

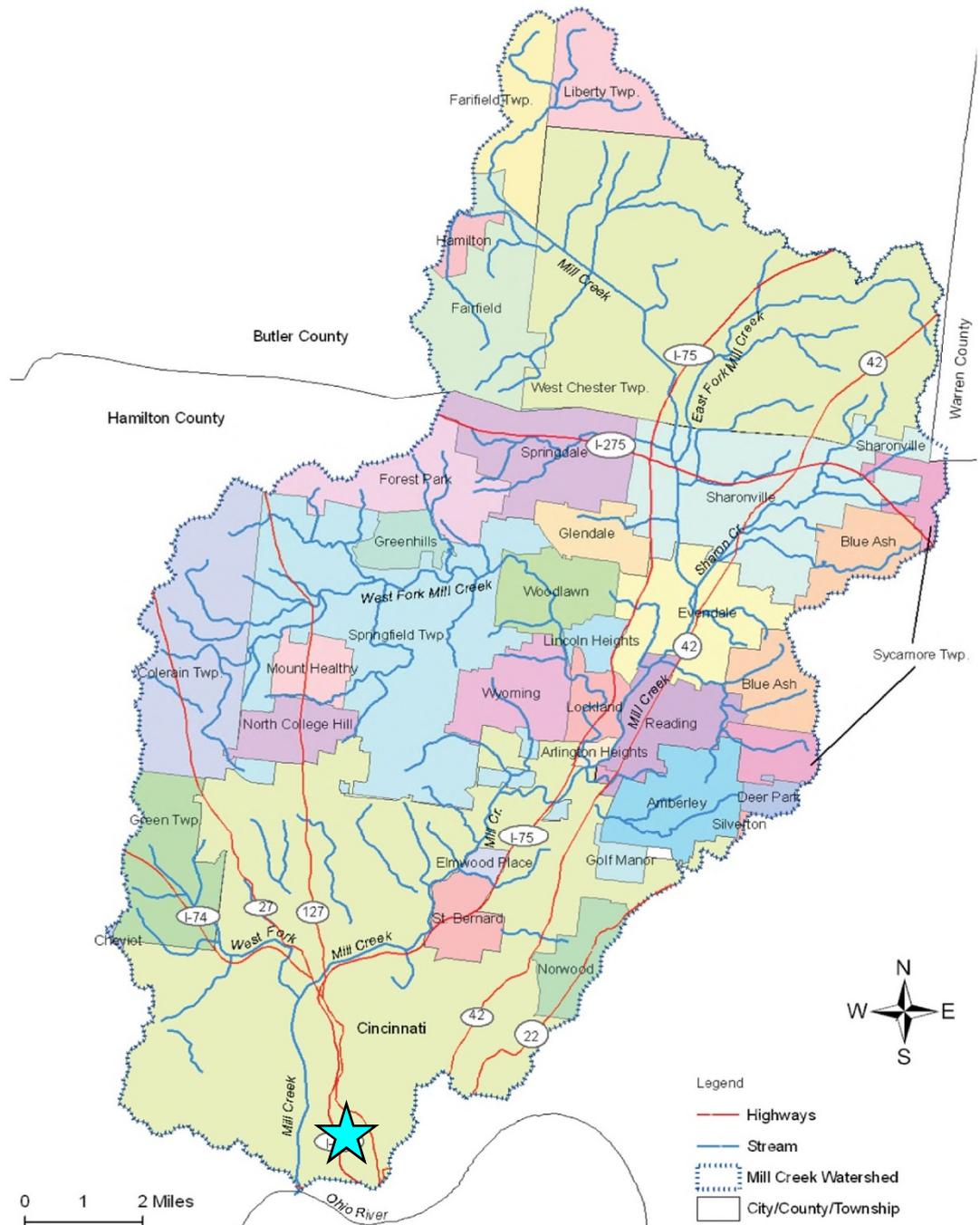
# **Enumerating the Return on Investment for Restoration Projects in an Urban Watershed through Successful Partnerships and Volunteer Efforts**

Kara Scheerhorn, Watershed Coordinator  
Mill Creek Watershed Council of Communities

# The Mill Creek Watershed

- 37 political jurisdictions
- 166 square miles
- 450,000 residents
- 28 miles of stream length on main stem

Amberley Village · Arlington Heights · Blue Ash  
 Butler County · Cheviot · Cincinnati · Colerain  
 Township Columbia Township · Deer Park ·  
 Elmwood Place  
 Evendale · Fairfield · Fairfield Township · Forest  
 Park Glendale · Golf Manor · Greenhills · Green  
 Township Hamilton · Hamilton County  
 Liberty Township · Lincoln Heights · Lockland  
 Montgomery · Mt. Healthy · North College Hill  
 Norwood · Reading · Sharonville · Silverton ·  
 Springdale  
 Springfield Township · St. Bernard · Sycamore  
 Township  
 West Chester Township · Woodlawn · Wyoming

