2022 Water Quality Forum

Mill Creek Basin

MSD Administration Building
December 14, 2022

METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI

It’s All About Clean Water

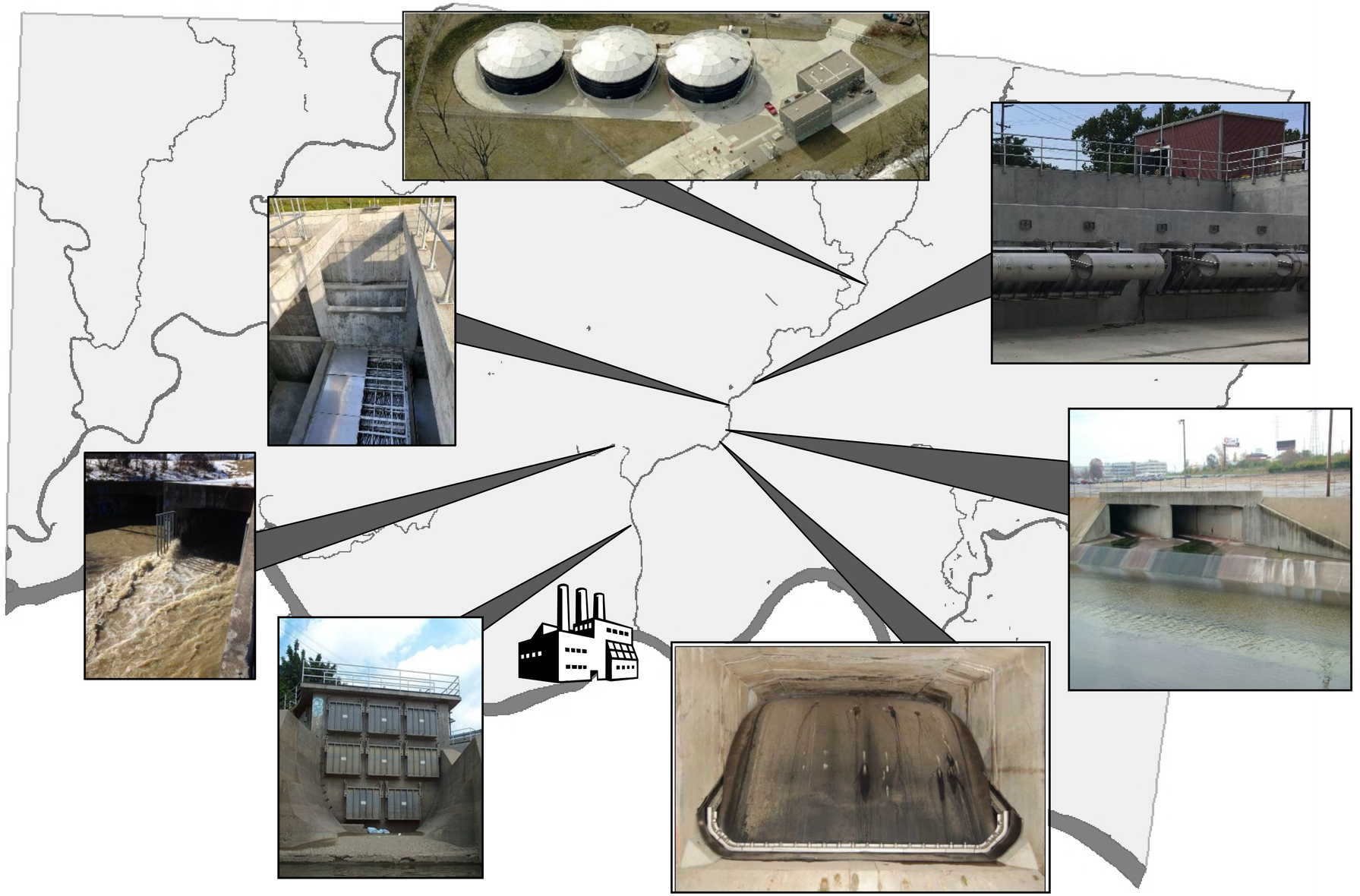
MSD collects, treats, and manages wastewater from Greater Cincinnati communities, protecting the environment and public health by returning clean water to local rivers and streams.

METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI

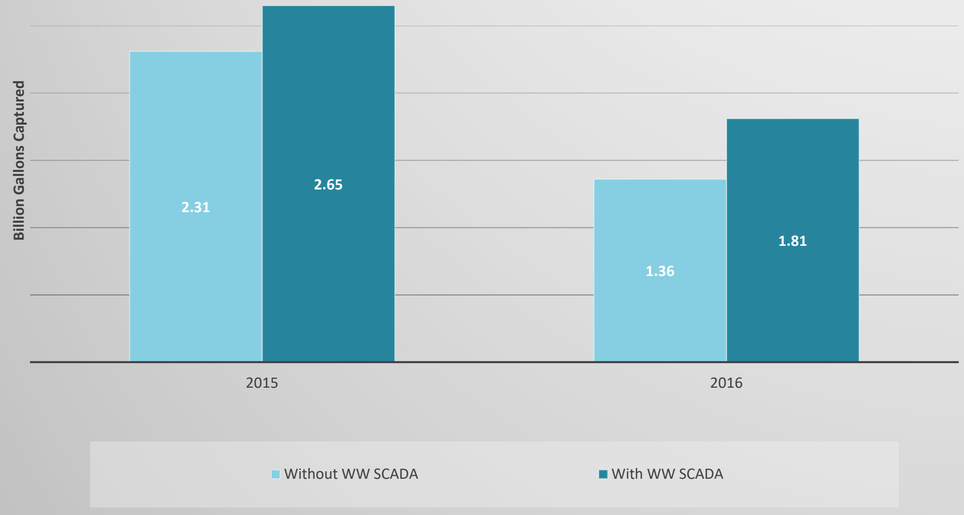
21st Century Solutions to a 19th Century Problem

Innovation at Work at MSD

Outfall-Specific Controls in Mill Creek



Improvement through *Telemetry*



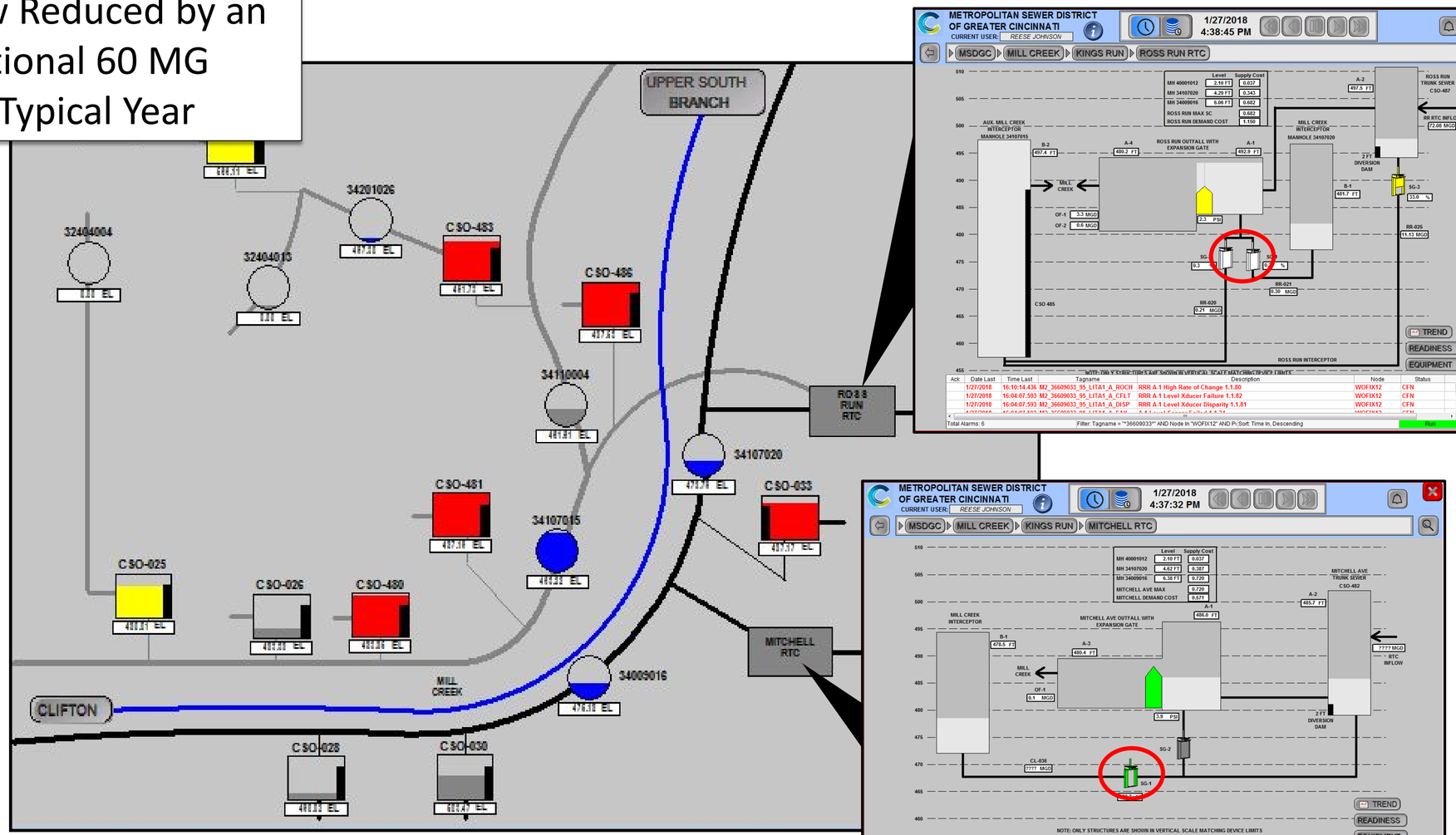
Added Connectivity to 4 Wet Weather Facilities:

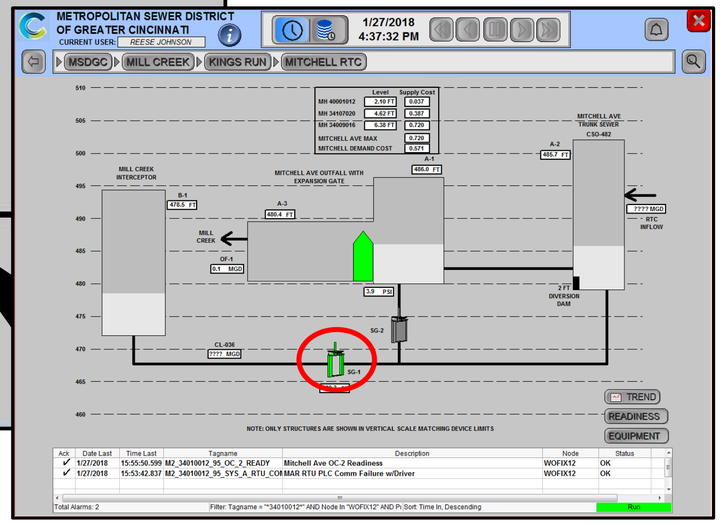
1st Year, added real-time monitoring capabilities:
15% improvement

2nd Year, added real-time control capabilities:
33% improvement

Maximization through *Market-Based Controls*

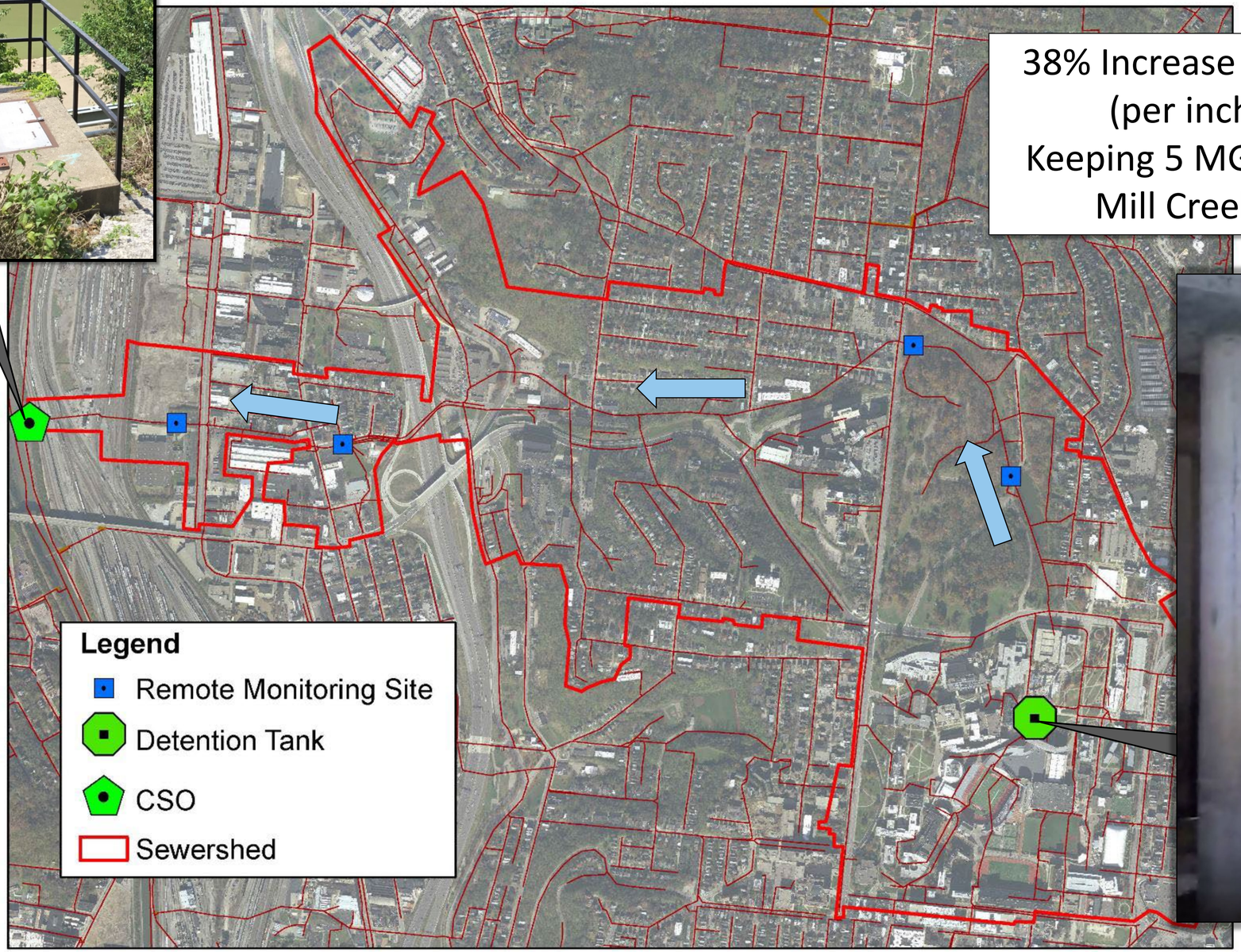
Overflow Reduced by an
Additional 60 MG
In a Typical Year





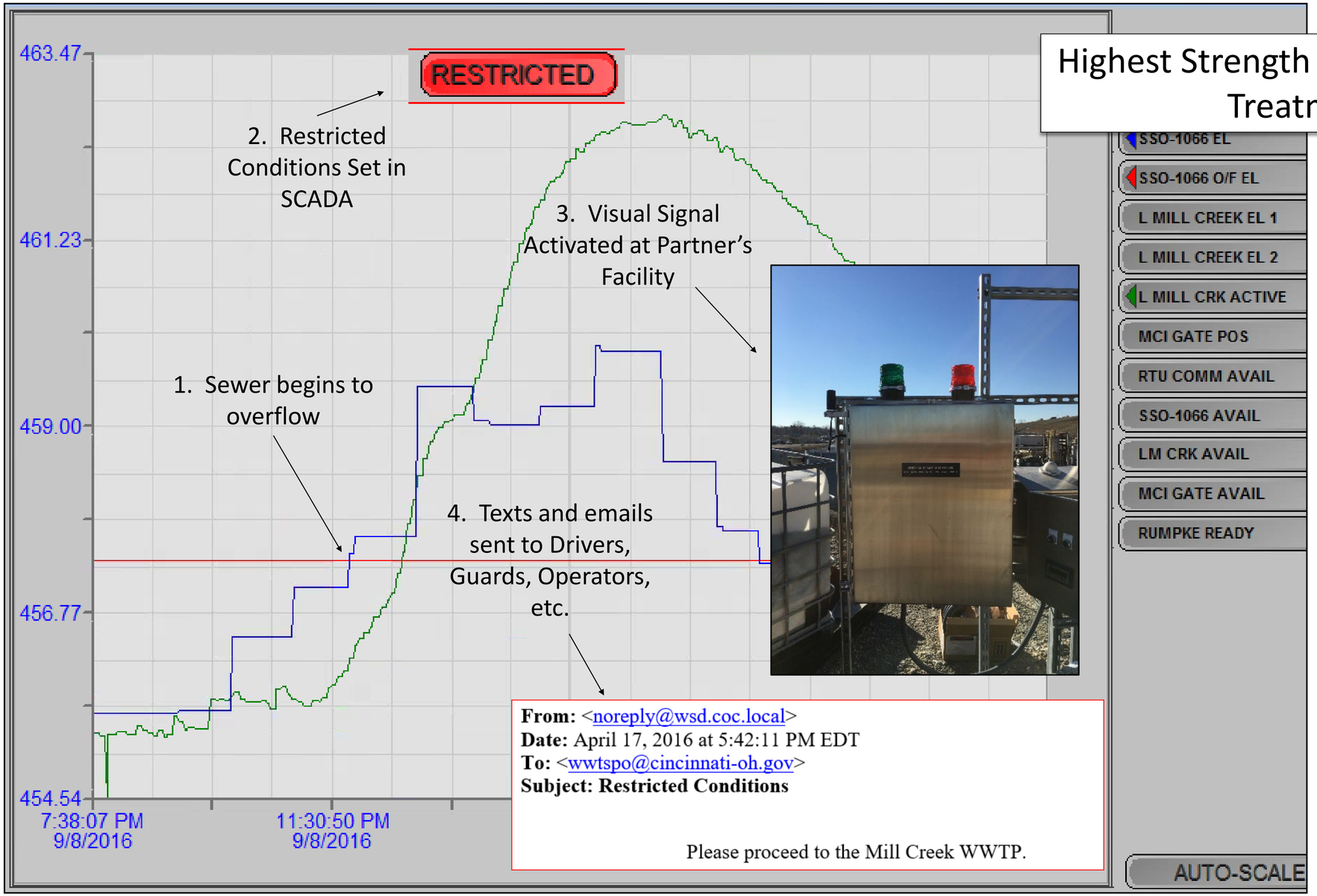
Minimization through *Prediction*

38% Increase in Stored Volume (per inch of rainfall), Keeping 5 MG of CSO from the Mill Creek in Typ. Year



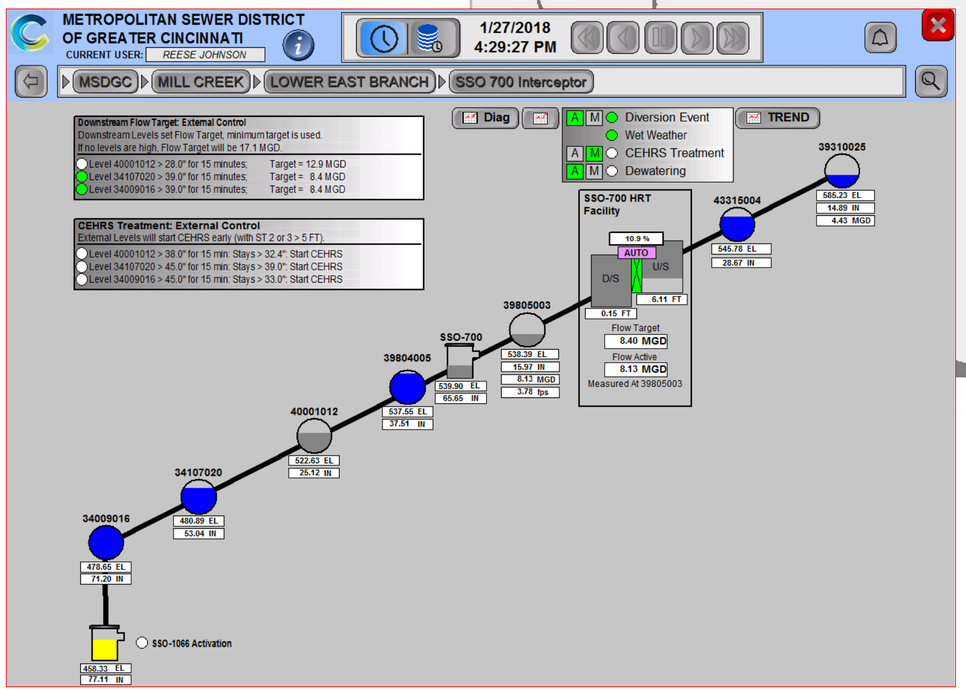
Protection through *Partnership*

Highest Strength Waste Gets Full Treatment



Elimination through *Awareness*

Overflow Reduced
by 247 MG
In a Typical Year



Mill Creek
WWTP

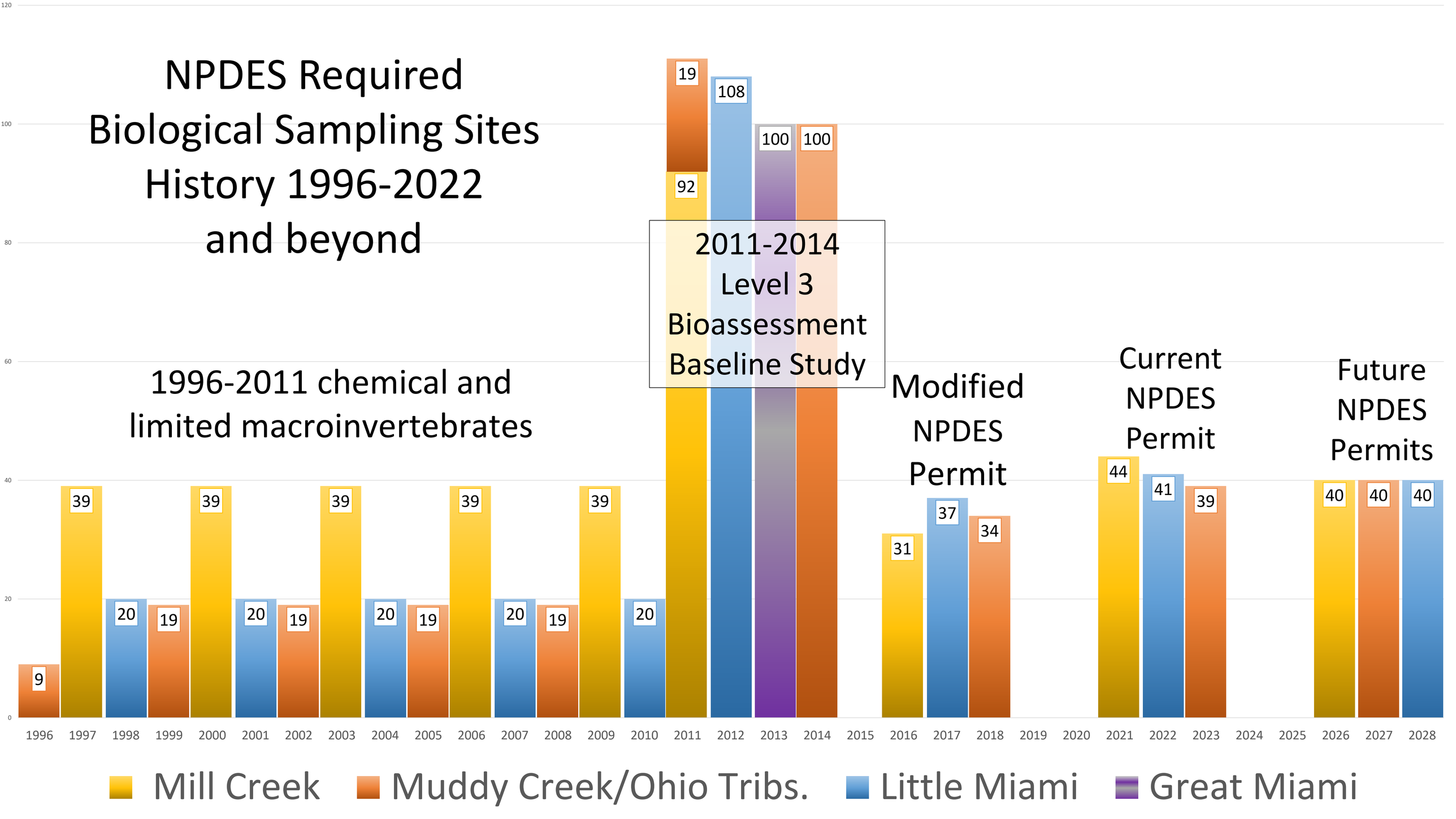
Virtual Elimination of
Sanitary Sewer Overflow
From Outfall 700

Validation through *Modeling*

Performance Criteria Evaluation	Overflow Reduction (Million Gallons)
Overflow Reduction Volume - Achieved	1,919
Overflow Reduction Volume - Required	1,672
Difference	**+247 (+14.8%)**

Bio Assessment & Water Quality at MSD

Chris Hall, P.E.


