Analysis of the Probabilities of the Classification of Small Headwater Streams as Primary Headwater Habitat (PHWH) and Warmwater Habitat (WWH) in Southwest Ohio

MC64 (Mill Creek Watershed)

LM49 (L. Miami Watershed)

OWRC WWRM Meeting
April 6, 2016

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GM56 (Great Miami Watershed)

GM106 (Taylor Cr. Watershed)

Specific Concerns

- **"Rules-of-thumb" used in regulatory programs for small streams are suspect – examples include:**
  - **"Bright line" criteria such as a 1 sq. mi. drainage area for functionally eliminating the WWH suite of uses;**
  - **>40 cm maximum pool depth for the same.**
- **Policy issues:**
  - **Applicability of PHWH is excluded by the Ohio EPA definition of existing use;**
  - **Federal definition of existing use is more inclusive.**
- **Execution of 401 Nationwide Permits:**
  - **"Rules-of thumb" can result in erroneous outcomes;**
  - **What, if any, monitoring is required can equally affect outcomes & potentially abrogate existing uses.**

Existing uses are those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards. ***(40 CFR Part 131.3[e])***

Existing Quality = Existing Use

Existing Quality is vulnerable to <u>not</u> collecting the right kinds of data.

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Small Stream Issues

Assessment of the Biological Assemblage Condition of Small Headwater Streams in Ohio Subject to the Proposed General Use Provisions of Ohio's Water Quality Standards

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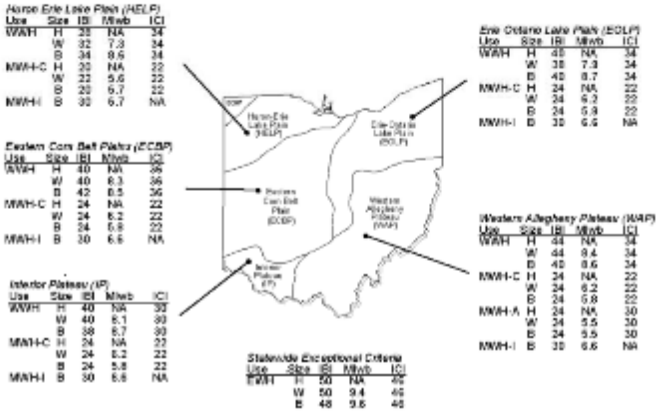
Ohio Biological Criteria: Adopted May 1990
(OAC 3745-1-07; Table 7-15)



- Perception of having less value than larger streams.
- Too numerous to deal with.
- "Fuzzy" jurisdiction and guidance issues.
- Poor acceptance of their important role in watersheds.
- Requiring the "right" type of monitoring is met with resistance.
- Easy to make exemptions based on small size.
- Rules-of-thumb are both common & inaccurate.

Ohio EPA
Division of Surface Water

Primary Headwater Stream Initiative

- Robert D. Davic
- Steve Tuckerman
- Paul Anderson
- Mike Bolton

What is a Primary Headwater Stream?

- A surface watercourse with a defined **Bed** and **Bank**
- Either continuous or periodical **flowing water**
- A watershed generally **less than one square mile** and **deepest pools < 40cm**
- Widely divergent communities based upon instream **Biology**