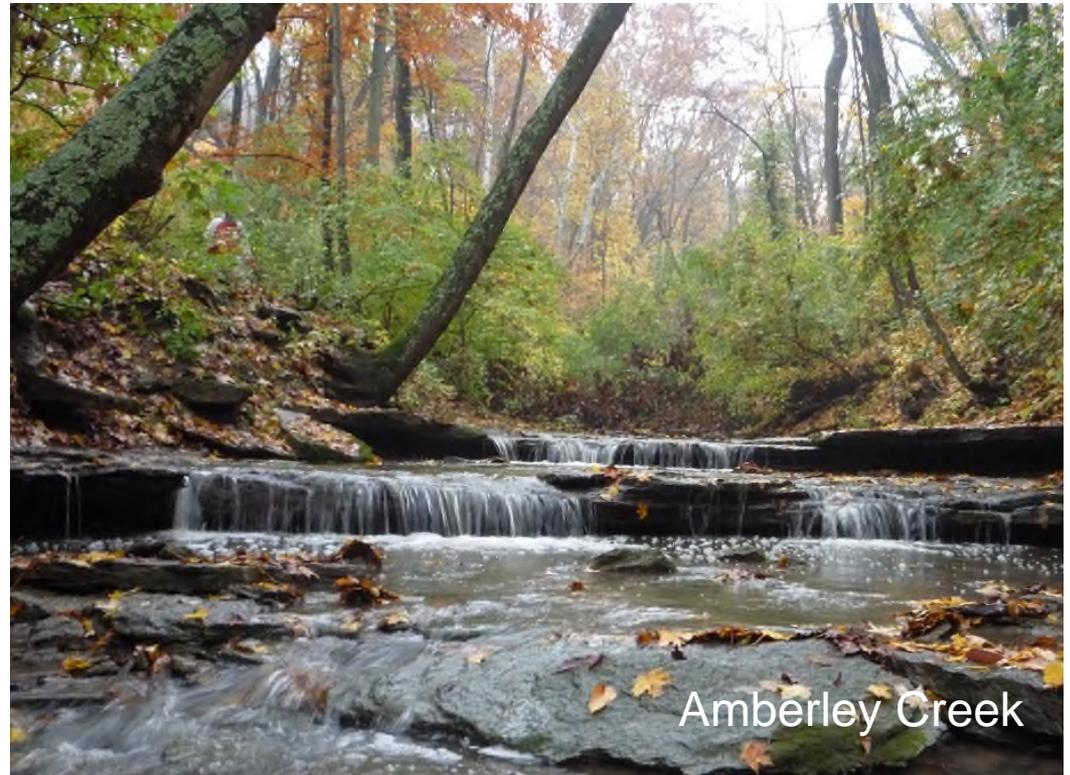




**The Vision:  
A restored Mill  
Creek that is an  
asset to our  
region**

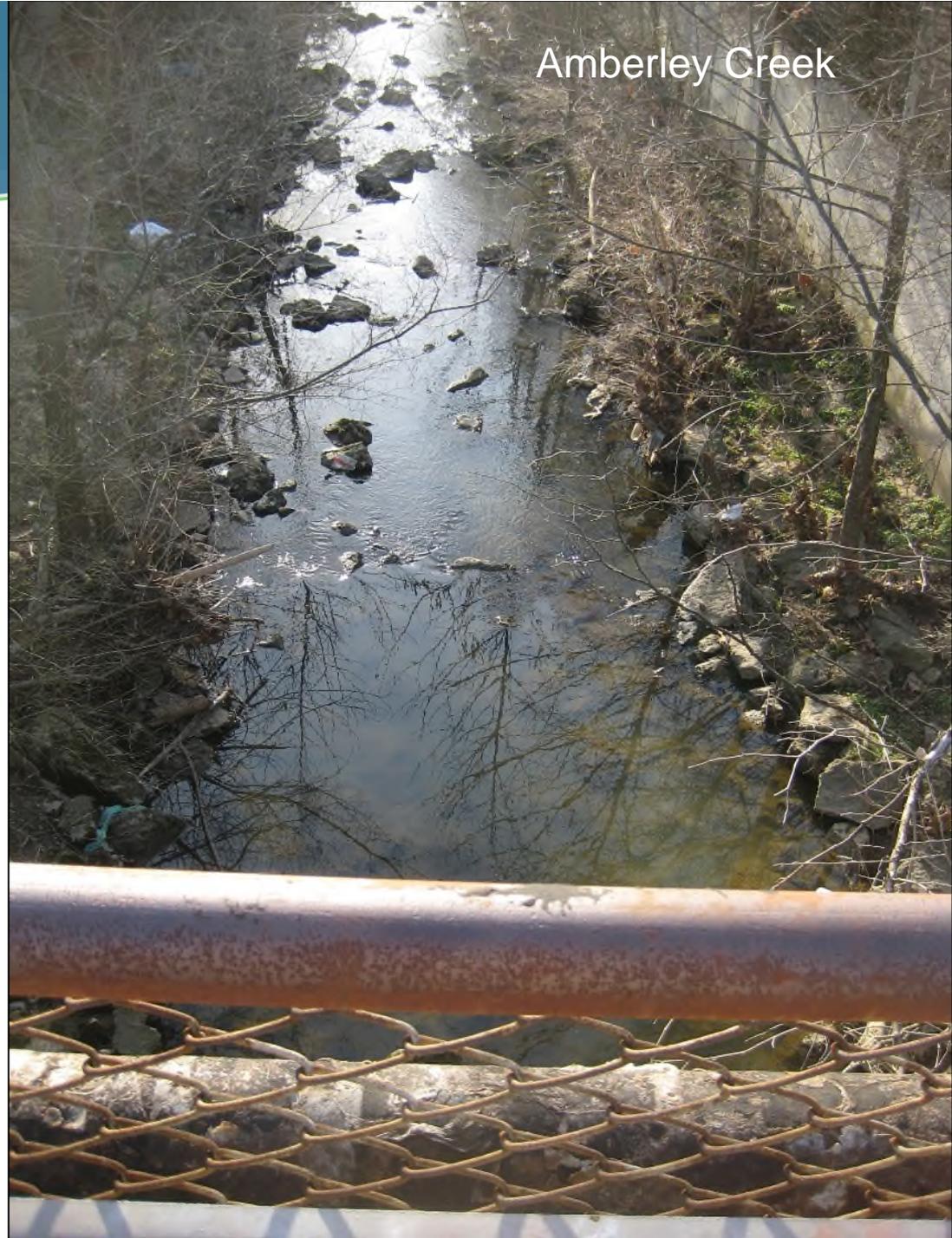
## Council Initiatives

- Building Consensus Around Our Shared Water Resource
