2023 Water Quality Forum

Lower Little Miami River

MSD Administration Building
November 8, 2023

METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI

It’s All About Clean Water

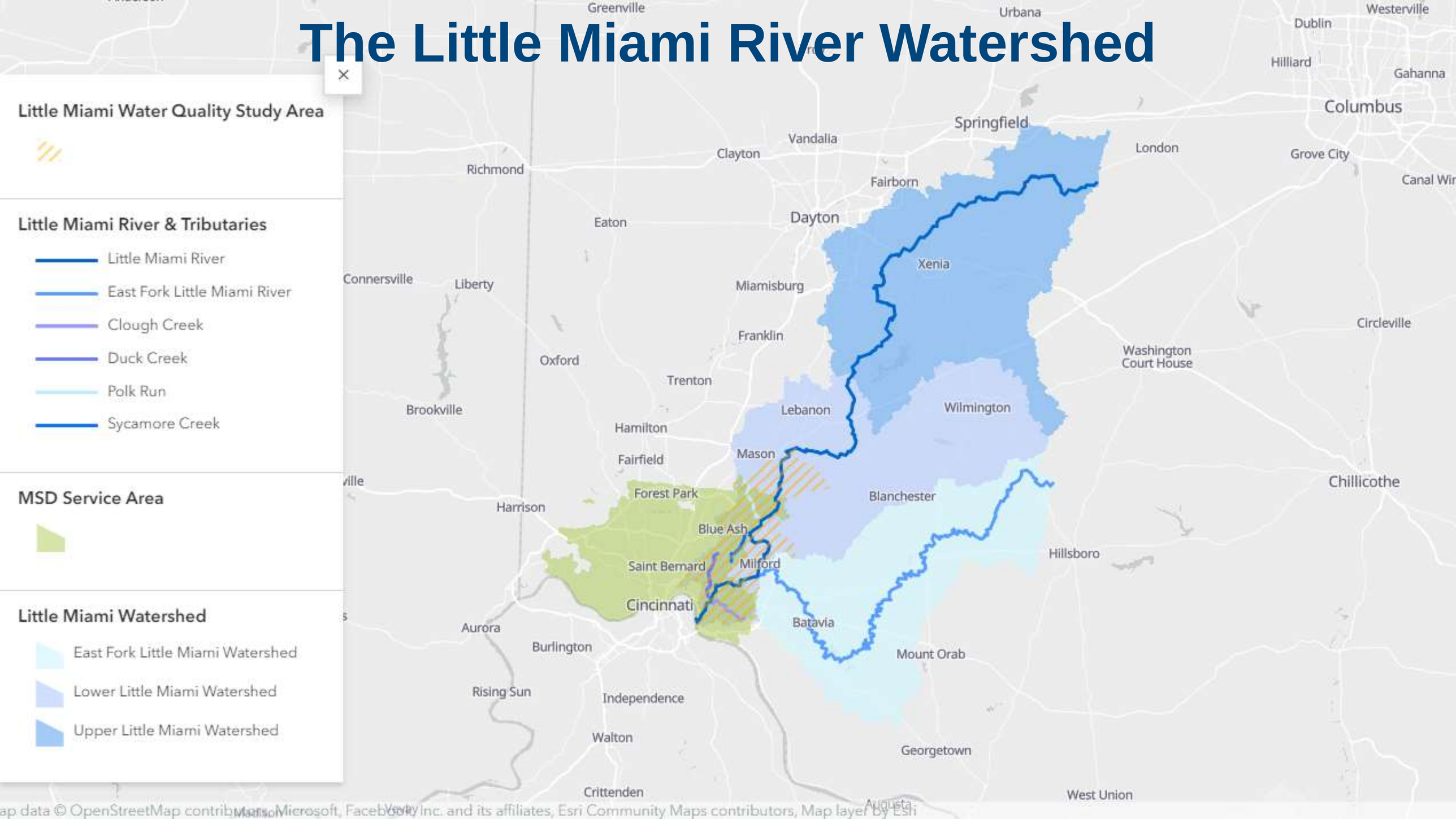
MSD collects, treats, and manages wastewater from Greater Cincinnati communities, protecting the environment and public health by returning clean water to local rivers and streams.

METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI

Agenda

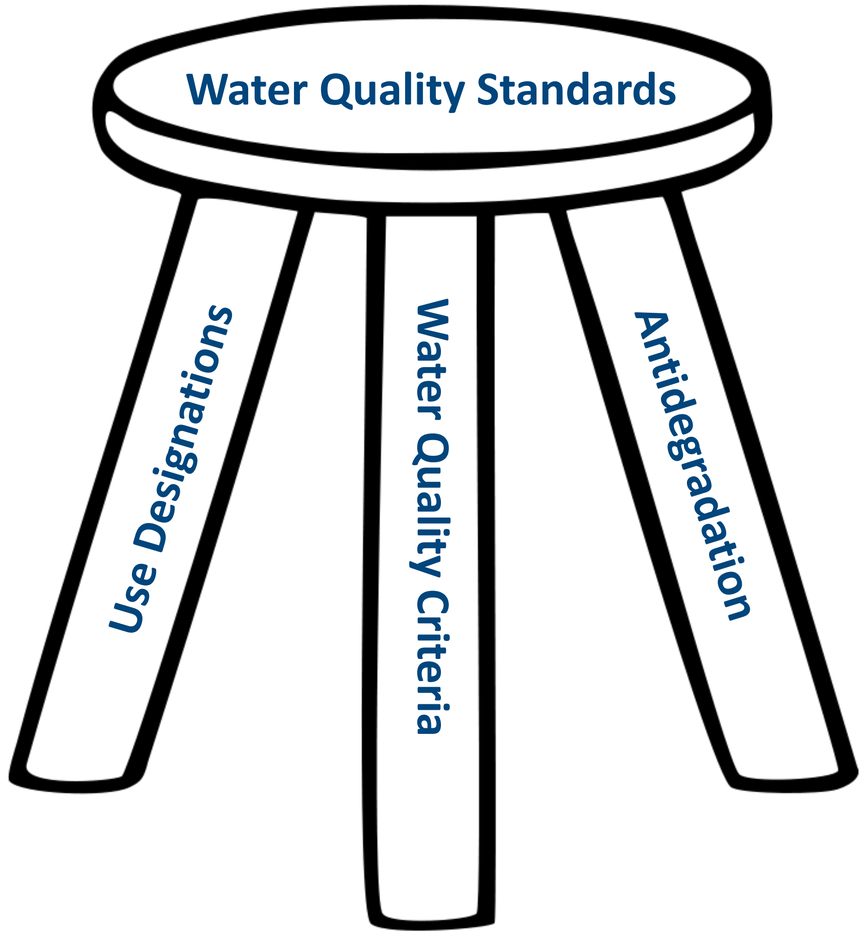
- Welcome - **Diana Christy**, MSD Director
- Little Miami Watershed Overview
- Ohio Water Quality Standards
- 2022 MBI Results – **Carrie Turner, Limnotech**
- Partner Highlights
  - **Jason Brownknight**, Little Miami Conservancy
  - **Aaron Rourke**, Ohio Department of Natural Resources
  - **Eric Bartl,** Hamilton County Public Health
  - **Reese Johnson,** MSD
- World Café Abridged (Breakouts for virtual folks)
- Harvest

The Little Miami River Watershed



Ohio Water Quality Standards

- Three Elements:
  - Beneficial Use Designations
  - Water Quality Criteria
  - Antidegradation



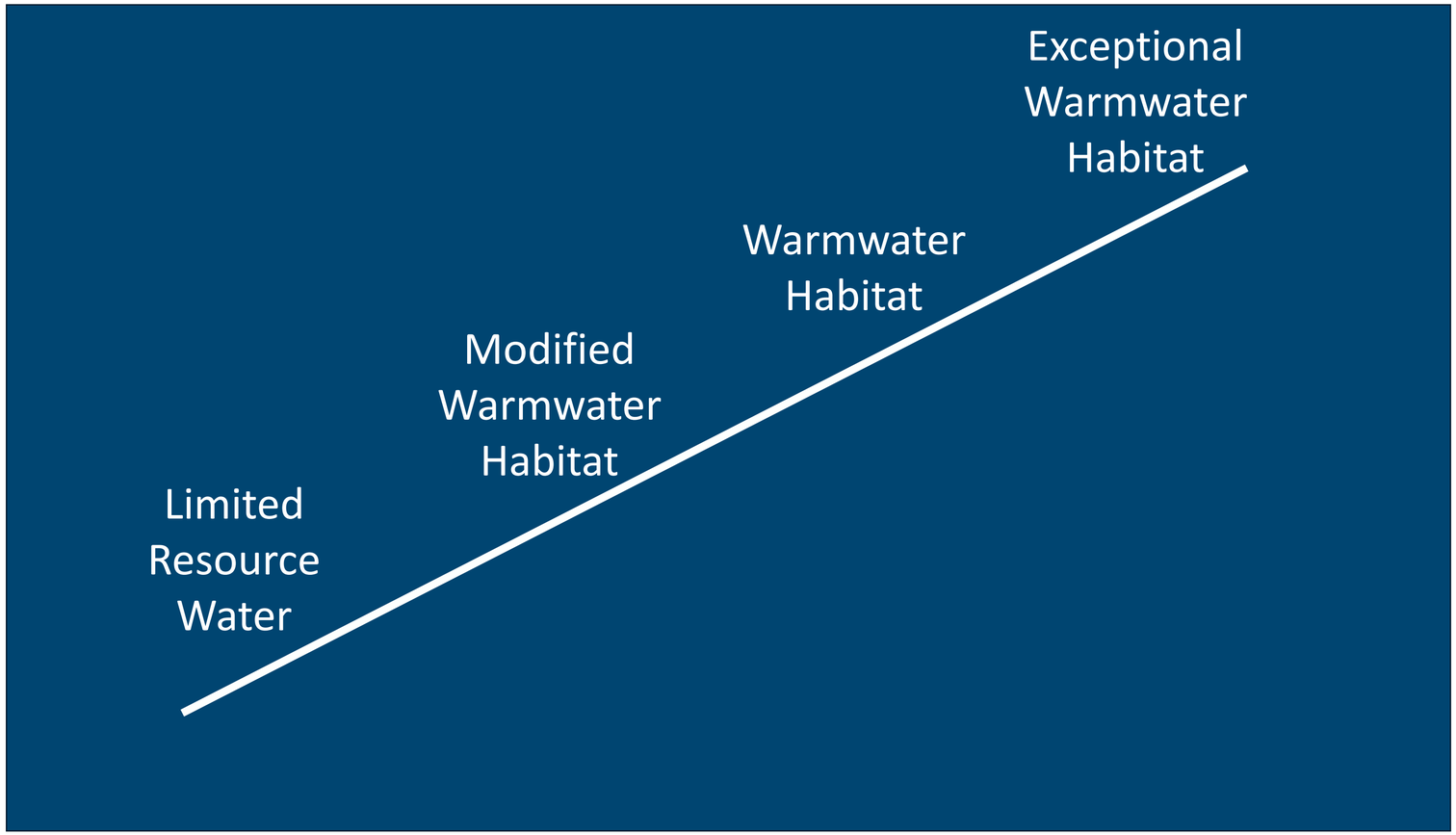
Water Body Segment	Aquatic Life Habitat							Water Supply			Recreation			Comments
	SRW	WWH	EWH	MWH	SSH	CWH	LRW	PWS	AWS	IWS	BW	PCR	SCR	
Little Miami river - North fork (RM 91.64) to RM 3.0 (downstream of Beechmont ave.)			+						+	+		+		
- all other segments		+							+	+		+		
Cluff creek (Clough creek)		+							+	+		+		
McCullough run		*							*	*		*		
Duck creek - downstream Red Bank road (RM 2.4) to the mouth		+							*	*		+		
- confluence of East fork and West fork to Red Bank road							+		*	*			+	Small drainageway maintenance

Beneficial Use Designations

Defined in rule 3745-1-18

Aquatic Life Use

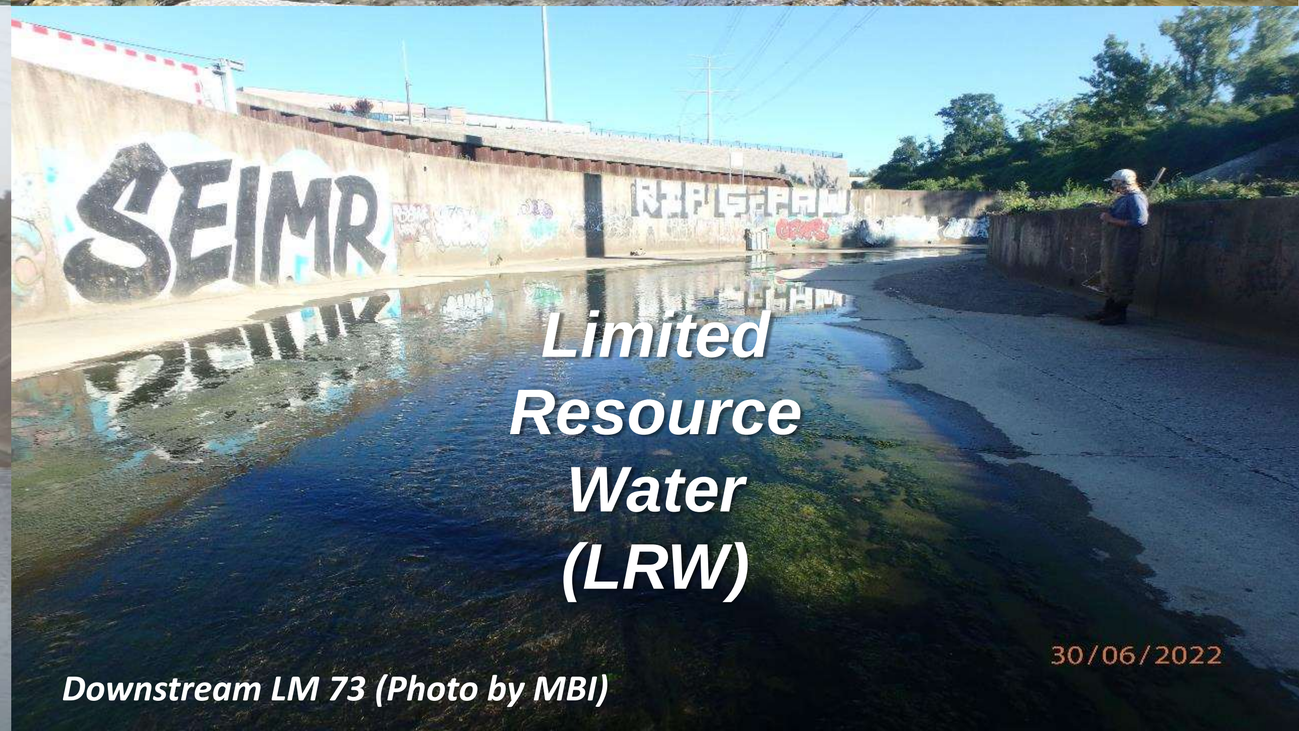
Ohio's Biocriteria and Tiered Aquatic Life Use (TALU) Designations



LM16 (Photo by MBI)

Upstream LM 40 (Photo by MBI)

Mill Creek downstream Spring Grove Ave. (MC07)



Downstream LM 73 (Photo by MBI)

Table 1. Summary of recreation uses and *E. coli* standards

Recreation Use	Description	*E. coli* (colony counts / 100 mL)	
		90-day Geometric Mean	Statistical Threshold Value [1]
Bathing Waters	Waters heavily used for swimming. Applies to all waters where a lifeguard or bathhouse is present, and waters designated Bathing Waters. Applies to Lake Erie and the Ohio River.	126	410 [a]
Primary Contact	Waters suitable for one or more full-body contact activities such as wading, swimming, boating, water skiing, canoeing, etc. All waters of the state are designated primary contact unless otherwise designated as bathing waters or secondary contact.	126	410
Secondary Contact	Waters that for reasons of insufficient depth and limited access result in minimal exposure to pathogens. These waters are designated in rules 3745-1-08 through 3745-1-30.	1,030	1,030

[1] These criteria shall not be exceeded in more than 10 percent of the samples taken during any 90-day period.
[a] A beach action value of 235 *E. coli* colony counts per 100 ml shall be used for the purpose of issuing beach and bathing wa
advisories.

Downstream LM 40 (Photo by MBI)

Downstream LM 01 (Photo by MBI)

Recreational Use

Water Quality Criteria

METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI

Water Quality Criteria

- Specifically designed to protect designated uses
- Three types:
  - Narrative criteria “Free froms”
  - Biological criteria or Biocriteria
  - Numeric criteria (chemical, physical, etc.)


Spotted Bass


Golden Redhorse


Longear Sunfish


Highfin Carpsucker


Rainbow Darter

Index of Biotic Integrity (IBI)
Modified Index of Well-being (MIwb)

Photos provided by MBI

Invertebrate Community Index (ICI) / Macroinvertebrates

Chemical / Physical Assessments (Grab, Sondes, QHEI)

Photos provided by MBI

Antidegradation

“Keep clean water clean”

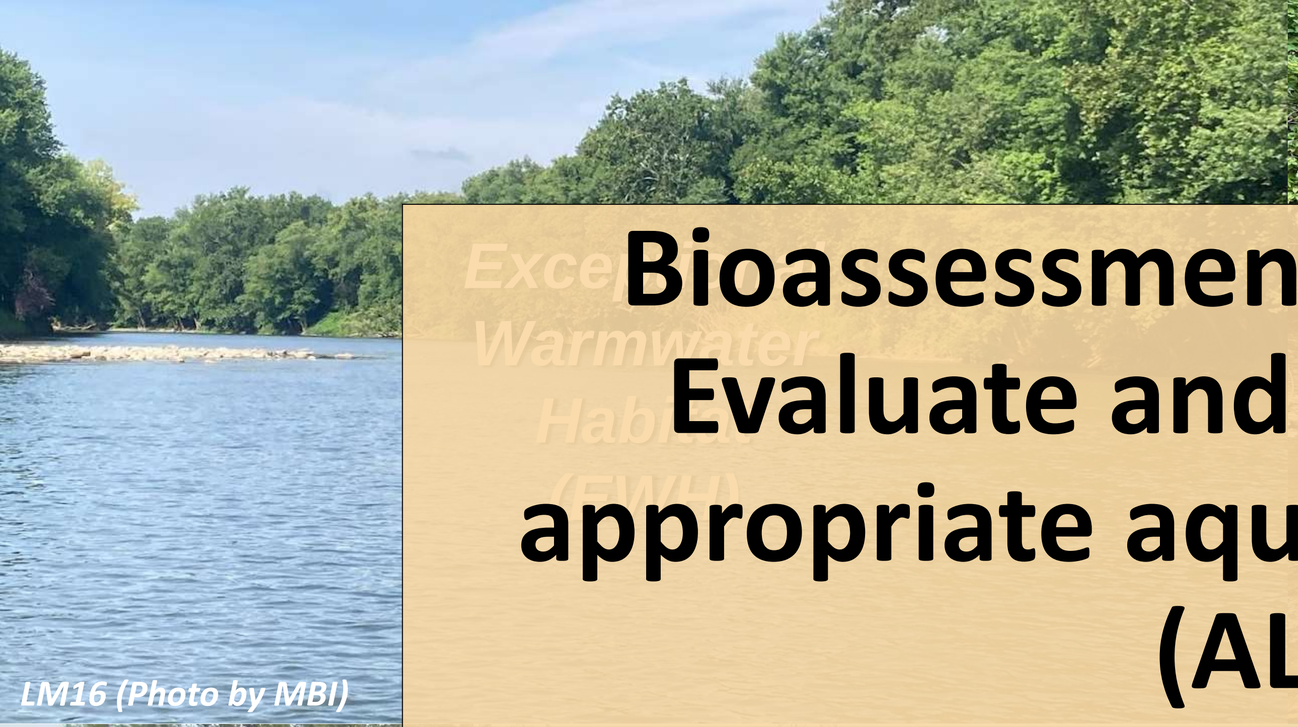
METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI

Antidegradation

- Framework for maintaining and protecting existing beneficial uses
- Water quality may only be lowered for important economic or social development, and must be without loss of uses
- A procedure for determining a discharge is necessary before authorizing it

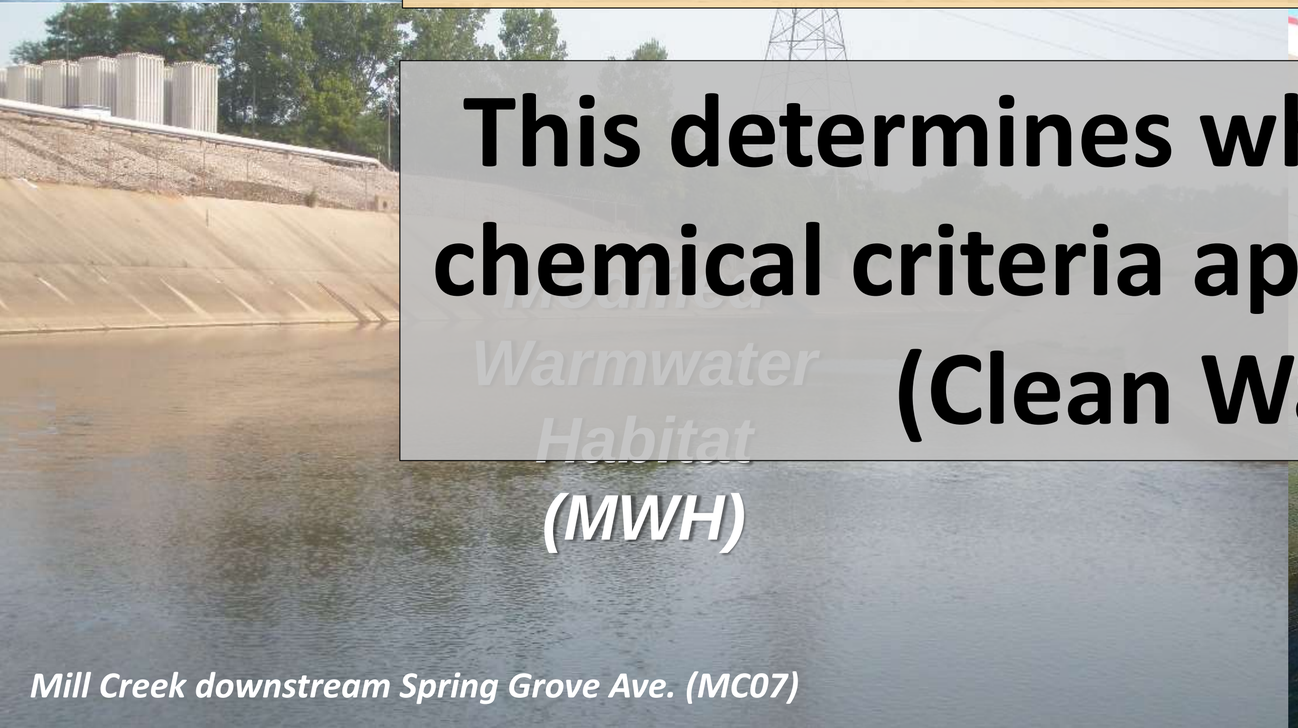
Bioassessment Objective 1: Evaluate and recommend appropriate aquatic life use tier (ALU)

This determines which biological and chemical criteria apply to a waterbody (Clean Water Act)