NPDES Required Biological Sampling Sites History 1996-2022 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
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20
19
39
20
19
39
20
19
39
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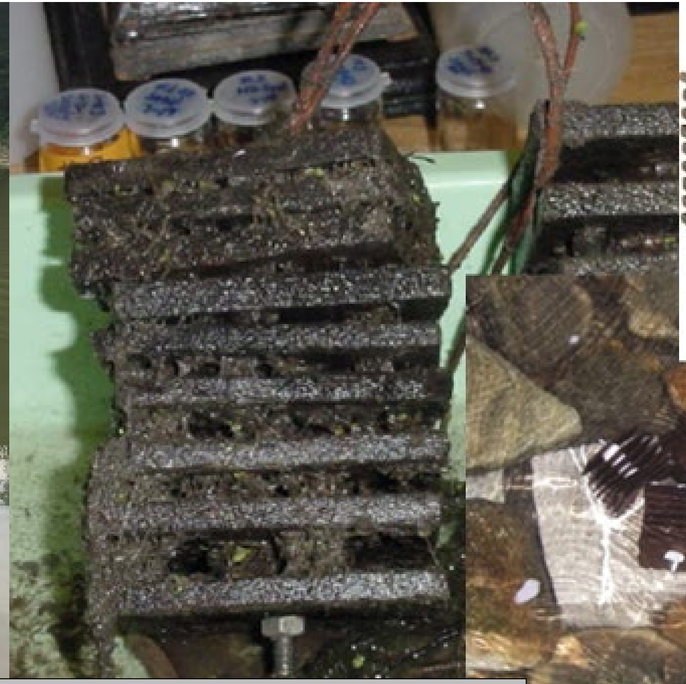
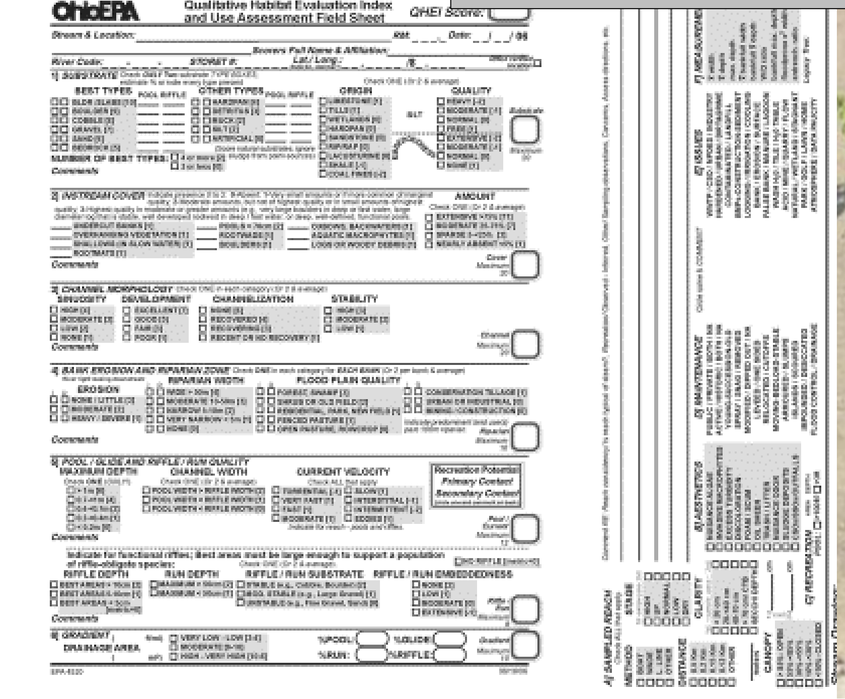
Mill Creek
Muddy Creek/Ohio Tribs.
Little Miami
Great Miami

What is a Bioassessment?

- **Bioassessment – a systematic assessment of the aquatic resource using biological indicators AND chemical/physical indicators in a *supporting role*.**
- **Tiered Aquatic Life Uses (TALUs) – a hierarchy of aquatic life uses in Ohio.**
- **Biocriteria – data-based numerical benchmarks for determining attainment of aquatic life uses in the Ohio WQS.**

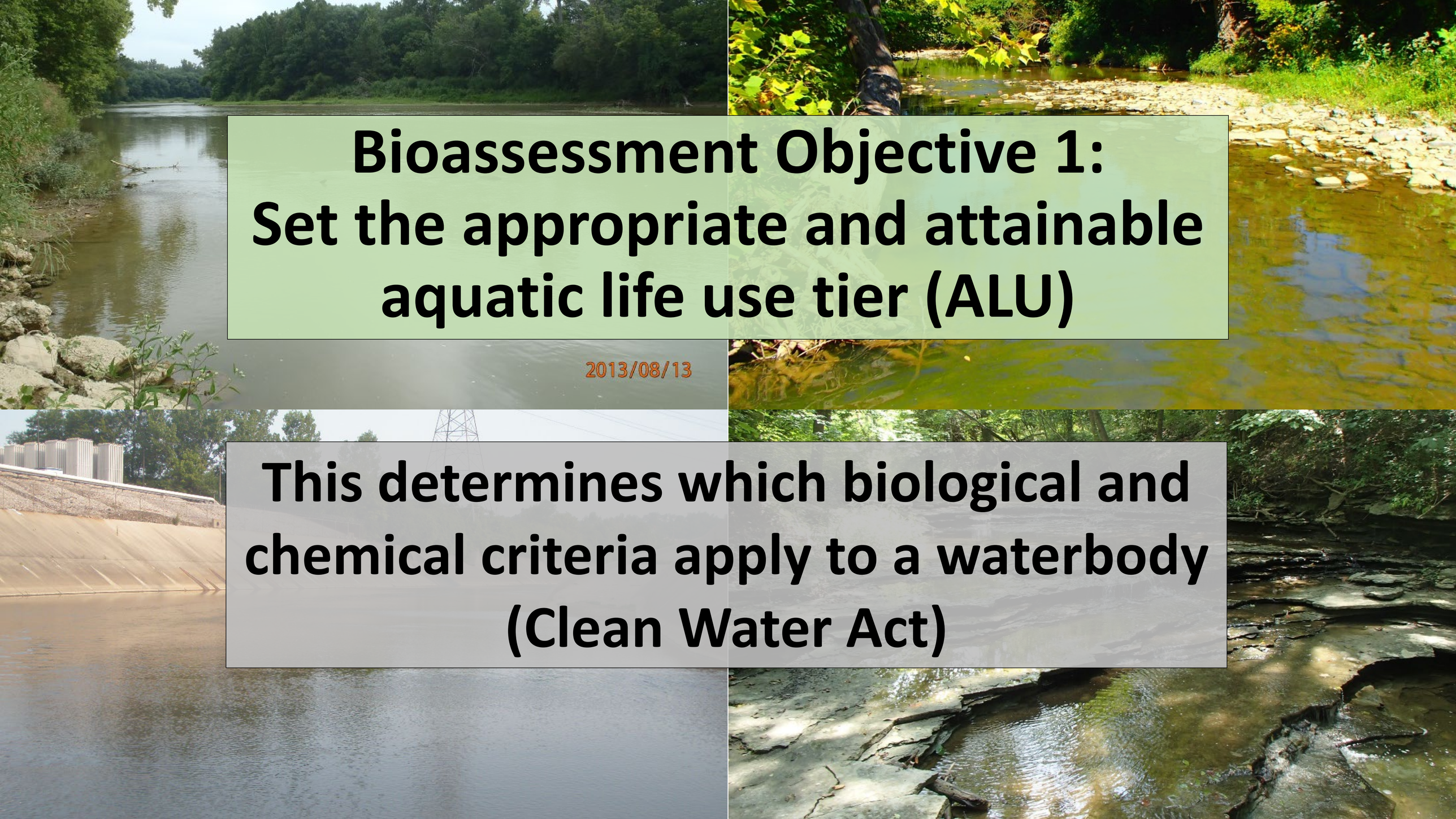


Fish, Macroinvertebrates, Sondes, Chemical samples, Habitat


OhioEPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

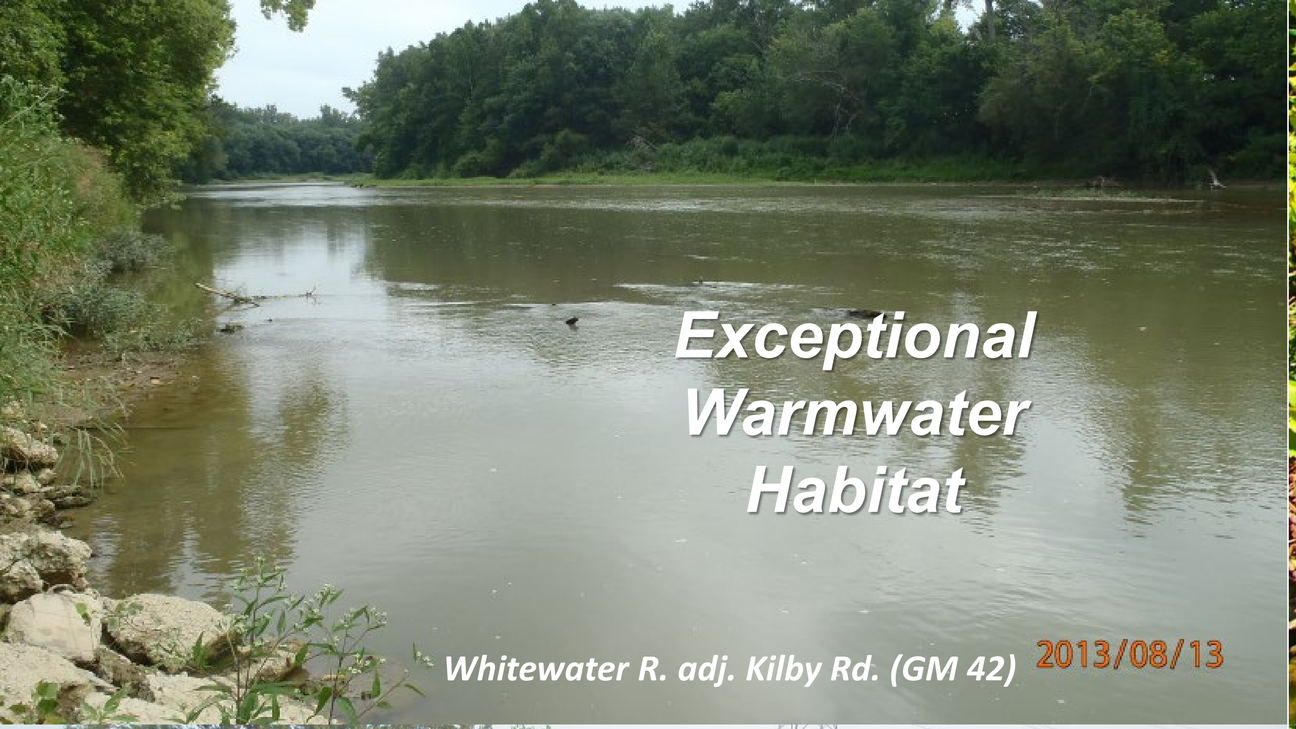
Instream Bioassessment Provides:

1. Assignment/Affirmation the ***appropriate & attainable aquatic life use tier*** (criteria-based) – what can the stream attain?
2. Determine the ***aquatic life status*** of a waterbody – is it impaired or attaining?
3. Determine ***changes over time*** – trend assessment.



Bioassessment Objective 1: Set the appropriate and attainable aquatic life use tier (ALU)

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


Exceptional
Warmwater
Habitat
Whitewater R. adj. Kilby Rd. (GM 42)
2013/08/13


Warmwater
Habitat
Taylor Creek between I-74 & Harrison Ave. (GM 81)


Modified
Warmwater
Habitat
Mill Creek downstream Spring Grove Ave. (MC07)


Primary
Headwater
Habitat
Unnamed Trib. to Taylor Cr. at 5310 Haft Rd. (GM106)

Major Causes Associated with Aquatic Life Impairments in MSDGC

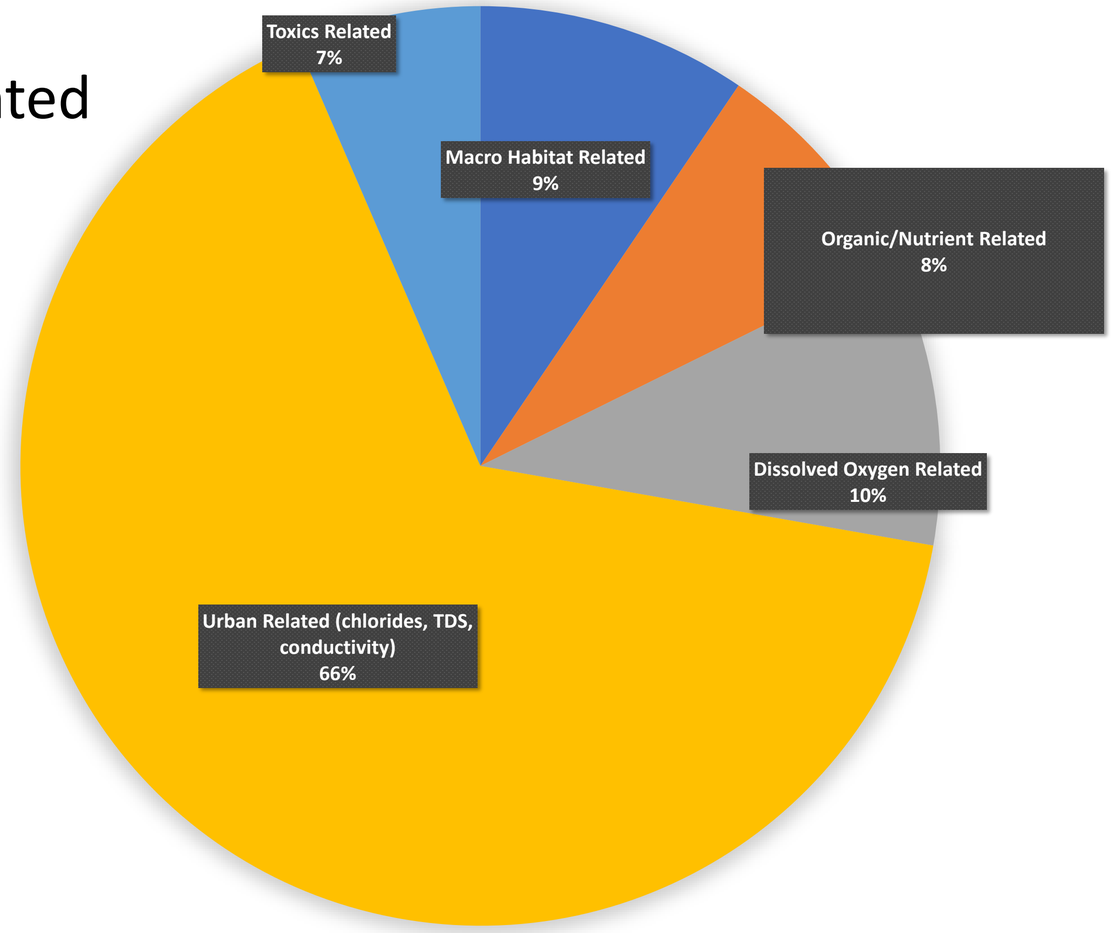
Bioassessment Objective 2: Determine aquatic life status and causes/sources of impairments

CSO/SSOs are not the only source of impairments – present day causes have lingering pollutants that are fundamental to attainment and attainability of WQS.

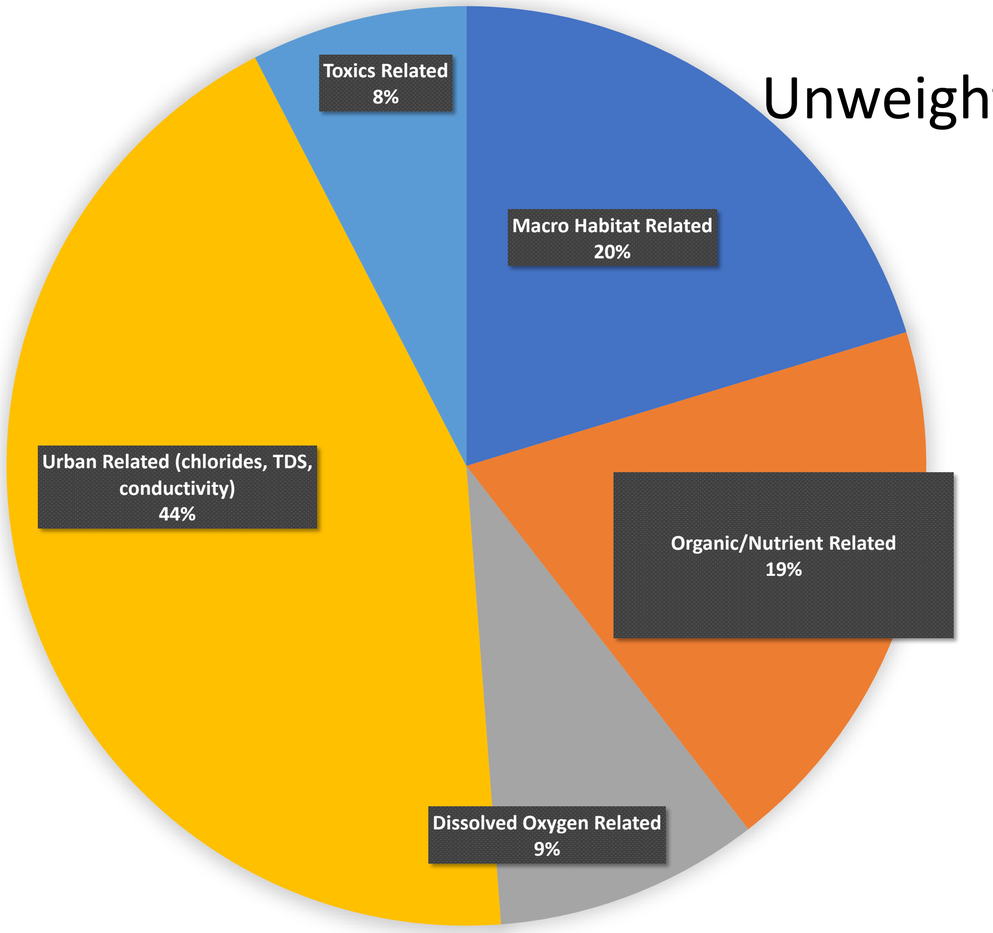
Knowledge of impaired (or attaining) waters is needed to develop & prioritize management actions

Figure 1. Weighted and unweighted causes associated with impairment of aquatic life in the Mill Creek mainstem study area in 2021. Major subcategories of causes are derived from the causes listed in Table 1 Aquatic life use attainment status

Weighted

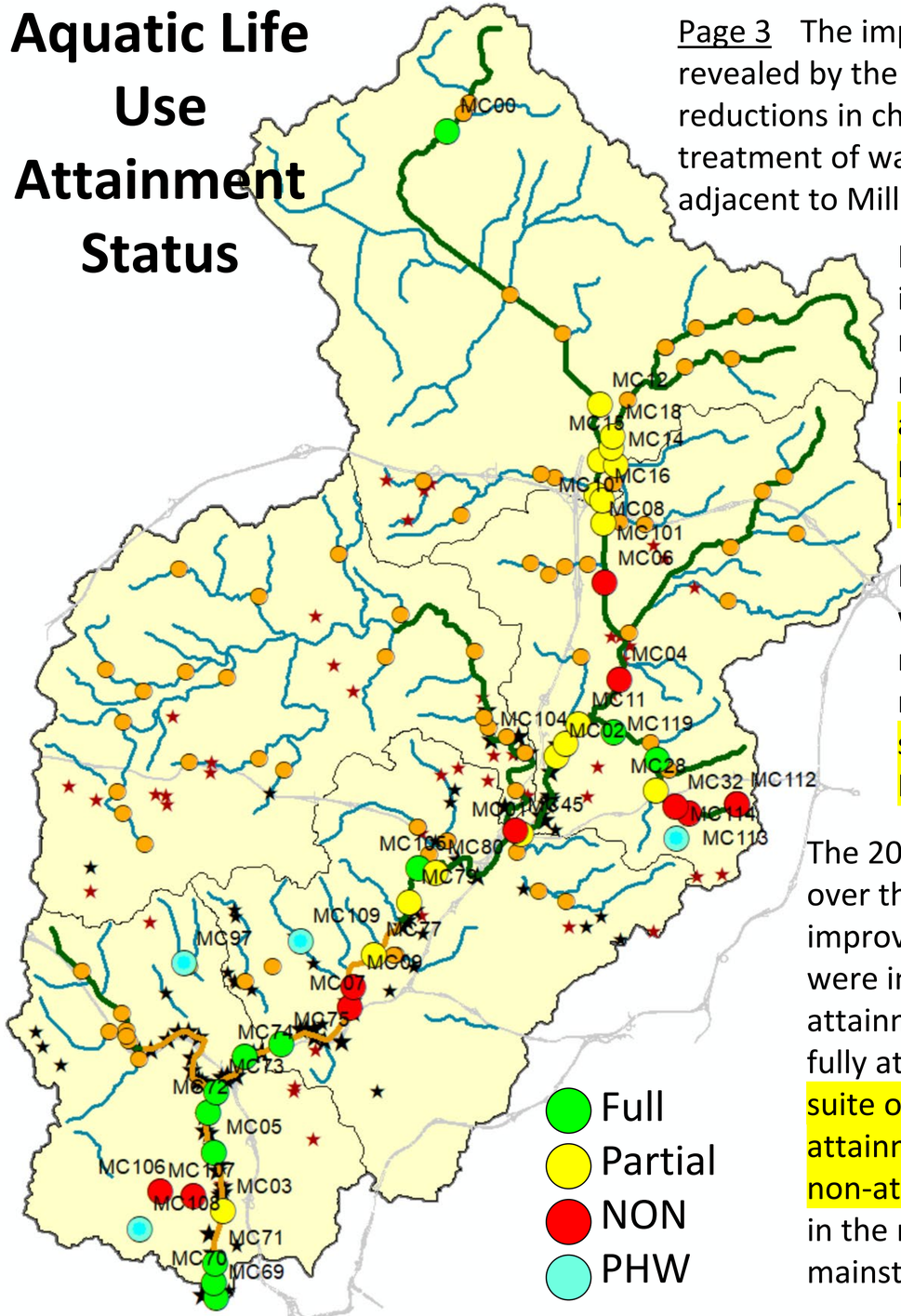


Unweighted



Overflows are not the only source of impairments – habitat modification, hydro-modification, road salt, household systems, etc.