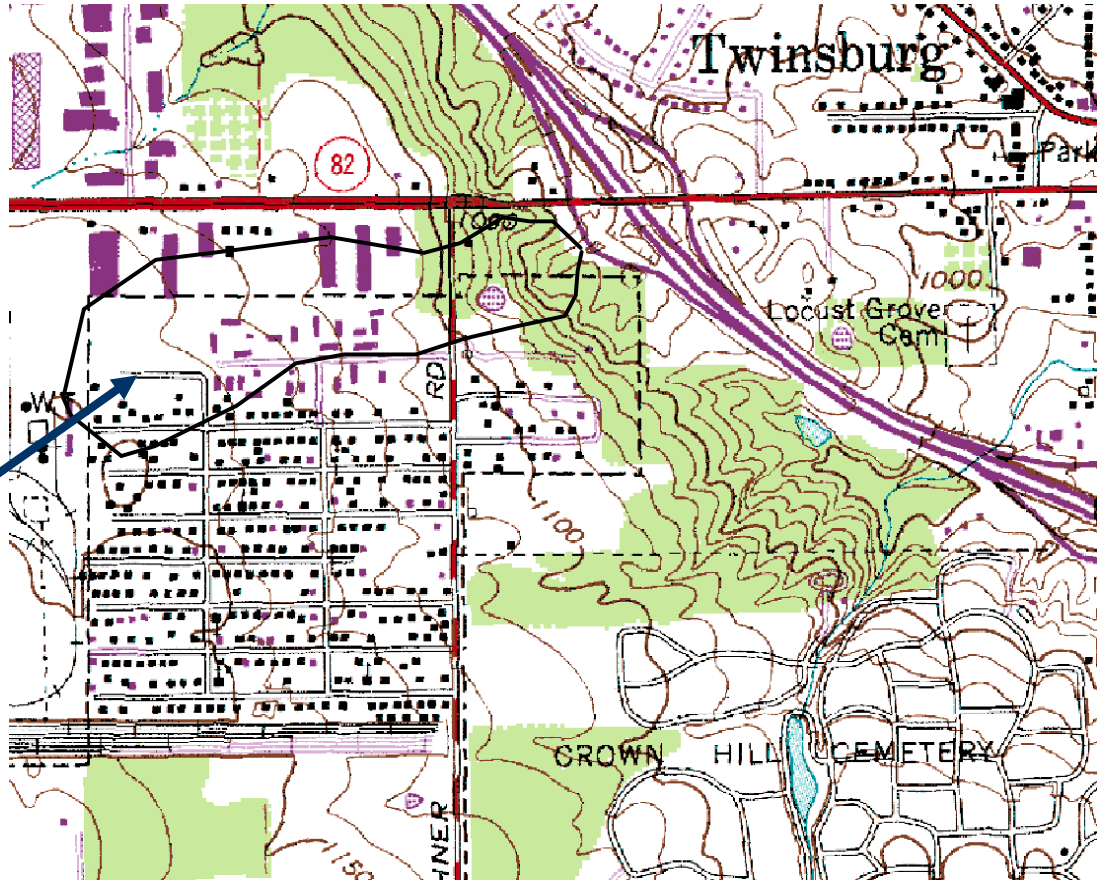
Primary Headwater Stream Watershed

USGS

7.5 Minute Quad

1: 24,000

0.68 sq. mi.