- Project Implementation
- Advancing Research and Knowledge
- Opportunity to Know Your Watershed
- Watershed Action Planning



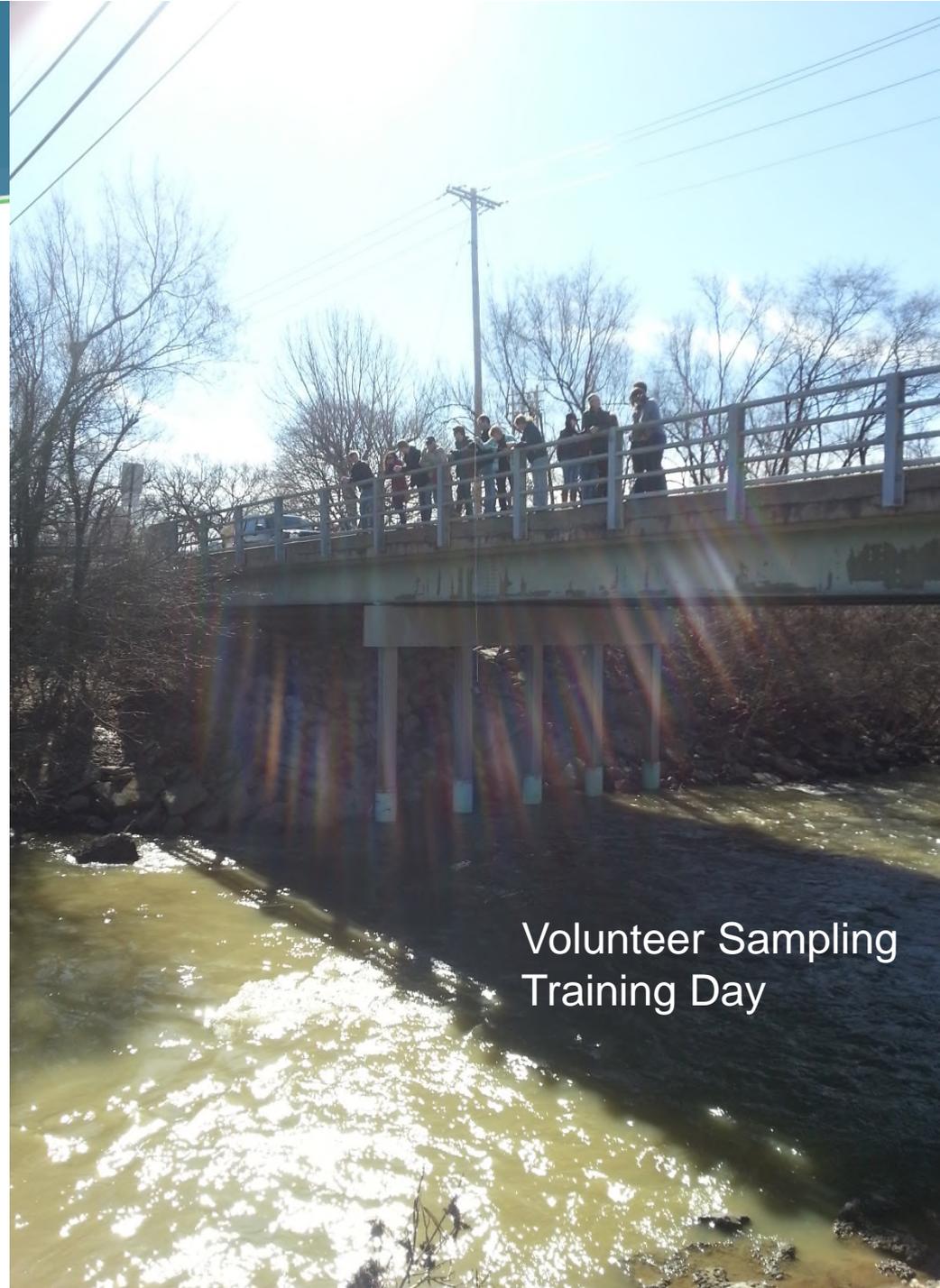
## Advancing Scientific Research and Knowledge