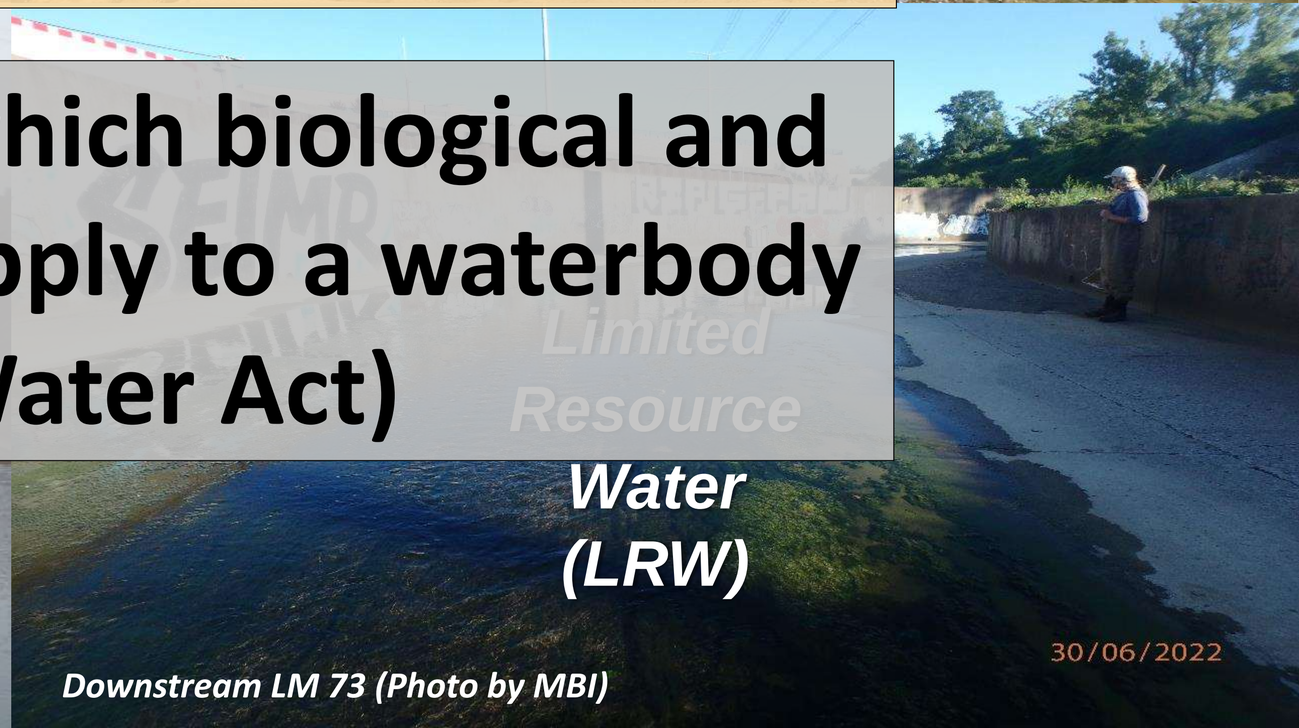
LM16 (Photo by MBI)

Warmwater Habitat (WWH)



Mill Creek downstream Spring Grove Ave. (MC07)

Modified Warmwater Habitat (MWH)

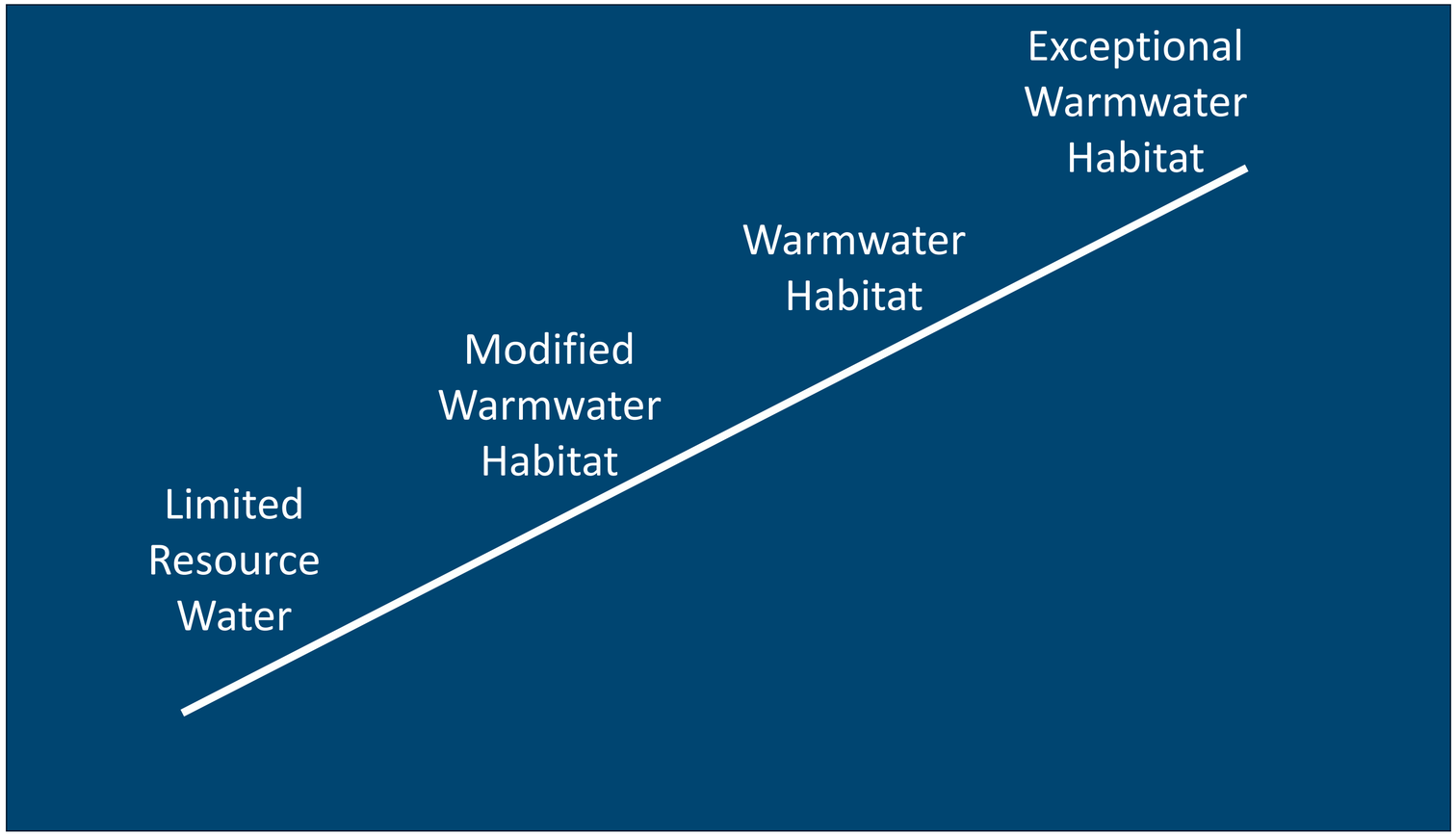


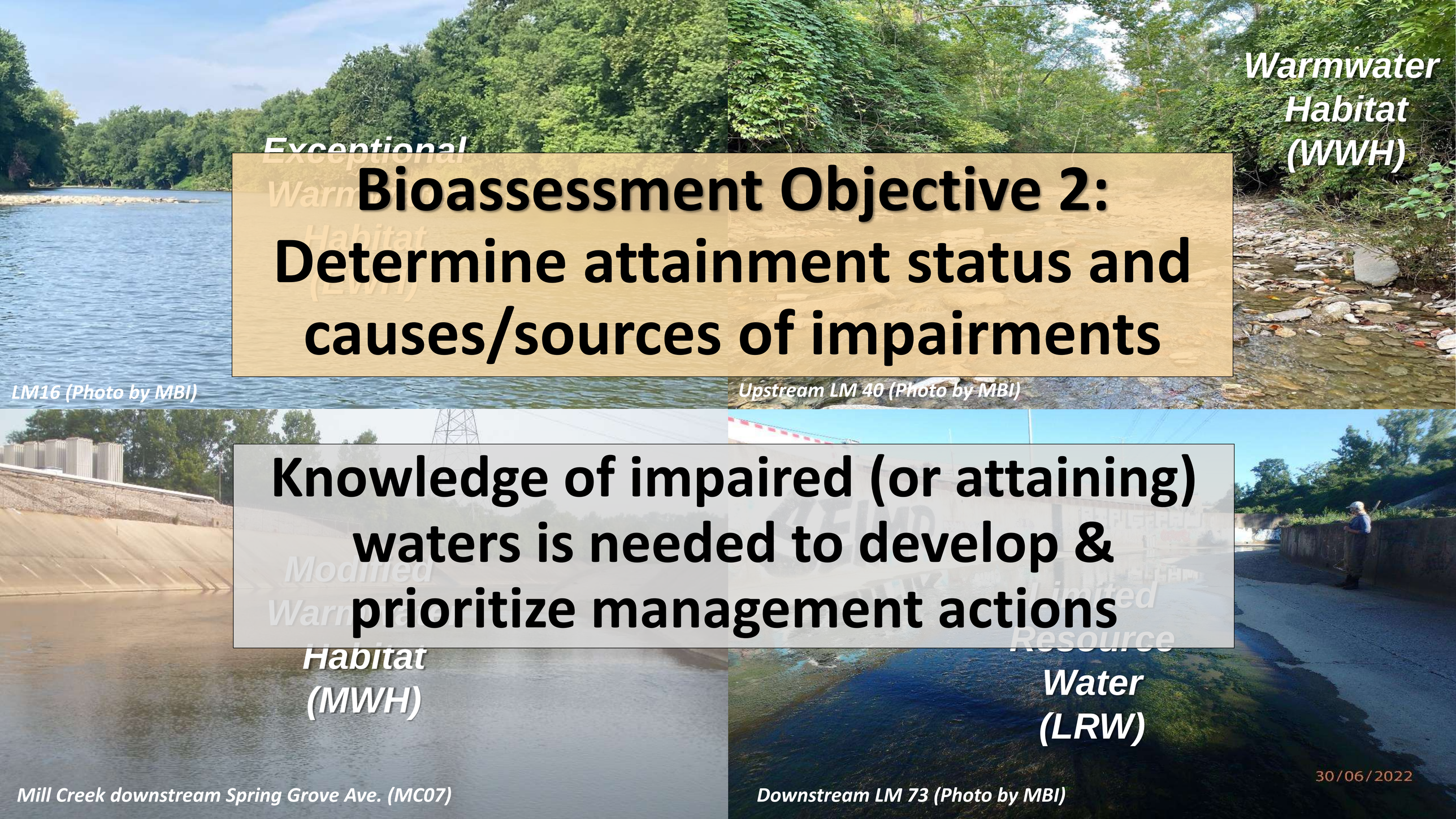
Limited Resource Water (LRW)

Downstream LM 73 (Photo by MBI)

Aquatic Life Use

Ohio's Biocriteria and Tiered Aquatic Life Use (TALU) Designations



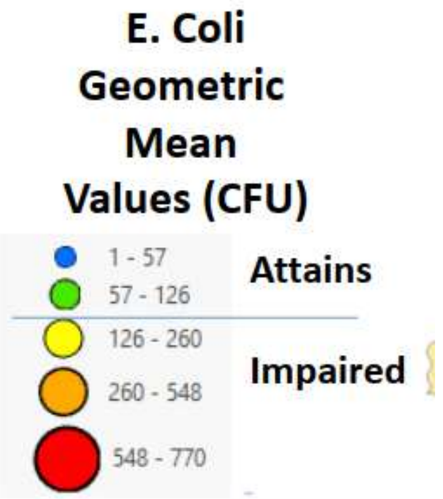


Bioassessment Objective 2: Determine attainment status and causes/sources of impairments

Knowledge of impaired (or attaining) waters is needed to develop & prioritize management actions

Use Attainment Status

- Degree to which environmental parameters or indicators are either above or below criteria set by WQS
- Portrayed as full, partial or non-attainment (non) for ALU or attains/impaired for RU
  - ALU status based on attainment of the Ohio biocriteria
  - RU status based on E. Coli indicator



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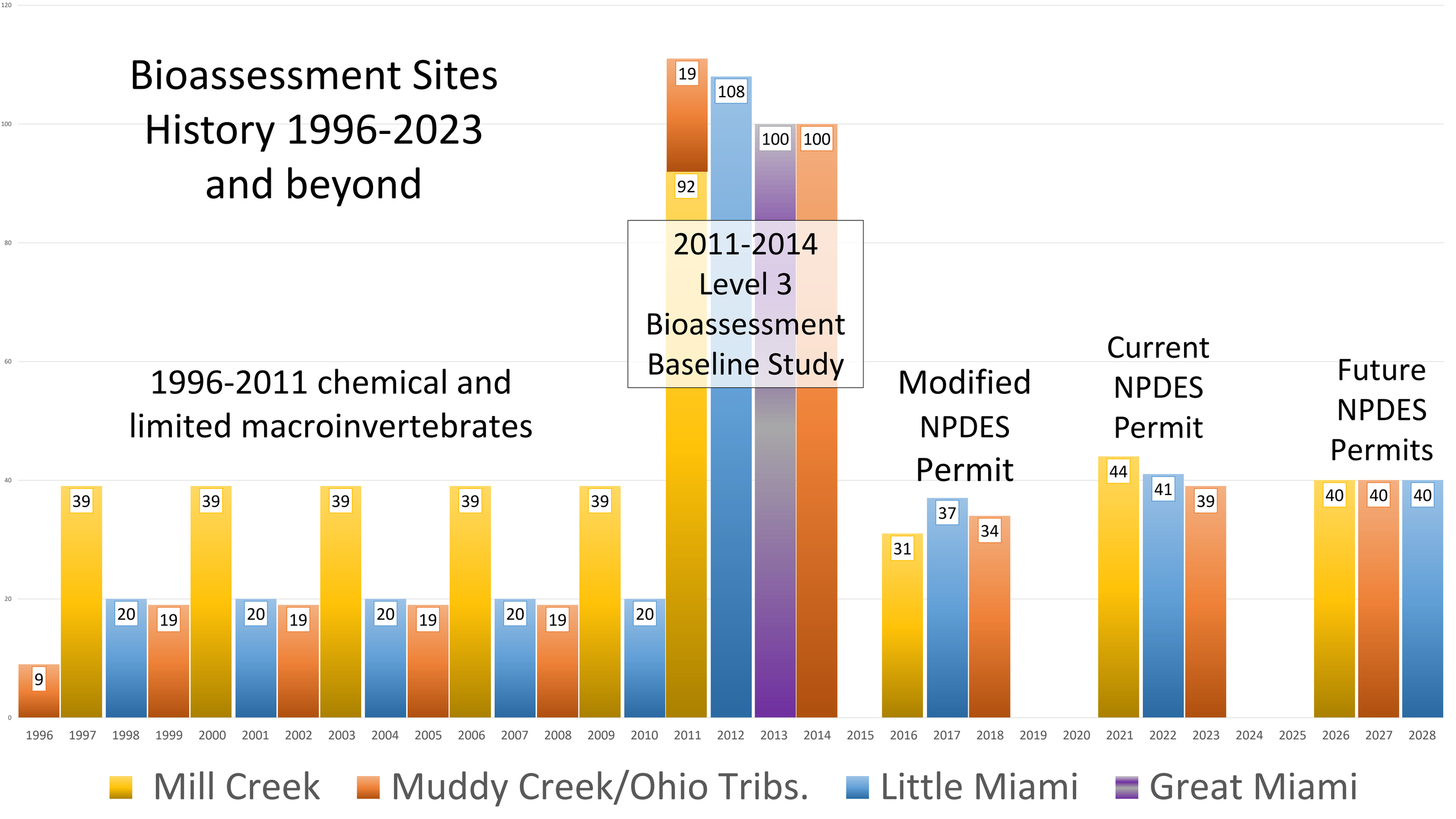
Bioassessment Objective 3: Determine trends over time

Trends reveal the effectiveness of strategies, controls & BMPs

Mill Creek downstream Spring Grove Ave. (MC07)

Downstream LM 73 (Photo by MBI)


Bioassessment Sites History 1996-2023 and beyond
1996-2011 chemical and limited macroinvertebrates
2011-2014 Level 3 Bioassessment Baseline Study
Modified NPDES Permit
Current NPDES Permit
Future NPDES Permits
120
100
80
60
40
20
0
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028
9
39
20
19
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39
20
19
39
20
19
39
20
92
19
108
100
100
31
37
34
44
41
39
40
40
40
Mill Creek
Muddy Creek/Ohio Tribs.
Little Miami
Great Miami

Water Quality Modeling Program Manager

- **Instream monitoring**
- **Story Map**
- **Watershed Modeling and Planning**
- **RDII mitigation research**
- **COVID wastewater-based epidemiology support**
- **Real-time water quality monitoring**

CSO SEVERITY ANALYSIS

LimnoTech
Water Environment | Scientists Engineers

2022 MBI Bioassessment Results

Lower Little Miami River and Selected Tributaries

METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI

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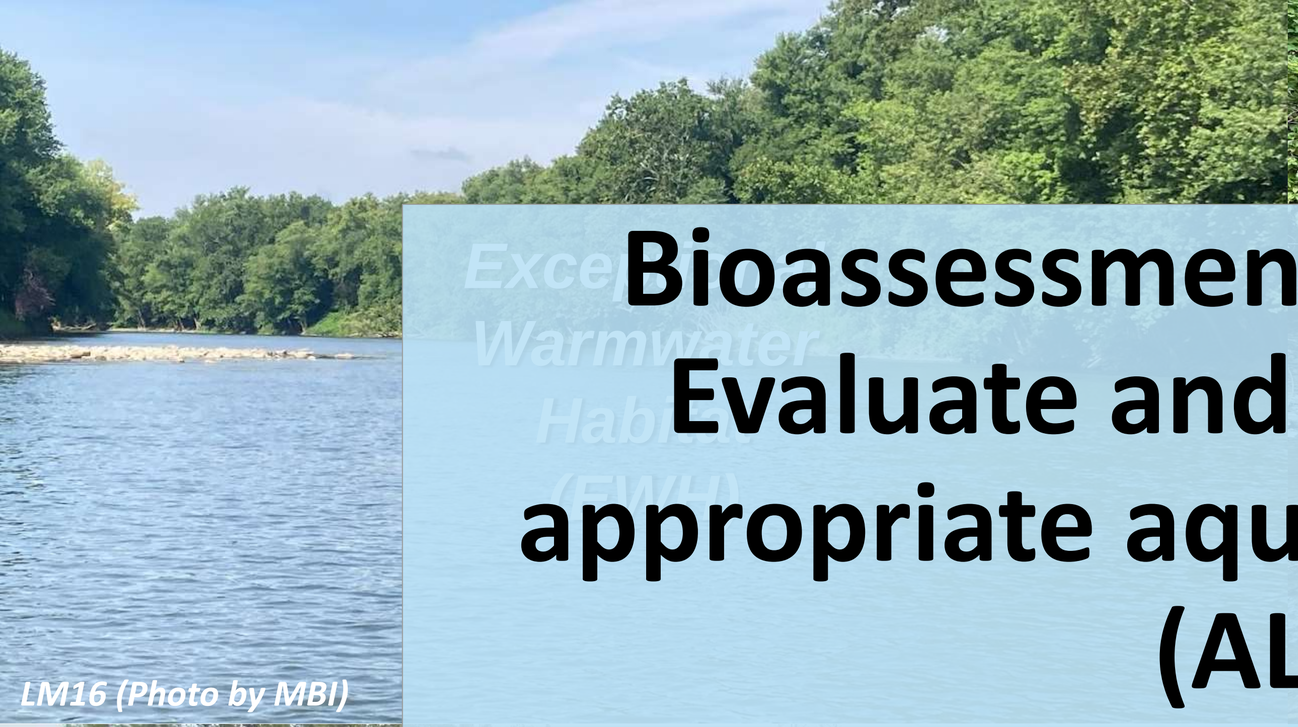
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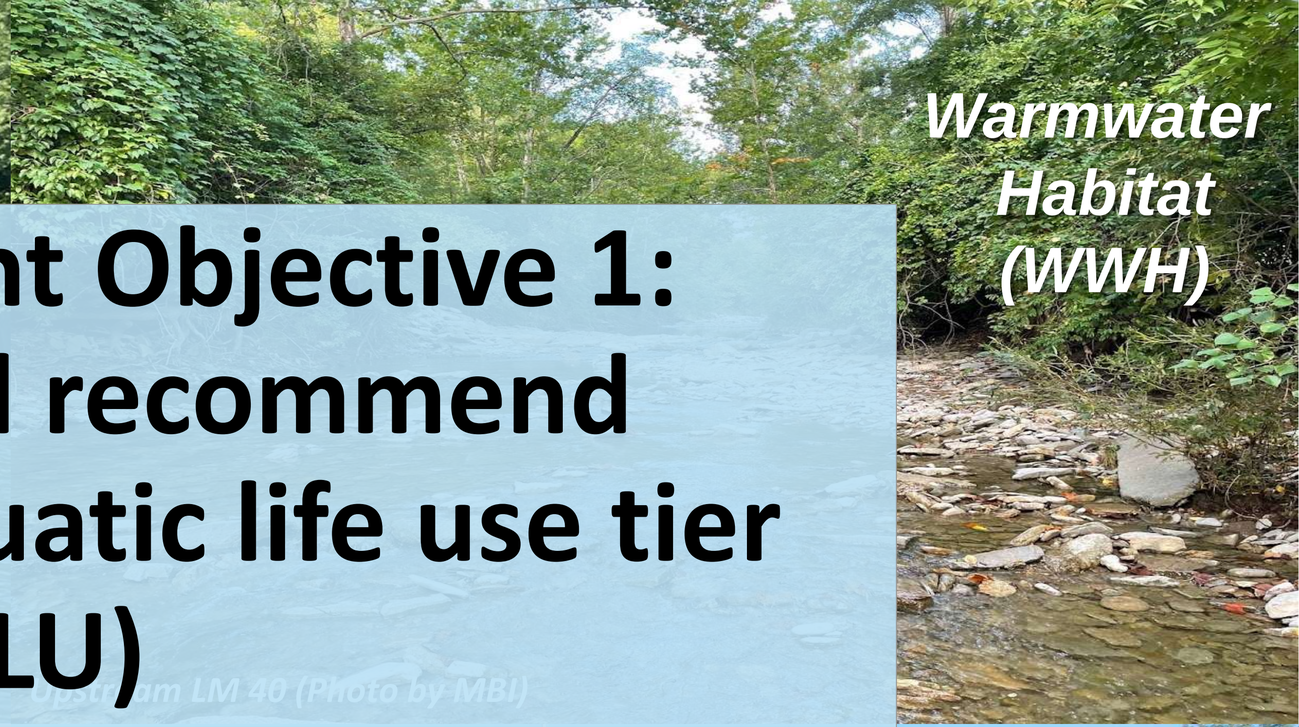
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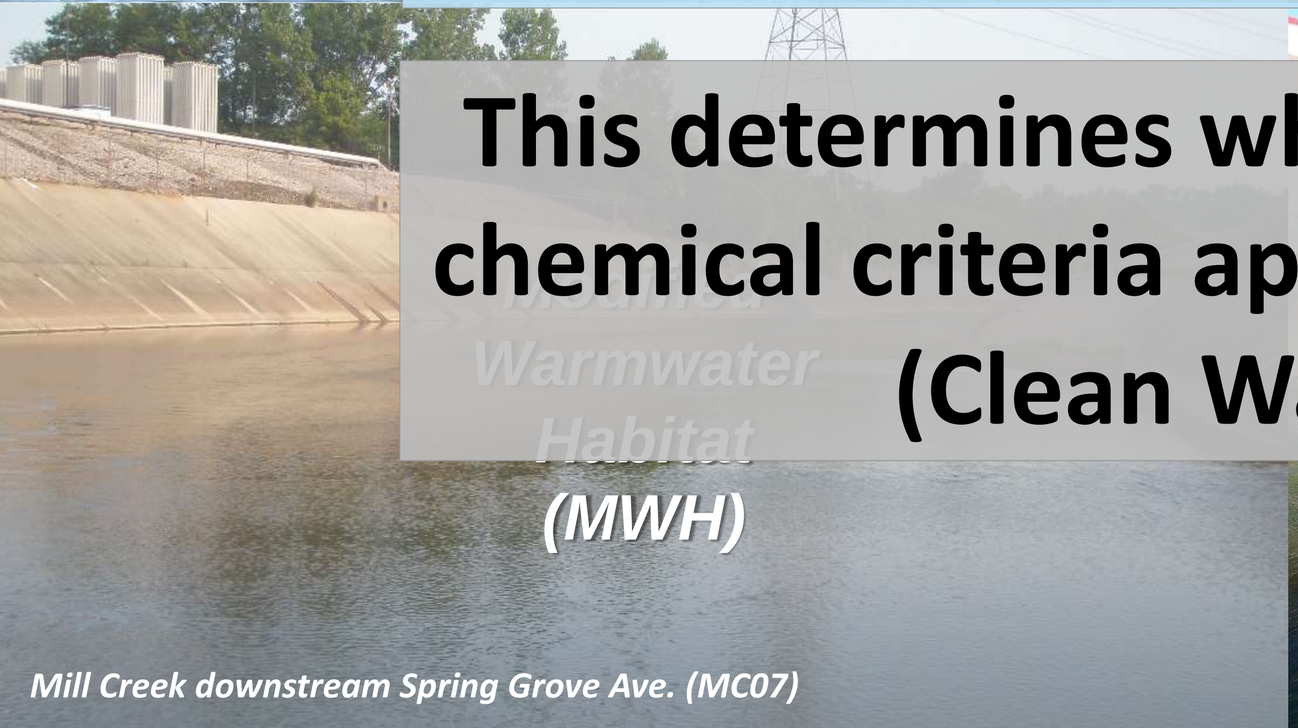
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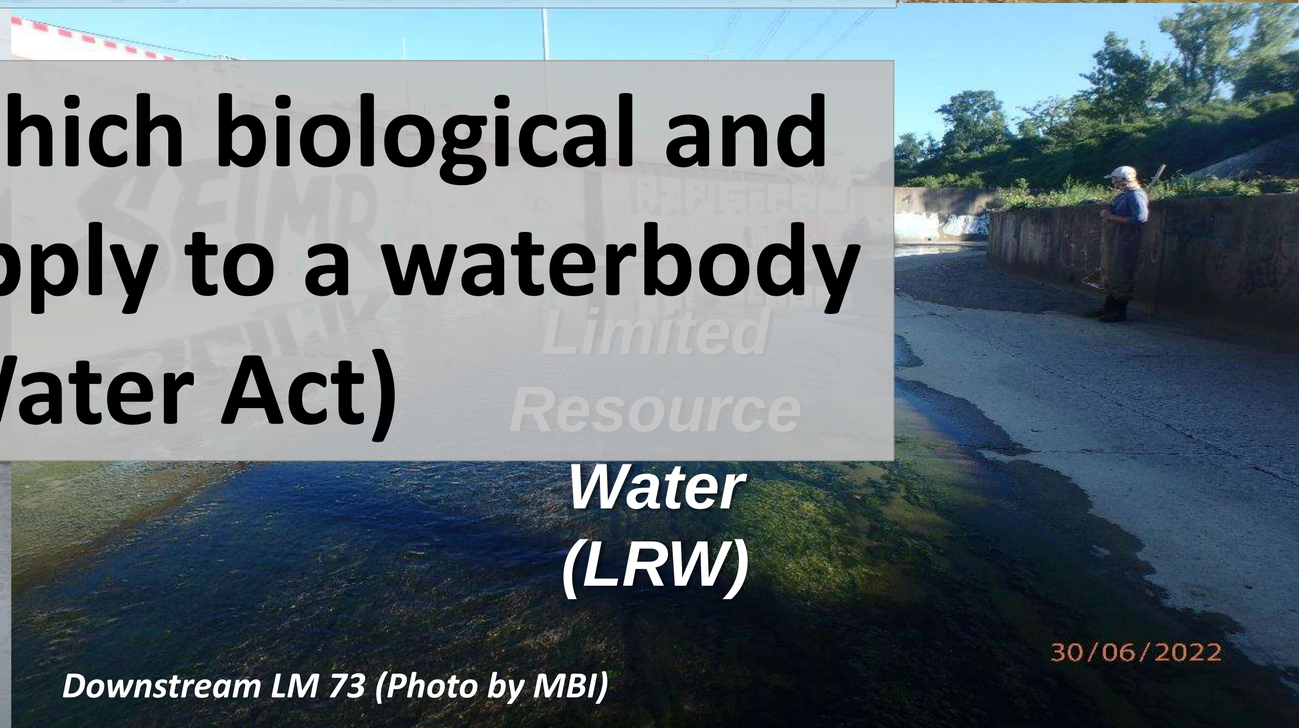
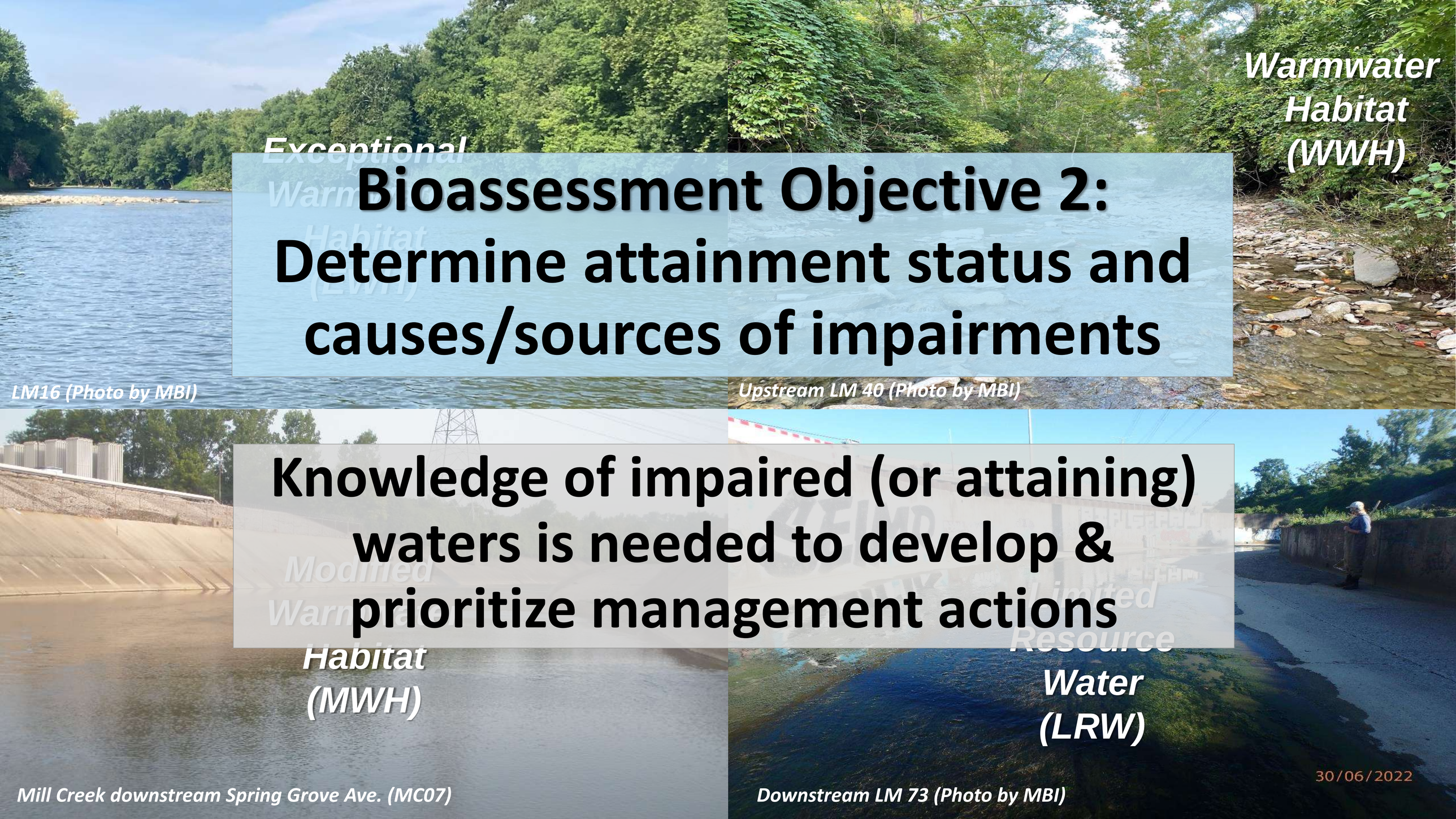