Aquatic Life Use Attainment Status



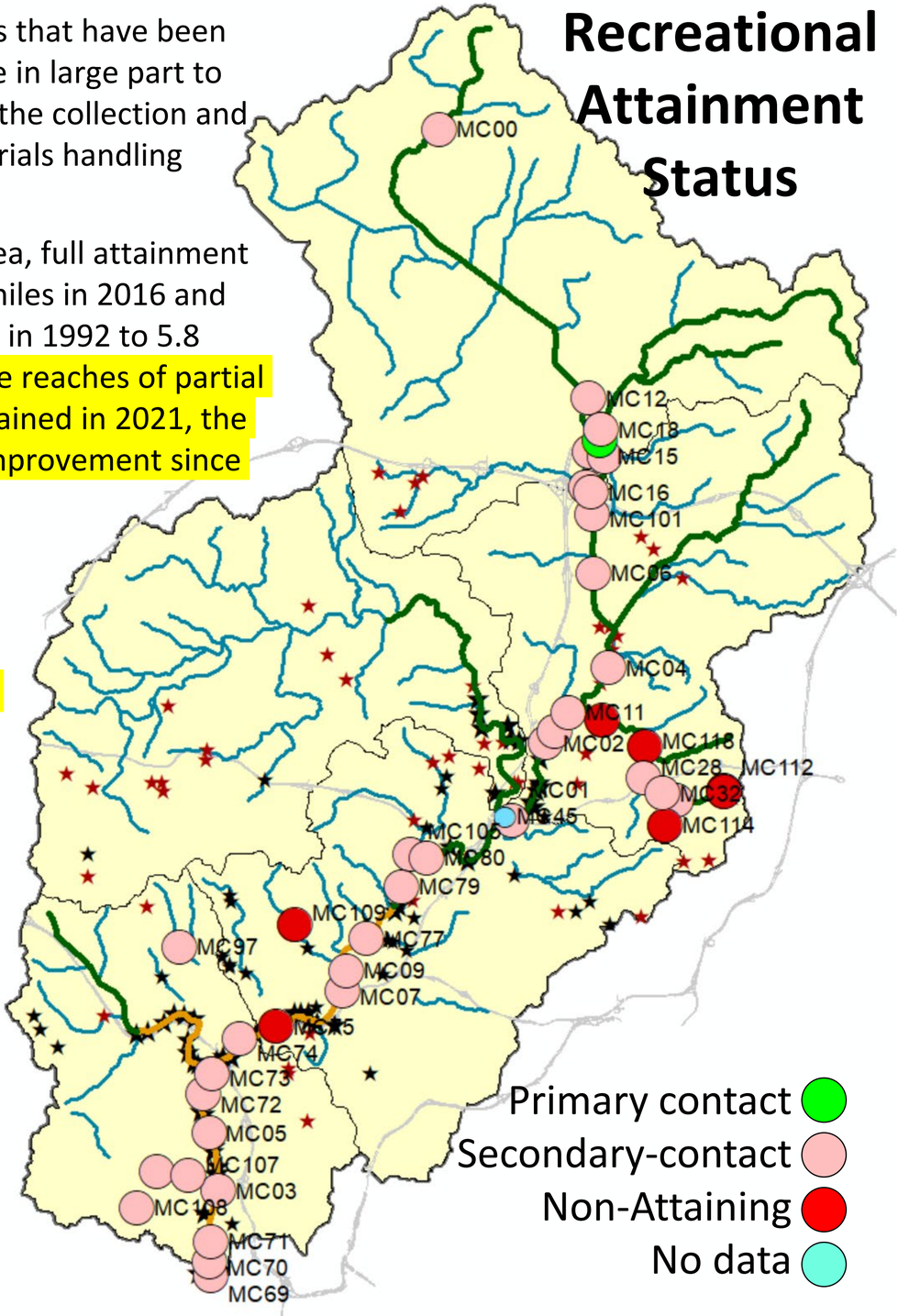
Page 3 The improvements in the biological assemblages that have been revealed by the biological assessment since 1992 are due in large part to reductions in chemical pollutant loadings resulting from the collection and treatment of wastewater and the clean-up of toxic materials handling adjacent to Mill Creek and tributaries.

In the 26 miles of the mainstem study area, full attainment increased from 0.1 mile in 1992 to 10.8 miles in 2016 and non-attainment declined from 24.4 miles in 1992 to 5.8 miles in 2016 and 5.1 miles in 2021. While reaches of partial and isolated sites in non-attainment remained in 2021, the results indicate continued incremental improvement since the 2011 and 2016

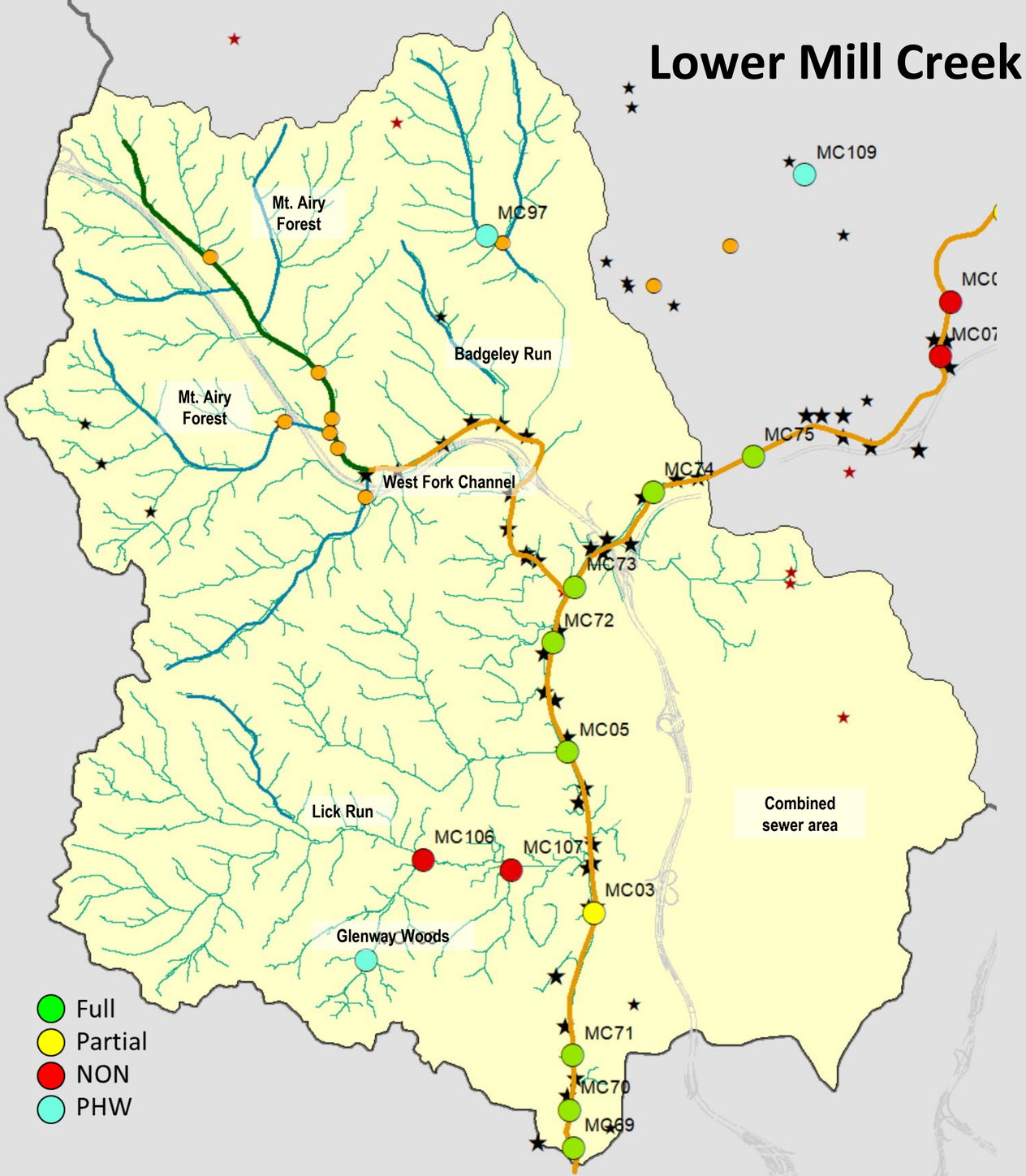
Recreational uses continued to exhibit widespread impairment based on E. coli results. Although E. coli values were reduced compared to 2011 and 2016, no site fully attained the Primary Contact Recreation (PCR) use criteria.

The 2021 results are a modest improvement over those found in 2016 and are a distinct improvement over 2011 when 11 of 28 sites were in non-attainment and only four (4) in full attainment of the MWH use – no WWH sites fully attained in 2011. In 2021, of the 36 WWH suite of use sites sampled, 12 were in full attainment, 18 in partial attainment, and 6 in non-attainment. Full attainment was observed in the nearly all of the MWH reaches of the mainstem.

Recreational Attainment Status



Lower Mill Creek

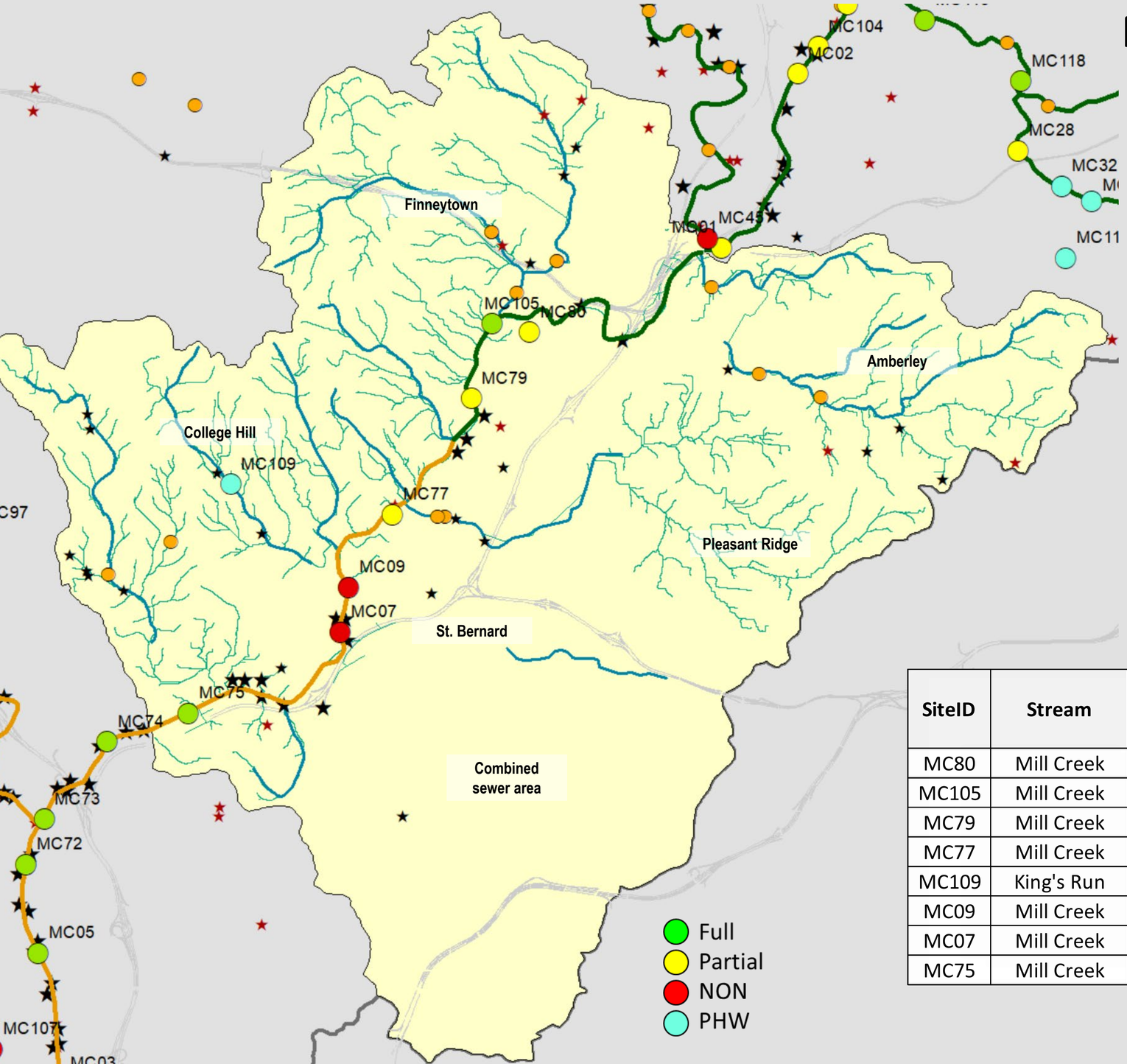


Page 3 Two (2) of the non-attaining sites were in Lick Run which failed to meet the WWH biocriteria being a **newly daylighted channel** that is not directly connected to Mill Creek and with a substrate covered in dense mats of filamentous algae. Lick Run is currently undesignated and no recommendation for an aquatic life or recreational use will be made at this time.

SiteID	Stream	River mile	Aquatic life Use	Attainment status	IBI	MIwb	ICI	QHEI
MC74	Mill Creek	4.21/4.30	MWH	FULL	38	6.98	28	62
MC73	Mill Creek	3.45/3.50	MWH	FULL	34	6.34	44	58.5
MC97	West Fork	1.49/1.40	PHW3A	-				69.5
MC72	Mill Creek	3.15/3.10	MWH	FULL	36	7.26	36	58.5
MC108	Lick Run	1.70/1.70	PHW2	-				
MC106	Lick Run	0.98/0.98	WWH	NON	16		P	45
MC107	Lick Run	0.45/0.45	WWH	NON	20		P	47.5
MC05	Mill Creek	2.50/2.50	MWH	FULL	34	6.69	36	53
MC03	Mill Creek	1.69/1.70	MWH	Partial	34	9.27	20	57.5
MC71	Mill Creek	0.83/0.65	MWH	FULL	34	8.16		49
MC70	Mill Creek	0.50/0.30	MWH	FULL	30	7.72		50
MC69	Mill Creek	0.21/0.10	MWH	FULL	28	6.47		50.5

Page 2 The 2021 assessment of Mill Creek provided an opportunity to gauge the effectiveness of past and ongoing attempts to improve water quality and overall conditions by comparing the results to prior assessments. The 2011, 2013, and 2016 (fish/habitat only) by MBI and the 1992, 1997, and 2014 surveys by Ohio EPA provide the most consistent basis for comparisons in terms of spatial coverage and between indicators and parameters for the Mill Creek mainstem.

Middle (South Branch) Mill Creek

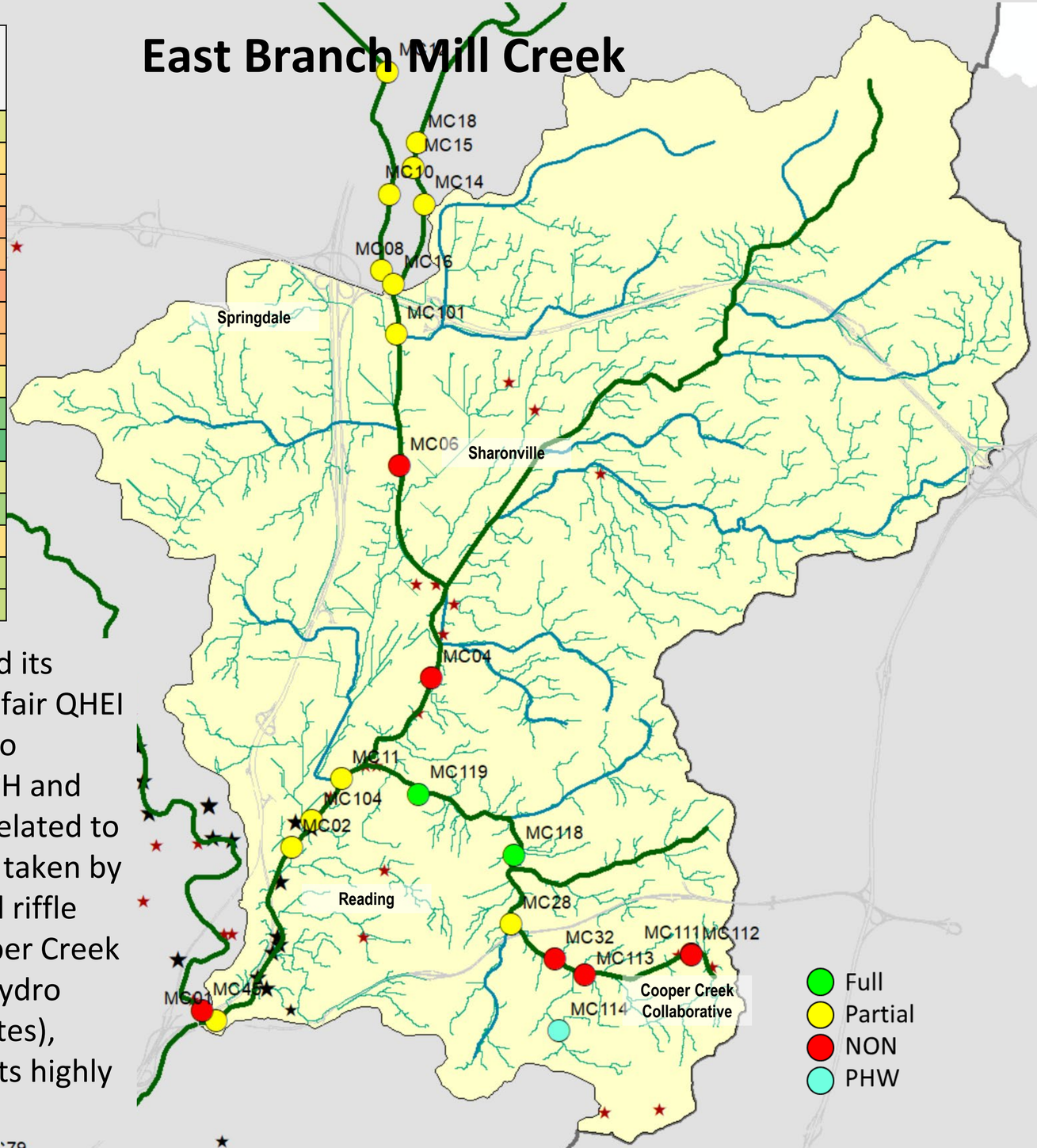


Page 3 Based on the results of the continuous monitoring of D.O. and temperature, the over-riding influence of the concrete channel beginning at RM 6.9 and the downstream channelized reach of Mill Creek was evident. From this point downstream, **diel D.O. swings** were extremely wide, and temperatures were elevated above the average and maximum Ohio water quality criteria. The feasibility of restoration aside, the controlling factor is the highly modified habitat that exacerbates water quality effects.