Scientific research and monitoring tell the story of water quality improvement and guide investment in projects that return the biggest environmental benefits. We work to understand the science behind these changes and share that knowledge with others.



## Need for Citizen Monitoring Program

- Comprehensive and consistent set of quality data watershed-wide
- Community connection to public waterway
- Eyes and ears of the stream
- Brings people to the banks of the Mill Creek and provides an opportunity to understand the watershed



Volunteer Sampling  
Training Day

## Goals for the Monitoring Program

- Collect a baseline of watershed-wide, comprehensive water quality data, and build from there a sustainable program
- Allow us to proactively respond to Federal mandates and changes to Clean Water Act requirements (specifically with regard to stormwater management)
- Articulate to watershed stakeholders the specific environmental and economic benefits achieved by projects and policies
- Aid in watershed planning efforts
- Enhance partnerships
- Achieve the vision of a restored Mill Creek

# Components of a Rigorous Monitoring Program

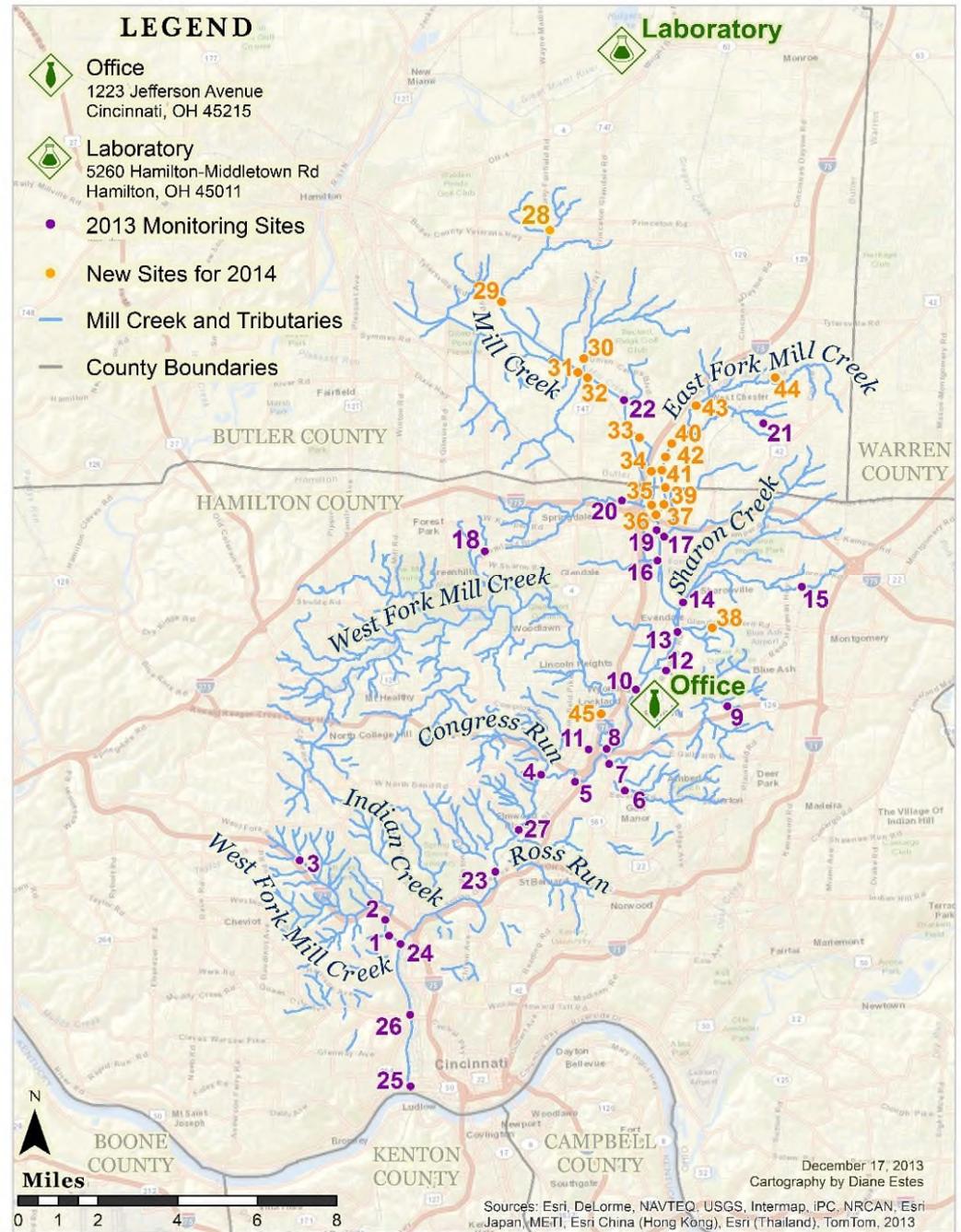
- **Water Chemistry:** N, TP, pH  
Conductivity, E. coli, Turbidity
- **Habitat Quality:** QHEI, riparian zone, pool/riffle, pebble count
- **Biocriteria:** fish and macroinvertebrates
- **Hydromodification**
  - Channelization, hardening, dredging
  - Low head dams
  - Pulse flows from runoff of impervious surfaces