Limited Resource Water (LRW)

Downstream LM 73 (Photo by MBI)

MBI Aquatic Life Use Recommendations

- Mainstem:
  - No recommendations
- East Fork Duck Creek:
  - LM84 LRW to WWH
  - LM85 LRW to WWH
- Sycamore Creek/Polk Run/Clough Creek:
  - No recommendations



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Knowledge of impaired (or attaining) waters is needed to develop & prioritize management actions

LM16 (Photo by MBI)

Upstream LM 40 (Photo by MBI)

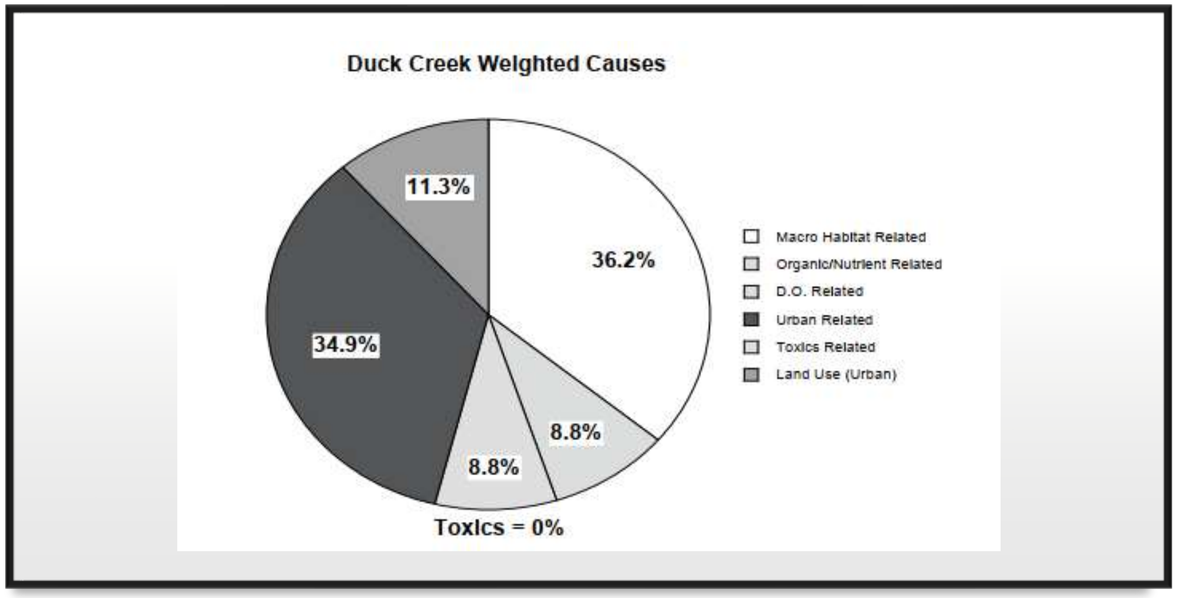
Mill Creek downstream Spring Grove Ave. (MC07)

Downstream LM 73 (Photo by MBI)

Aquatic Life Attainment Status By Site

Stream Segment	Full	Partial	Non
Mainstem (14)	79%	14%	7%
Sycamore Creek & Tribs (5)	40%	20%	40%
Polk Run (1)	100%	0%	0%
Duck Creek (15)	33%	20%	47%
Clough Creek (2)	50%	50%	0%

- 41 sites sampled
- Excludes PHW sampling locations
  - (1) Sycamore Creek
  - (3) Duck Creek
- 88% of total RM of mainstem in full attainment



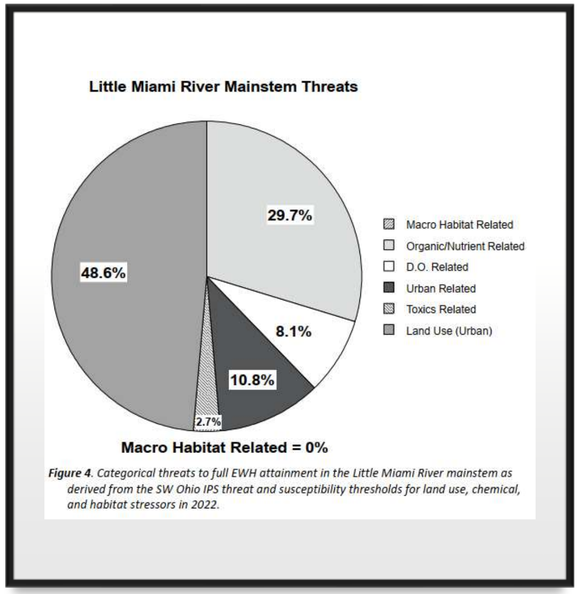


Figure 4. Categorical threats to full EWH attainment in the Little Miami River mainstem as derived from the SW Ohio IPS threat and susceptibility thresholds for land use, chemical, and habitat stressors in 2022.

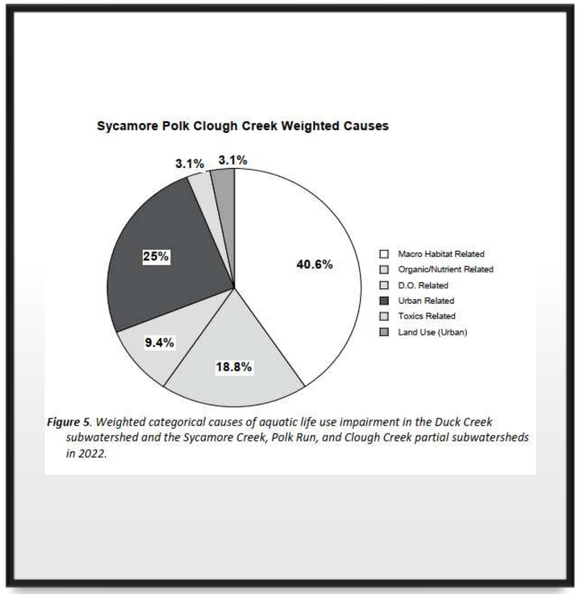


Figure 5. Weighted categorical causes of aquatic life use impairment in the Duck Creek subwatershed and the Sycamore Creek, Polk Run, and Clough Creek partial subwatersheds in 2022.

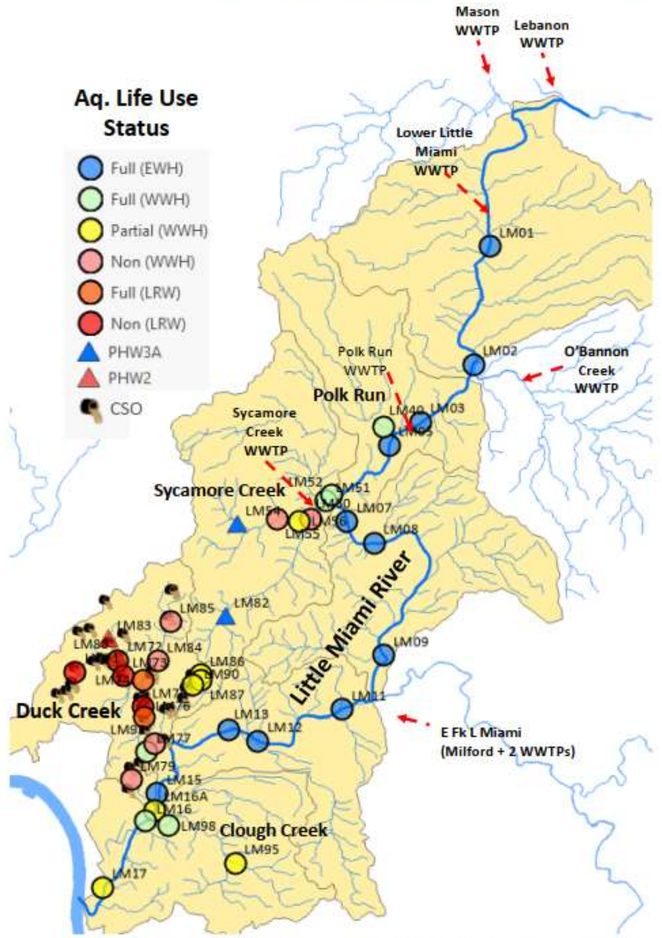


Figure 3. Aquatic life use attainment status in the Little Miami River study area during 2022 (blue circles – full attainment of EWH; green circles – full attainment of WWH; yellow – partial attainment; red – non-attainment; grey outfall symbols – CSO locations). Site descriptions and site codes appear in Table 6. Sites evaluated as PHWH sites appear as triangles with their classification results (blue – PHW Class 3AI; orange – PHWH Class 2; yellow – PHW Class 1).

Recreation Use Attainment Status By Site

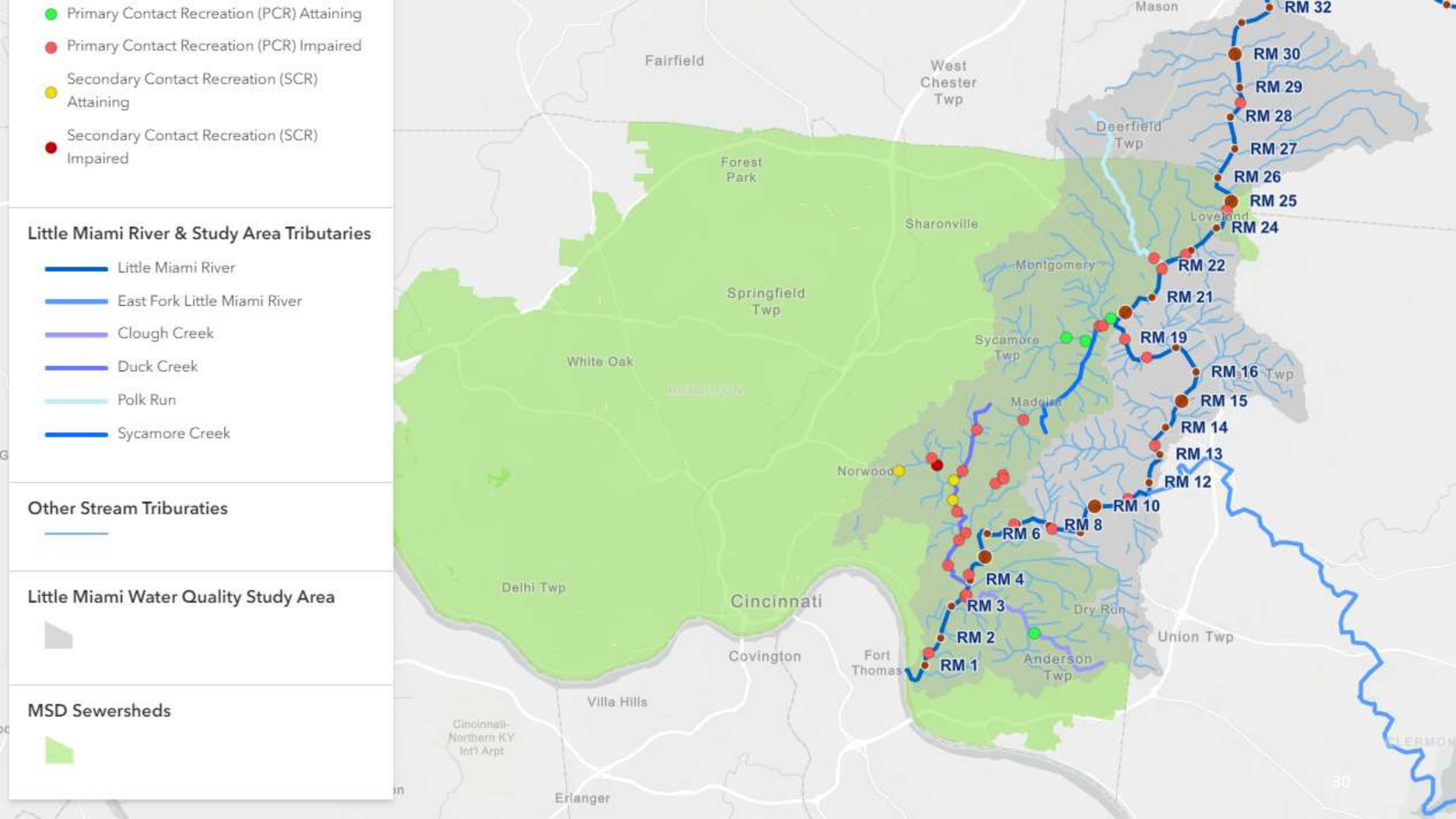
Stream Segment	Attains	Impaired
Mainstem (14)	7%	93%
Sycamore Creek & Tribs (5)	60%	40%
Polk Run (1)	0%	10%
Duck Creek (15)	20%	80%
Clough Creek (2)	50%	50%

- 38 sites sampled
- Excludes PHW
  - (1) Sycamore
  - (3) Duck Creek
- % includes both PCR & SCR designated uses

Table 3. *E. coli criteria for Ohio streams and rivers (OAC 3745-1-07).*

	***E. coli* Counts (cfu/100 ml)**	
Recreation Use	Seasonal Geometric Mean	Statistical Threshold Value[1]
PCR	126	410
SCR	1,030	1,030

[1]These criteria shall not be exceeded in more than 10 percent of the samples taken during any 90-day period.


Primary Contact Recreation (PCR) Attaining
Primary Contact Recreation (PCR) Impaired
Secondary Contact Recreation (SCR) Attaining
Secondary Contact Recreation (SCR) Impaired
Little Miami River & Study Area Tributaries
Little Miami River
East Fork Little Miami River
Clough Creek
Duck Creek
Polk Run
Sycamore Creek
Other Stream Triburaties
Little Miami Water Quality Study Area
MSD Sewersheds
Fairfield
West Chester Twp
Deerfield Twp
Forest Park
Sharonville
Loveland
Montgomery
Springfield Twp
Sycamore Twp
White Oak
Madeira
Norwood
Delhi Twp
Cincinnati
Dry Run
Union Twp
Covington
Fort Thomas
Anderson Twp
Villa Hills
Cincinnati-Northern KY Int'l Arpt
Erlanger
RM 32
RM 30
RM 29
RM 28
RM 27
RM 26
RM 25
RM 24
RM 22
RM 21
RM 19
RM 16
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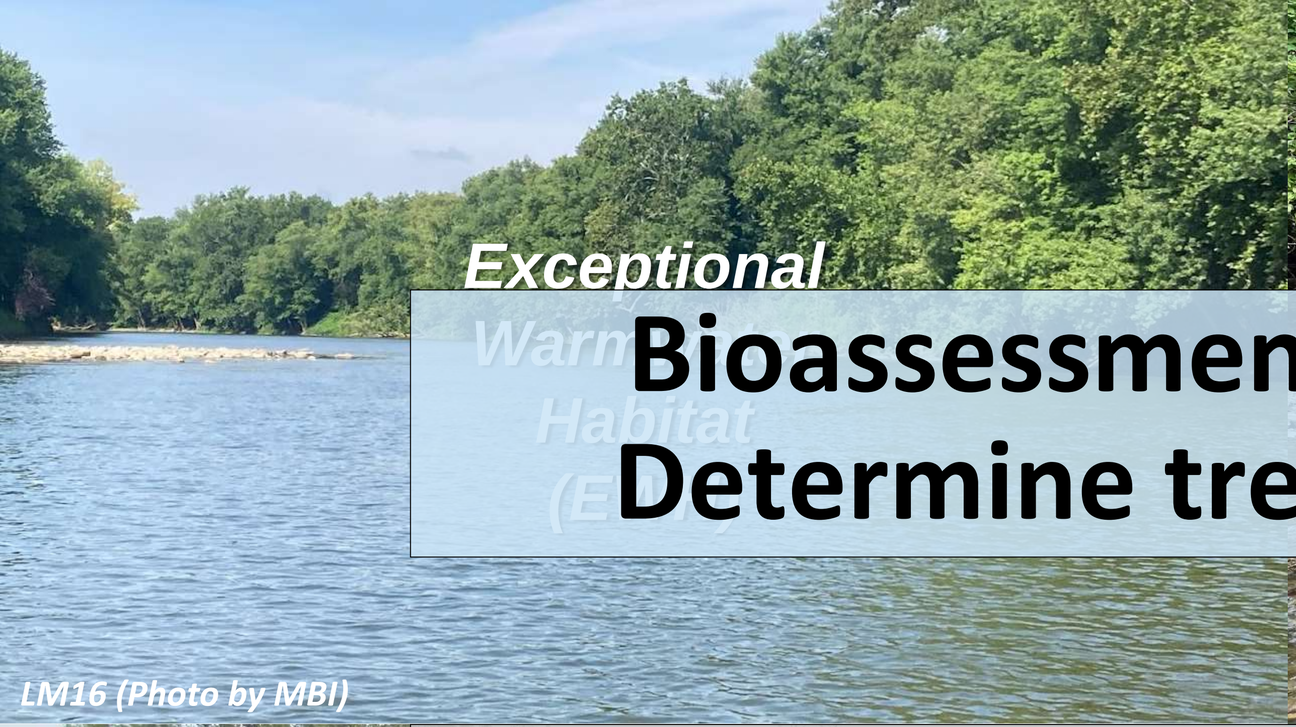
RM 6
RM 4
RM 3
RM 2
RM 1

Bioassessment Objective 3: Determine trends over time



LM16 (Photo by MBI)

Upstream LM 40 (Photo by MBI)