SiteID	Stream	River mile	Aquatic life Use	Attainment status	IBI	MIwb	ICI	QHEI
MC80	Mill Creek	10.48/10.45	WWH	Partial	37	7.09	36	78.3
MC105	Mill Creek	9.24/9.24	WWH	FULL	38	7.84	38	71.8
MC79	Mill Creek	8.63/8.65	WWH	Partial	35	8.09	40	75.5
MC77	Mill Creek	7.47/7.45	WWH	Partial	40	6.88	38	55
MC109	King's Run	1.11/1.00	PHW3A	-				52
MC09	Mill Creek	6.80/6.80	MWH	NON	30	3.84	24	28.5
MC07	Mill Creek	6.45/6.35	MWH	NON	28	3.69	16	38.5
MC75	Mill Creek	4.84/5.10	MWH	FULL	31	6.53	28	49

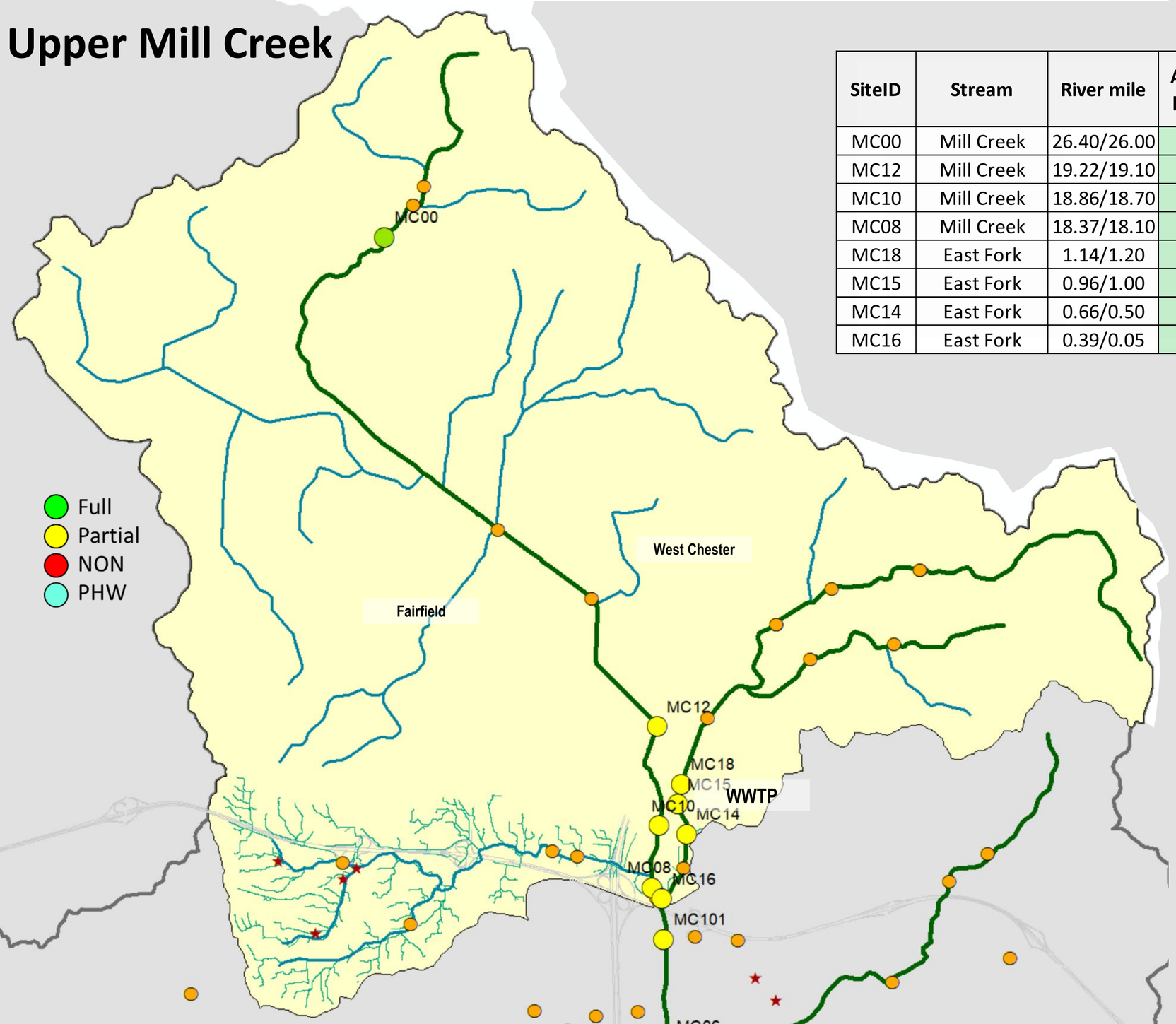
SiteID	Stream	River mile	Aquatic life Use	Attainment status	IBI	MIwb	ICI	QHEI
MC101	Mill Creek	17.96/1.30	WWH	Partial	31	6.41	40	65
MC06	Mill Creek	16.73/16.60	WWH	NON	22	5.09	40	56
MC04	Mill Creek	15.41/14.80	WWH	NON	24	3.74	40	50.5
MC114	Cooper Creek	0.55/0.55	WWH	NON	12	NA	VP*	45.5
MC111	Cooper Creek	3.57/3.57	WWH	NON	28	NA	VP*	48.5
MC112	Cooper Creek	3.42/3.42	WWH	NON	28	NA	F*	42.5
MC113	Cooper Creek	2.84/2.84	WWH	NON	30	NA	VP*	47.5
MC32	Cooper Creek	2.59/2.55	WWH	NON	30	NA	VP*	49.5
MC28	Cooper Creek	2.13/2.20	WWH	Partial	32	NA	MG	61.3
MC118	Cooper Creek	1.58/1.58	WWH	FULL	46	NA	G	81.5
MC119	Cooper Creek	0.44/0.46	WWH	FULL	46	NA	G	88.5
MC11	Mill Creek	13.96/13.90	WWH	Partial	35	7.06	40	65.5
MC104	Mill Creek	13.76/13.70	WWH	Partial	36	6.57	46	75.8
MC02	Mill Creek	13.27/13.10	WWH	Partial	31	5.92	46	55.5
MC01	Mill Creek	11.70/11.30	WWH	Partial	39	7.19	42	69.5
MC45	West Branch	0.20/0.20	WWH	NON	26	7.06	30	69.3

Stream Habitat Page 54 The habitat assessment is based on the QHEI and its metrics, submetrics, and individual attributes. Page 55 Cooper Creek had fair QHEI scores at the upstream most sites, but **excellent QHEI** scores at the two downstream sites. The upper sites were classified by this study as WWH and had both high and moderate influence modified QHEI attributes that related to shallow depths and flow intermittency. **Rehabilitation steps** are being taken by the Hamilton County Conservation District to increase pool depths and riffle development using natural materials such as woody debris. Page 58 Cooper Creek showed multiple deficiencies below the WWH IPS thresholds for the Hydro QHEI at 4 sites, along with deficiencies for current (4 sites), depth (3 sites), channel (3 sites), cover (4 sites), and riffle (4 sites) which is related to its highly urbanized watershed.



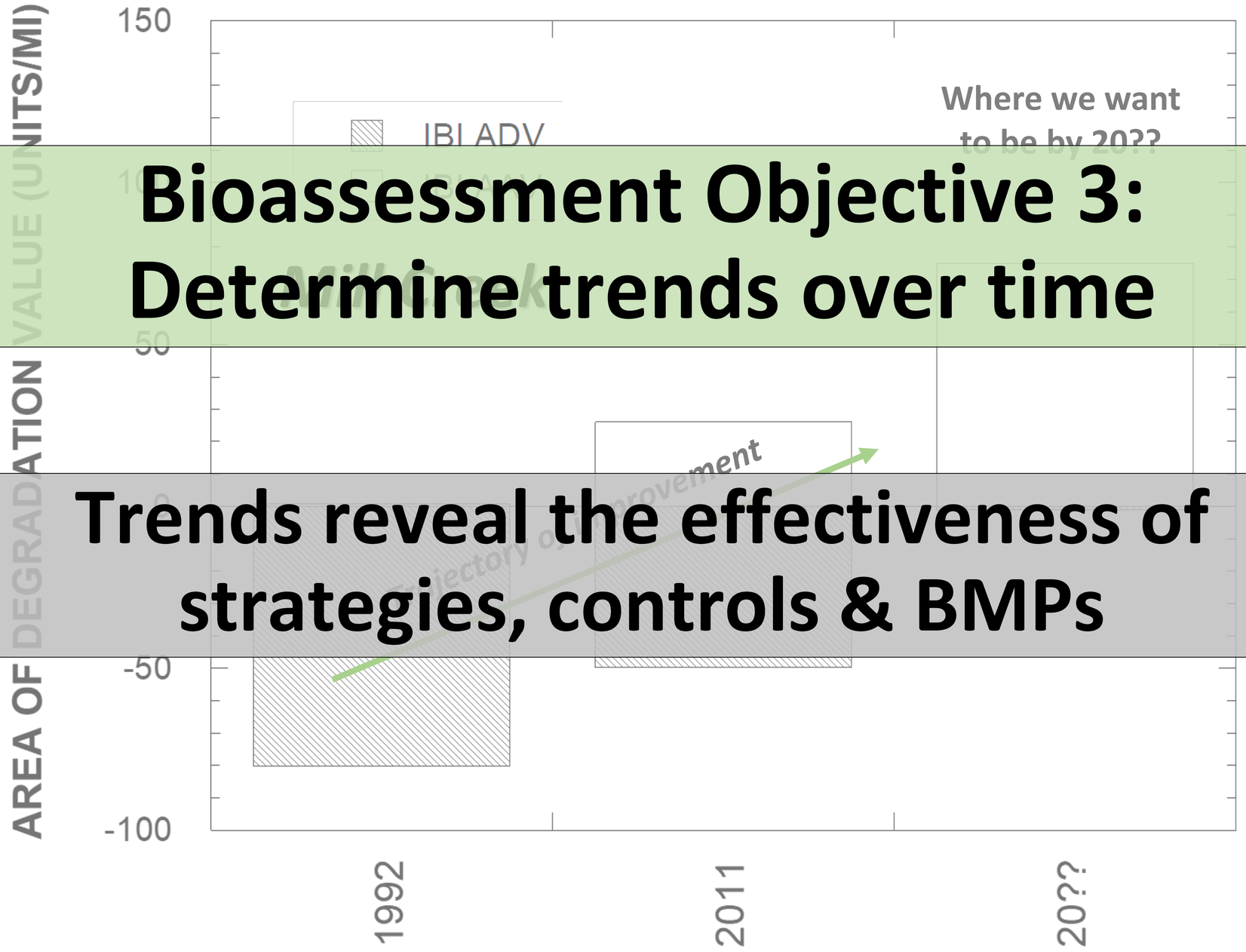
Upper Mill Creek

SiteID	Stream	River mile	Aquatic life Use	Attainment status	IBI	MIwb	ICI	QHEI
MC00	Mill Creek	26.40/26.00	WWH	FULL	43	NA	44	69
MC12	Mill Creek	19.22/19.10	WWH	Partial	30	6.2	42	69.3
MC10	Mill Creek	18.86/18.70	WWH	Partial	28	6.22	44	70.5
MC08	Mill Creek	18.37/18.10	WWH	Partial	34	6.57	44	83.5
MC18	East Fork	1.14/1.20	WWH	Partial	33	NA	42	71.5
MC15	East Fork	0.96/1.00	WWH	Partial	34	NA	30	78
MC14	East Fork	0.66/0.50	WWH	Partial	28	NA	38	71
MC16	East Fork	0.39/0.05	WWH	Partial	28	NA	36	60.5



Page 3 Of the partially attaining sites the **fish assemblage was the limiting** determinant as the macroinvertebrate assemblage met the ICI biocriterion at all of these sites;

Page 3 The longitudinal patterns in **conductivity, total dissolved solids (TDS), chlorides,** nitrate, and total phosphorus continue to clearly point to the Butler Co. Upper Mill Creek WRF as the principal source of elevated levels of these parameters in the East Fork and well downstream into Mill Creek extending to the MWH reach at RM 6.9.

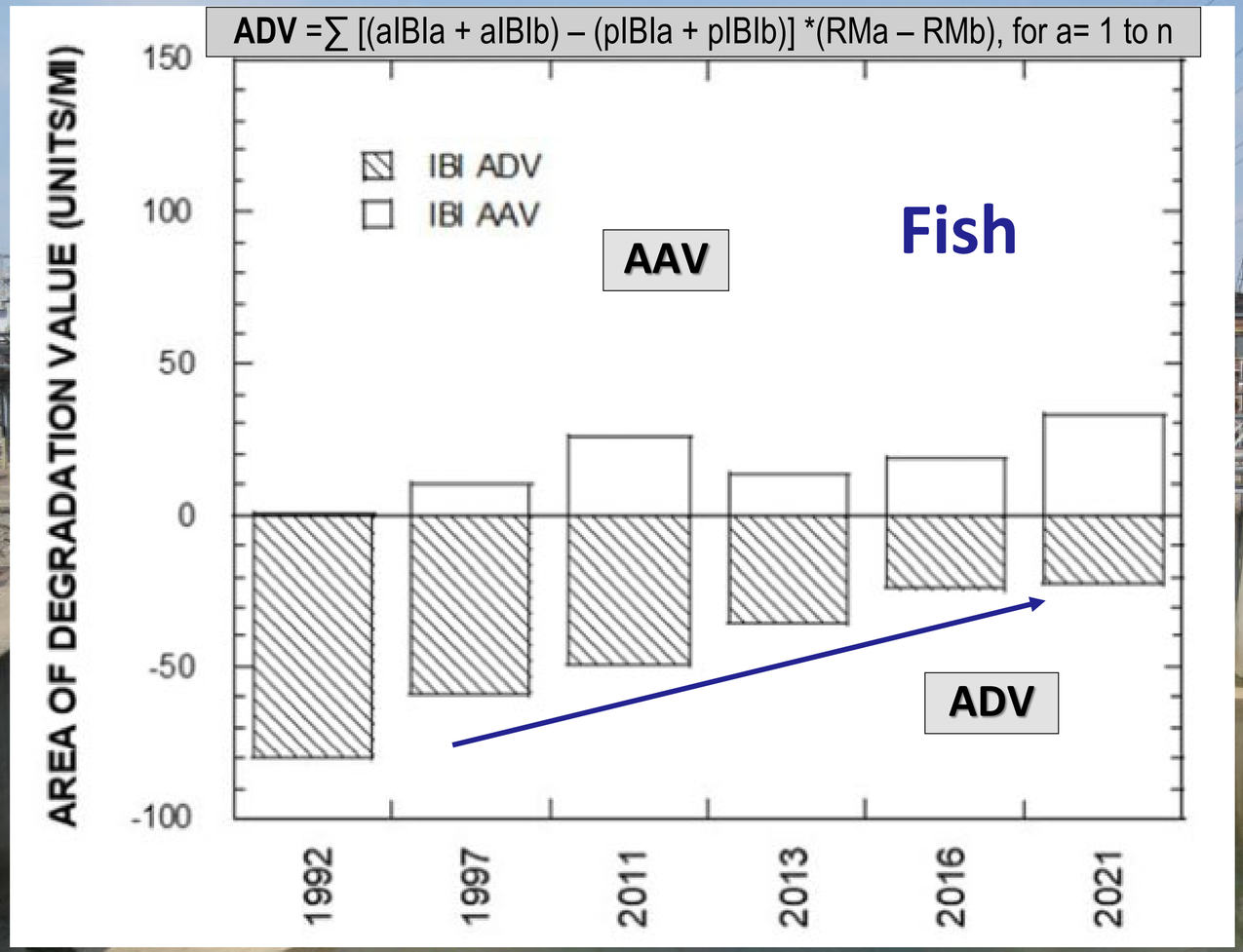


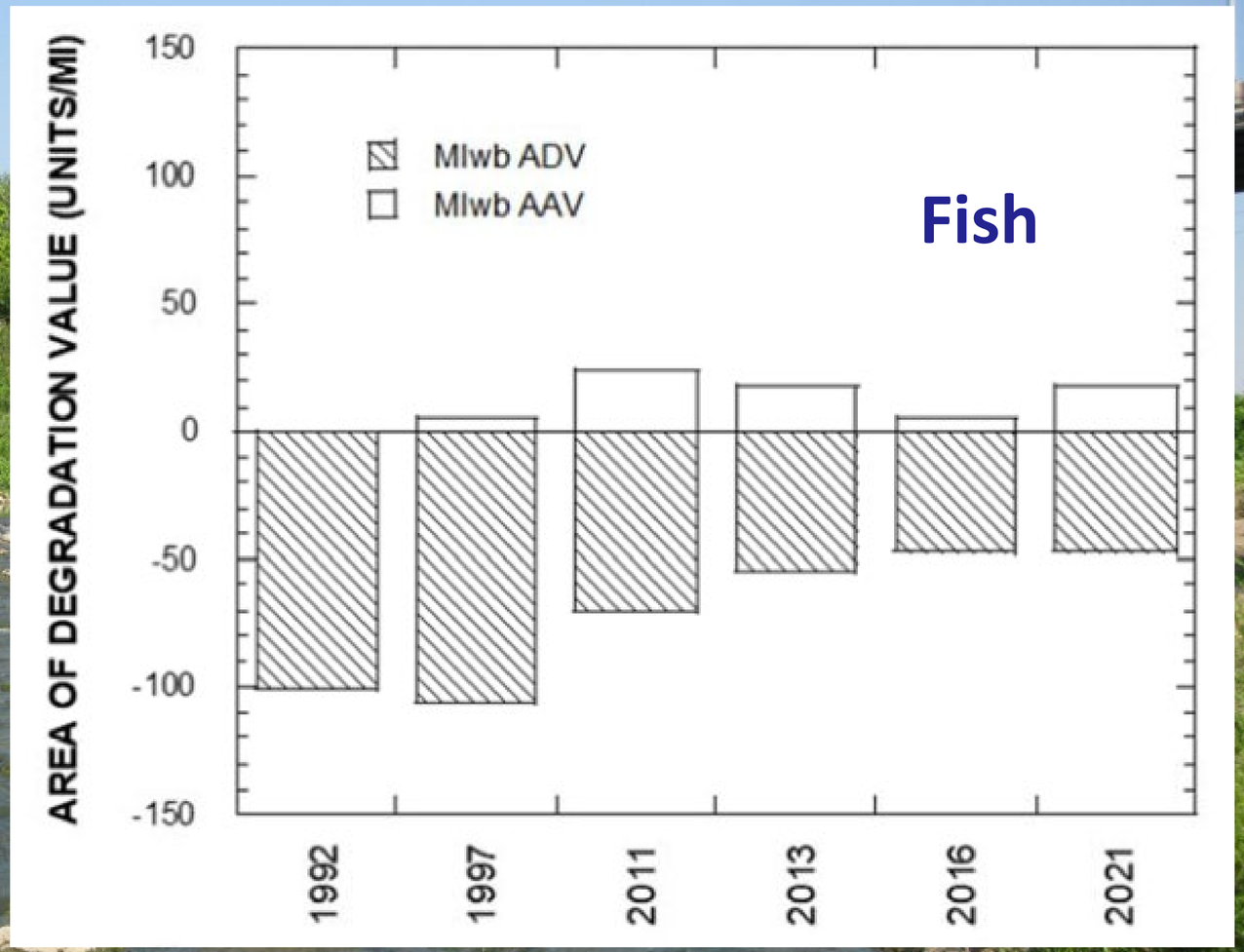
Bioassessment Objective 3: Determine trends over time

Trends reveal the effectiveness of strategies, controls & BMPs

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



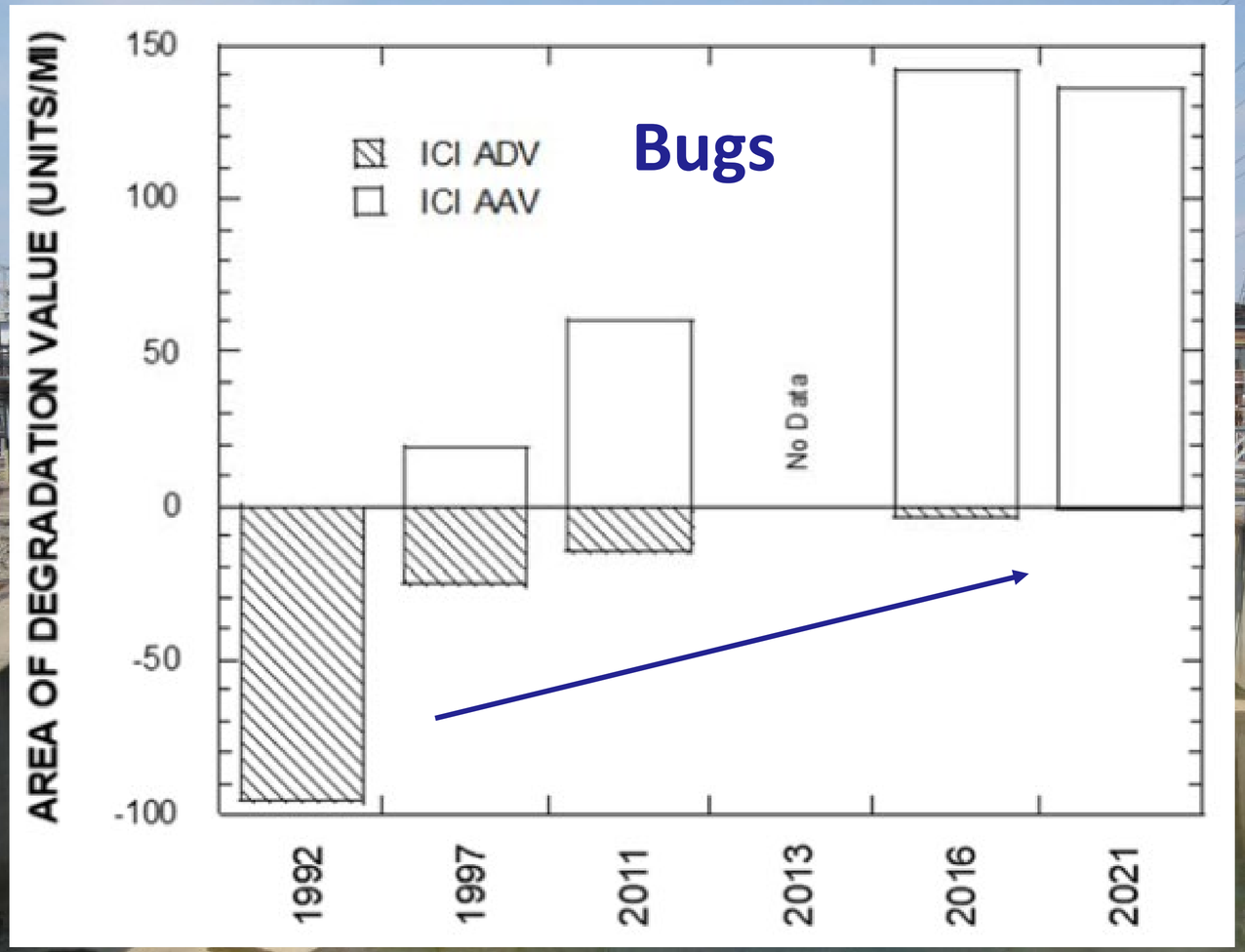


AAV = Area of Attainment Value;
Meets WQS and by how much

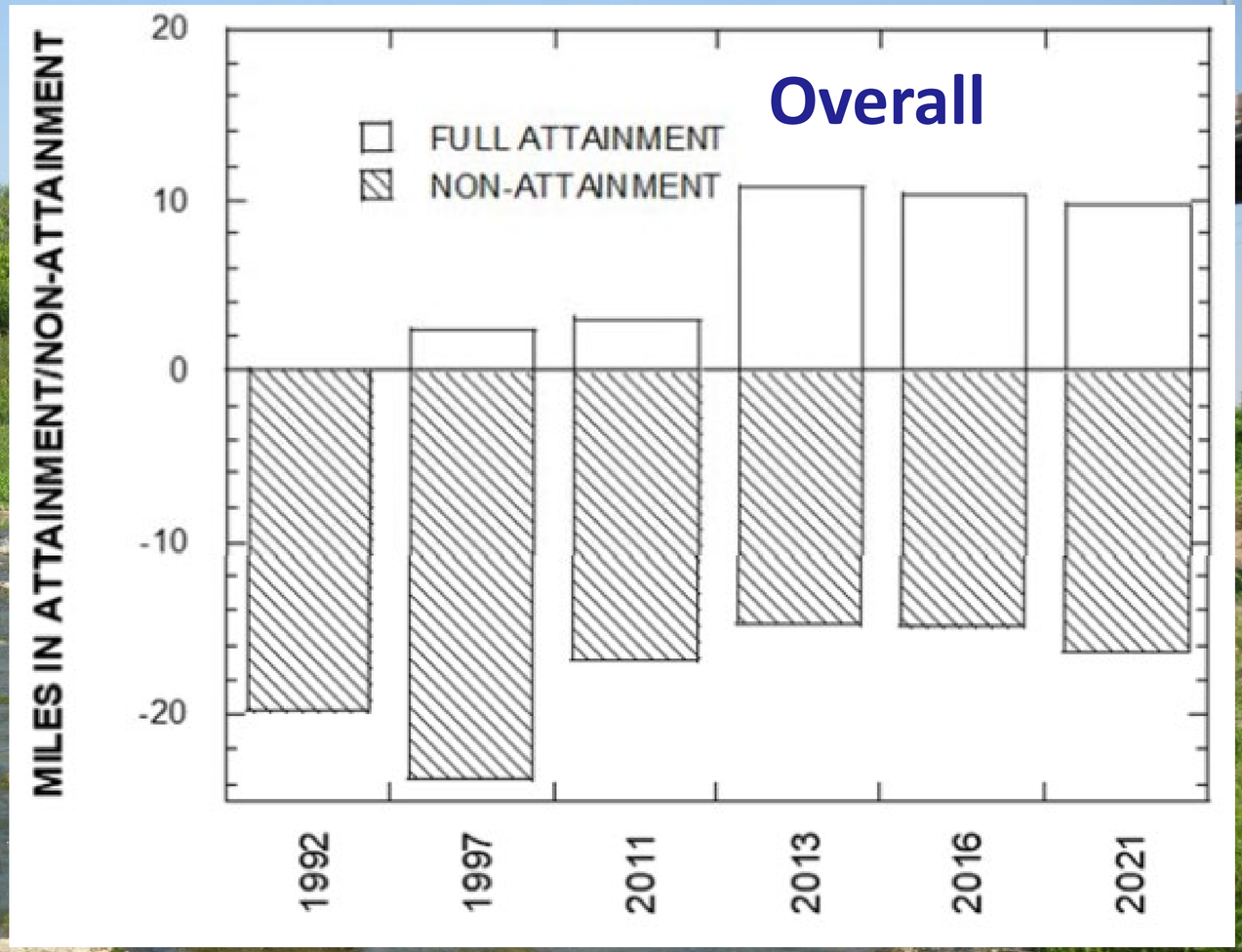
ADV = Area of Degradation Value;
Fails WQS and by how much