# Mill Creek Volunteer Water Quality Monitoring Program

- April-November, once per month
- Grab sample monitoring and lab analysis for water chemistry
- Began in 2013

## MILL CREEK MONITORING SITES



## Funding and Partnerships



## Volunteer Training and Coordination

- Stream sampling training provided prior to first event
- Sampling demonstration at the Mill Creek
- How-to for field data form and online form
- 2013- 25 volunteers, 2014- 45 volunteers
- Volunteers responsible for group coordination
- Teams allow for rotation and better retention



## Lab Analysis at Level 3 Certified Lab

Test water samples for:

- pH (Meter)
- Total Phosphorous (HACH DR/4000 Procedure, Method 8190, PhosVer 3 with Acid Persulfate Digestion)
- Nitrates (HACH DR/4000 Procedure, Method 10020, Chromotropic Acid Method)
- Turbidity (Meter)
- Conductivity (Meter)
- Fecal Coliforms (IDEXX Quanti-Tray/2000)



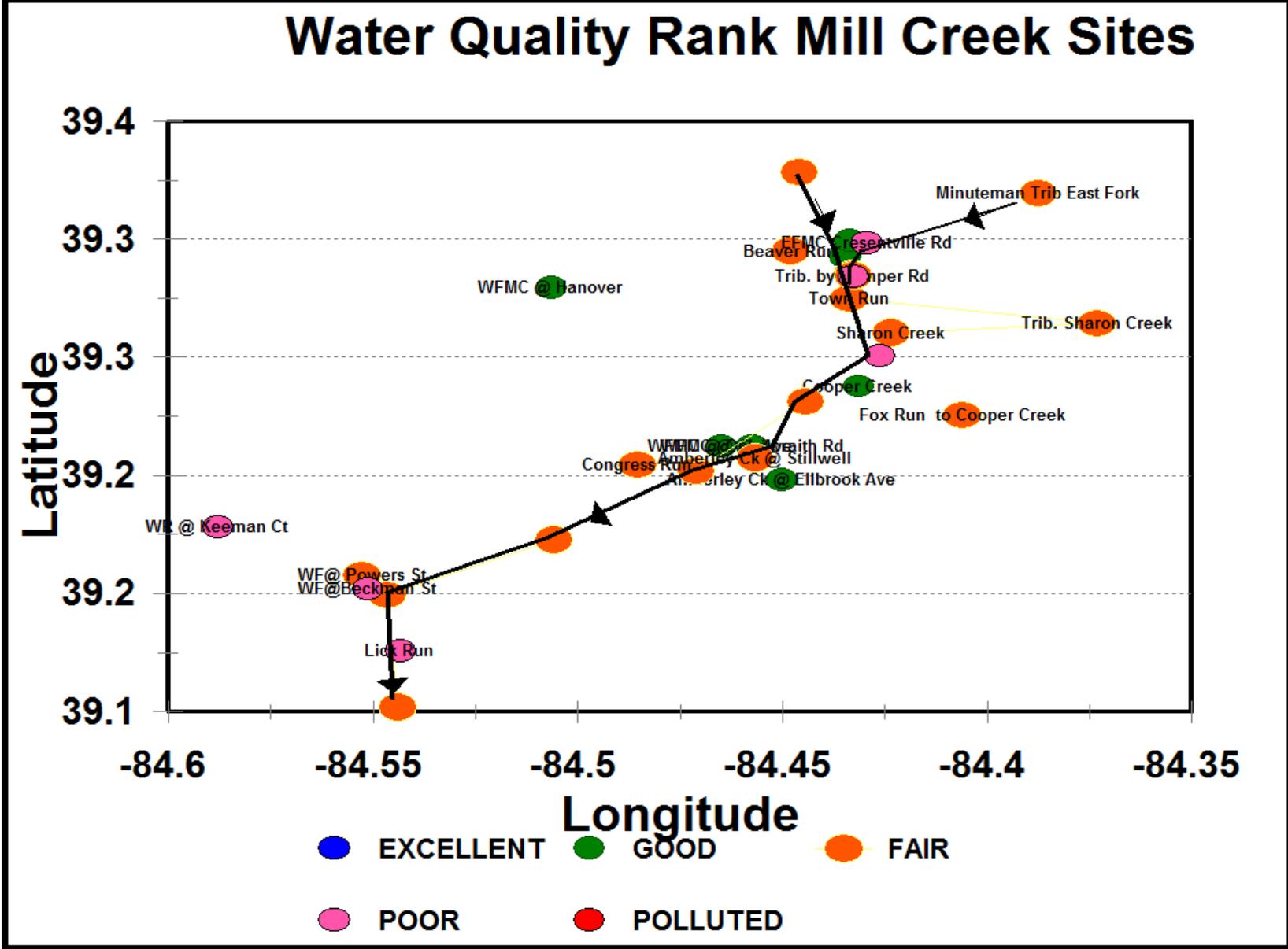
## Lab Days

- Up to eight volunteers in the lab
- 1-2 volunteers per test
- Range of experience levels
- Training provided on-site
- 10:30am-3:00pm 2<sup>nd</sup> Saturday of the month
- E. coli/Fecal Coliform test on 2<sup>nd</sup> Sunday





Plotting the water quality index by longitude x latitude shows the spatial pattern. 2013 data summary:



## Summary of WQA for 2013

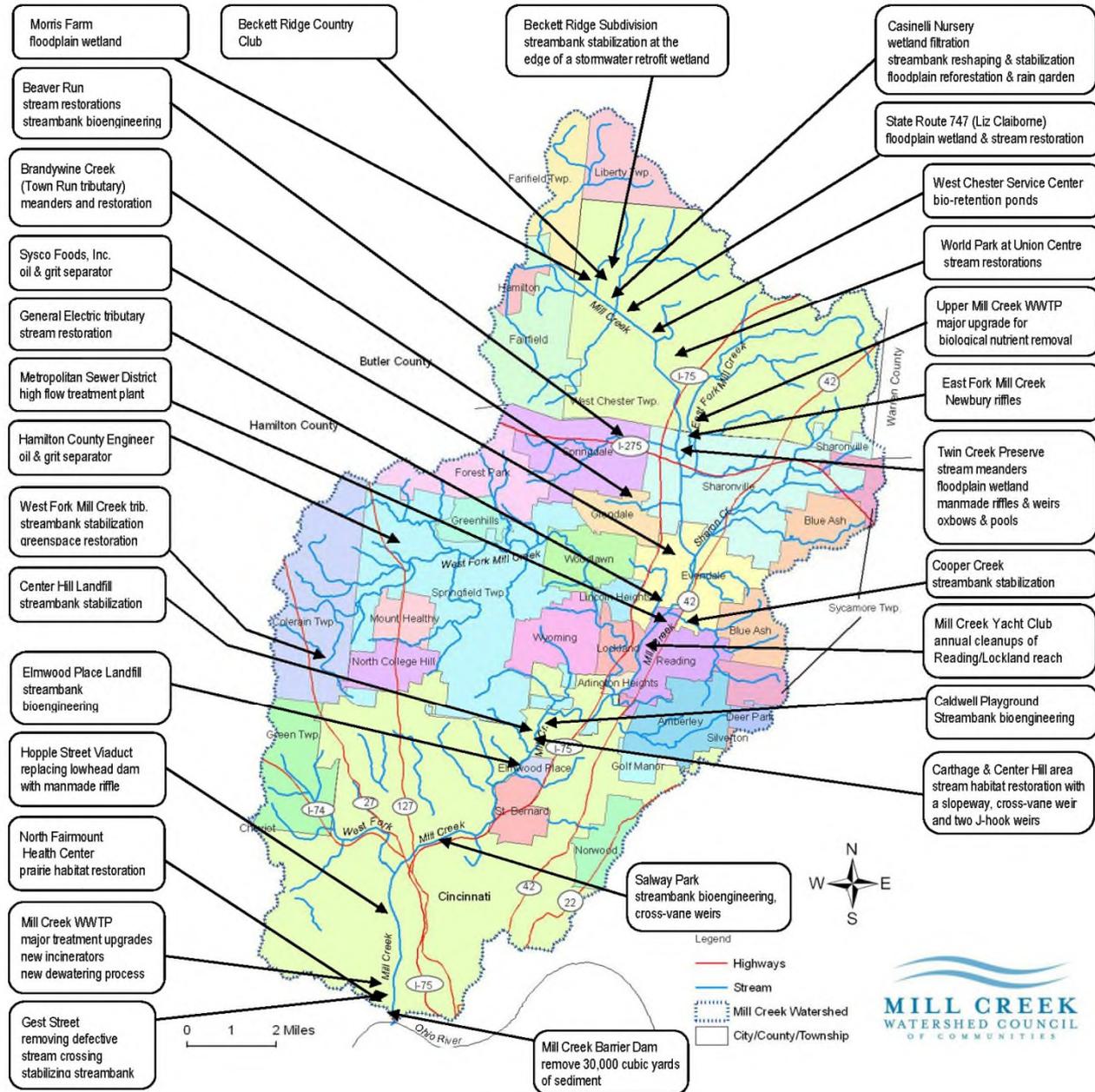
- Vegetation appears to reduce pulse runoff in summer by evaporation & transpiration
- Turbidity is higher before vegetation is fully developed
- Total Phosphorus is high even for an urban stream with MWWH expectation
- *E. coli* are too high on days of high discharge
- We have a base line to compare data from subsequent years