“Invisible” Stream

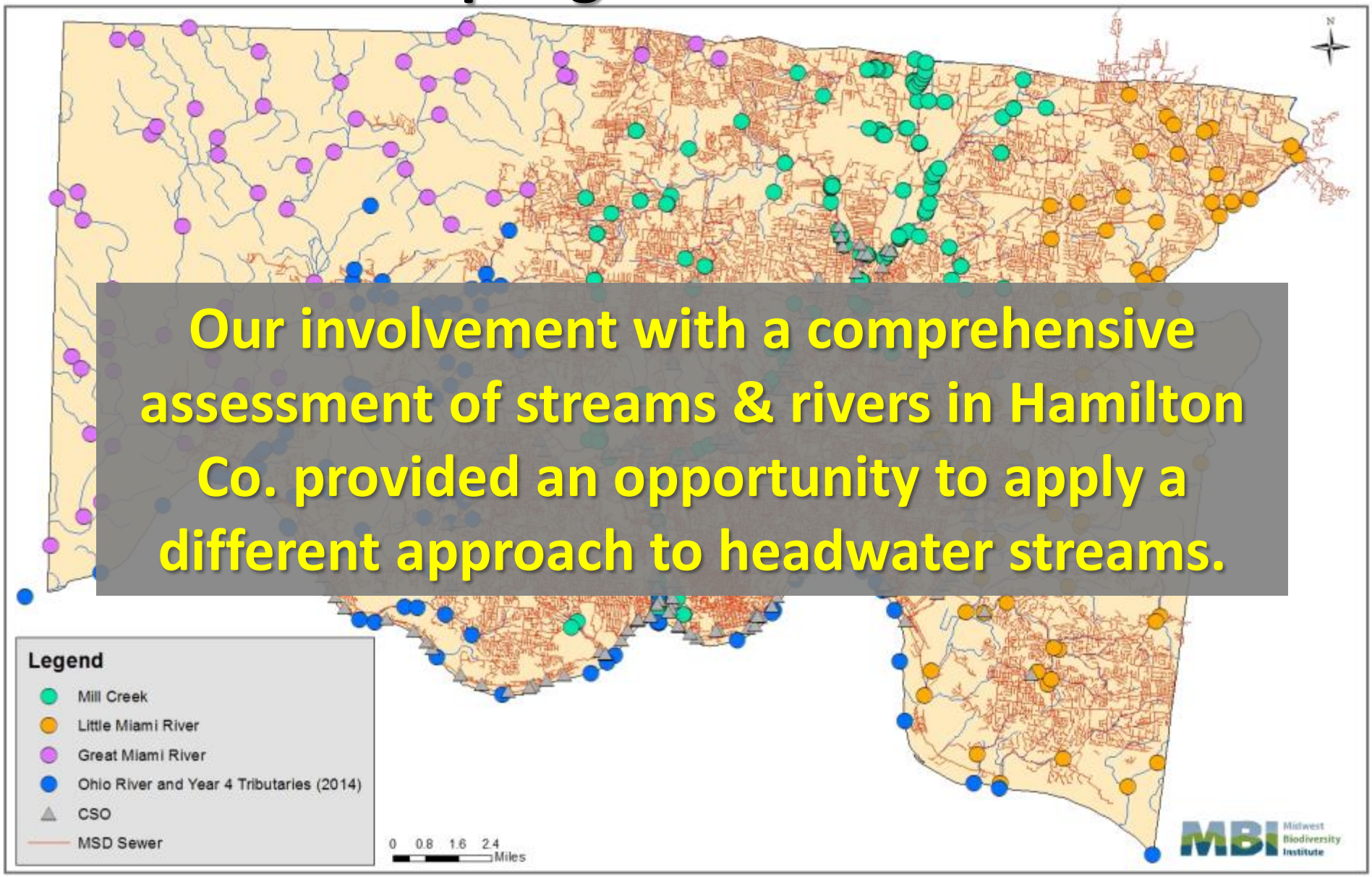
1999

Unnamed Tributary
to Tinkers Creek

What Are the Current Issues?

- **Transition from the Warmwater Habitat (WWH) suite of aquatic life use designations to Primary Headwater Habitat (PHWH) occurs at ≈1-3 sq. mi. drainage area.**
- **Each are defined in terms of the biological assemblages that can be supported.**
- **WWH suite of uses have biocriteria based on fish and macroinvertebrates codified in Ohio WQS (OAC 3745-1-07[A]).**
- **PHWH is a method-based framework with no codification in the WQS.**
- **Does an over-reliance on "rules-of thumb" for regulatory applications in these small headwater streams result in inaccuracies in terms of protections?**

MBI Sampling Sites in Hamilton Co.



Three Principal Objectives of Systematic Bioassessment in Ohio

- Determine if use designations are appropriate and attainable
- Determine condition and status of the resource (including causal associations)
- Are changes taking place over time and what do they mean?

