<b>Median % Difference in Field Duplicates</b>
<b>Conductivity</b>	11.7	0.5	3.1	2.9
<b>pH</b>	10.9	0.3	3.1	1.0
<b>Turbidity</b>	11.7	6.0 (0.6 NTU numerical difference)	3.1	48.7 (3.0 NTU numerical difference)
<b>Phosphorus</b>	21.2	11.1 (0.01 mg/L numerical difference)	3.0	21.4 (0.04 mg/L numerical difference)

<i><b>Waterway Sampled</b></i> <i><b>(74 Total)</b></i>	<i><b>Number of</b></i> <i><b>Sample Sites</b></i>	<i><b>Waterway Sampled</b></i> <i><b>(74 Total)</b></i>	<i><b>Number of</b></i> <i><b>Sample Sites</b></i>
<b>Banklick Creek</b>	<b>3 (+1)</b>	<b>Lee Creek tributaries</b>	<b>1 (-1)</b>
<b>Banklick Creek tributary</b>	<b>1</b>	<b>Miami Whitewater Lake</b>	<b>1 (+1)</b>
<b>Blue Rock Creek</b>	<b>1</b>	<b>Miami Whitewater Lake outflow</b>	<b>1 (+1)</b>
<b>Brierly Creek</b>	<b>1</b>	<b>Mullen Creek</b>	<b>1</b>
<b>Dry Fork of Whitewater River</b>	<b>5</b>	<b>North Branch Blue Rock Creek</b>	<b>3</b>
<b>Dry Fork of Whitewater River tributary</b>	<b>1</b>	<b>Ohio River</b>	<b>3</b>
<b>Dunlap Run</b>	<b>1 (+1)</b>	<b>Owl Creek</b>	<b>1</b>
<b>Eagle Creek</b>	<b>1</b>	<b>Oxbow Ponds</b>	<b>3 (-2)</b>
<b>Forfeit Creek</b>	<b>1</b>	<b>Paddys Run</b>	<b>4 (+1)</b>
<b>Fox Run</b>	<b>1</b>	<b>Sand Run</b>	<b>2</b>
<b>Great Miami River</b>	<b>13 (+1)</b>	<b>Sheed Creek</b>	<b>3</b>
<b>Great Miami River unnamed tributaries</b>	<b>1 (-1)</b>	<b>Sheed Creek tributary</b>	<b>1</b>
<b>Howard Creek</b>	<b>1</b>	<b>Strimple – MWW Lake inflow</b>	<b>1</b>
<b>Indian Creek</b>	<b>1</b>	<b>Taylor Creek</b>	<b>4 (+1)</b>
<b>Jameson Creek</b>	<b>0 (-1)</b>	<b>Taylor Creek tributaries</b>	<b>2</b>
<b>Jordan Creek</b>	<b>1</b>	<b>Two-Mile Creek</b>	<b>1</b>
<b>Kolb Creek</b>	<b>0 (-1)</b>	<b>Wesselman Creek</b>	<b>3</b>
<b>Lee Creek</b>	<b>1</b>	<b>Whitewater River</b>	<b>4</b>
		<b>Whitewater River tributary</b>	<b>1</b>

# Great Miami River Citizens' Water Quality Monitoring Program

Mapping Out the Sample Sites

## GREAT MIAMI RIVER WATERSHED



- BUTLER COUNTY**
- 1 Paddy's Run in Shandon
  - 2 Indian Creek at New London Road
  - 3 Two Mile Creek just upstream of confluence with GMR
  - 4 Great Miami below Hamilton Sewage Treatment Facility

### PREFERRED SAMPLING SITES

- COLERAIN TOWNSHIP**
- 1 Great Miami River at Harrison Avenue
  - 2 Taylor Creek at E. Miami River Road Bridge
  - 3 Great Miami River at Blue Rock Road Bridge
  - 4 N. Branch Blue Rock Creek at Sheits Road / Blue Rock Road intersection
  - 5 Blue Rock Creek at Sheits Road
  - 6 N. Branch Blue Rock Creek at Newberry Wildlife Refuge
  - 7 N. Branch Blue Rock Creek at Colerain Township Park
  - 8 Banklick Creek Tributary at Kemper Road / Bank Road intersection
  - 9 Banklick Creek at Richardson Preserve
  - 10 Great Miami River just upstream of Old Colerain Avenue Bridge
  - 11 Dunlap Run at E. Miami River Road Bridge
  - 12 Owl Creek at E. Miami River Road Bridge
  - 13 Great Miami River at Heritage Park
  - 14 Great Miami River at Obergeising Park (formerly Dravo Park)
  - 15 Sheed Creek adjacent to Sheed Road between Hanley and Deseritgold
  - 16 Hubble Road Creek just before confluence with Sheed Creek
  - 17 Forfeit Creek at Forfeit Run Road / Harrison Road Bridge
  - 18 Eagle Creek at Eagle Creek Road / Harrison Road Bridge