Trends reveal the effectiveness of strategies, controls & BMPs

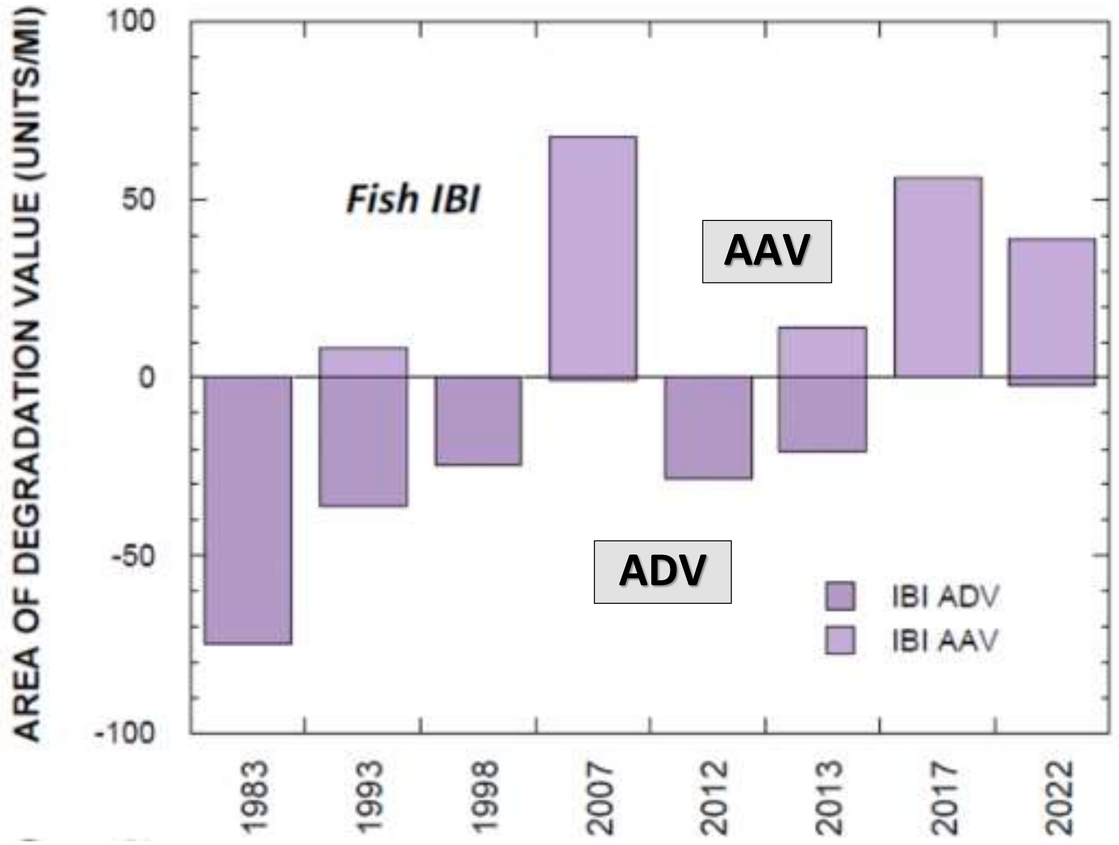
Mill Creek downstream Spring Grove Ave. (MC07)

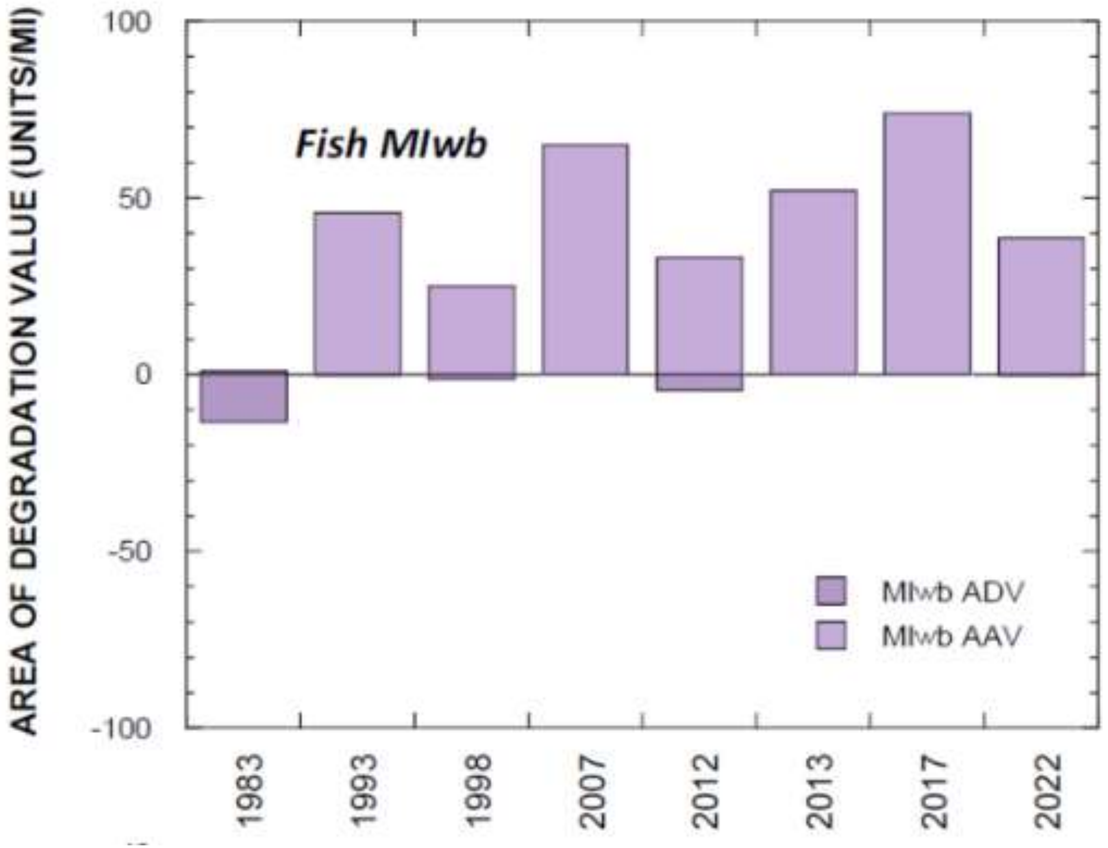
Downstream LM 73 (Photo by MBI)

Index of Biotic Integrity (IBI) scores the ability to support and maintain a balanced, adaptive community of fish species

Modified Index of Well-Being (MIwb) score reflects the overall productivity and diversity of the fish assemblage

ADV =∑ [(aIBIa + aIBIb) – (pIBIa + pIBIb)] *(RMa – RMb), for a= 1 to n



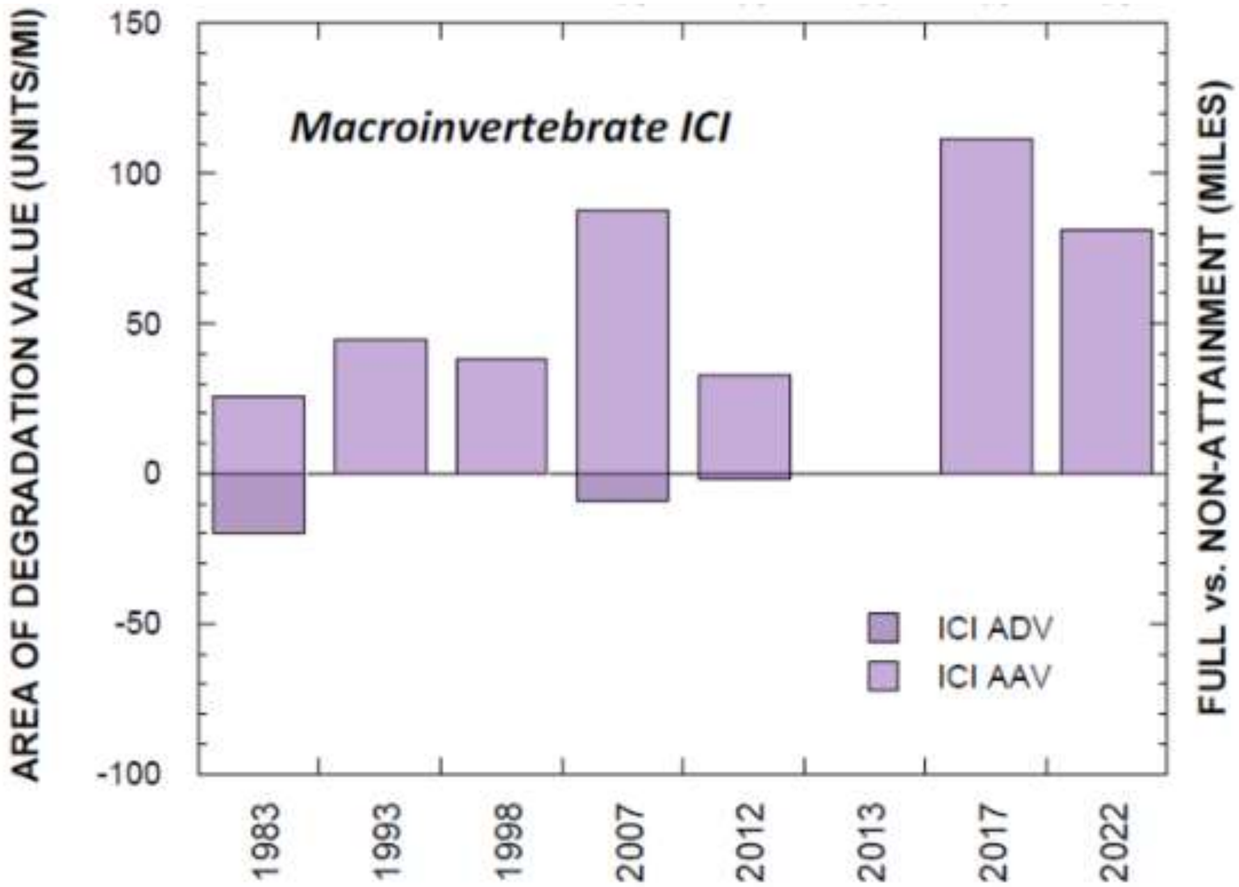


AAV = Area of Attainment Value; Meets WQS and by how much

ADV = Area of Degradation Value; Fails WQS and by how much

Figure 2. (Page 11) Area of Degradation (ADV) and Area of Attainment (AAV) values

Invertebrate Community Index (ICI) scores measures the health of the macroinvertebrate community



Stream miles in full attainment over miles in partial or non-attainment

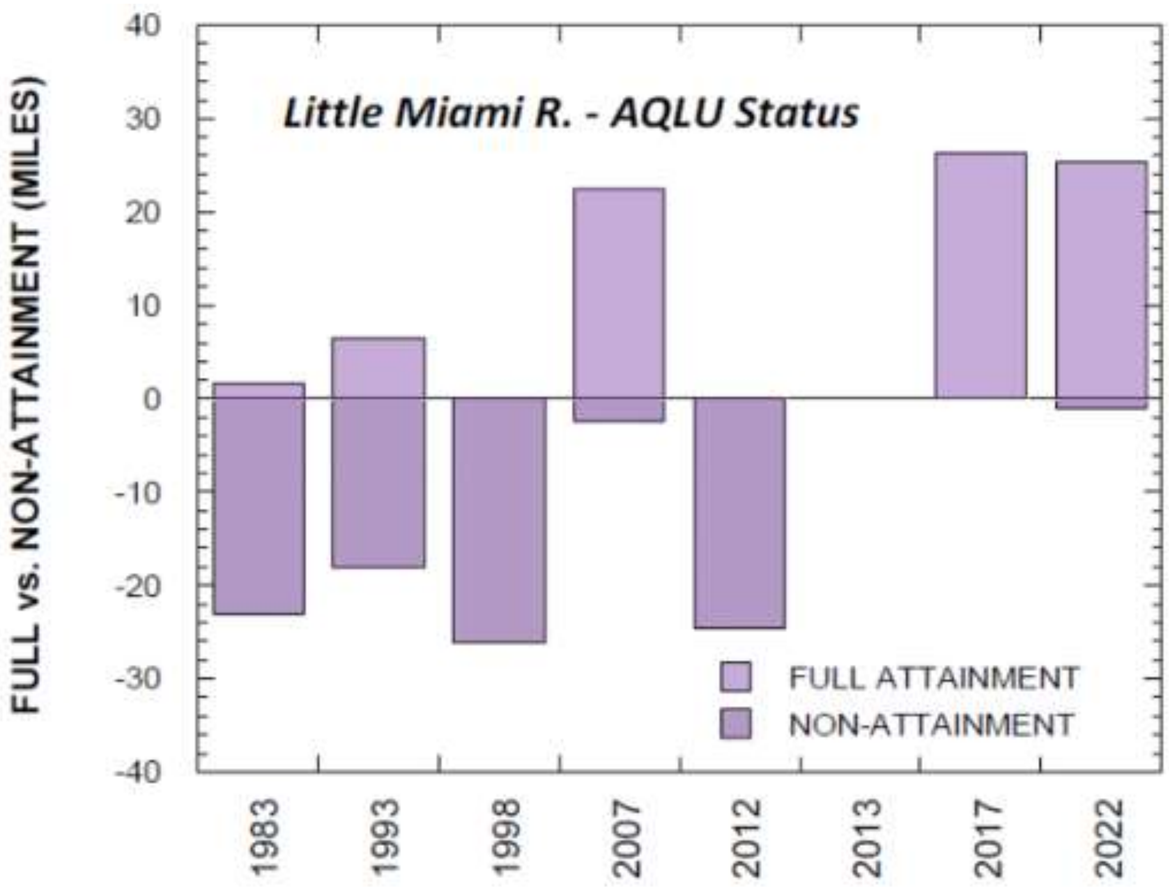


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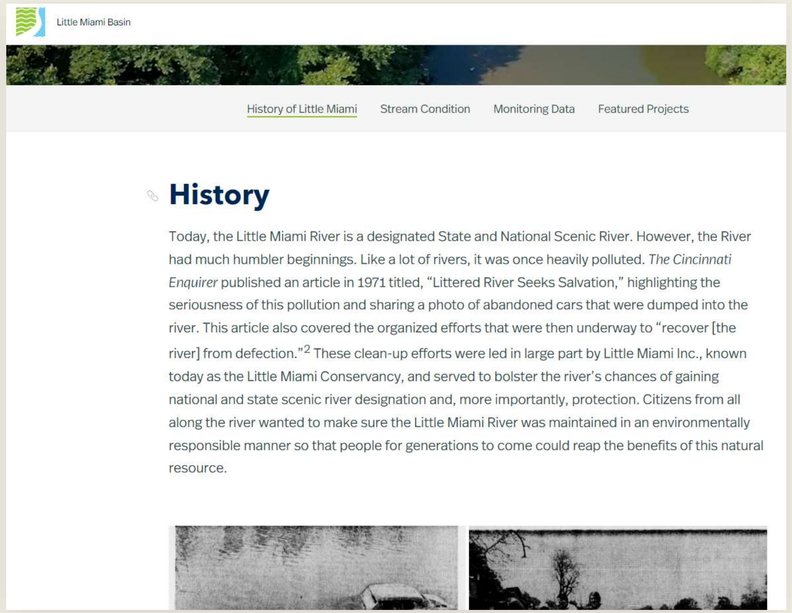
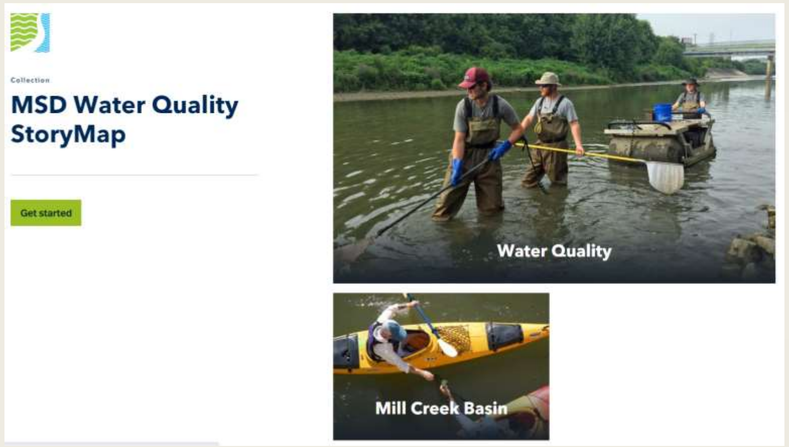
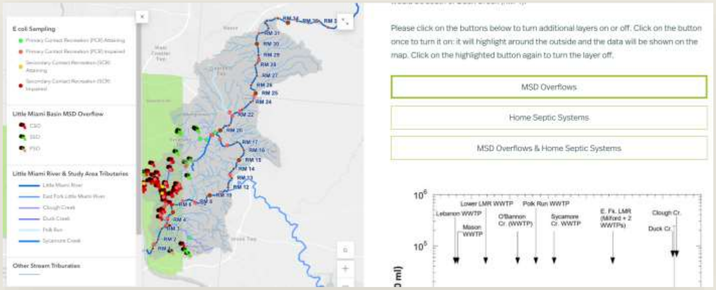
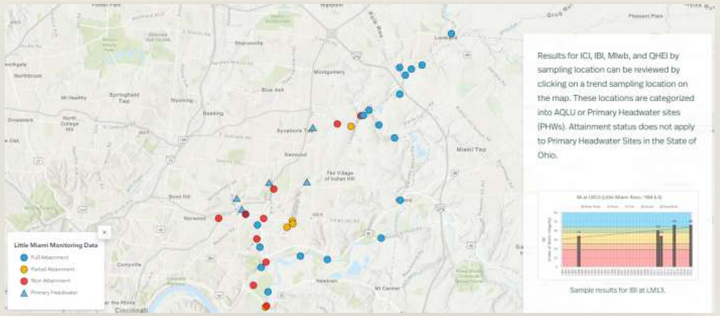
Figure 2. (Page 11) Area of Degradation (ADV) and Area of Attainment (AAV) values

MSD ArcGIS StoryMap

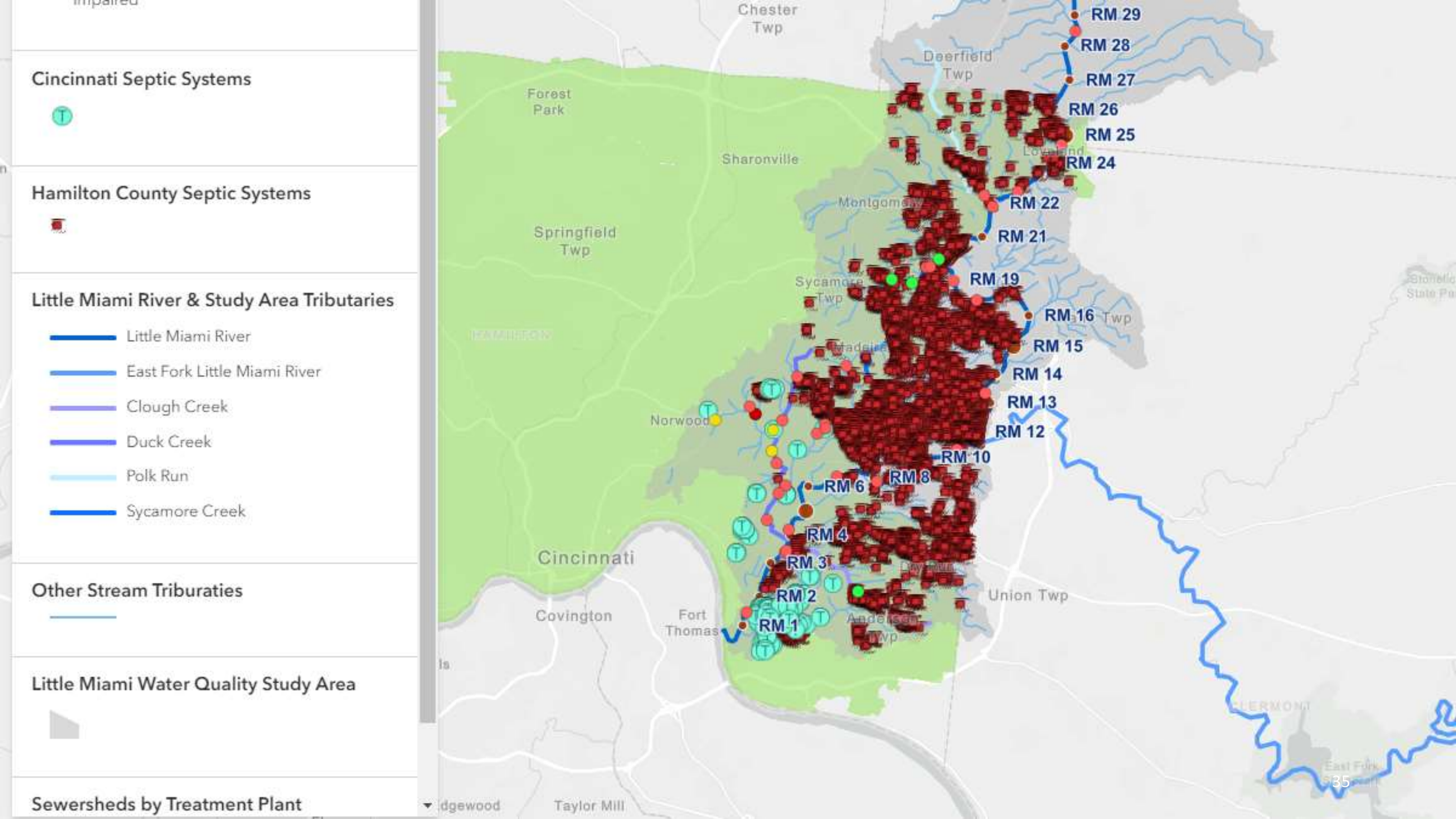








https://storymaps.arcgis.com/stories/3dce2d0e40144a86b48d944388ee48a1


Impaired
Cincinnati Septic Systems
Hamilton County Septic Systems
Little Miami River & Study Area Tributaries
Little Miami River
East Fork Little Miami River
Clough Creek
Duck Creek
Polk Run
Sycamore Creek
Other Stream Triburaties
Little Miami Water Quality Study Area
Sewersheds by Treatment Plant
Chester Twp
Deerfield Twp
Forest Park
Sharonville
Springfield Twp
Sycamore Twp
Norwood
Cincinnati
Covington
Fort Thomas
Union Twp
Taylor Mill
RM 29
RM 28
RM 27
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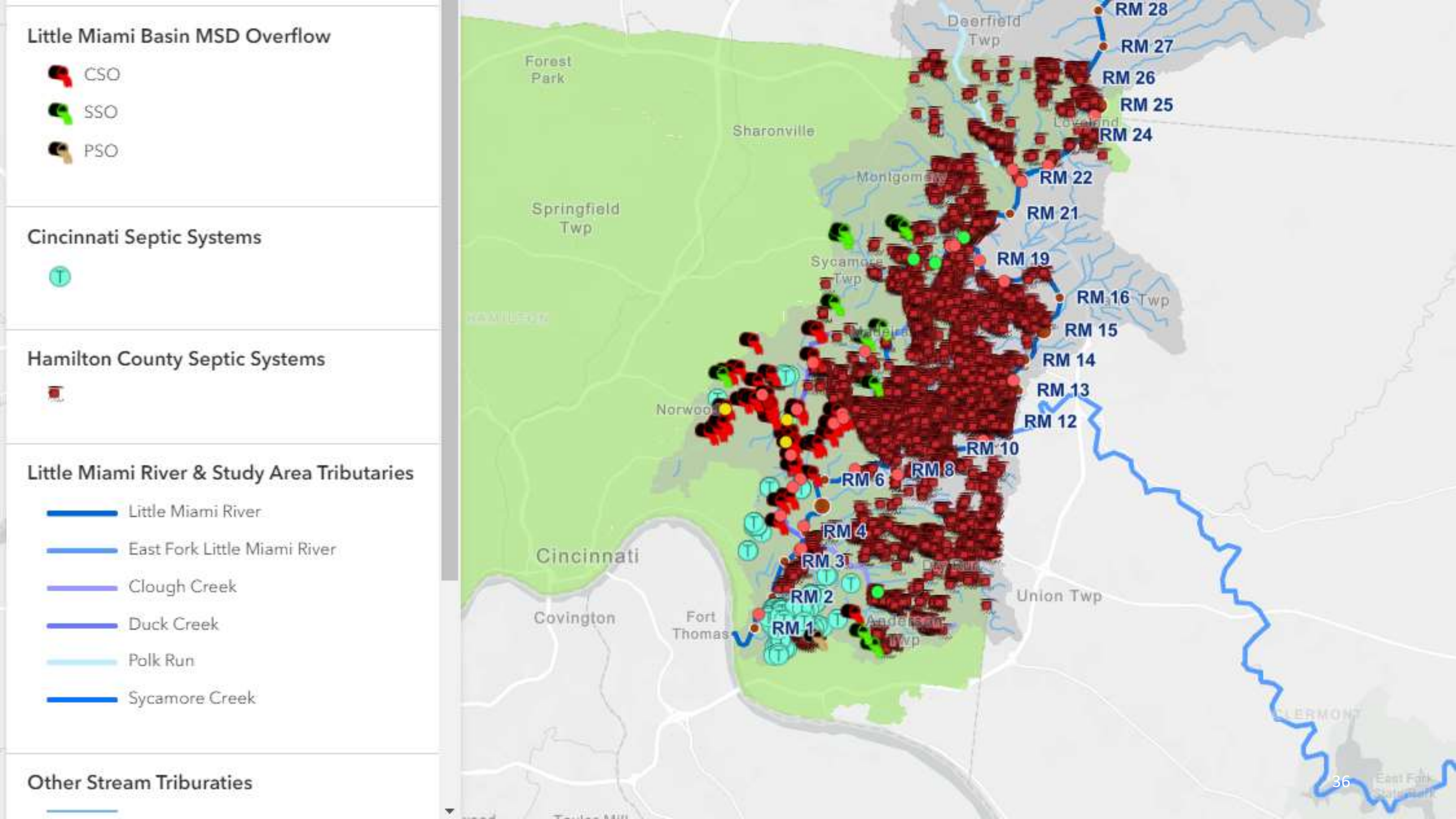
Little Miami Basin MSD Overflow
CSO
SSO
PSO
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Cincinnati
Covington
Fort Thomas
Union Twp
RM 28
RM 27
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RM 25
RM 24
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RM 1