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



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

Site, Stream Name, River Mile, Location, Designated Aquatic Life Use.					Measured Aquatic Life Use Attainment - Difference between study years and difference over ten-years					
Site	Stream Name	River Mile	2021 Aquatic Life Use	Column1	2011 Attainment Status	ALUA 2011-16 5-year change	2016 Attainment Status	ALUA 2016-21 5-year change	2021 Attainment Status	**ALUA 2011-21 10-year change**
MC69	Mill Creek	0.21	MWH		PARTIAL	▲ 1	FULL	▬ 0	FULL	▲ **1**
MC70	Mill Creek	0.5	MWH		PARTIAL	▲ 1	FULL	▬ 0	FULL	▲ **1**
MC71	Mill Creek	0.83	MWH		PARTIAL	▬ 0	PARTIAL	▲ 1	FULL	▲ **1**
MC03	Mill Creek	1.69	MWH		PARTIAL	▲ 1	FULL	▼ -1	PARTIAL	▬ **0**
MC05	Mill Creek	2.5	MWH		PARTIAL	▲ 1	FULL	▬ 0	FULL	▲ **1**
MC72	Mill Creek	3.15	MWH		FULL	▬ 0	FULL	▬ 0	FULL	▬ **0**
MC73	Mill Creek	3.45	MWH		FULL	▬ 0	FULL	▬ 0	FULL	▬ **0**
MC74	Mill Creek	4.21	MWH		PARTIAL	▲ 1	FULL	▬ 0	FULL	▲ **1**
MC75	Mill Creek	4.84	MWH		FULL	▬ 0	FULL	▬ 0	FULL	▬ **0**
MC07	Mill Creek	6.45	MWH		FULL	▼ -1	PARTIAL	▼ -1	NON	▼ **-2**
MC09	Mill Creek	6.8	MWH		NON	▲ 1	PARTIAL	▼ -1	NON	▬ **0**
MC77	Mill Creek	7.47	WWH		NON	▲ 1	PARTIAL	▬ 0	PARTIAL	▲ **1**
MC79	Mill Creek	8.63	WWH		NON	▲ 2	FULL	▼ -1	PARTIAL	▲ **1**

Site, Stream Name, River Mile, Location, Designated Aquatic Life Use.					Measured Aquatic Life Use Attainment - Difference between study years and difference over ten-years					
Site	Stream Name	River Mile	2021 Aquatic Life Use	Column1	2011 Attainment Status	ALUA 2011-16 5-year change	2016 Attainment Status	ALUA 2016-21 5-year change	2021 Attainment Status	**ALUA 2011-21 10-year change**
MC45	West Branch	0.2	WWH		NON	▲ 1	PARTIAL	▼ -1	NON	▬ **0**
MC80	Mill Creek	10.48	WWH		PARTIAL	▼ -1	NON	▲ 1	PARTIAL	▬ **0**
MC01	Mill Creek	11.7	WWH		NON	▲ 1	PARTIAL	▬ 0	PARTIAL	▲ **1**
MC02	Mill Creek	13.27	WWH		NON	▲ 1	PARTIAL	▬ 0	PARTIAL	▲ **1**
MC11	Mill Creek	13.96	WWH		NON	▲ 2	FULL	▼ -1	PARTIAL	▲ **1**
MC04	Mill Creek	15.41	WWH		NON	▬ 0	NON	▬ 0	NON	▬ **0**
MC06	Mill Creek	16.73	WWH		NON	▬ 0	NON	▬ 0	NON	▬ **0**
MC08	Mill Creek	18.37	WWH		PARTIAL	▬ 0	PARTIAL	▬ 0	PARTIAL	▬ **0**
MC10	Mill Creek	18.86	WWH		NON	▲ 1	PARTIAL	▬ 0	PARTIAL	▲ **1**
MC12	Mill Creek	19.22	WWH		NON	▲ 1	PARTIAL	▬ 0	PARTIAL	▲ **1**
MC16	Mill Creek East Fork	0.39	WWH		PARTIAL	▼ -1	NON	▲ 1	PARTIAL	▬ **0**
MC14	Mill Creek East Fork	0.66	WWH		PARTIAL	▬ 0	PARTIAL	▬ 0	PARTIAL	▬ **0**
MC15	Mill Creek East Fork	0.96	WWH		FULL	▼ -1	PARTIAL	▬ 0	PARTIAL	▼ **-1**
MC18	Mill Creek East Fork	1.14	WWH		PARTIAL	▬ 0	PARTIAL	▬ 0	PARTIAL	▬ **0**

Site, Stream Name, River Mile, Location, Designated Aquatic Life Use.					Index of Biotic Integrity (IBI) scores ability to support and maintain a balanced,						Modified Index of Well-Being (MIwb) scores reflects the overall productivity and diversity of						Invertebrate Community Index (ICI) scores measures the health of the macroinvertebrate						Qualitative Habitat Evaluation Index (QHEI) scores used to identify habitat variables important to					
Site	Stream Name	River Mile	2021 Aquatic Life Use	1	IBI 2011	change		change		IBI 2011-21 10-year change	2	MIwb 2011	change		change		wb year nge	3	ICI 2011	2		change		ICI 2011-21 10-year change	4	QHEI 2011					QHEI 2011-21 10-year change
MC69	Mill Creek	0.21	MWH		31	-2	29	-1	28	-3		7.9	-0.9	7	-0.53	6.47	-1.4		6		x		x			48	2.5	50.5	0	50.5	-48
MC70	Mill Creek	0.5	MWH		29	-2	27	3	30	1		8.2	-0.1	8.1	-0.38	7.72	-0.5		6		x		x			44	5.5	49.5	0.5	50	-44
MC71	Mill Creek	0.83	MWH		30	-7	23	11	34	4		8.2	-0.6	7.6	0.56	8.16	-0		6		x		x			51.5	-0.5	51	-2	49	-54
MC03	Mill Creek	1.69	MWH		33	-8	25	9	34	1		8.8	-0.8	8	1.27	9.27	0.47		10	14	24	-4	20	10		52.5	1.5	54	3.5	57.5	-49
MC05	Mill Creek	2.5	MWH		31	1	32	2	34	3		6.7	0.9	7.6	-0.91	6.69	-0		20	8	28	8	36	16		32	28.5	60.5	-7.5	53	-40
MC72	Mill Creek	3.15	MWH		30	5	35	1	36	6		6.4	-0.1	6.3	0.96	7.26	0.86		x		26	10	36			32	18.5	50.5	8	58.5	-24
MC73	Mill Creek	3.45	MWH		34	0	34	0	34	0		7.3	-1	6.3	0.04	6.34	-1		24		x		44	20		37	24.8	61.8	-3.3	58.5	-40
MC74	Mill Creek	4.21	MWH		33	4	37	1	38	5		8.3	-0.6	7.7	-0.72	6.98	-1.3		20		x		28	8		62	3	65	-3	62	-65
MC75	Mill Creek	4.84	MWH		30	0	30	1	31	1		6.8	-1.3	5.5	1.03	6.53	-0.3		22	12	34	-6	28	6		40.75	6.25	47	2	49	-39
MC07	Mill Creek	6.45	MWH		30	-9	21	7	28	-2		6.1	-1.2	4.9	-1.21	3.69	-2.4		22	2	24	-8	16	-6		27	0.5	27.5	11	38.5	-16
MC09	Mill Creek	6.8	MWH		20	2	22	8	30	10		4	1	5	-1.16	3.84	-0.2		x		x		24			27	10	37	-8.5	28.5	-36
MC77	Mill Creek	7.47	WWH		27	2	29	11	40	13		6.5	-0.1	6.4	0.48	6.88	0.38		28		x		38	10		57.5	-9.5	48	7	55	-51
MC79	Mill Creek	8.63	WWH		25	13	38	-3	35	10		4.3	3.8	8.1	-0.01	8.09	3.79		36	8	44	-4	40	4		62	11.5	73.5	2	75.5	-60

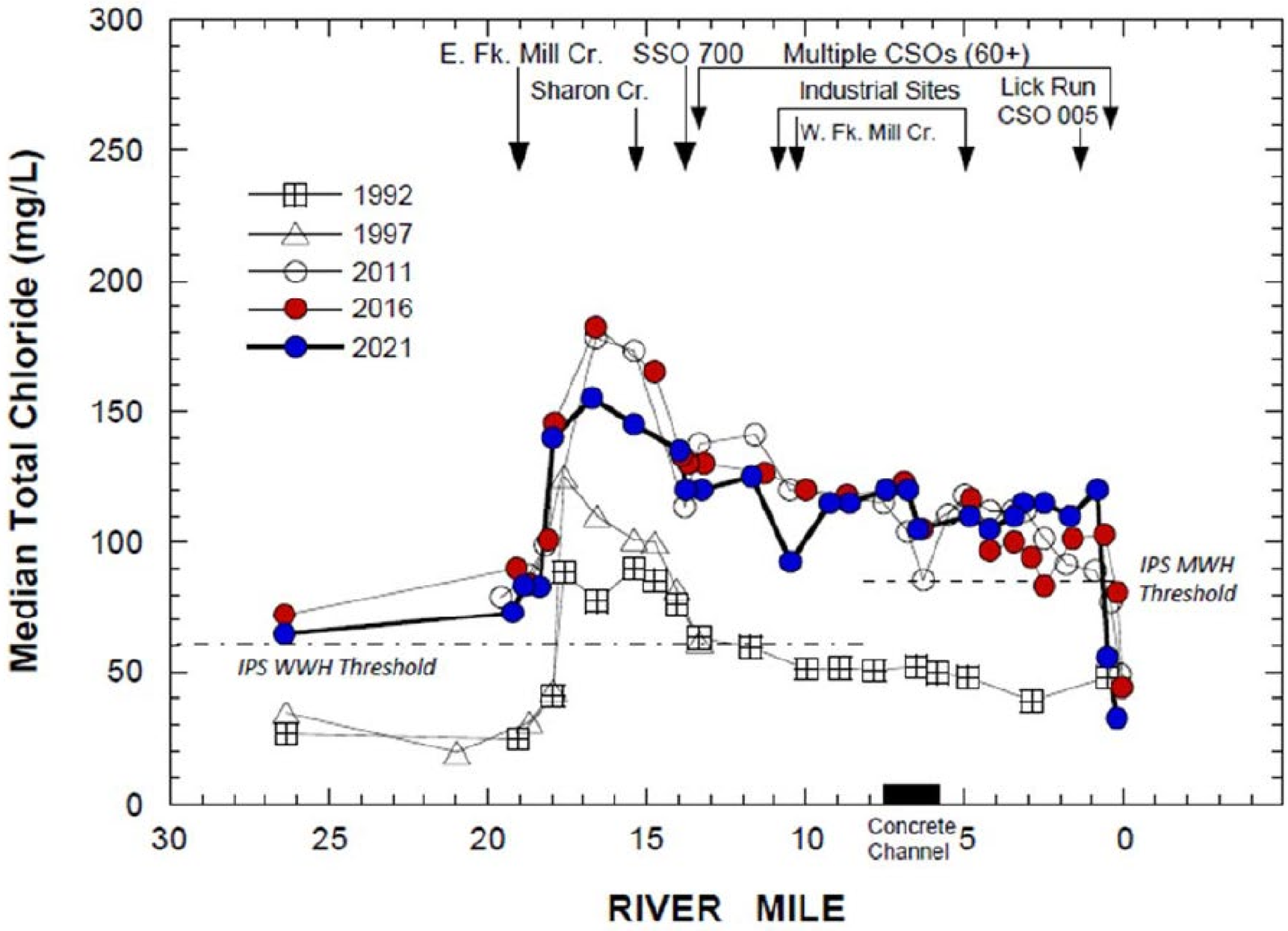
IBI

MIwb

ICI

QHEI

Site, Stream Name, River Mile, Location, Designated Aquatic Life Use.					Index of Biotic Integrity (IBI) scores ability to support and maintain a balanced, adaptive community of fish species							Modified Index of Well-Being (MIwb) scores reflects the overall productivity and diversity of the fish assemblage							Invertebrate Community Index (ICI) scores measures the health of the macroinvertebrate community							Qualitative Habitat Evaluation Index (QHEI) scores used to identify habitat variables important to attainment of the Ohio biological criteria						
Site	Stream Name	River Mile	2021 Aquatic Life Use	1	IBI 2011					IBI 2011-21 10-year change	2	MIwb 2011						wb year nge	3	ICI 2011	2				ICI 2011-21 10-year change	4	QHEI 2011					QHEI 2011-21 10-year change
MC45	West Branch	0.2	WWH		24	1	25	1	26	2		7	0.1	7.1	-0.04	7.06	0.06			x		48	-18	30			60.75	7.75	68.5	0.8	69.3	-60	
MC80	Mill Creek	10.48	WWH		29	2	31	6	37	8		6.2	-0.6	5.6	1.49	7.09	0.89			x		40	-4	36			50.25	28.75	79	-0.7	78.3	-51	
MC01	Mill Creek	11.7	WWH		31	5	36	3	39	8		6.2	0.8	7	0.19	7.19	0.99			x		x		42			62.5	8.3	70.8	-1.3	69.5	-64	
MC02	Mill Creek	13.27	WWH		23	4	27	4	31	8		3.3	2.6	5.9	0.02	5.92	2.62			44	-2	42	4	46	2		58.5	0	58.5	-3	55.5	-62	
MC11	Mill Creek	13.96	WWH		28	7	35	0	35	7		5.3	2.3	7.6	-0.54	7.06	1.76			36		x		40	4		71.25	6.75	78	-12.5	65.5	-84	
MC04	Mill Creek	15.41	WWH		27	-2	25	-1	24	-3		6.5	-1.7	4.8	-1.06	3.74	-2.8			40	-2	38	2	40	0		68.25	-15.25	53	-2.5	50.5	-71	
MC06	Mill Creek	16.73	WWH		24	3	27	-5	22	-2		4.4	1	5.4	-0.31	5.09	0.69			40	-2	38	2	40	0		47.75	12.25	60	-4	56	-52	
MC08	Mill Creek	18.37	WWH		34	1	35	-1	34	0		7.4	0.2	7.6	-1.03	6.57	-0.8			x		38	6	44			61.5	15.5	77	6.5	83.5	-55	
MC10	Mill Creek	18.86	WWH		32	1	33	-5	28	-4		5.2	2.3	7.5	-1.28	6.22	1.02			38	8	46	-2	44	6		67	-1	66	4.5	70.5	-63	
MC12	Mill Creek	19.22	WWH		28	7	35	-5	30	2		3.8	3.9	7.7	-1.5	6.2	2.4			26	18	44	-2	42	16		49.25	21.25	70.5	-1.2	69.3	-50	
MC16	Mill Creek East Fork	0.39	WWH		32	-10	22	6	28	-4										x		48	-12	36			60.75	4.75	65.5	-5	60.5	-66	
MC14	Mill Creek East Fork	0.66	WWH		34	-6	28	0	28	-6										42	-2	40	-2	38	-4		57.25	1.25	58.5	12.5	71	-45	
MC15	Mill Creek East Fork	0.96	WWH		42	-9	33	1	34	-8										32	2	34	-4	30	-2		56	17	73	5	78	-51	
MC18	Mill Creek East Fork	1.14	WWH		28	3	31	2	33	5										34	8	42	0	42	8		54	3	57	14.5	71.5	-40	



In northern latitudes, chloride has been identified as an emerging problem for aquatic life, largely related to **road salt** application in developed areas, but some **industrial sources** in effluents can also contribute. Unfortunately, road salt applied during winter is not exported completely out of a watershed each year and accumulates in soils and shallow groundwater. Because of this **chloride levels have been gradually increasing in most developed areas in Ohio.** The plot on the left illustrates a source of chlorides from **effluents** in the upper part of Mill Creek, but also the increasing general trend in chlorides in the watershed between 1992 and more recent samples

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

TECHNICAL SESSION Q1 2023 – DATE TBD

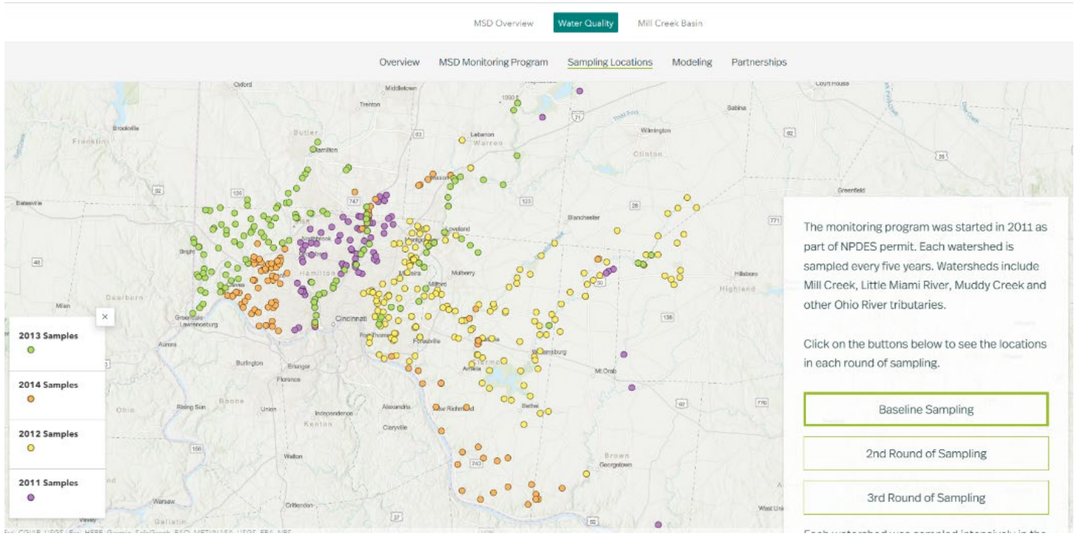
LimnoTech
Water Environment | Scientists Engineers

MSD ArcGIS StoryMap

Collection

MSD Water Quality StoryMap

Get started



MSD Water Quality Forum, December 14, 2022

Freshwater Mussels making a comeback!


Giant Floater–Sharonville


Fragile Papershell-Near Hopple Street


Pond Papershell-WFMC-Lockland

Macroinvertebrates in full attainment almost everywhere!
Fish populations improving rapidly.