Today...  
the Mill  
Creek Is  
Improving

But we have a  
long way to go

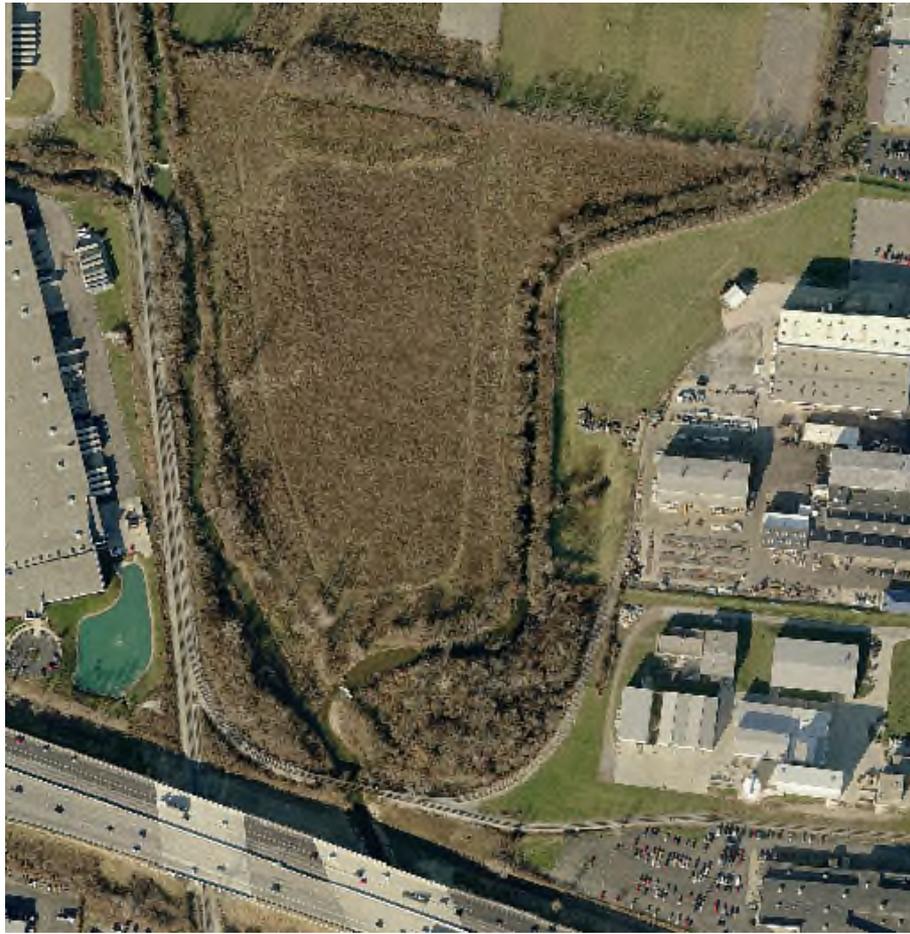
# Stream Corridor Restoration Projects in the Mill Creek Watershed



## Pre/Post Construction Monitoring

- How effective are these projects in achieving water quality and quantity goals?
- What is return on investment?
- How can we be strategic in future implementation?





## Upstream of Main Stem

Commercial/Residential Development

1. Impervious surface
2. Increases pulse flow with rainfall runoff
3. Increases turbidity from bank/bottom erosion

Pre-construction:

Poor habitat, high sediment loads, high nutrients

Post-construction:

Riffles increase oxygen and provide pools for aquatic habitat, wetland captures nutrient loads, once trees mature we predict decreased turbidity, TP, nitrates, lower water temperatures

## Upstream of East Fork

Butler Co. Regional Water Reclamation Plant

1. Elevates TP & nitrate
2. Lowers turbidity
3. Increases Conductivity, pH, % D.O. saturation, algal productivity, E. coli



# Wildermuth Stream and Wetland Restoration

- East Fork Mill Creek
- Butler County
- North of Upper Mill  
Creek Water  
Reclamation Facility