Ohio Rivers At A Glance

Summary of Findings from the 2020-2021 Aquatic Life and Water Quality Survey of Ohio's Large River *July 2023*

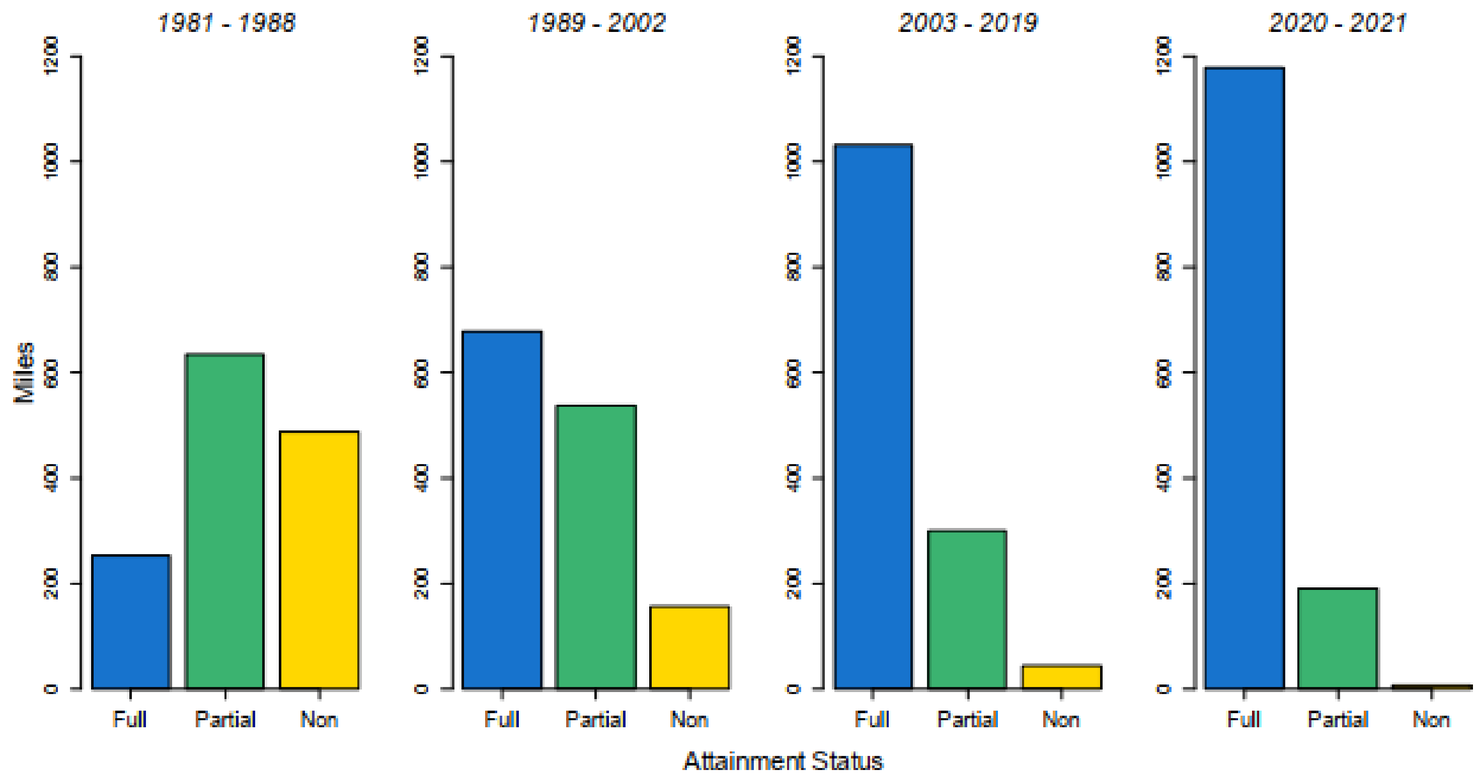
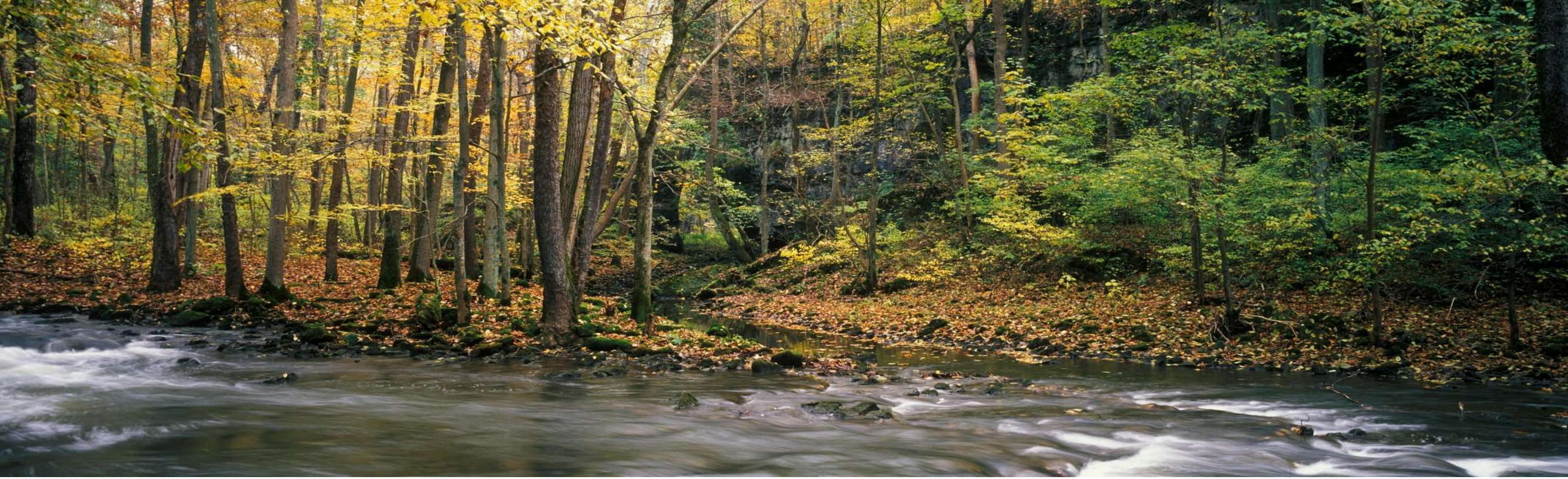


Figure 2 - The number of river miles categorized by attainment status over four relevant time periods.



LITTLE MIAMI CONSERVANCY

Working to restore and protect the Little Miami State and National Scenic River since 1967

Jason Brownknight, Executive Director
www.littlemiami.org

Ohio State Scenic Rivers

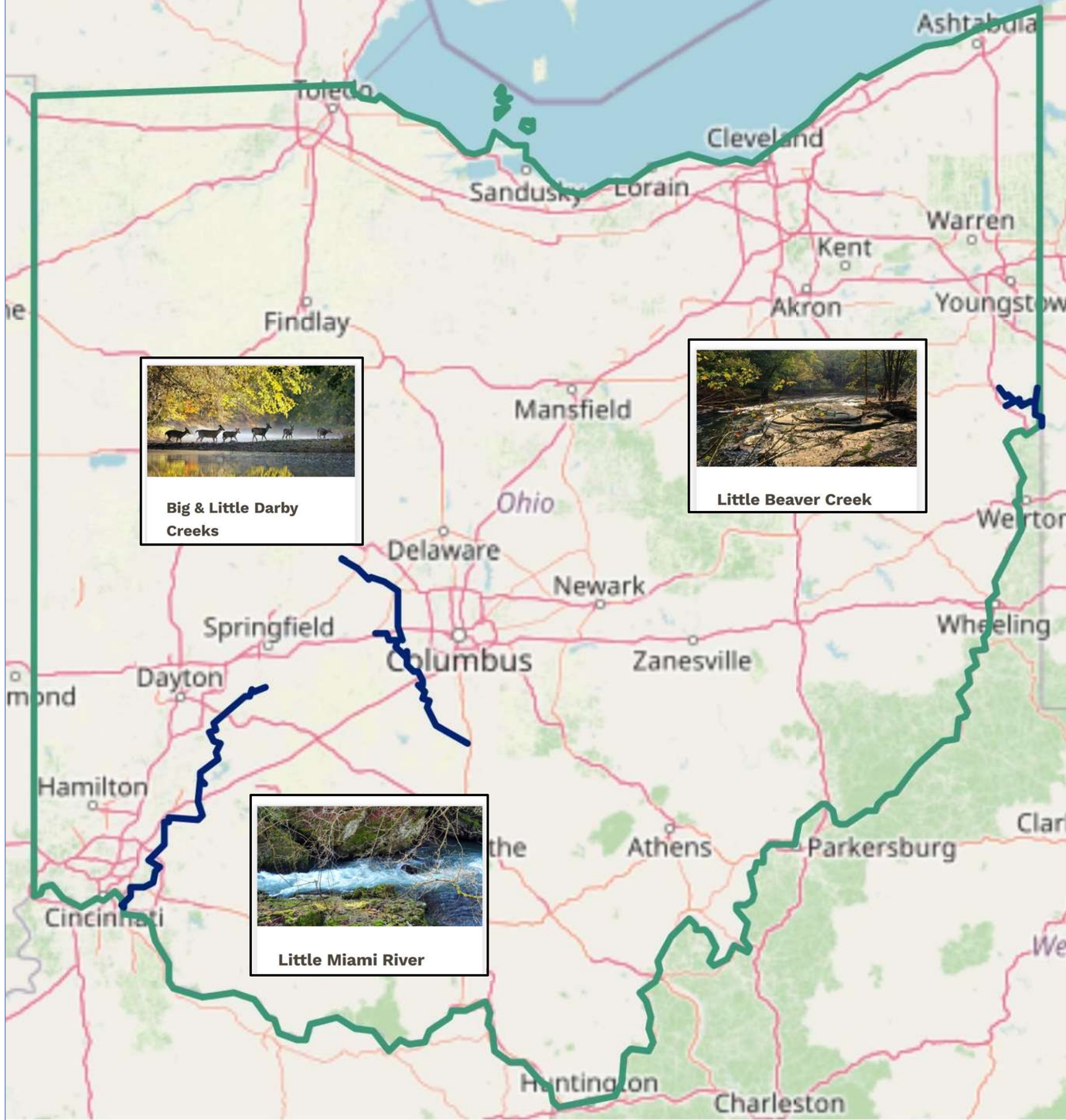
April 23, 1969
Upper Little Miami
1st State Scenic River

October 27, 1971
Lower Little Miami was designated

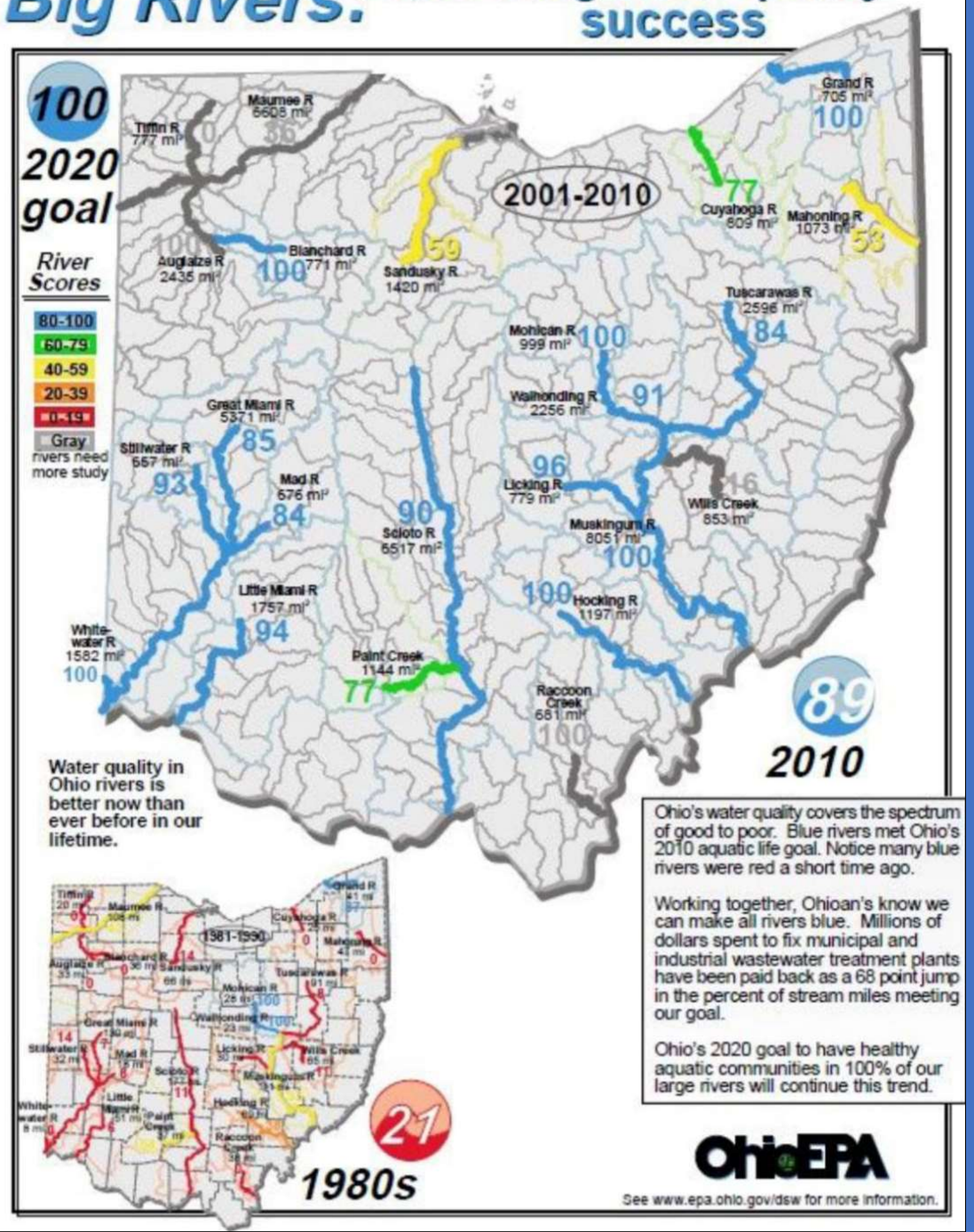
National Wild & Scenic Rivers in Ohio

Upper Little Miami was designated in 1973

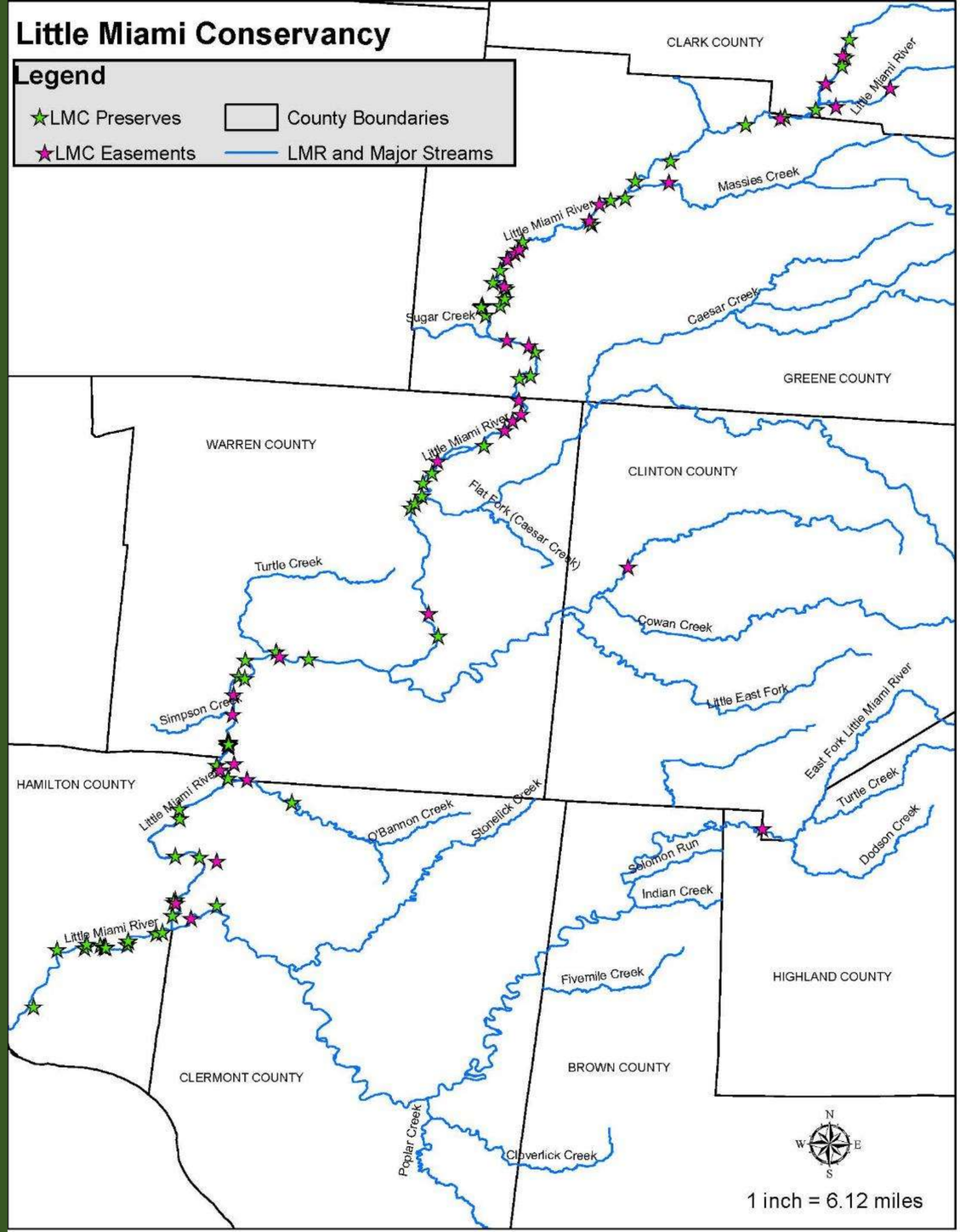
Lower Little Miami was designated in 1980



Big Rivers: Ohio's big water quality success



Manages ***121*** Natural Areas and Preserves encompassing over ***2,000*** acres across 7 counties



Thank You

You can help by visiting www.littlemiami.org to learn more about our upcoming programs and projects.

Jason Brownknight

Executive Director

Little Miami Conservancy

513-578-2104

brownknight@littlemiami.org

Aaron Rourke

ODNR Scenic Rivers Program

SW Ohio manager

614-230-8534

HAMILTON COUNTY
PUBLIC HEALTH

PREVENT. PROMOTE. PROTECT.

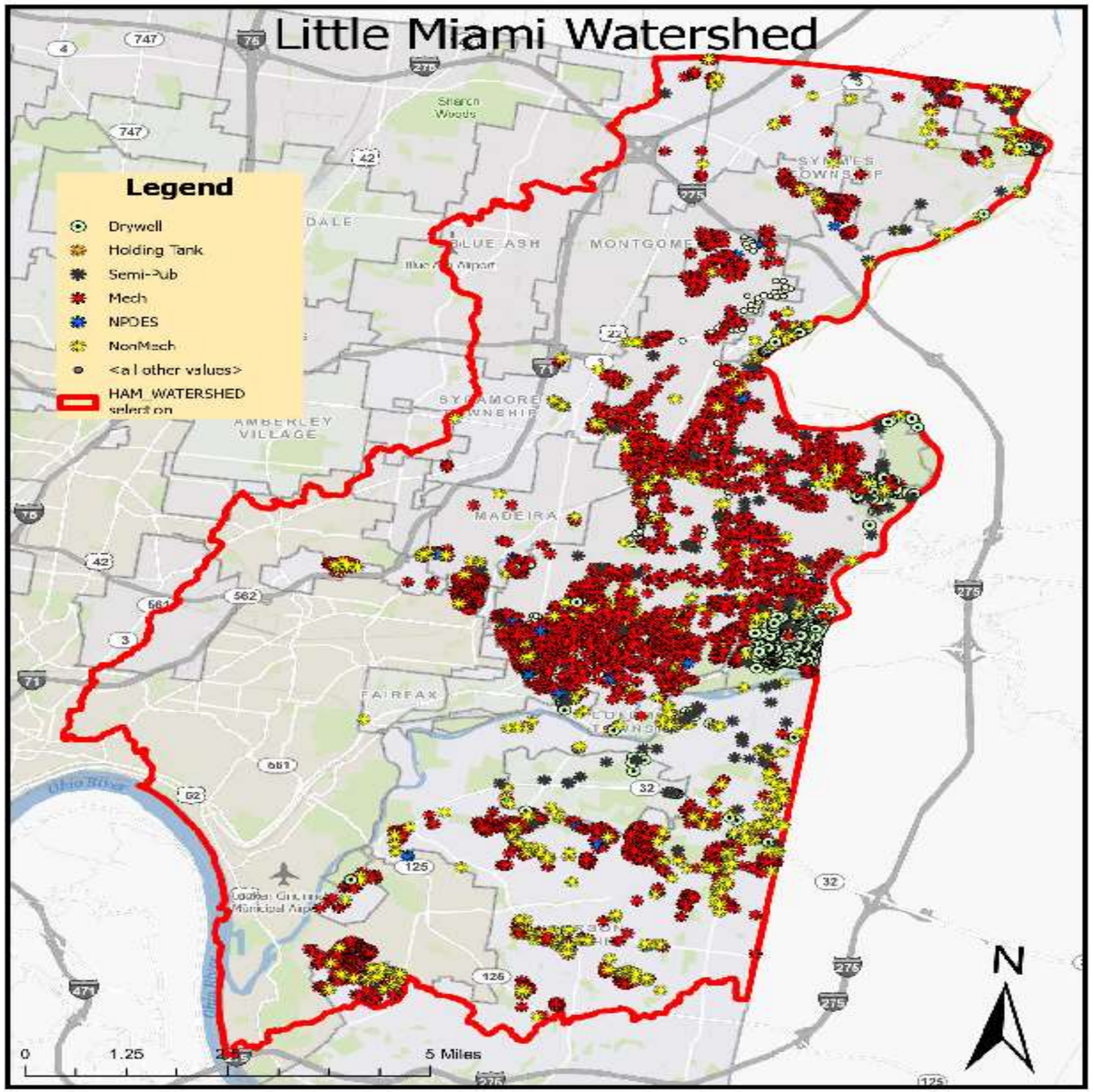
Little Miami Water Quality

Eric Bartl

Registered Environmental Health Specialist

Division of Water Quality

WQ Sewage Treatment Systems (Little Miami Watershed)



HAMILTON COUNTY PUBLIC HEALTH

PREVENT. PROMOTE. PROTECT.