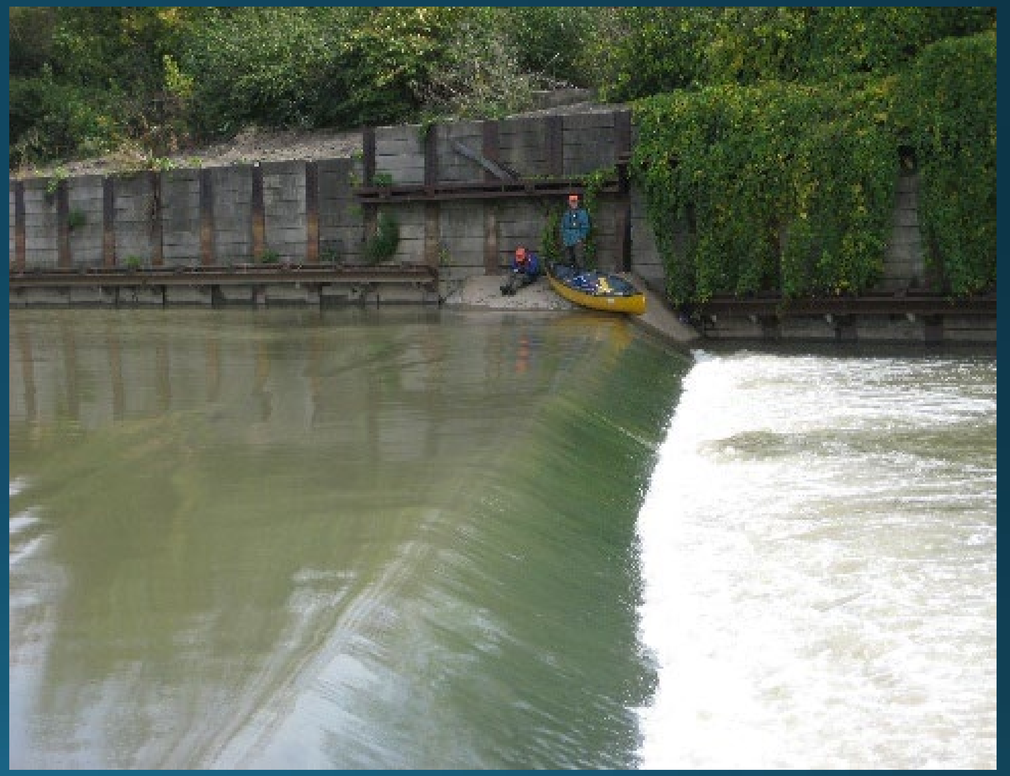


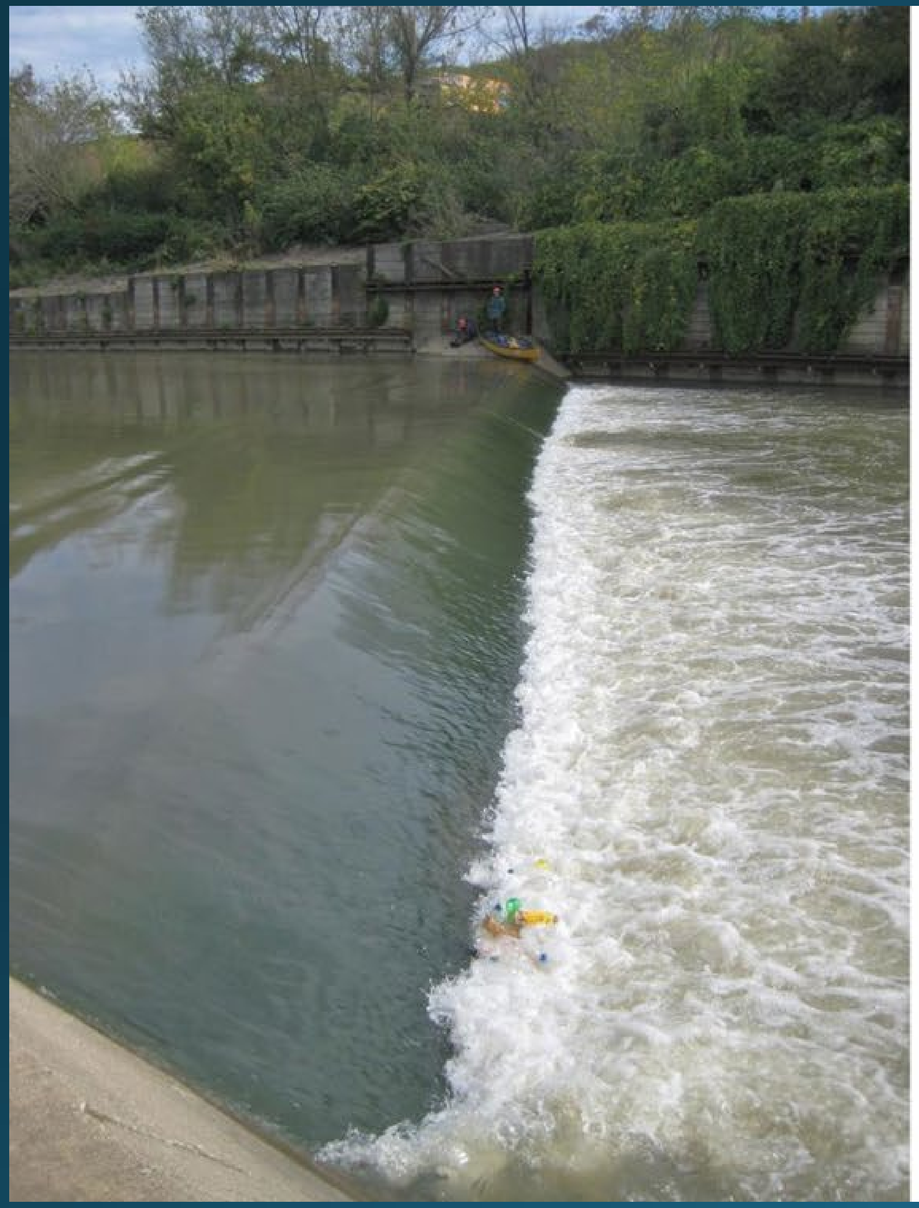



Bass Pro Shops


Mill Creek Low Head Dam Mitigation Benefits

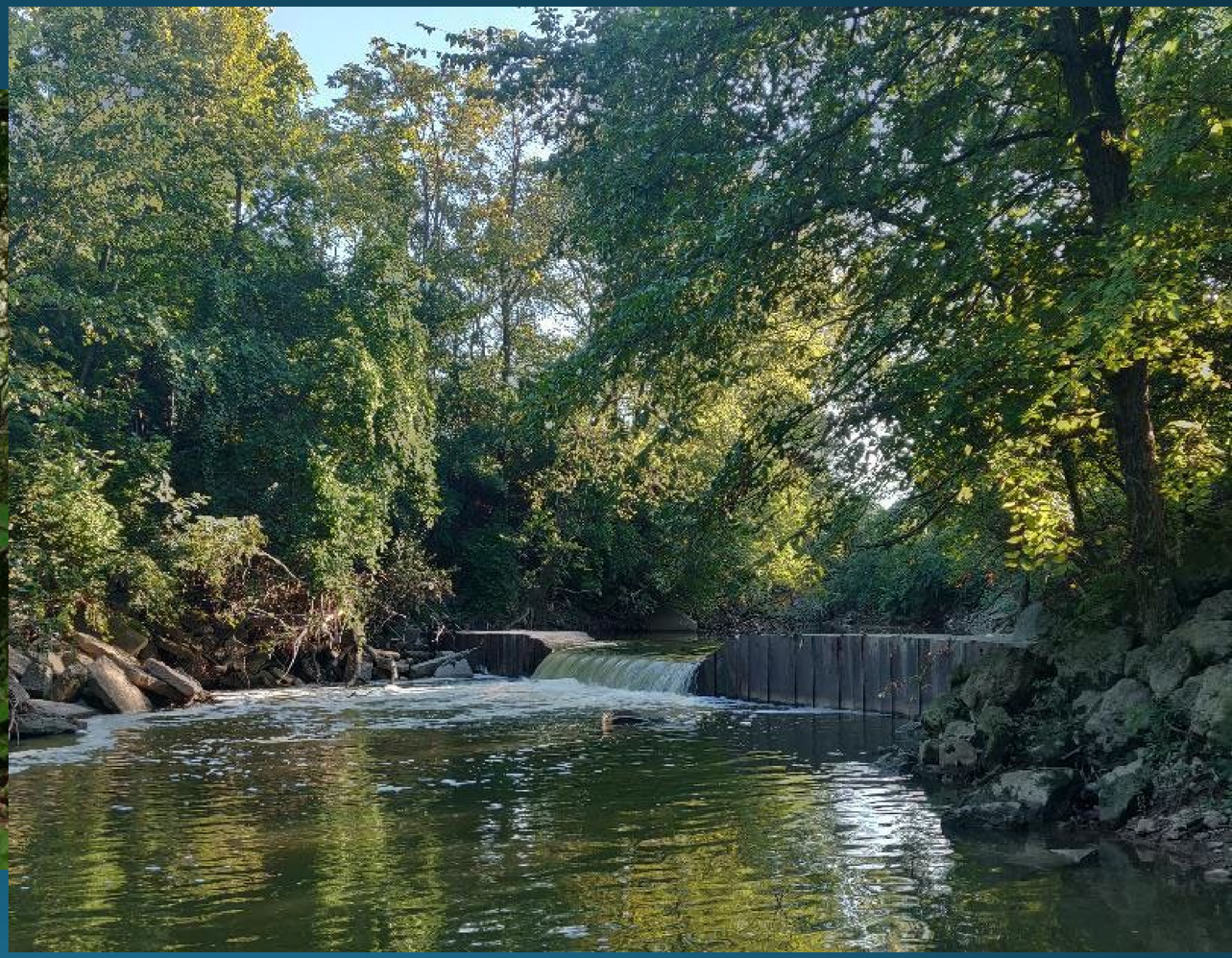
- Mitigate the negative environmental impacts of two low head dams
- Removing two major fish passage barriers and creating new in-stream habitat
- Protecting MSDGC infrastructure
- Improving recreational opportunities in the lower Mill Creek





Clark Street LHD Mitigation-River Mile 12-2 (Reading/Arlington Hts)

Bonecrusher Falls, RM 12.0, Reading



Cooper Creek Collaborative

Adam Lehmann

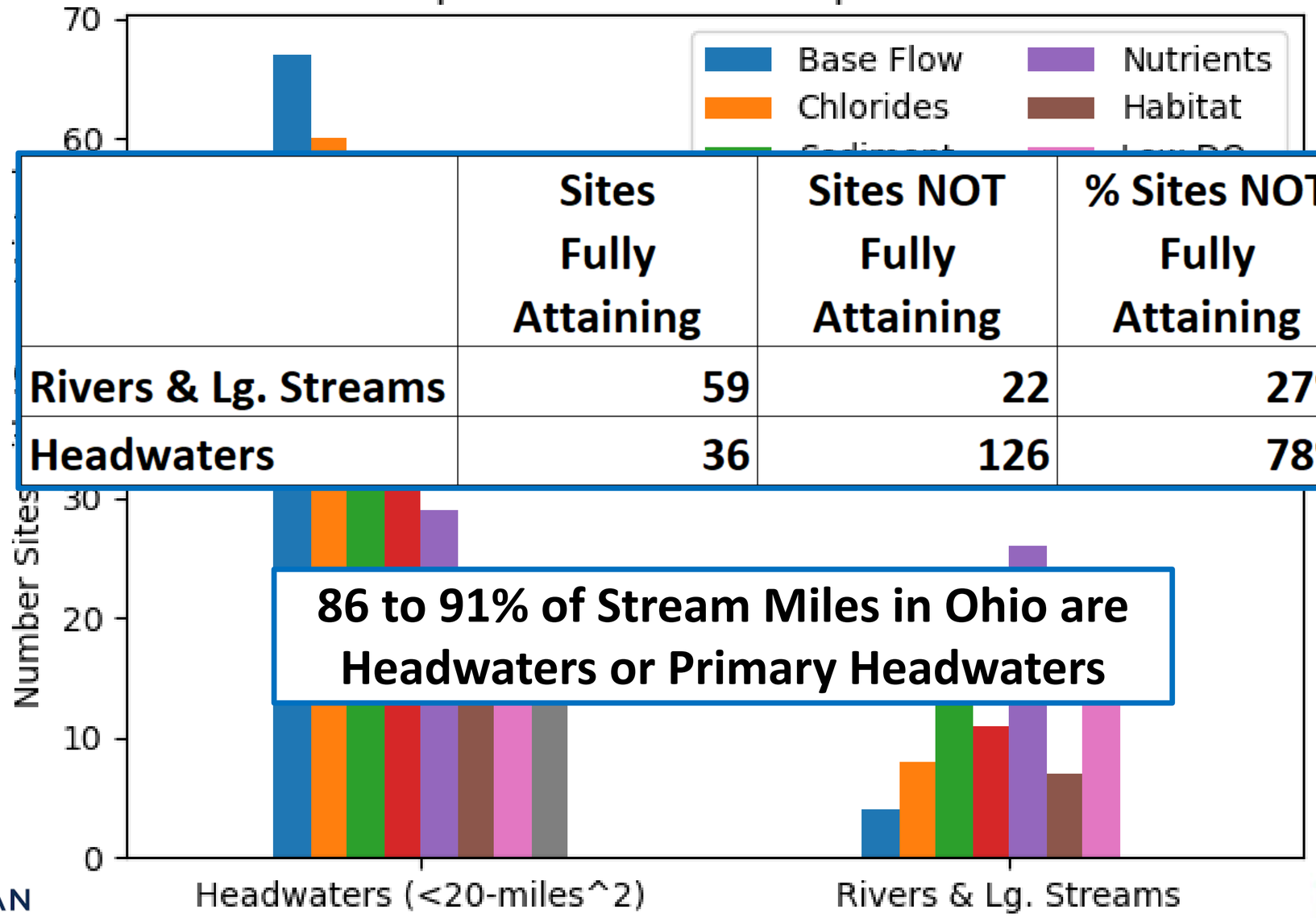
Hamilton County Conservation District

Adam.Lehmann@Hamilton-Co.org

www.CooperCreek.org

12/14/2022

Number of MBI Sites (2011 - 2017) Determined to Have a Listed 'Cause' of Aquatic Life Use Impairment



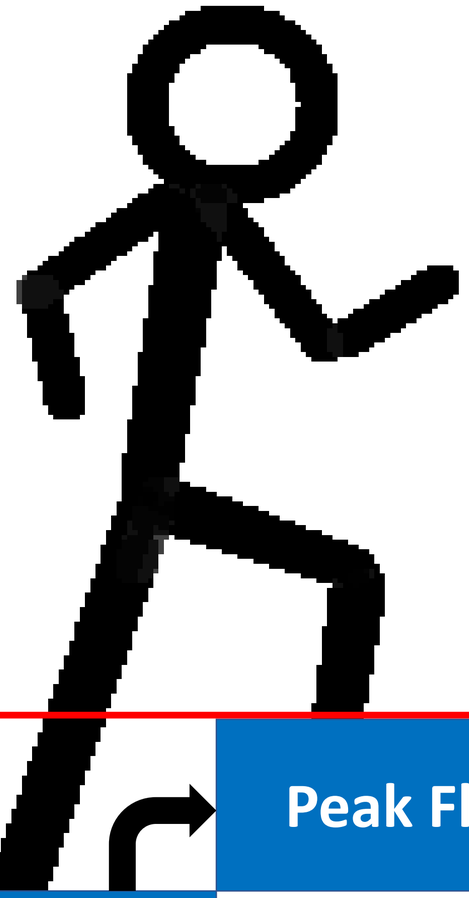
	Sites Fully Attaining	Sites NOT Fully Attaining	% Sites NOT Fully Attaining
Rivers & Lg. Streams	**59**	**22**	**27%**
Headwaters	**36**	**126**	**78%**

86 to 91% of Stream Miles in Ohio are Headwaters or Primary Headwaters

METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI

MBI Midwest Biodiversity Institute

Restoring Function: 1 Step at a Time



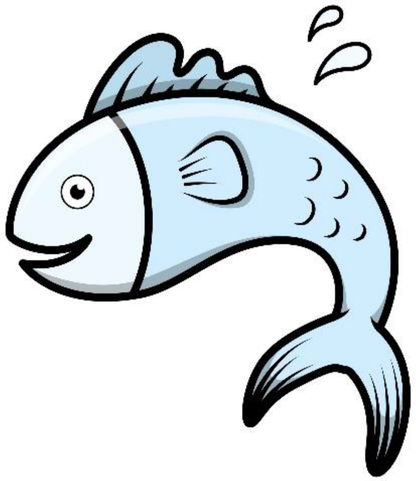
Base Flow

Peak Flow

Stable Channel

Habitat

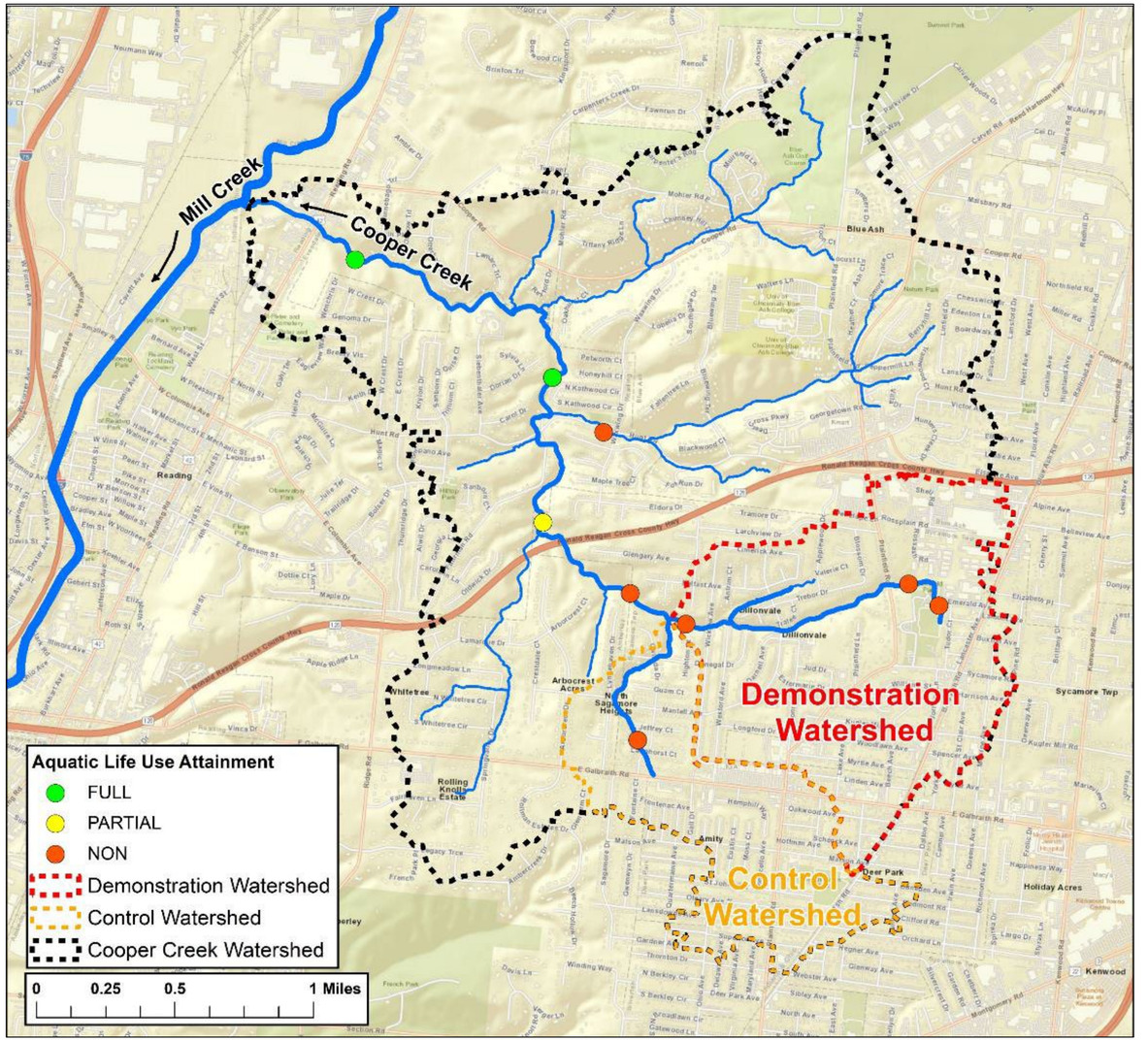
Water Quality



Is it feasible to restore hydrology in densely developed watersheds?
(to a biologically relevant extent)

Demonstration Watershed

- Documented History of Baseflow Impacts
- History of Streambank Erosion Problems
- 41% Impervious Cover



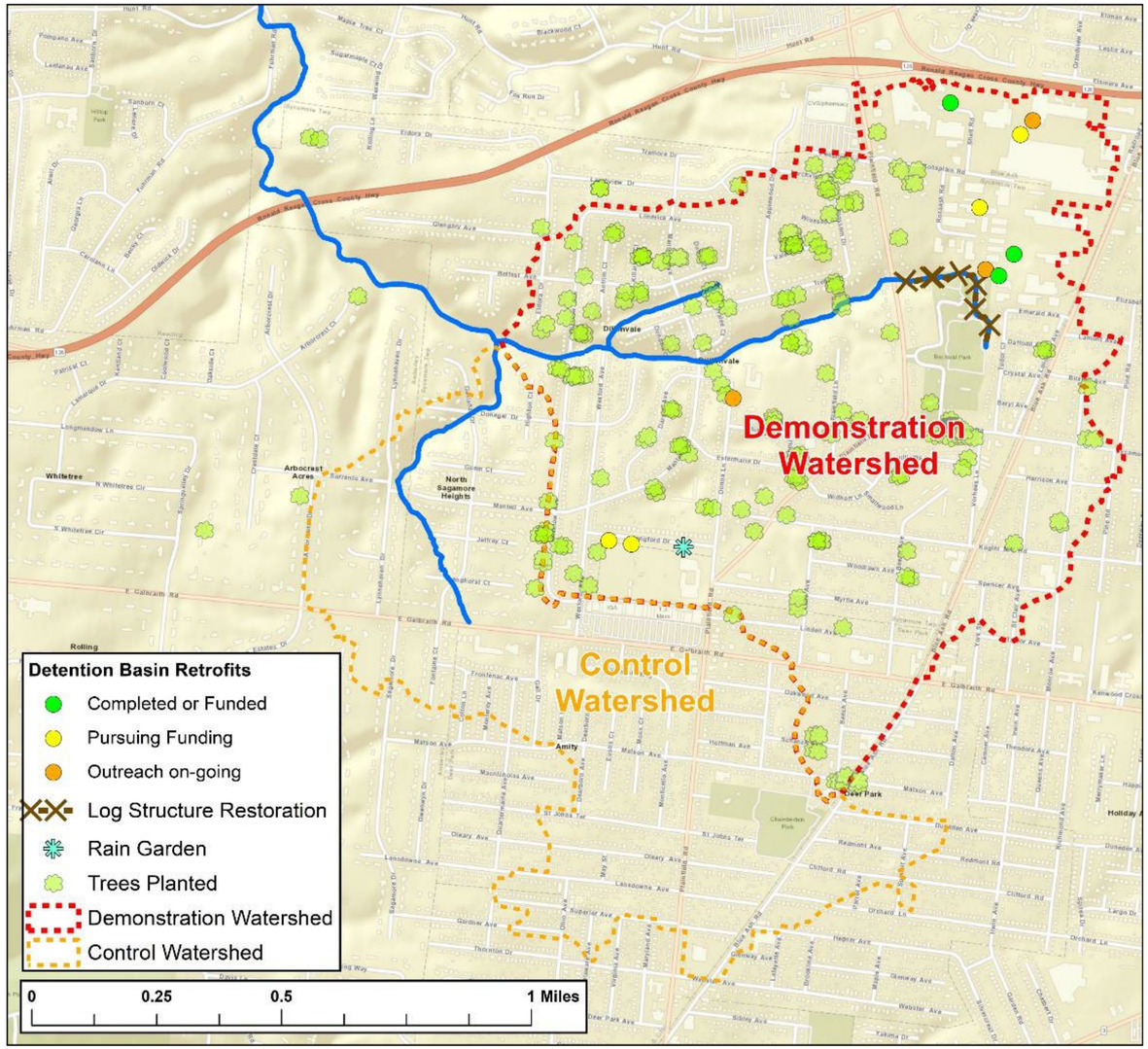
On-Going Projects

Watershed-Based Projects

- **Stormwater Basin Retrofits**
  - Ten (surface) Basins located in the Demo Wat.
  - Exploring potential of subsurface retrofits (7)
- **Green Infrastructure**
  - One rain garden so far
- **Tree Canopy Restoration**
  - 344-Trees Planted in 2021 & 2022