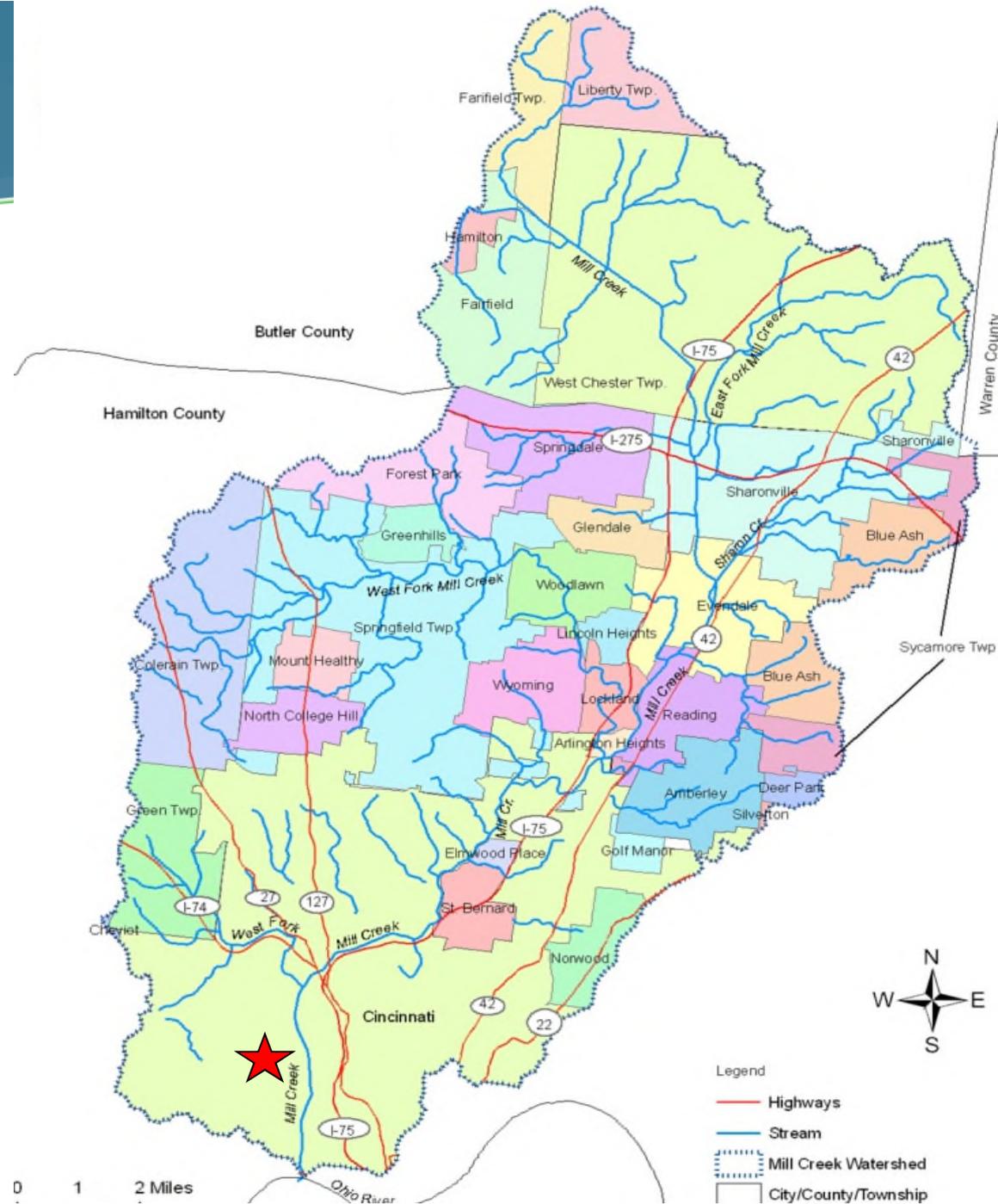
# Project Objectives

- Restore 1,800 linear ft. of the East Fork Mill Creek
- Enhance the 22-acre floodplain
- Alleviate extreme flood flows
- Reduce in-stream erosion
- Attenuate nutrient loads
- Community education and outreach



# Roberts Academy “Front Yard” Stormwater Demonstration

- Lower Mill Creek
- Hamilton County
- Cincinnati Public School Campus



## Project Objectives

- Reduce annual stormwater volume to CSO 5 of approximately 250,000 gallons per year
- Reduce nutrient and sediment loads
- Complement to strategic sewer separation improvements and CSO volume reduction
- Educate community
- Partner with Cincinnati Public Schools



Existing Condition



## Monitoring Provides Validation

- Investment in water quality pays off
- Public and private funding for restoration is taken seriously and used in the best way possible
- Citizen scientists produce valuable and accurate data
- We all have a stake in our local water quality
- Data provides confidence

**MY  
WATERSHED**



**I WILL  
PROTECT IT!**

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Communities**

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