Broken or Clogged Sewer Laterals

HAMILTON COUNTY PUBLIC HEALTH

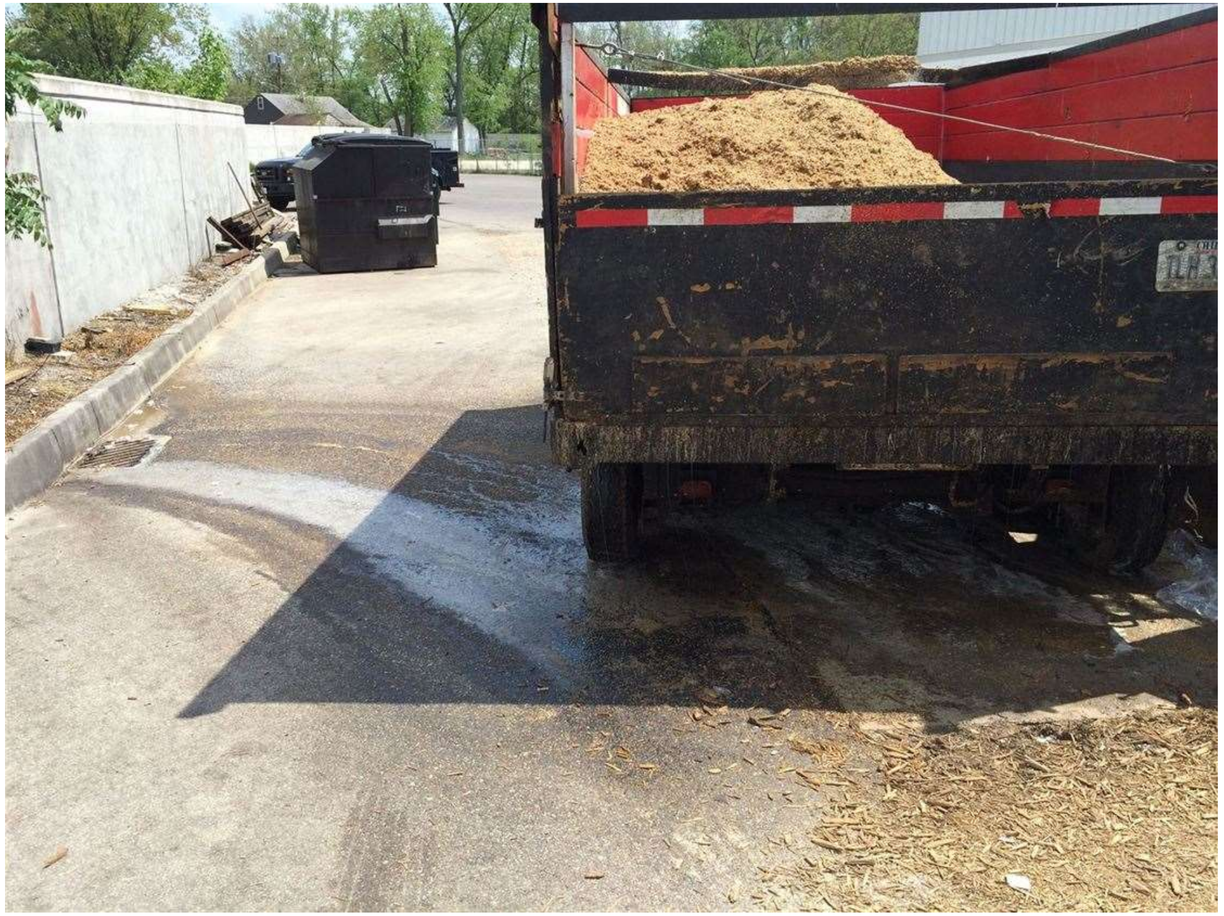
PREVENT. PROMOTE. PROTECT.

Storm Sewer Cross Connections

HAMILTON COUNTY PUBLIC HEALTH

PREVENT. PROMOTE. PROTECT.

Breweries - Spent Grain Leachate



Concrete Wash Out and Road Cuts

HAMILTON COUNTY PUBLIC HEALTH

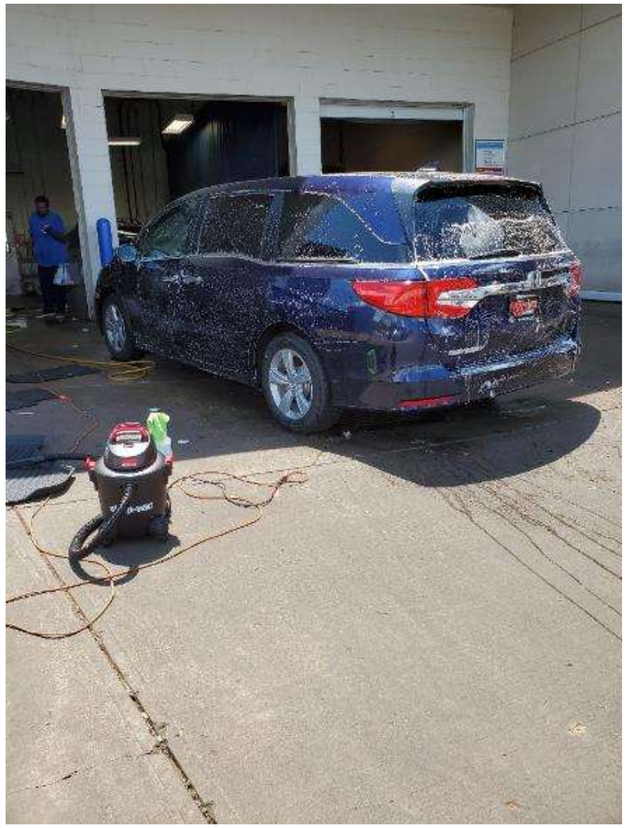
PREVENT. PROMOTE. PROTECT.

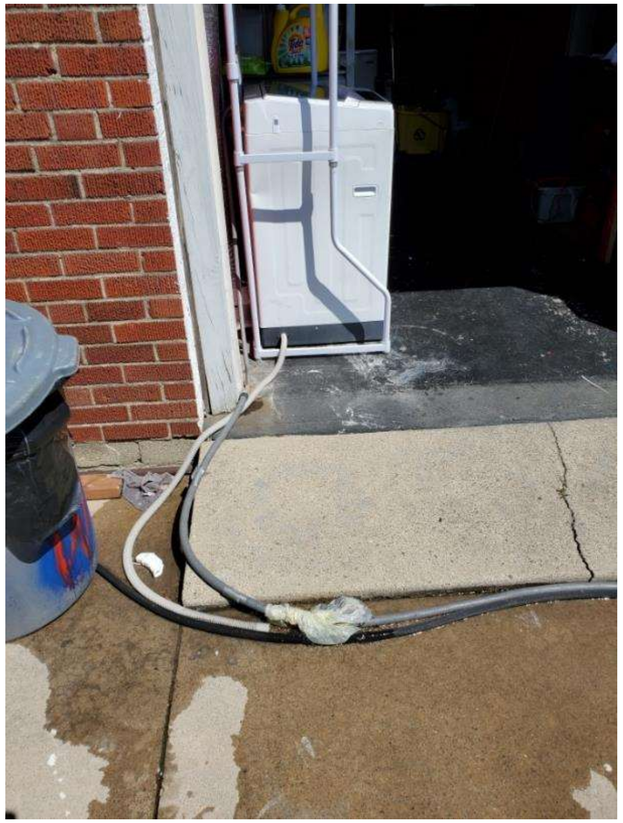
Restaurant Dumpster Grease

HAMILTON COUNTY PUBLIC HEALTH

PREVENT. PROMOTE. PROTECT.

Soaps and Detergents





HAMILTON COUNTY PUBLIC HEALTH

PREVENT. PROMOTE. PROTECT.

HAMILTON COUNTY
PUBLIC HEALTH

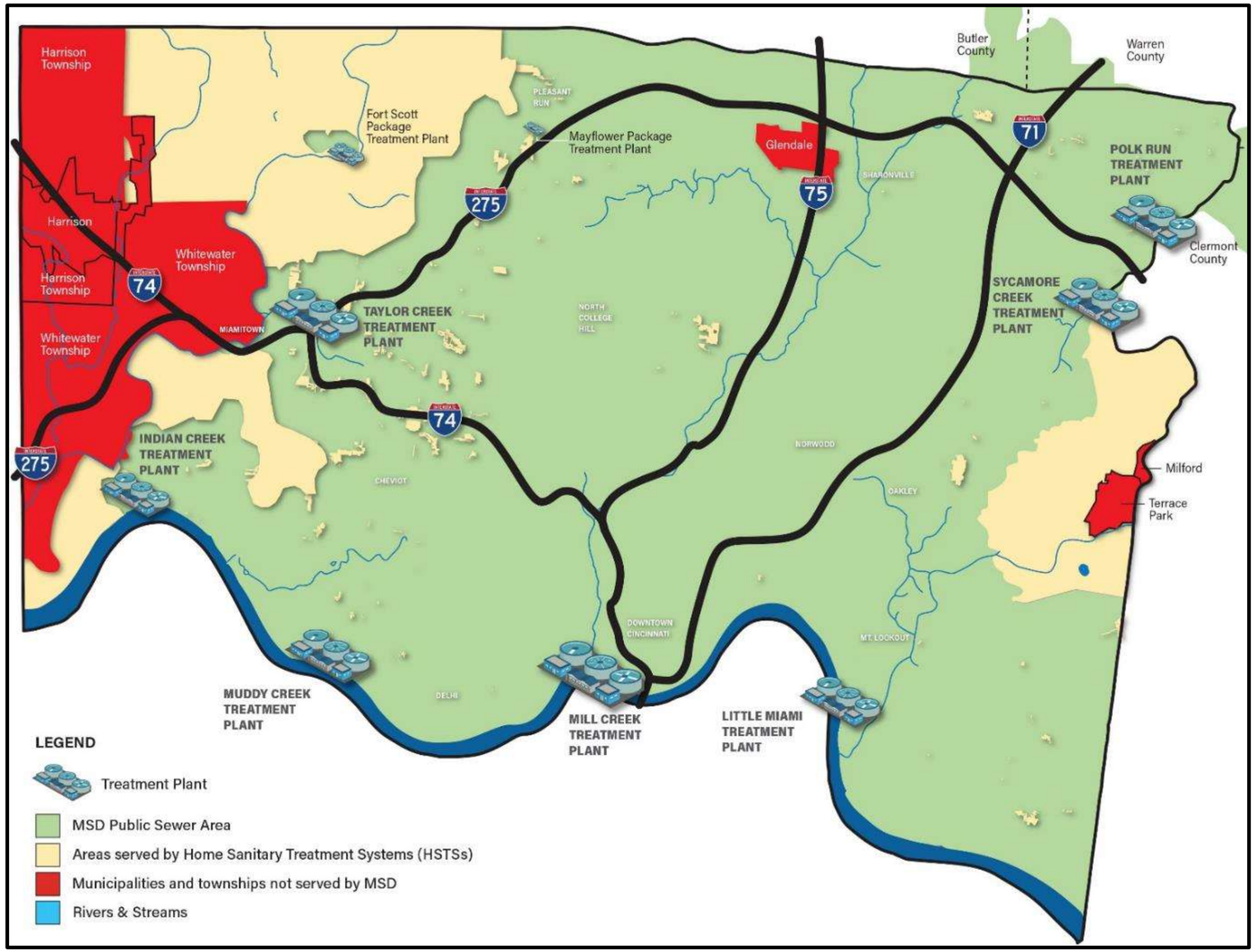
PREVENT. PROMOTE. PROTECT.

Thank You

Eric Bartl, REHS

Registered Environmental Health Specialist, (REHS) Division of Water Quality
Hamilton County Public Health
p: 513.946.7850 f: 513.946.7890

MSD At A Glance



MSD serves >225,000 residential, commercial and industrial customers

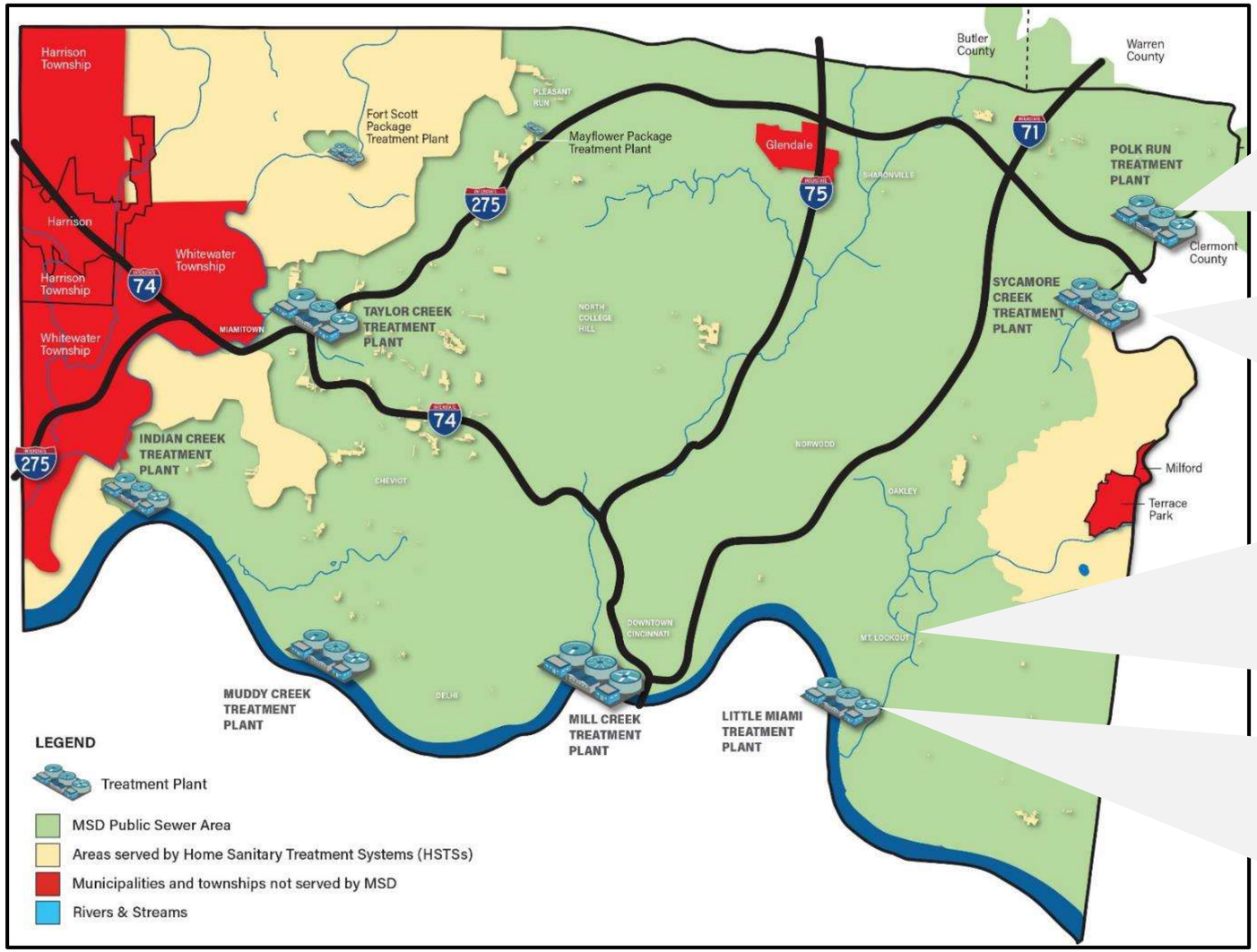
MSD has 9 treatment plants and other assets

MSD maintains more than 3,000 miles of sewer pipe

MSD treats 185 million gallons of wastewater a day

MSD in the
Little Miami River Watershed

MSD in the Little Miami Watershed



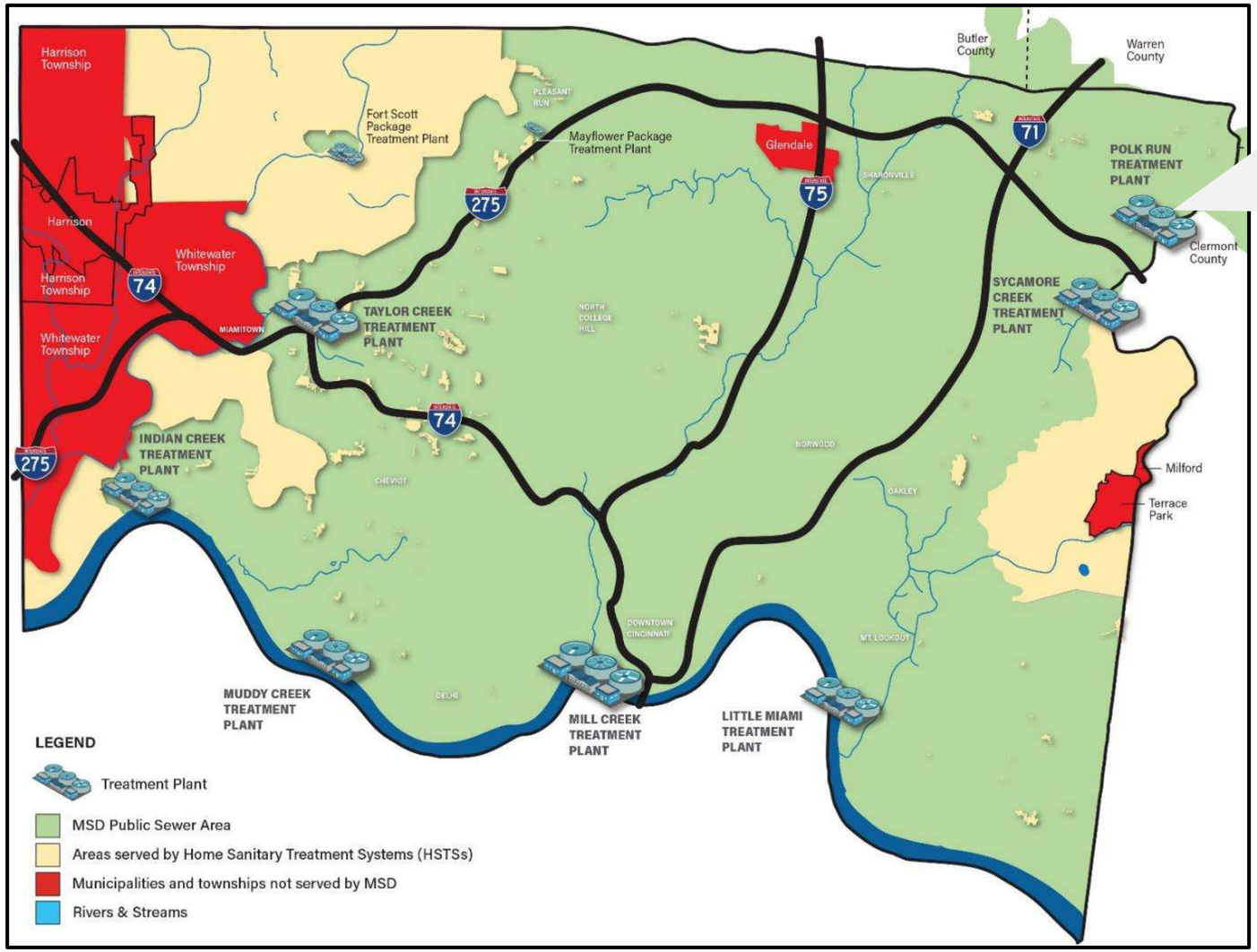
Polk Run WWTP @ unnamed trib./Little Miami RM 21.8

Sycamore Creek WWTP at RM 0.26, Little Miami RM 19.1

CSOs along Duck Creek 1 in Clough Creek and 1 into Little Miami (all below RM 6)

Little Miami WWTP discharges to Ohio River

MSD in the Little Miami Watershed

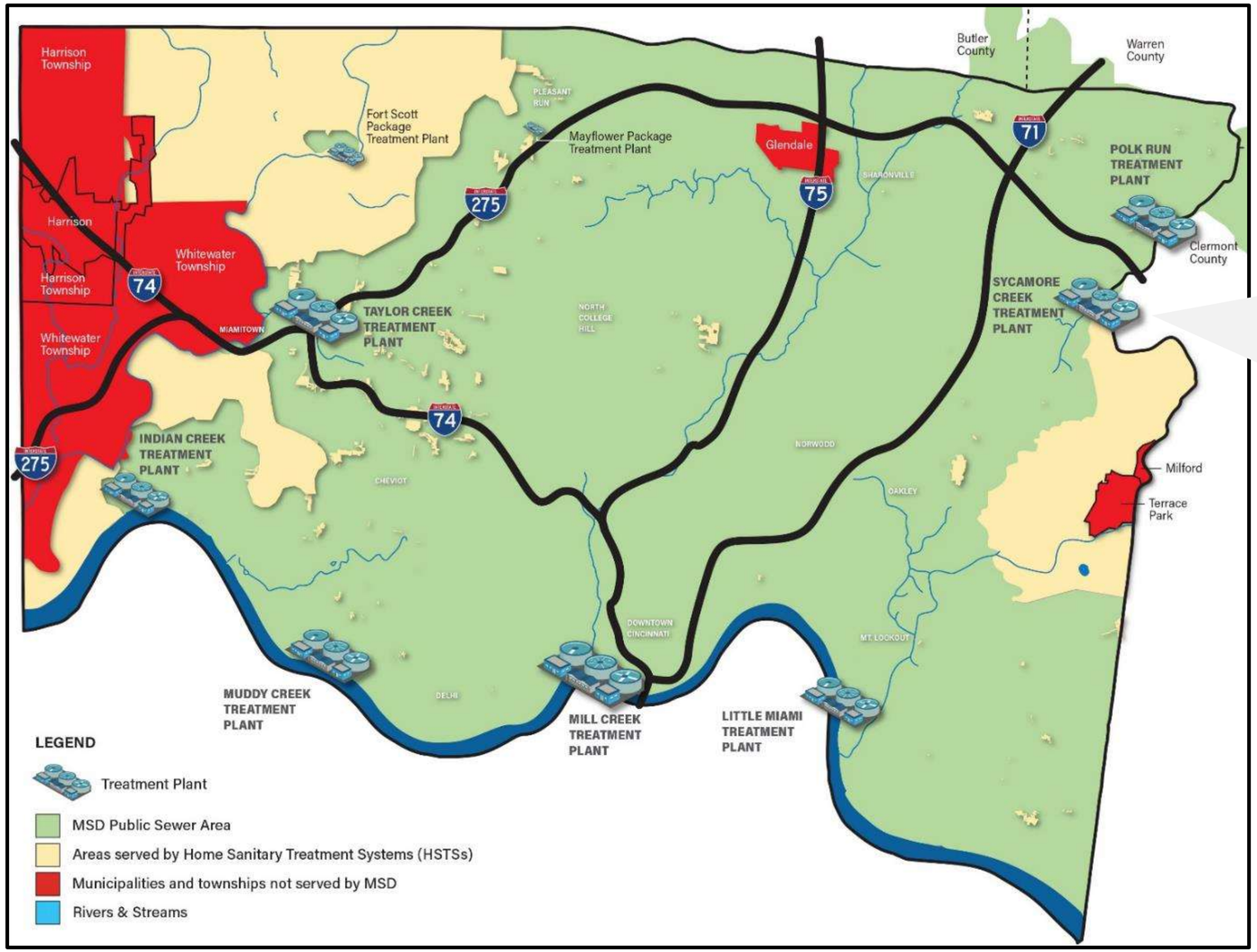


Polk Run WWTP @ unnamed trib./Little Miami RM 21.8

- Average Flow: 5.5 MGD
- Received NACWA Peak Performance Awards in 2018, 2019, 2020, 2021, 2022
- One E.coli exceedance in the last 5 years