Stream-Based Projects

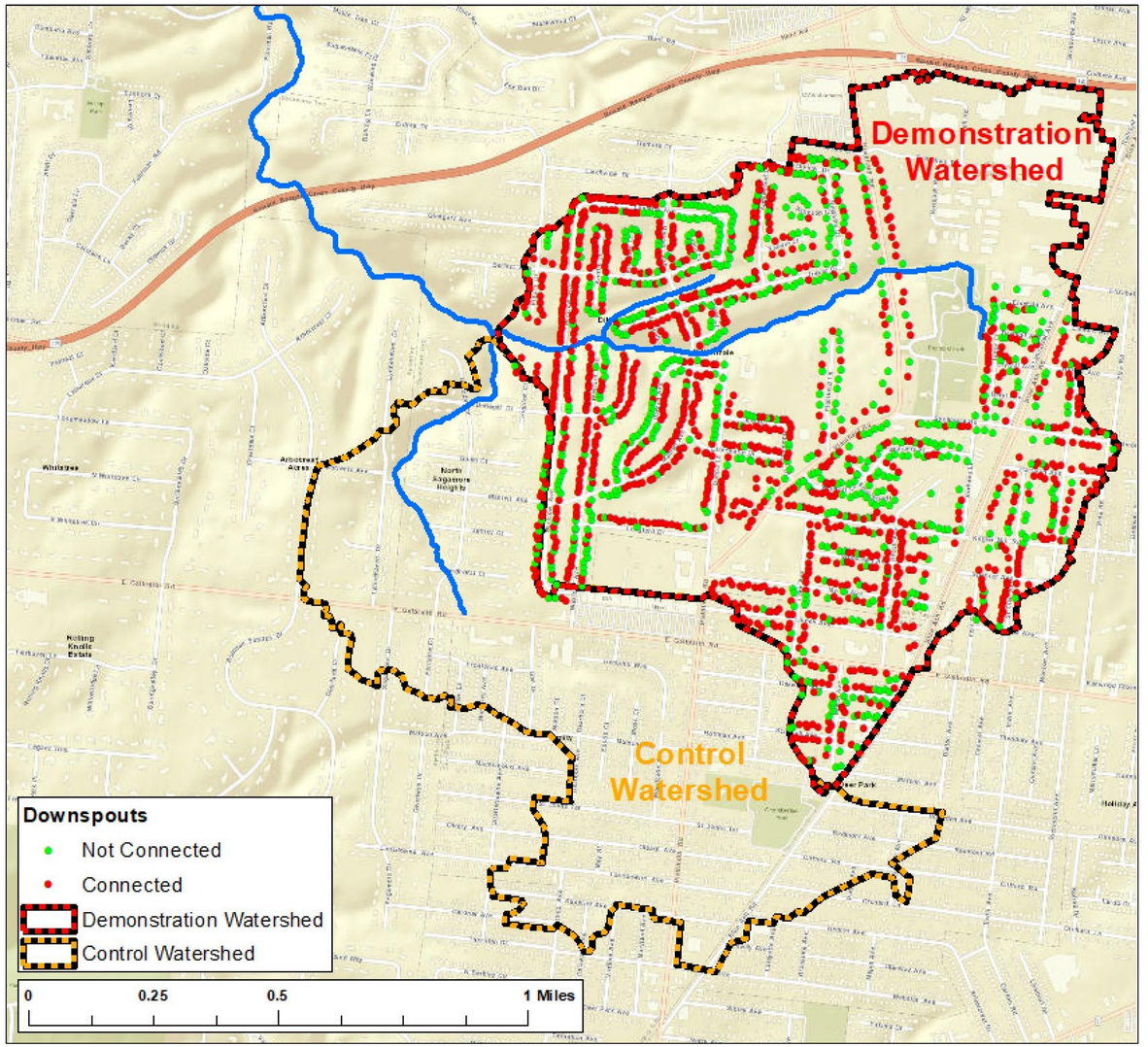
- **Log Structure Restoration**
  - Demo. project in upper-most reach



Planned Projects – Watershed-Based

Downspout Disconnection

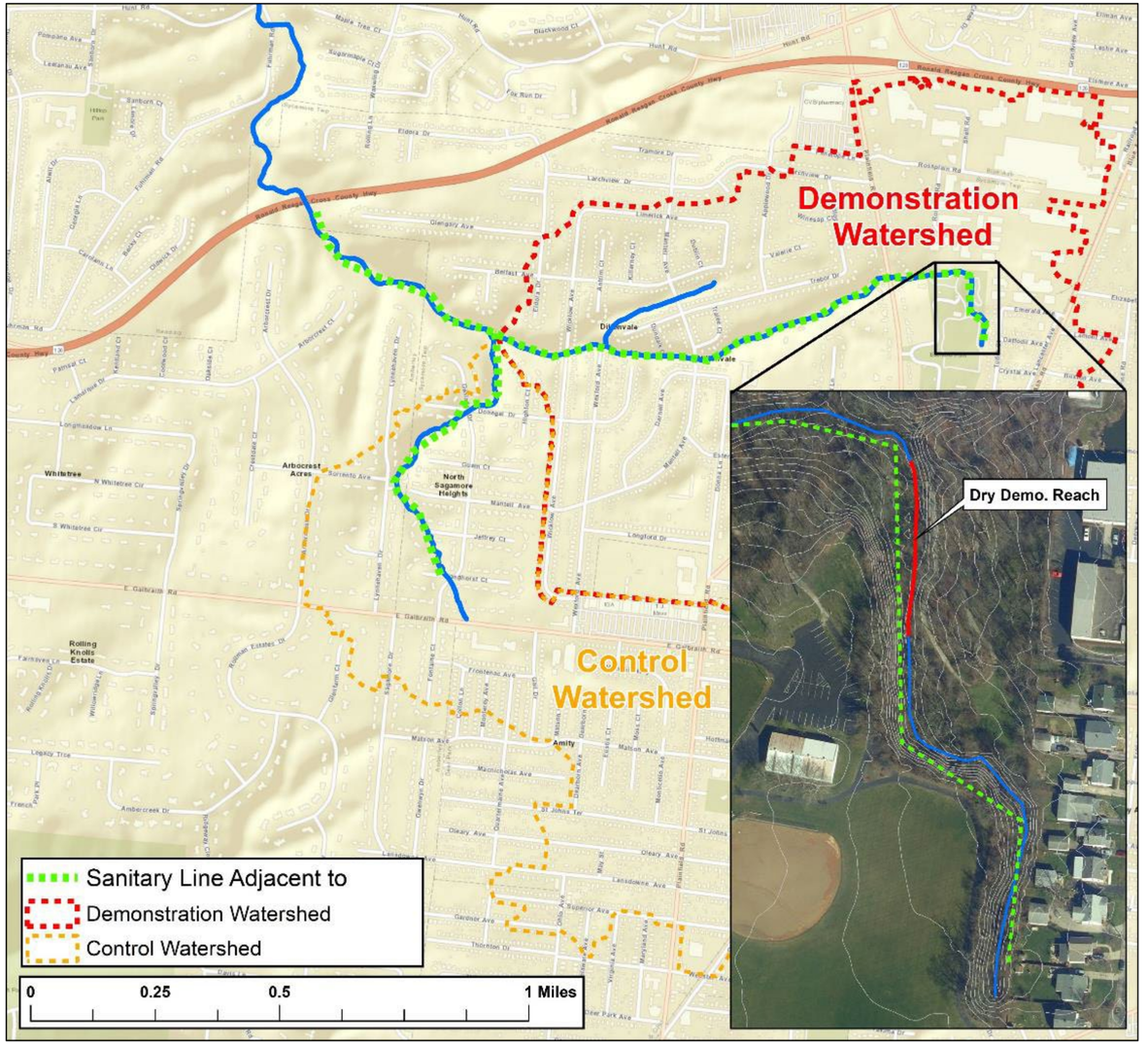
- 64% of homes have some connected downspouts
- Planning to pursue funding for a "*reverse auction*"
  - Pay homeowners to let us disconnect their downspouts



Planned Projects – Stream-Based

“Trench Dams” Pilot Project

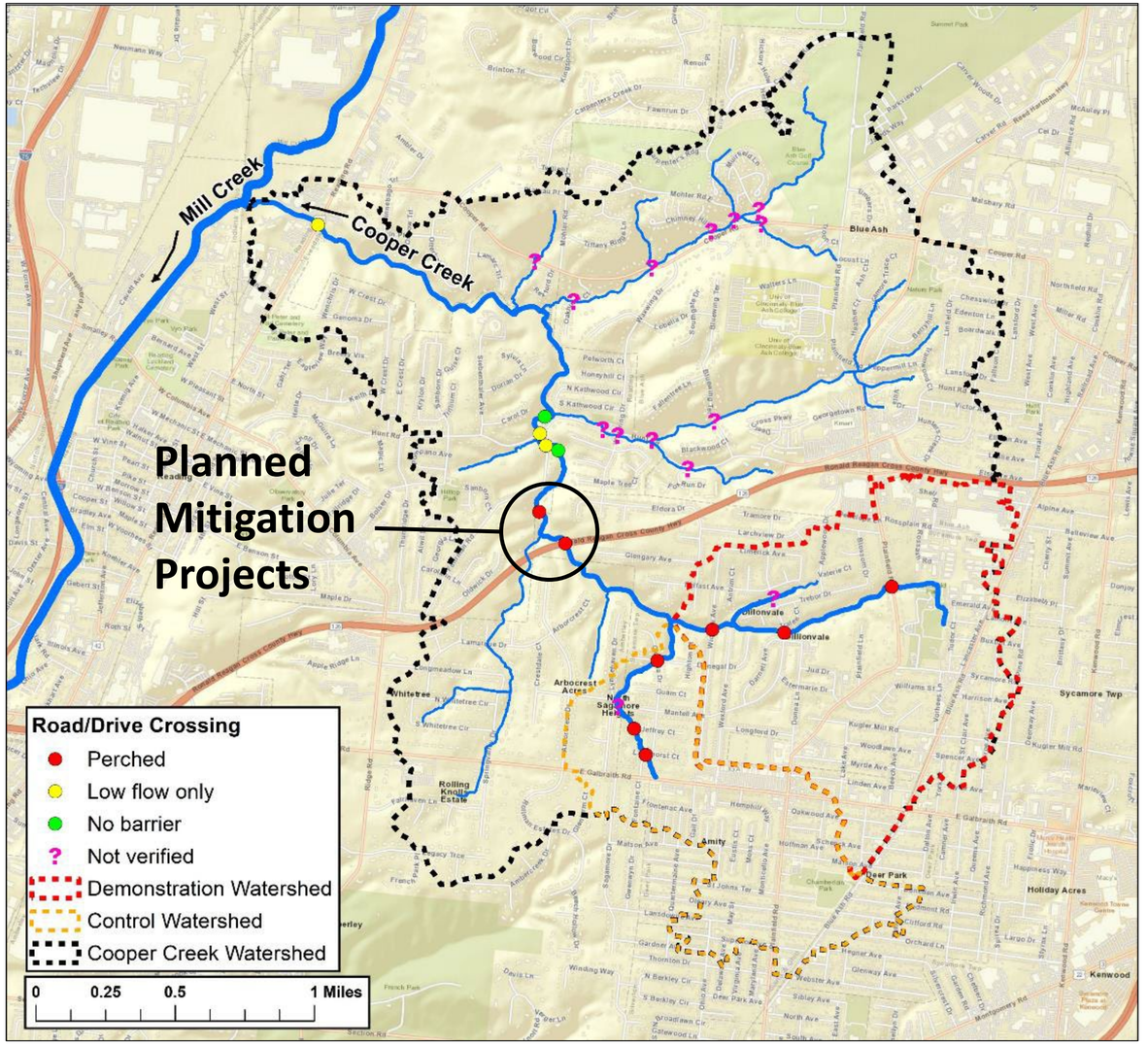
- Could watershed mitigation efforts be “Going Down the Drain”?
- A potentially cost-effective method for:
  - Restoring flow losses to the creek
  - Reducing downstream overflows
- *Pending permission from Sycamore Twp.



Planned Projects – Stream-Based

Fish Migration Barrier Mitigation

- Minimal barriers in “Lower Cooper Creek”
- Re-connect “Lower Cooper Creek” to nearly 4,500-linear feet of “Upper Cooper Creek”
  - At least 3 darter species & green sunfish currently excluded



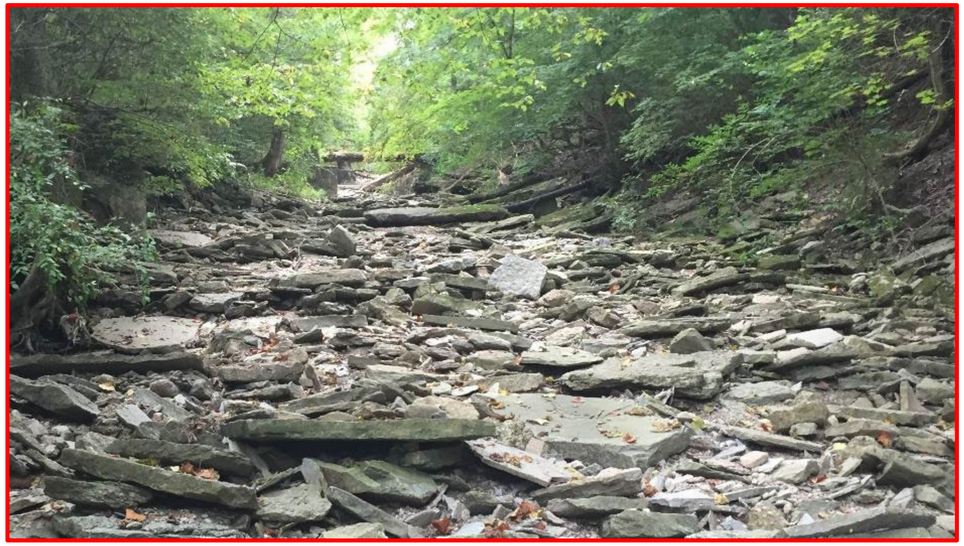
Program Objectives

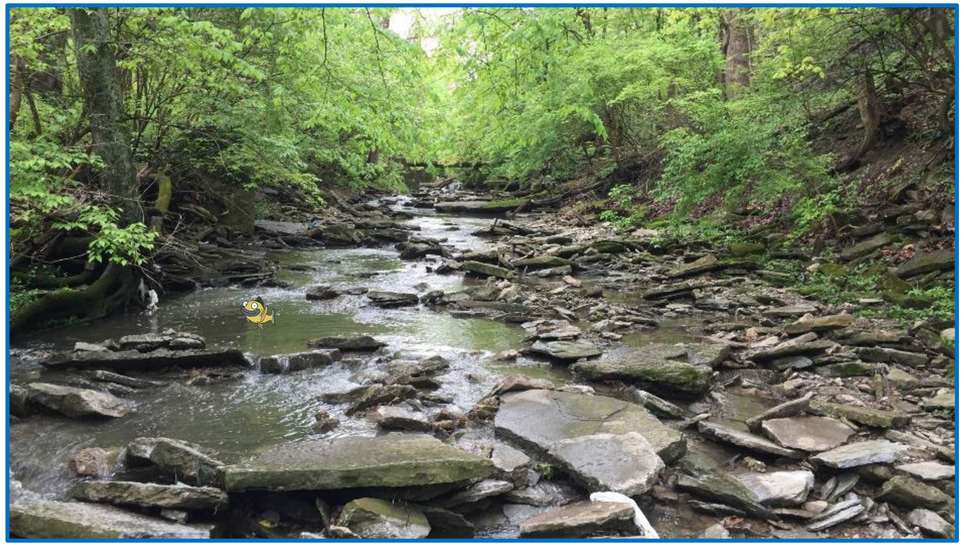
Baseflow impacts:

- Frequency of perennial pools
- Connectivity between pool
- Flow duration metrics

Frequency/Magnitude of “Erosive Flows”

- Tracking via Storm Water Management Model (SWMM)





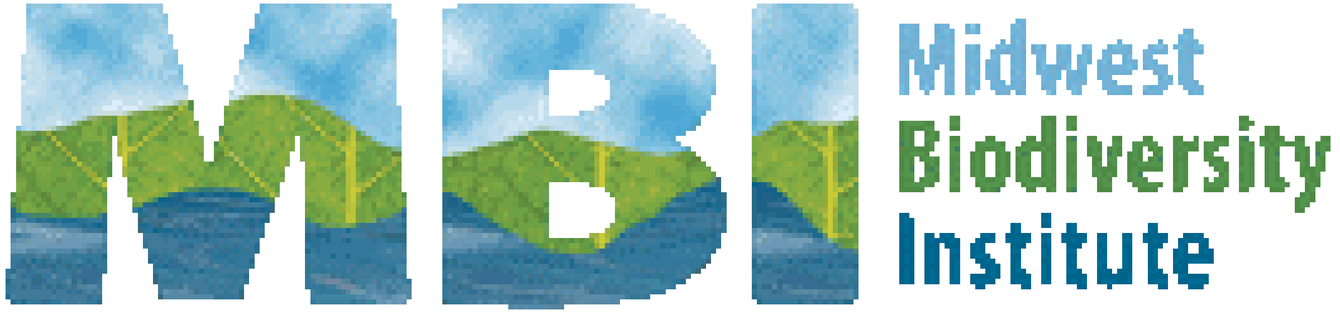
Cooper Creek Collaborative

Questions?

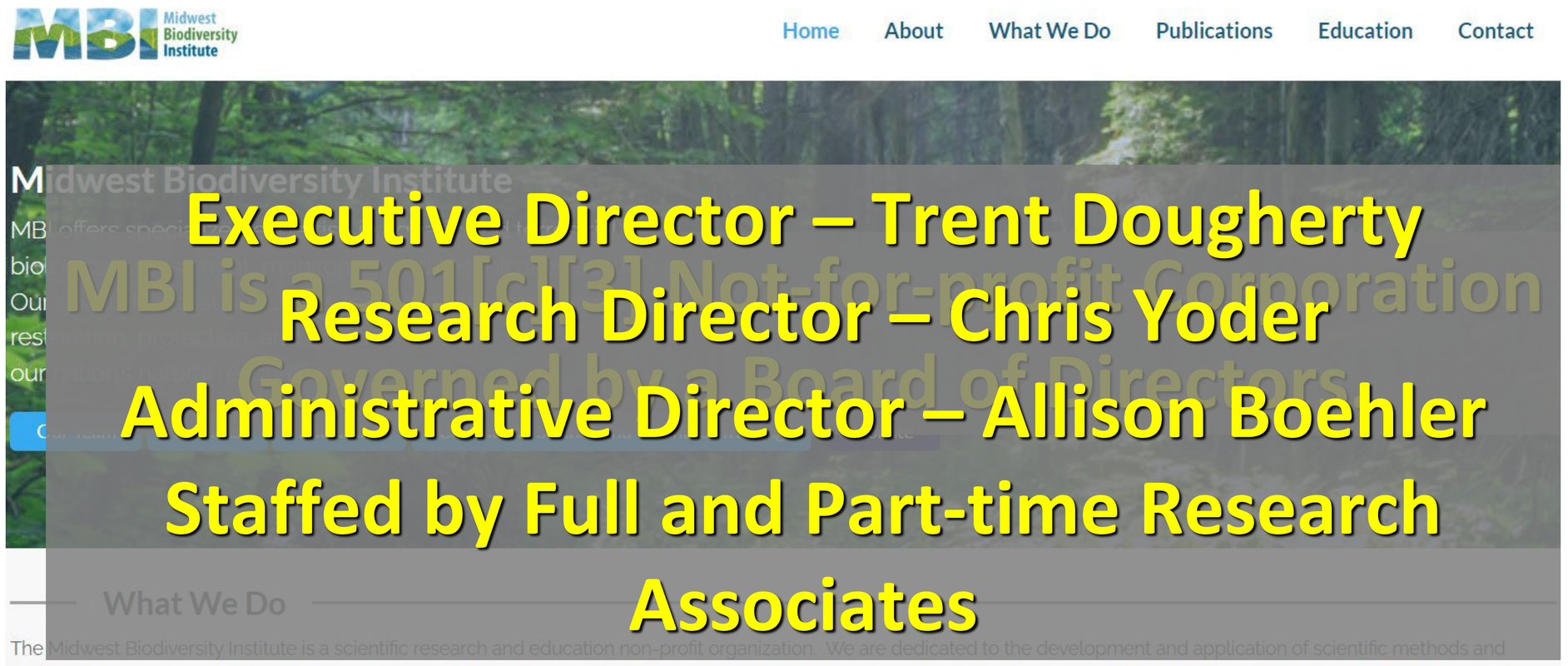
www.CooperCreek.org

Open Forum

METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI


MBI
Midwest
Biodiversity
Institute

MBI Research Capabilities and Projects



Executive Director – Trent Dougherty

Research Director – Chris Yoder

Administrative Director – Allison Boehler

Staffed by Full and Part-time Research Associates

MBI Research: Major Areas of Practice

- ❑ Aquatic Biological Surveys – Midwest, N. England, Gr. Lakes
  - ✓ Streams, rivers, lakes, wetlands
  - ✓ Fish, macroinvertebrates, amphibians, crayfish, plants
  - ✓ Data management, analysis, reporting
- ❑ Technical Support to States & U.S. EPA
  - ✓ State Program Evaluations – 27 States
  - ✓ State Program Development & Support
  - ✓ Water Quality Standards – policy & development
- ❑ Innovative Technical Support & Development
  - ✓ Integrated Prioritization Systems for NE Illinois & MSDGC
  - ✓ Combined Nutrients Effects Procedure – OH, IL, IN
- ❑Training
  - ✓ Ohio Credible Data Law – QDC Levels 2 & 3
  - ✓ Citizen Science – stream habitat, macroinvertebrates

Treating these factors independently or piecemeal will not solve our water quality challenges

A Major Guiding Principle – the Five Factors that determine the integrity of a water resource.

The "right" mix of biological, chemical, and physical parameters and spatial monitoring design is needed to balance management responses to multiple and overlapping stressors.

Aaron Rourke

ODNR Scenic Rivers Program

SW Ohio manager

614-230-8534

HAMILTON COUNTY
PUBLIC HEALTH

PREVENT. PROMOTE. PROTECT.