- CROSBY TOWNSHIP**
- 1 Paddy's Run at Rt. 128 Bridge
  - 2 Paddy's Run at Willey Road Bridge
  - 3 Dry Fork Creek at Oxford Road Bridge
  - 4 East of Lee Creek at Baughman Road Bridge
  - 5 Dry Fork Creek at Mt. Hope Road Bridge
  - 6 East of Lee Creek at Dry Fork Road Bridge
  - 7 Lee Creek at Dry Fork Road Bridge
  - 8 Dry Fork Creek at West Road Bridge
  - 9 Howard Creek at UC Field Station

- GREEN TOWNSHIP**
- 1 Taylor Road Creek at Taylor Road Bridge
  - 2 Emerald Run Creek at junction with Taylor Road
  - 3 Emerald Run Creek at 4575 Hutchinson Road
  - 4 Taylor Creek at intersection of Reemlin and Johnson Roads
  - 5 Wesselman Creek at 700' east of 5200 Race Road
  - 6 Brierly Creek adjacent to 6222 Brierly Creek Road
  - 7 Sheed Creek at 5555 Sheed Road
  - 8 Taylor Creek at Harrison Avenue Bridge adjacent to Sheed Road
  - 9 Wesselman Creek at 6915 Wesselman Road

- HARRISON TOWNSHIP**
- 1 Kolb Creek at Harrison Gun and Conservation
  - 2 Whitewater River at State Street Bridge
  - 3 Lee Creek at Baughman Road Bridge
  - 4 Lee Creek Tributary at Dry Fork Road Bridge
  - 5 Whitewater River at 7777 Lawrencburg Road

- MIAMI TOWNSHIP**
- 1 Great Miami River at Lawrenceburg Road Bridge
  - 2 Great Miami River at Rt. 50 Bridge
  - 3 Emerald Run at Bridge Point Pass bridge
  - 4 Jordan Creek at E. Miami River Road Bridge
  - 5 Great Miami at right fork railroad trestle upstream of confluence with Ohio
  - 6 Ohio River at confluence with Great Miami River (downstream fork)
  - 7 Great Miami at left fork railroad trestle upstream of confluence with Ohio
  - 8 Ohio River upstream of confluence with Great Miami

- WHITWATER TOWNSHIP**
- 1 Dry Fork Creek at Harrison Avenue Bridge
  - 2 Sand Run Creek at Sand Run Road Bridge
  - 3 Fox Run at Lawrenceburg Road Bridge
  - 4 Dry Fork Creek at Kilby Road Bridge
  - 5 Whitewater River at Suspension Bridge Road Bridge
  - 6 Sand Run Creek at Lawrenceburg Road Bridge
  - 7 Whitewater River at Rt. 50
  - 8 Great Miami River at Shawnee Lookout County Park
  - 9 Great Miami River at Shawnee Lookout Oxbow
  - 10 Miami Whitewater Forest Lake tributary at Strimple Road Bridge
  - 11 Interstate Exchange Creek at 128 Bridge

● ● ● ● ● ● ● ● ● ● - available  
○ ○ ○ ○ ○ ○ ○ ○ ○ ○ - taken

# Great Miami River Citizens' Water Quality Monitoring Program

## *Public Involvement and Sampling Accomplishments: 2010-2012*

Year	Volunteer Hours and Value	# Sample Sites, Analyses and Samples	Collaborative Data Presentations and Events
<b>2010</b>	Hours: 750 Value: \$18,870	<ul style="list-style-type: none"> <li>Total sites: 71</li> <li>Monthly range: 15-45 sites</li> <li>Analyses: 1,644</li> <li>Samples: 274 - 30/mo. ave.</li> </ul>	<ul style="list-style-type: none"> <li>Data sharing presentation to volunteer samplers in February 2011 on 2010 data.</li> </ul>
<b>2011</b>	Hours: 1,066 Value: \$27,300	<ul style="list-style-type: none"> <li>Total sites: 73</li> <li>Monthly range: 38-64 sites</li> <li>Analyses: 2,994</li> <li>Samples: 499 - 55/mo. ave.</li> </ul>	<ul style="list-style-type: none"> <li>Local TV segment (Channel 5 Project Earth)</li> <li>Ohio EPA</li> <li>Greater Cincinnati MSD</li> <li>Hamilton County Environmental Action Commission</li> <li>Land Lab for Price Hill Middle School students</li> <li>Oxbow Inc.</li> <li>Green Umbrella</li> <li>University of Cincinnati Planning Students</li> </ul>
<b>2012</b>	Hours: 1,233 Value: \$32,144	<ul style="list-style-type: none"> <li>Total sites: 74</li> <li>Monthly range: 63-80 sites</li> <li>Analyses: 3,942</li> <li>Samples: 657 - 73/mo. ave.</li> </ul>	<ul style="list-style-type: none"> <li>Data sharing presentation to volunteer samplers in February 2012 on 2011 data.</li> <li>OKI Council of Governments Regional Conservation Council annual meeting.</li> <li>StormCon National Conference (Denver, CO).</li> <li>Great Miami River Days.</li> <li>Great Outdoor Weekend event.</li> <li>Hamilton County Public Health.</li> <li>Land Conservancy of Hamilton County annual meeting.</li> <li>Watershed Management Association of Ohio (WMAO) annual meeting (Columbus, OH).</li> </ul>



May 2012