Peak Performance AWARDS

MSD in the Little Miami Watershed

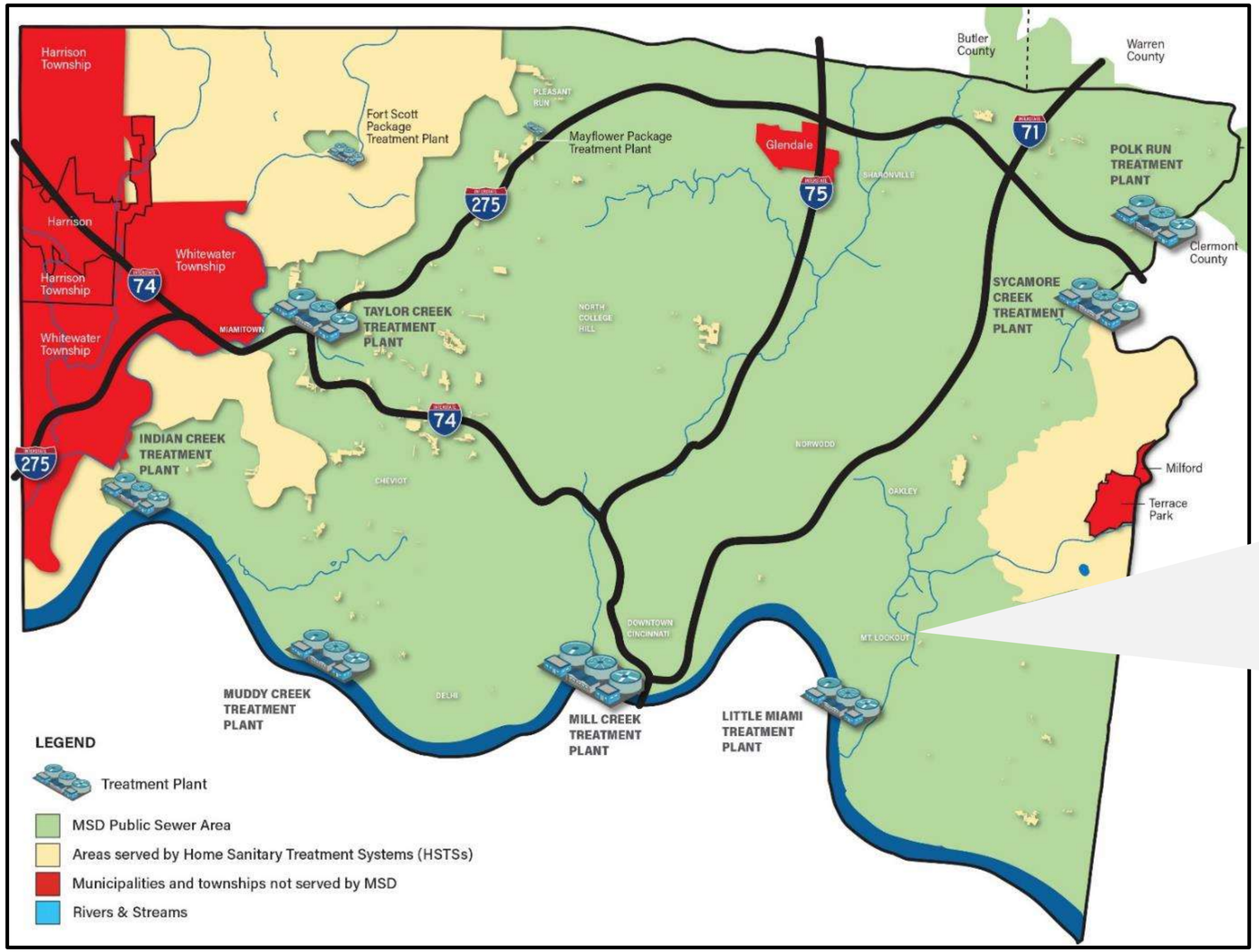


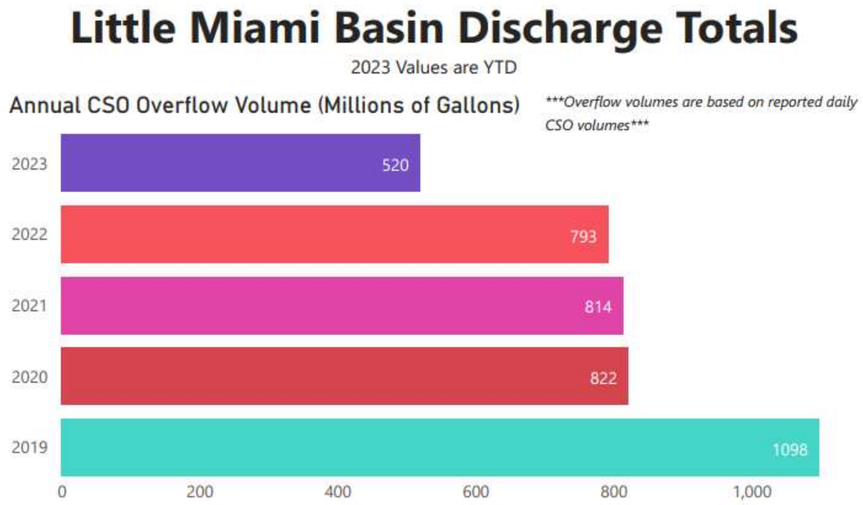
Sycamore Creek WWTP at RM 0.26, Little Miami RM 19.1

- Average Flow: 6.5 MGD
- Received NACWA Peak Performance Awards in 2018, 2020, 2021, 2022
- Zero E.coli exceedances in the last 5 years

Peak Performance AWARDS

MSD in the Little Miami Watershed

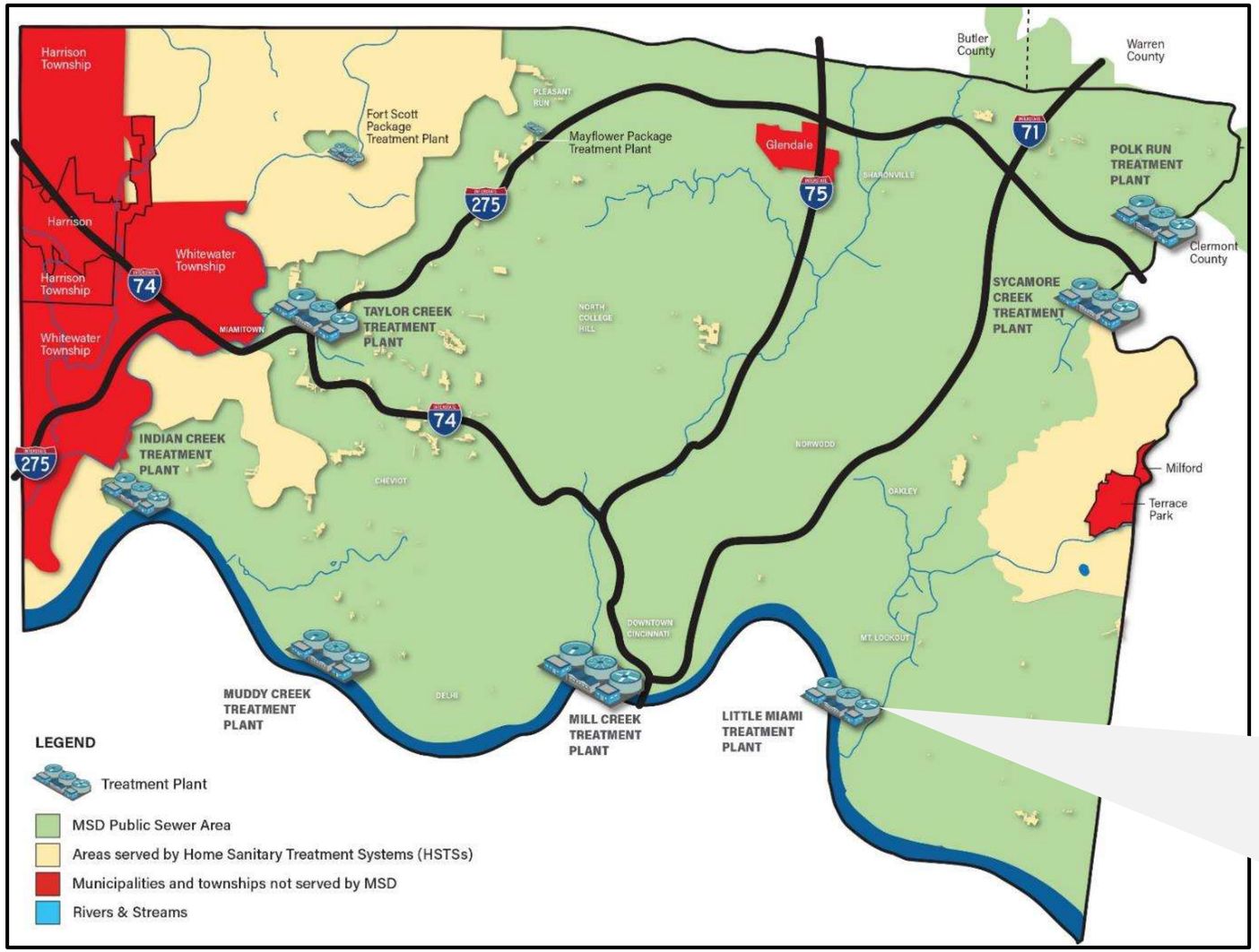




CSOs along Duck Creek
1 in Clough Creek
and 1 into Little Miami
(all below RM 6)

- CSO-083 D.U.C. – Under Construction
- CSO-472 D.U.C. – Construction to follow

MSD in the Little Miami Watershed

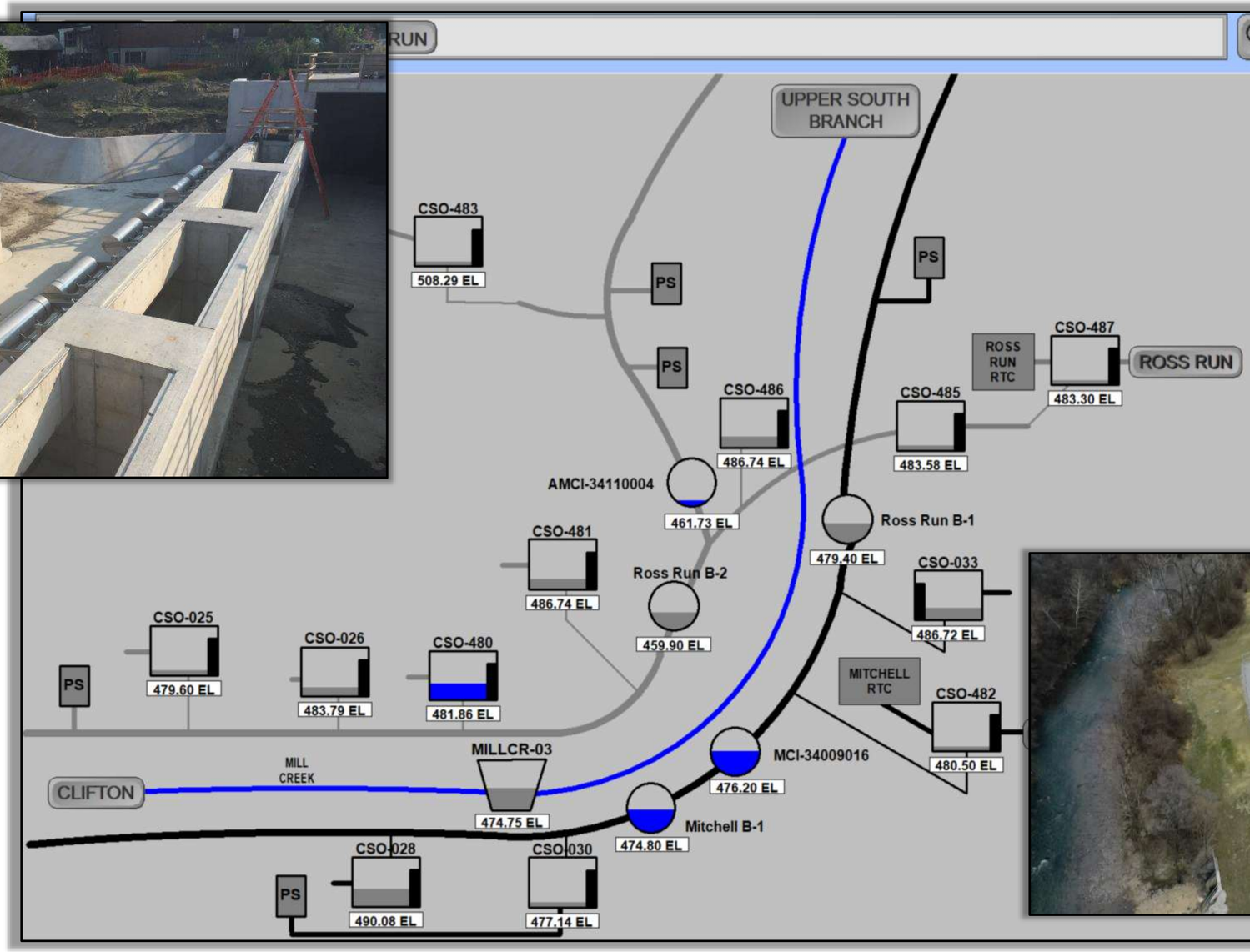


- LM Standby Power – under construction
- LM Flow Meter Renewal – under construction
- LM Solids Facility – under design, const. by 2028Q2
- LM Electrical, Primary, and Secondary Improvements – Design to begin 2024Q2
- LM HRT Preparation – Design to begin 2025Q3
- LM HRT Facility – TBD