Division of Water Quality

Eric Bartl, Water Quality Supervisor

WQ Stormwater Programs

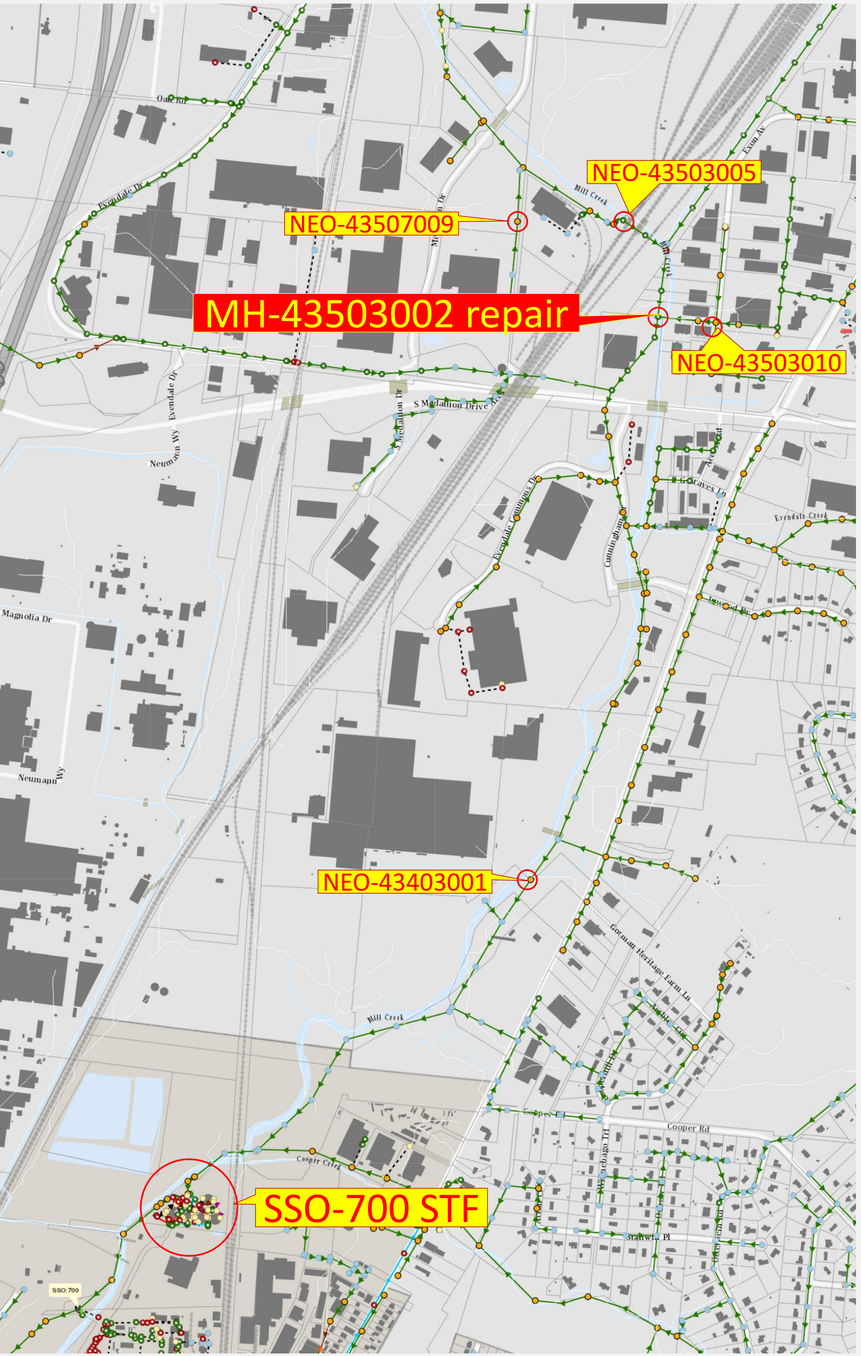
- MAPPING DISCHARGING SEWAGE TREATMENT SYSTEMS (STS)
- MAPPING PRIVATE STORMWATER INFRASTRUCTURE
- MCM 3 - ILLICIT DISCHARGE DETECTION ELIMINATION
- MCM 6 - TRAINING GOVERNMENT EMPLOYEES
- SEWER CONNECTION ORDERS
- STS ABANDONMENTS
- SEPTAGE HAULERS

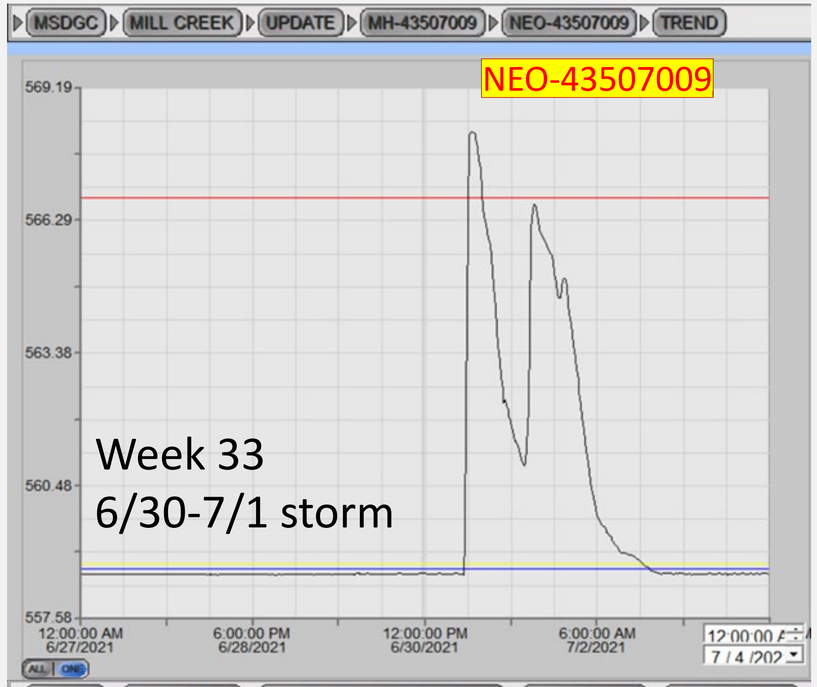
Week 36-2021

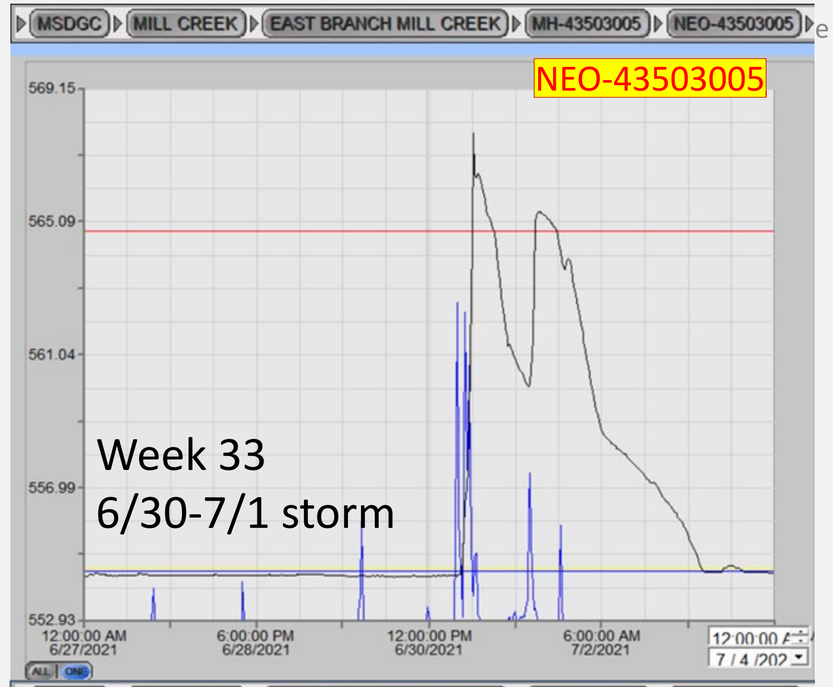
September 9 report

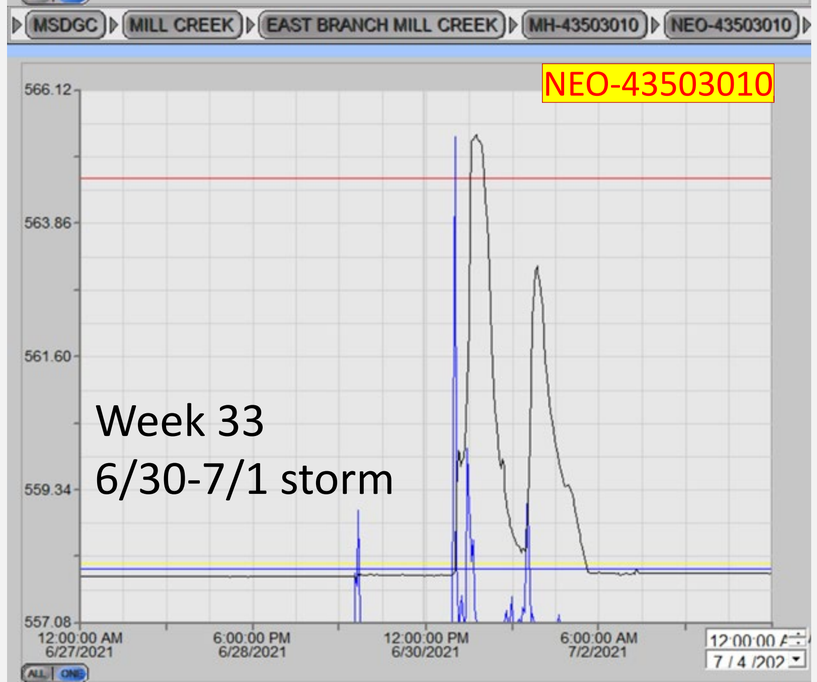
Evendale NEOs

Evendale NEOs 43403001, 43503005, 43503010, 43507009









Evendale NEOs 43403001, 43503005, 43503010, 43507009

08/31/2021 [CTH] Rob Kneip Reports that there has been a dramatic improvement at SSO 700 Facility. We had been observing long durations for facility dewatering after rain events. This was observed for approximately the last year. Since this repair was made, we are able to begin dewatering the facility much sooner after rain events and it is able to dewater at a much faster rate. SCADA trends for local NEOs show zero discharges since July 17 rain event.

07/29/2021 [MMR] Email from Jim Ramstetter to Dave Schmitt, Millcreek Watershed Alliance, to update on contractor status: "The MSD contractor is wrapping up repairs. They are working on restoration today and will most likely be off-site by early next week. We tied our sewer back to the manhole and encased all pipe in the creek in concrete." Dave Schmitt returned email noting he was on site today and spoke with MSD's contractors. All looks great.

07/22/2021 [CLH] MSD maintenance bypassed the US line to remove flow from repair. The crew removed existing pipe and placed #2 gravel for a bed. The crew installed ductile iron pipe. They reinforced the pipe with lengths of angel iron sections pushed in next to pipe. The crew formed an area around pipe and poured fast set concrete. Two of the bypass pumps were left running for the weekend.

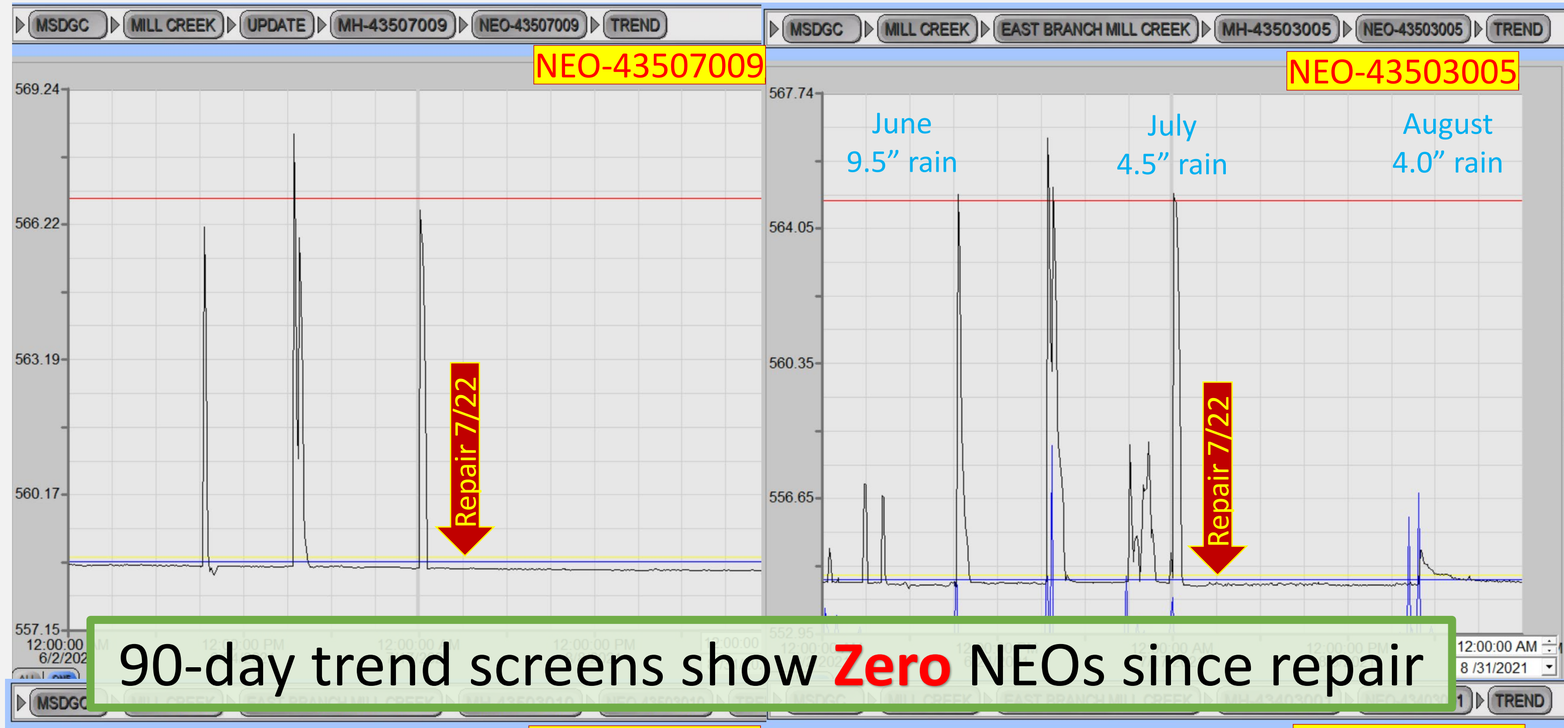
07/19/2021 [CLH] Thursday 15th. The crew installed a temporary piece of SDR pipe so MSD would be able to reduce the infiltration into the mainline. Friday the 16th we had MSD TV crew camera the line. [JAR] Reviewed video with [CLH]. Decided to go forward replacing from US side of temporary PVC hookup to DSMH as originally planned. All pipe under creek looks to be in good shape - no major infiltration seen.

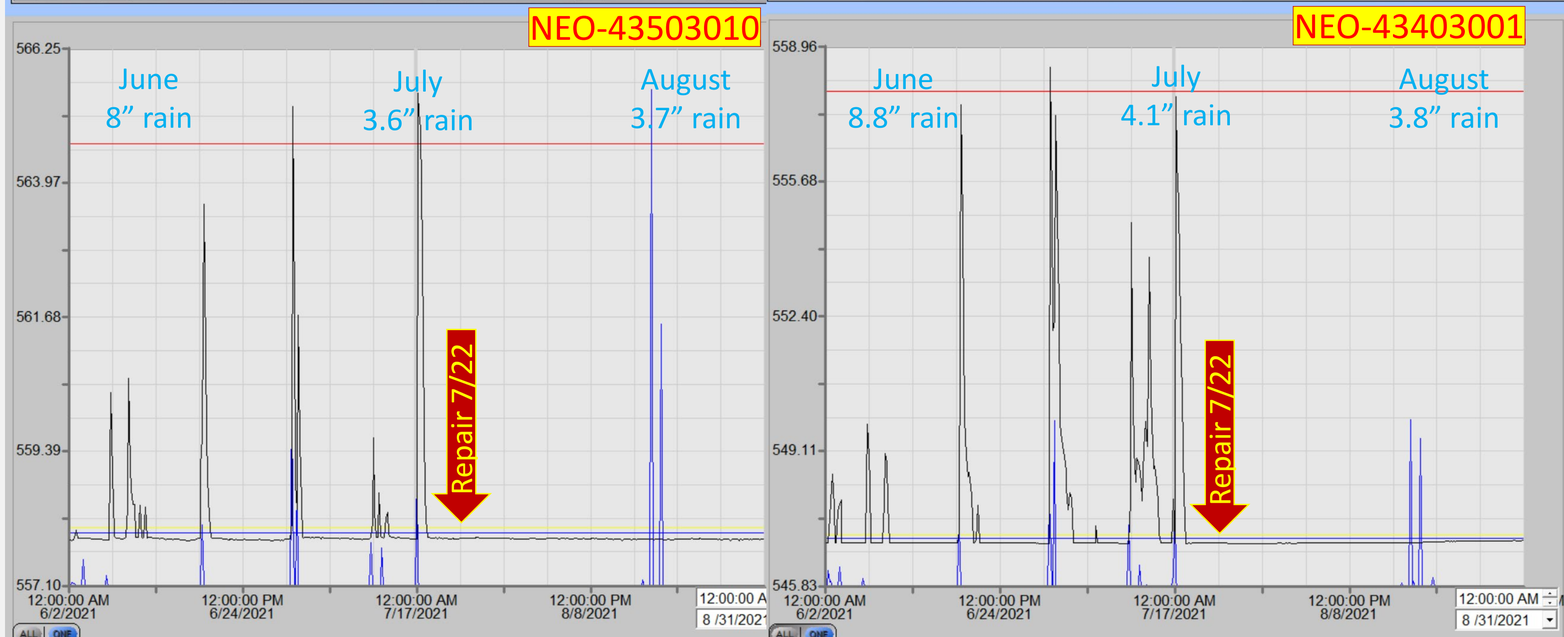
07/8/2021 [BCI] Mobilize in build road for access, clear trees and brush; prep area for installing coffer dam.

06/4/2021 [MMR] Onsite meeting with Mill Creek Alliance (Bennett Kottler, Dave Schmitt), Cardno Construction (Rick Warwick), Resource Environmental Solutions (Brian Wiatkowski) and MSD (Jenny Richmond, Maureen Richard, Jim Ramstetter) to coordinate necessary MSD sewer repair with MCA stream restoration project that was scheduled to mobilize this week. MCA will install rock riffles for grade control, flow dissipation and for equip. access during construction. MSD concerned with turbulence and scouring on downstream side of riffle over the sewer. Riffle on upstream side of sewer to have gradual slope over concrete pad into a pool good for habitat. Riprap (Type B and C mix) on streambank to tie into exist concrete pad and riffle, extending from concrete pad surface to 3' below. Construction to progress from upstream to downstream in creek. Cardno was planning on using riffle to cross sewer. Sewer is shallow. Cardno to reconsider crossing area with equip.

06/2/2021 [JAR] Repair is needed on 12" mainline section 43503009-43503002. TV inspection is unable to be completed without bypass pumping line. Sewage appears to be surfacing in the creek near the west bank where the creek has eroded past the original concrete encasement on mainline near MH 43503002.

05/19/2021 [MCA] Citizen reports cloudy water and drainage swirl was witnessed in the creek. Mill Creek Alliance water quality data suspects pollution hot spot.





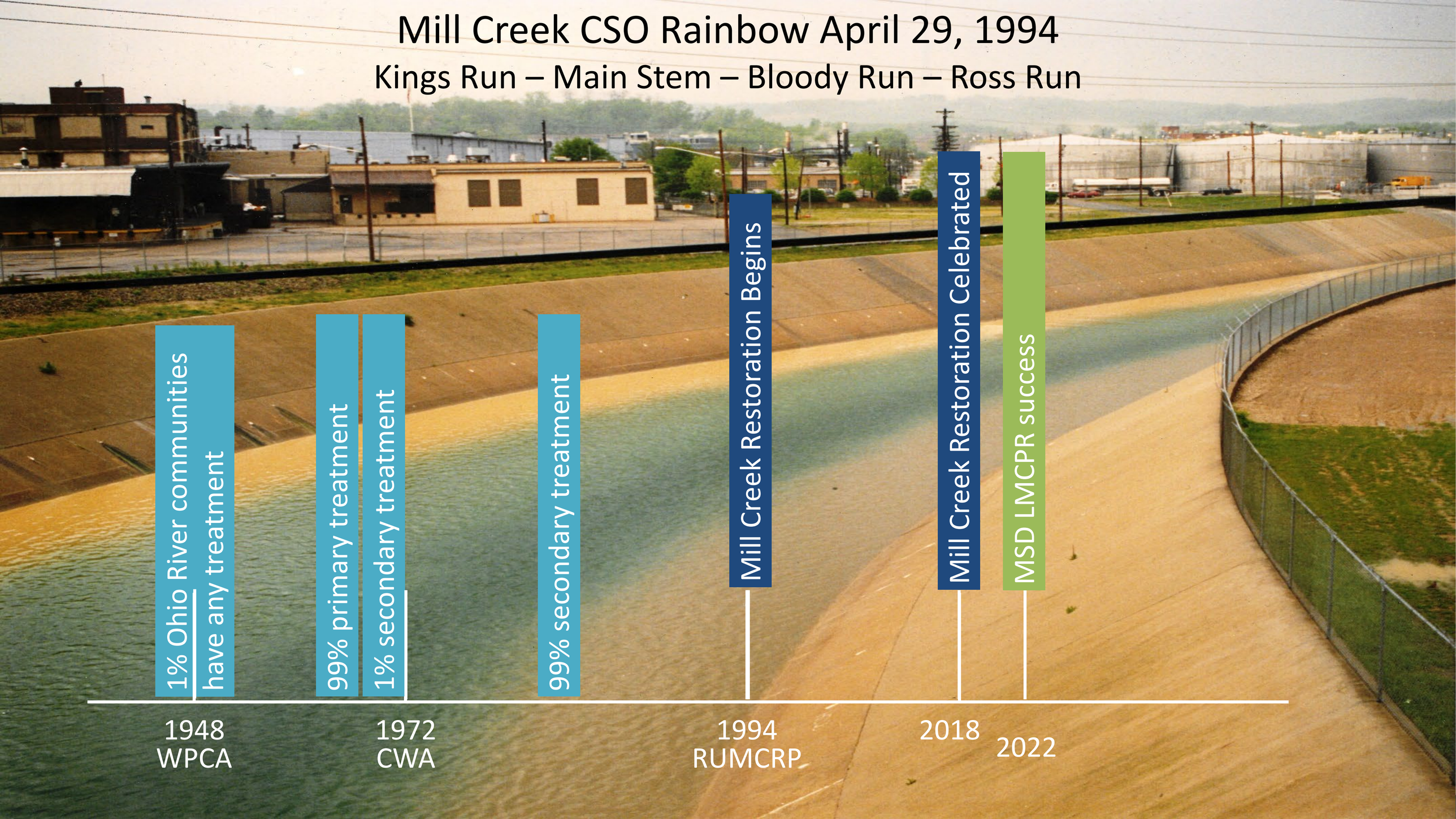
MH-43503002 mainline repair

MH-43503002 mainline repair

Construction site restoration completed.

Mill Creek CSO Rainbow April 29, 1994

Kings Run – Main Stem – Bloody Run – Ross Run



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HAMILTON COUNTY CONSERVATION DISTRICT

Cooper Creek Collaborative

"There are many science-based metrics used when evaluating water quality. But as a lay person, I know MSD's efforts are working when I see a community of mussels surviving in the Mill Creek (first time in over 100 years,) an increase of fish populations and diversity (ask members of the Buckeye United Fly Fishers), and herons, osprey, and eagles feasting in the Mill Creek shallows. For me, a healthy, vibrant habitat is the best indicator of water quality. "

- John Mangan

Board Chair MCA

Board VP HCCD