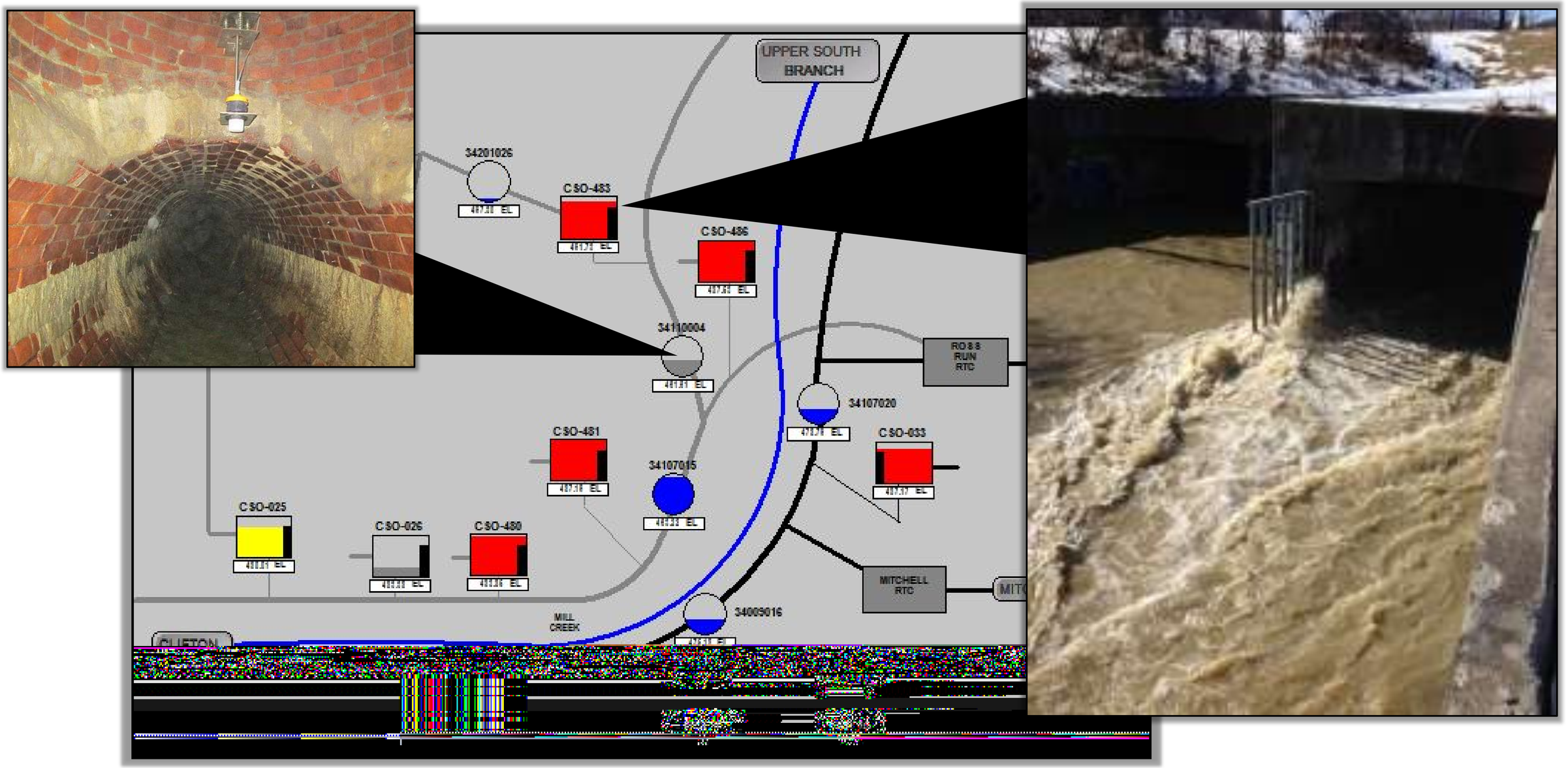
Over $100M Investment

Little Miami WWTP discharges to Ohio River

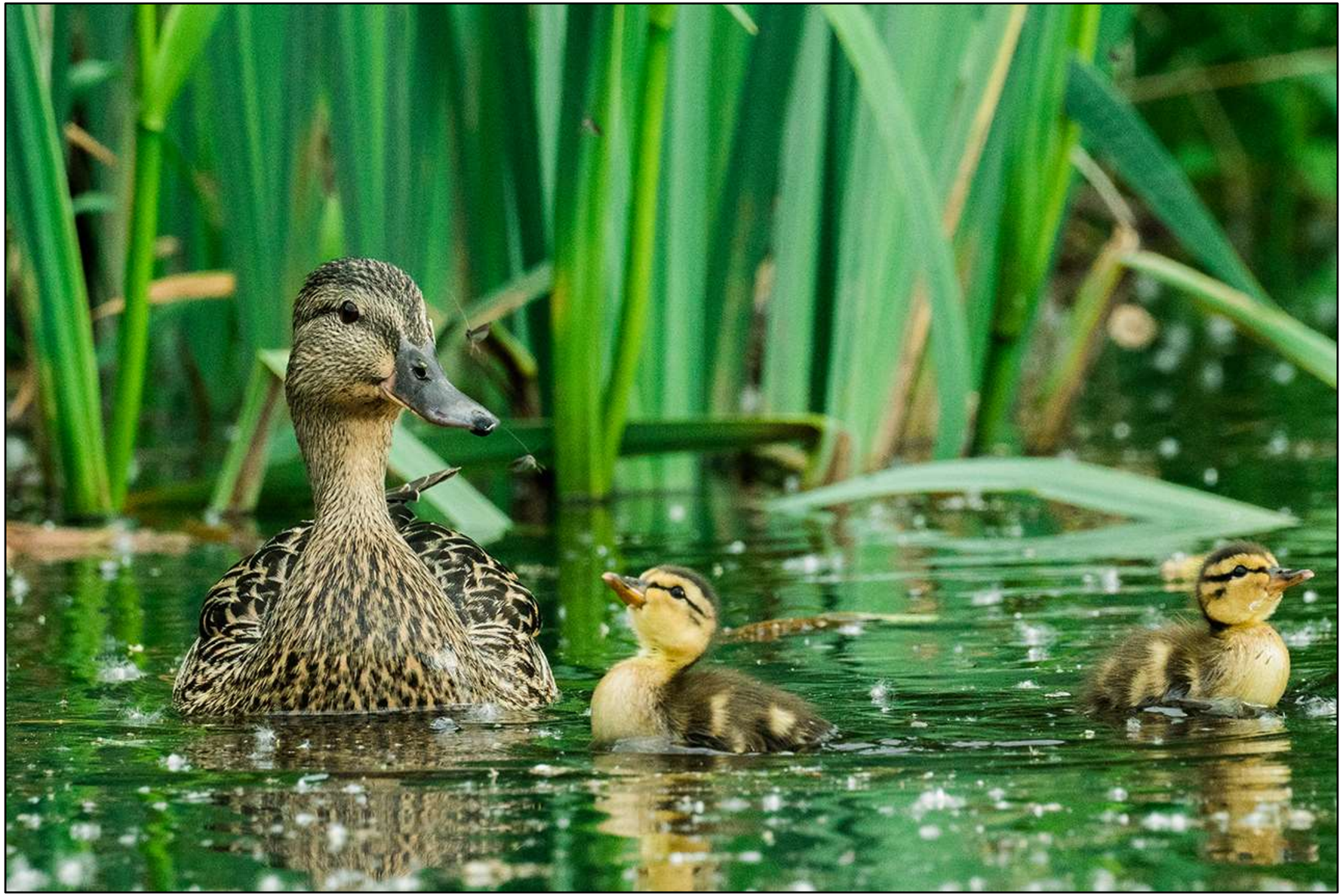
MSD's Smart Sewer System



MSD's Smart Sewer System

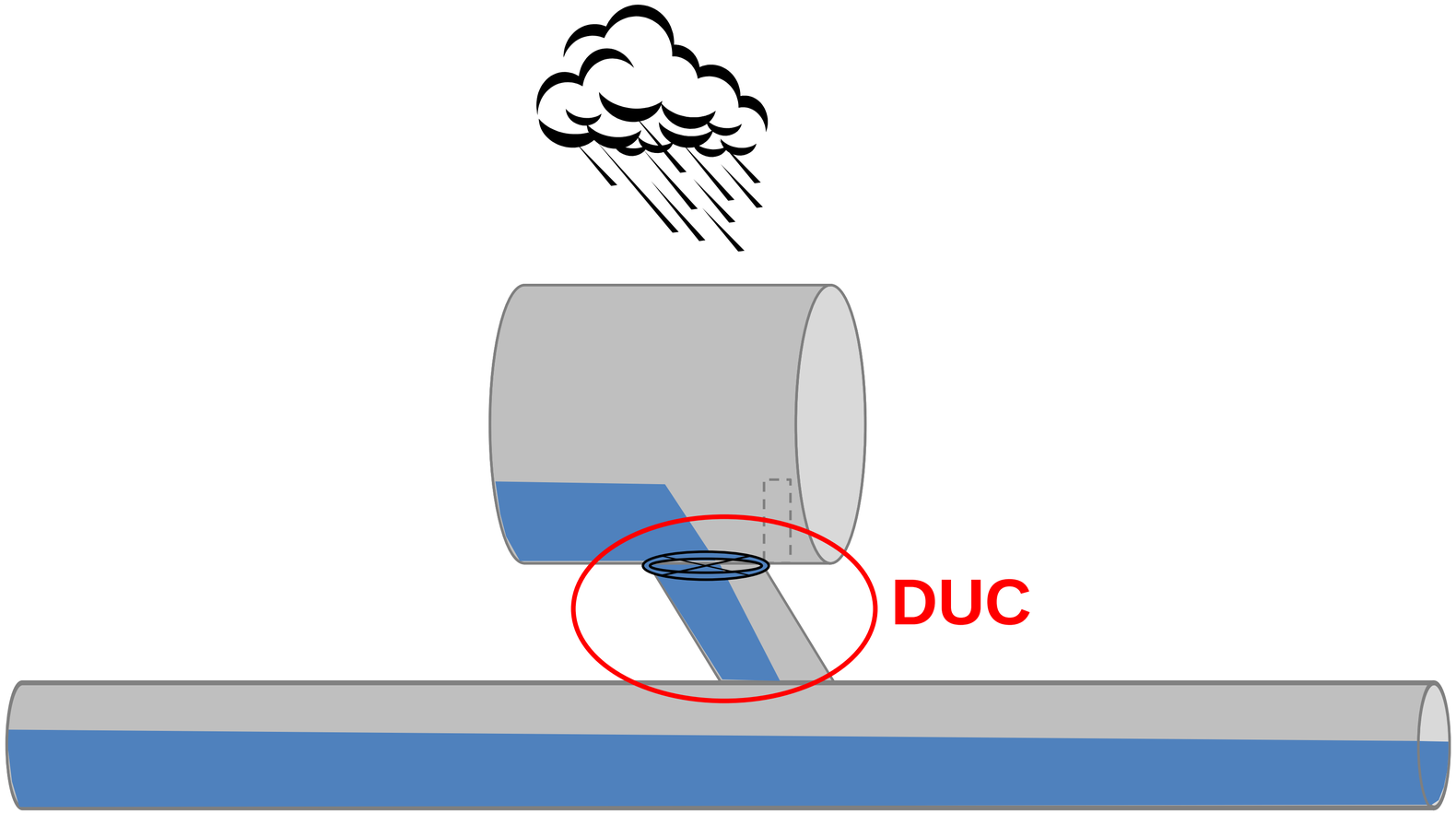


MSD’s Smart Sewer System



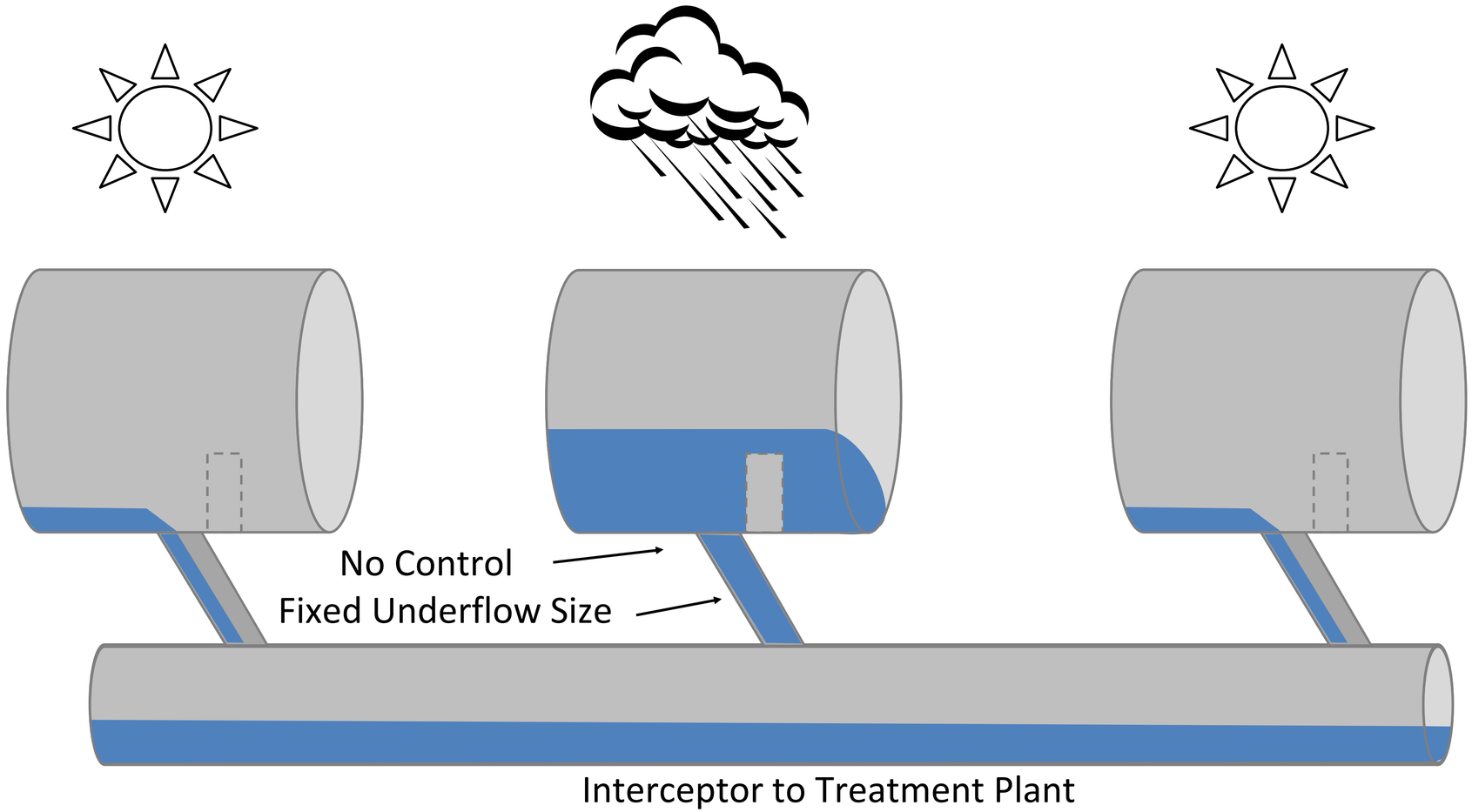
MSD's Smart Sewer System

Dynamic Underflow Control (DUC) Structures



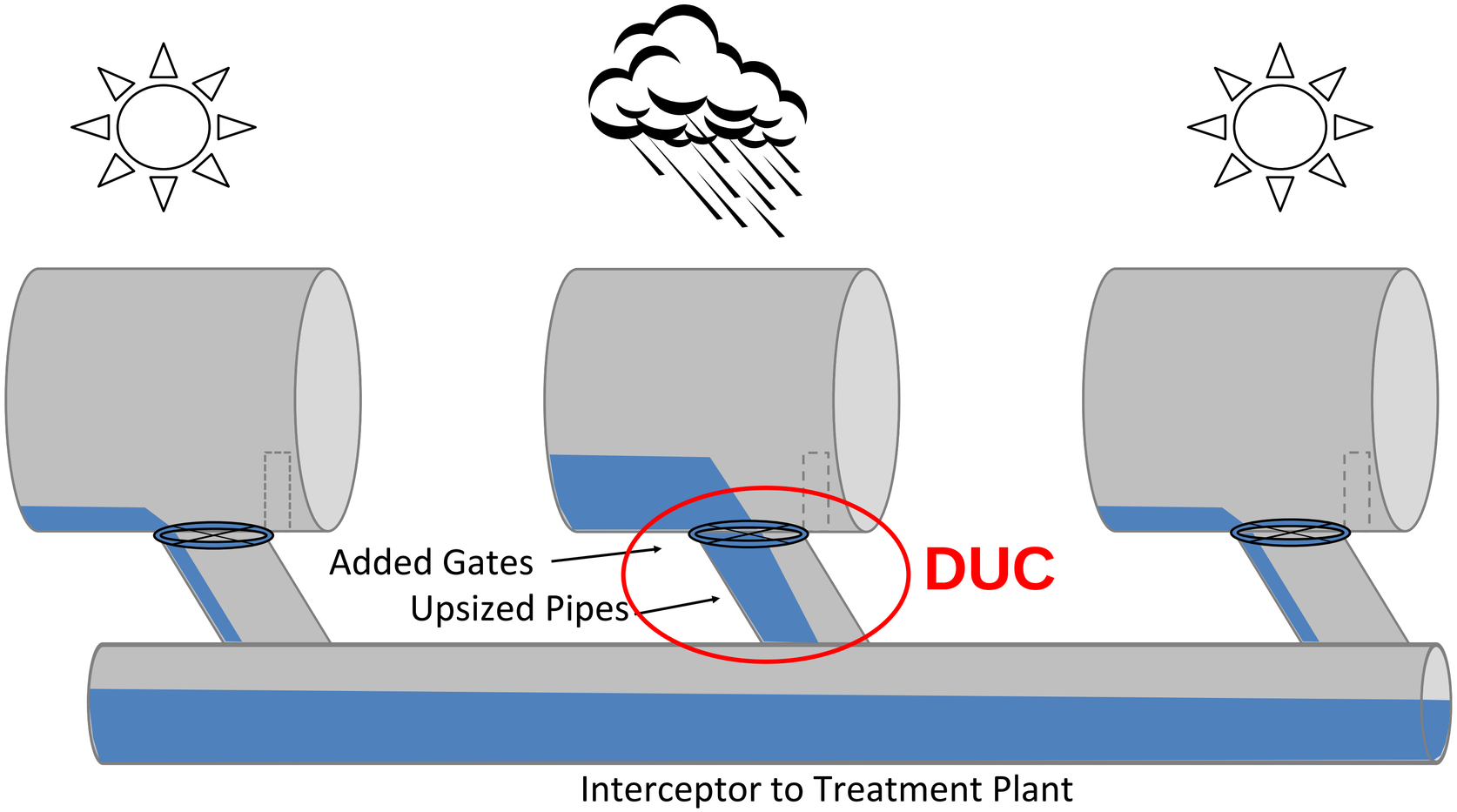
MSD's Smart Sewer System

Traditional, Passive Regulator Structures



MSD's Smart Sewer System

Dynamic Underflow Control (DUC) Structures

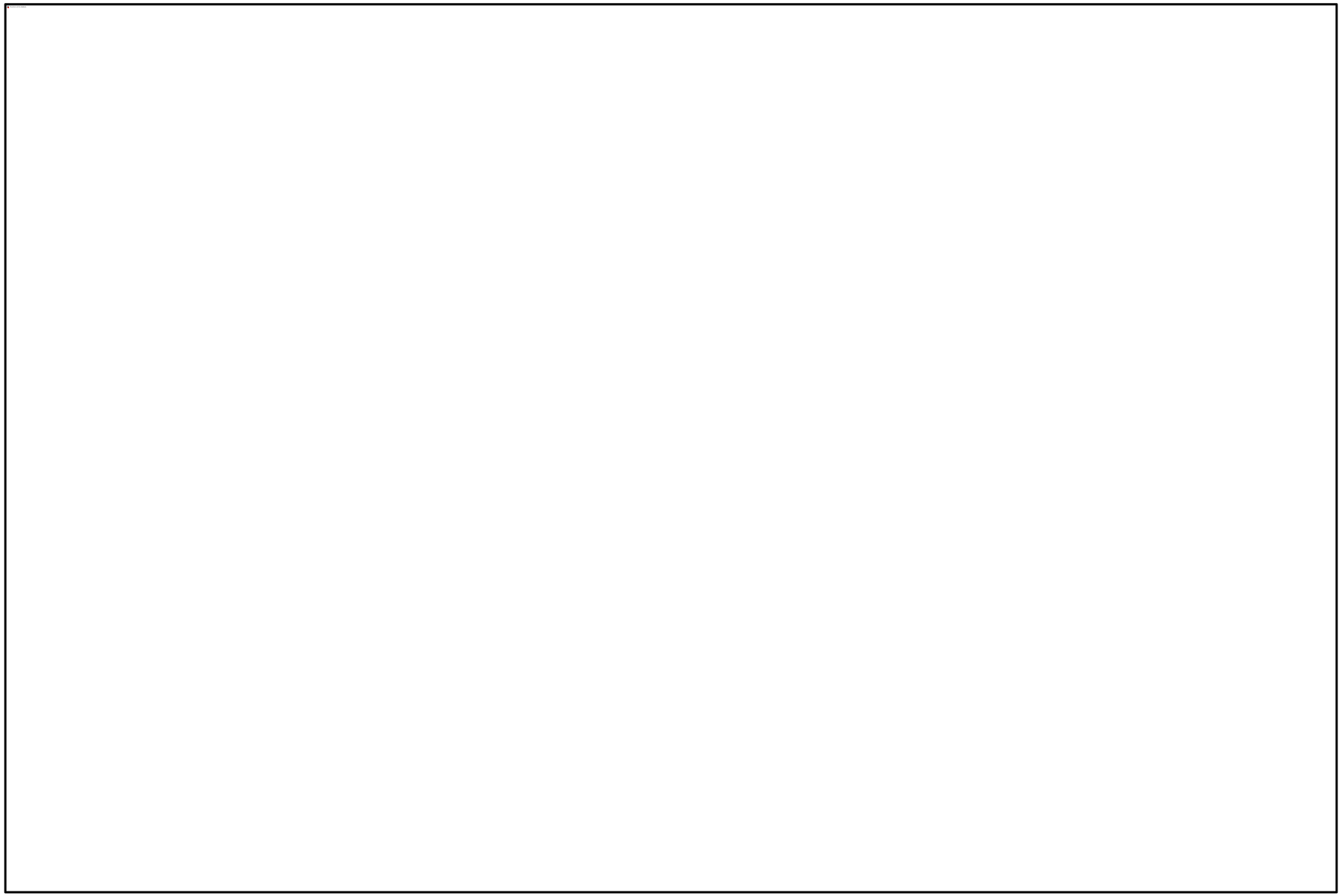


Previous Condition at CSO-083

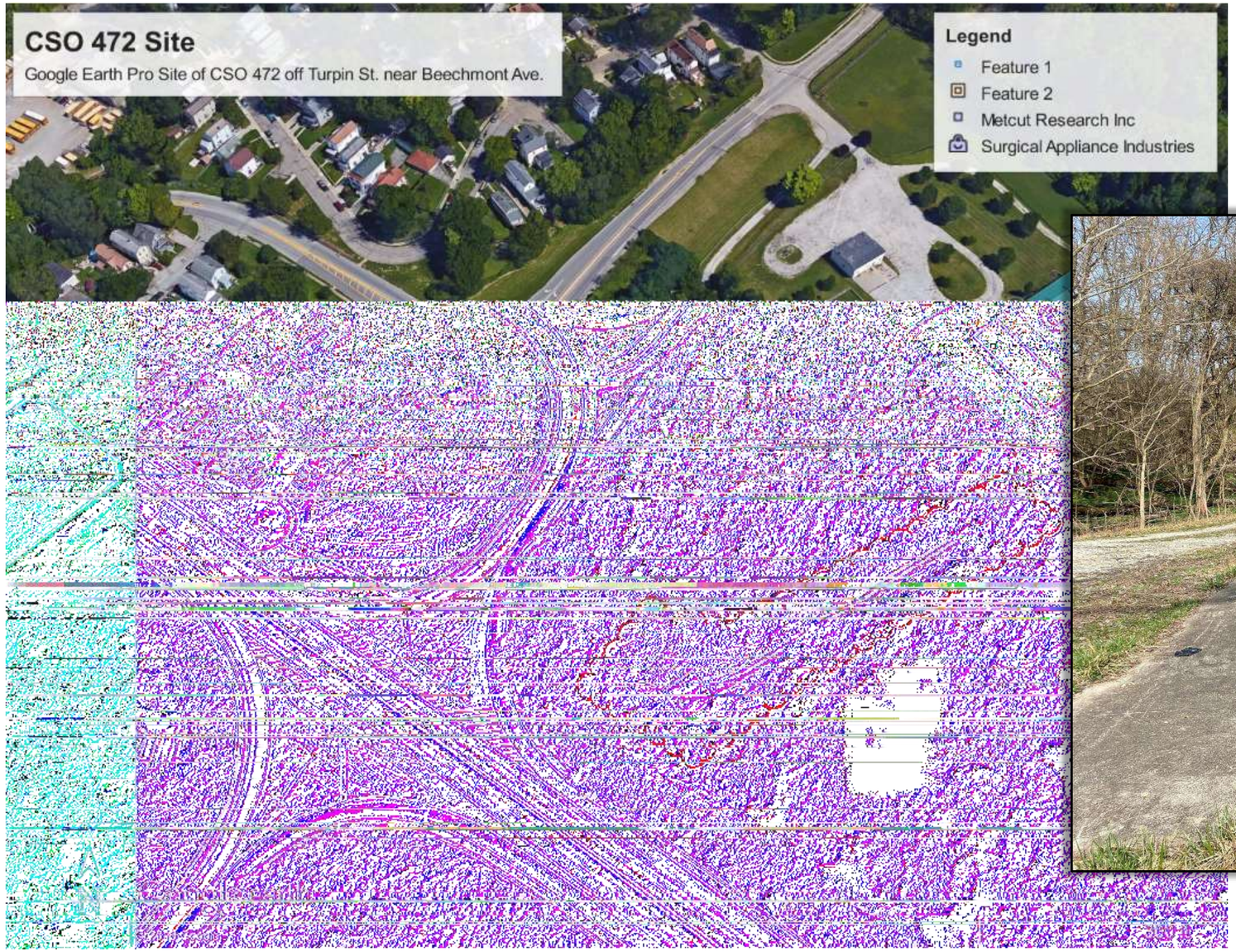
Future Condition at CSO-083

Construction at CSO-083

Final Condition at CSO-083 – Coming Soon!



Current Conditions at CSO-472



Future Conditions at CSO-472

New 36” Underflow

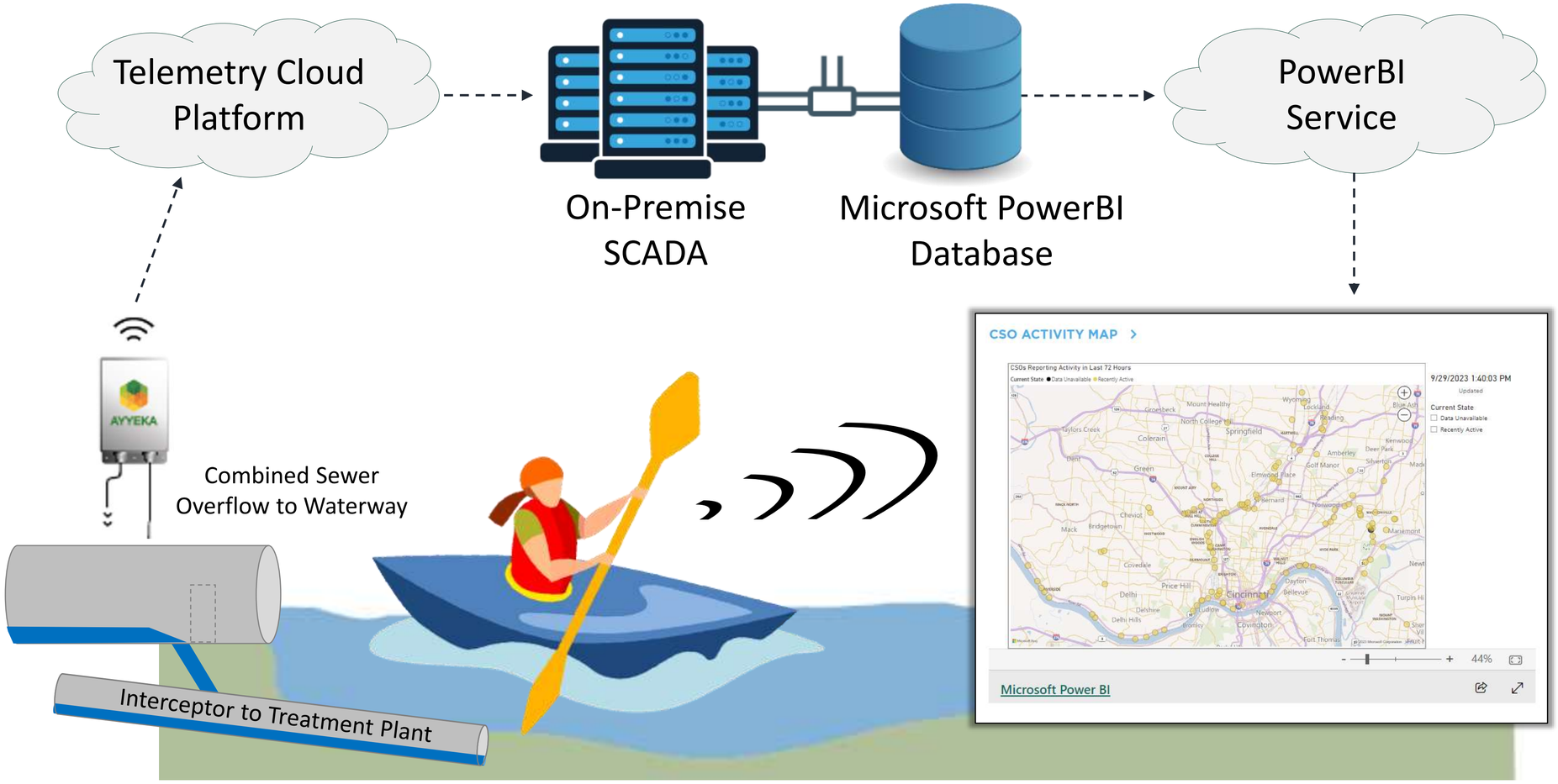
Old 12” Underflow

Existing 72” Interceptor

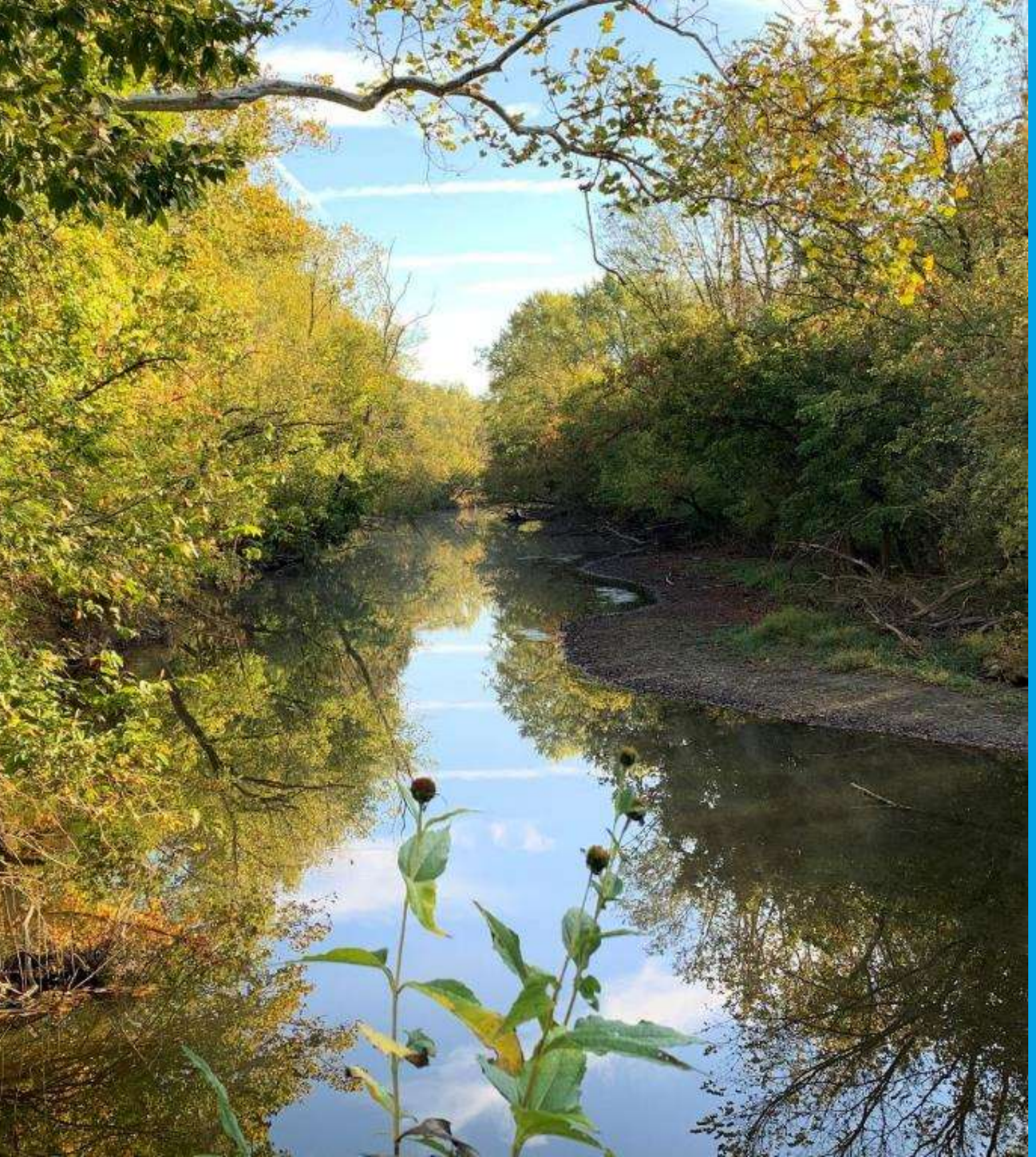
New Automated Gate

Existing 84” Combined Sewer

CSO Public Notification Improvements



[CSO Notification Program - Metropolitan Sewer District of Greater Cincinnati (msdgc.org)]



For more information:

Reese Johnson, Superintendent
Compliance Services Division
reese.johnson@cincinnati-oh.gov

METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI

World Café Conversations

Graphic illustration by Avril Orloff

- Three rounds of small group conversations (8-10 minutes)
- At the end of each round, everyone moves to a different table
- At the end, we'll all come together to share insights

Etiquette:

- Focus on what matters
- Contribute your thinking
- Speak your mind and heart
- Listen to understand
- Link and connect ideas
- Listen together for deeper insights and questions
- Play, doodle, draw
- Have fun!

Round 1

- What did you take away from the presentations?
- Did anything surprise you?

Round 2

- What challenges do you see in addressing water quality threats to the Little Miami River?

- Are there opportunities for partnership?

Round 3

- In your opinion, what needs our immediate attention today?

- If we had enough resources to tackle, just **one** water quality challenge facing the Little Miami River today, what should it be and why?

Thanks to our Partners!

How YOU can help, too!

- Pick up pet waste
- Apply fertilizers only when necessary & not before rain events
- Build a rain garden (Master Rain Gardener Program)
- Use phosphate-free soaps and detergents
- Use water efficiently
- Inspect & maintain your septic system
- Energy Efficiency
- Use commercial car washes
- Get involved! Join your local watershed group