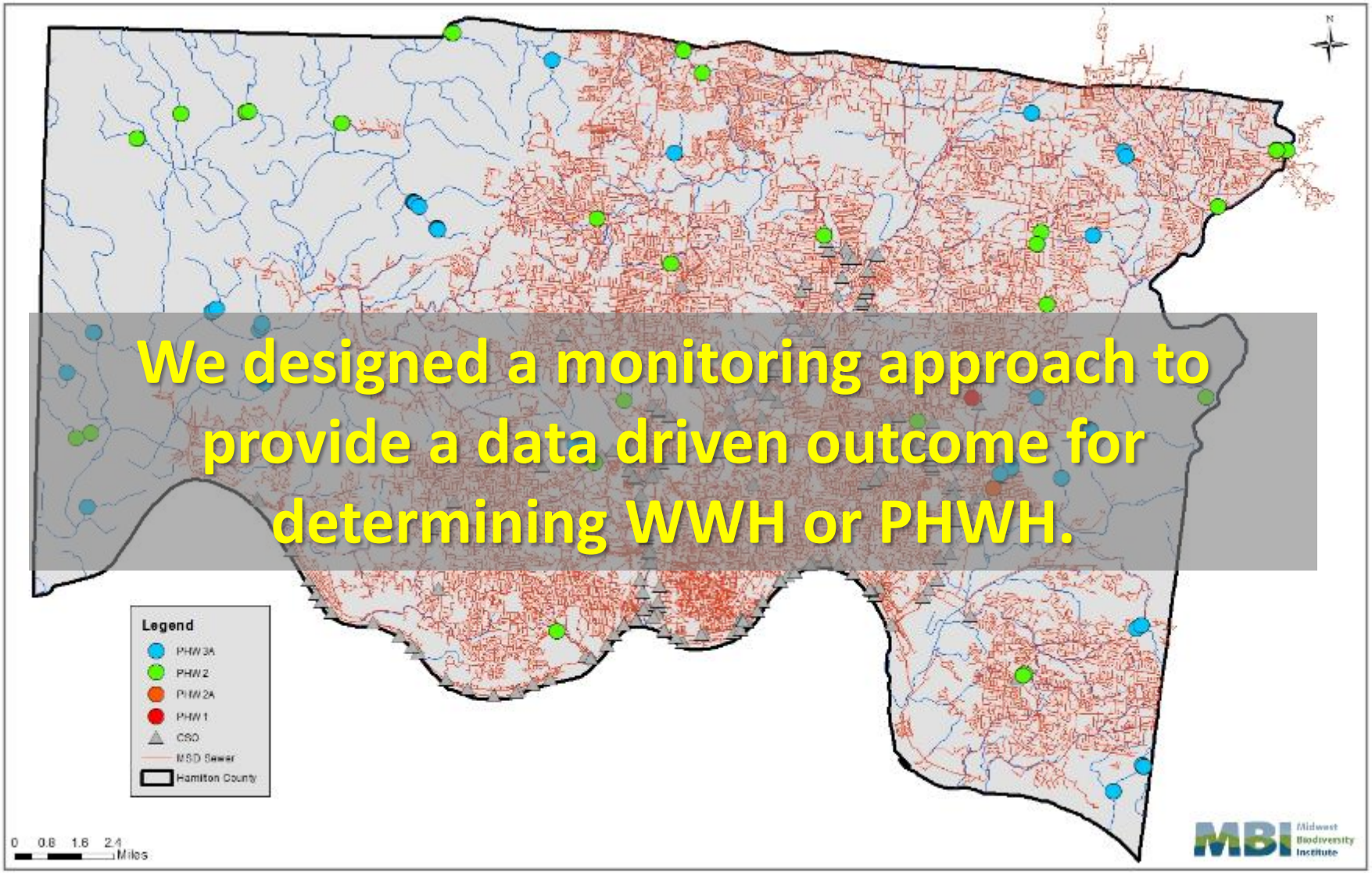
The monitoring was performed under a Level 3 Project Study Plan making the data eligible for making use designation determinations.

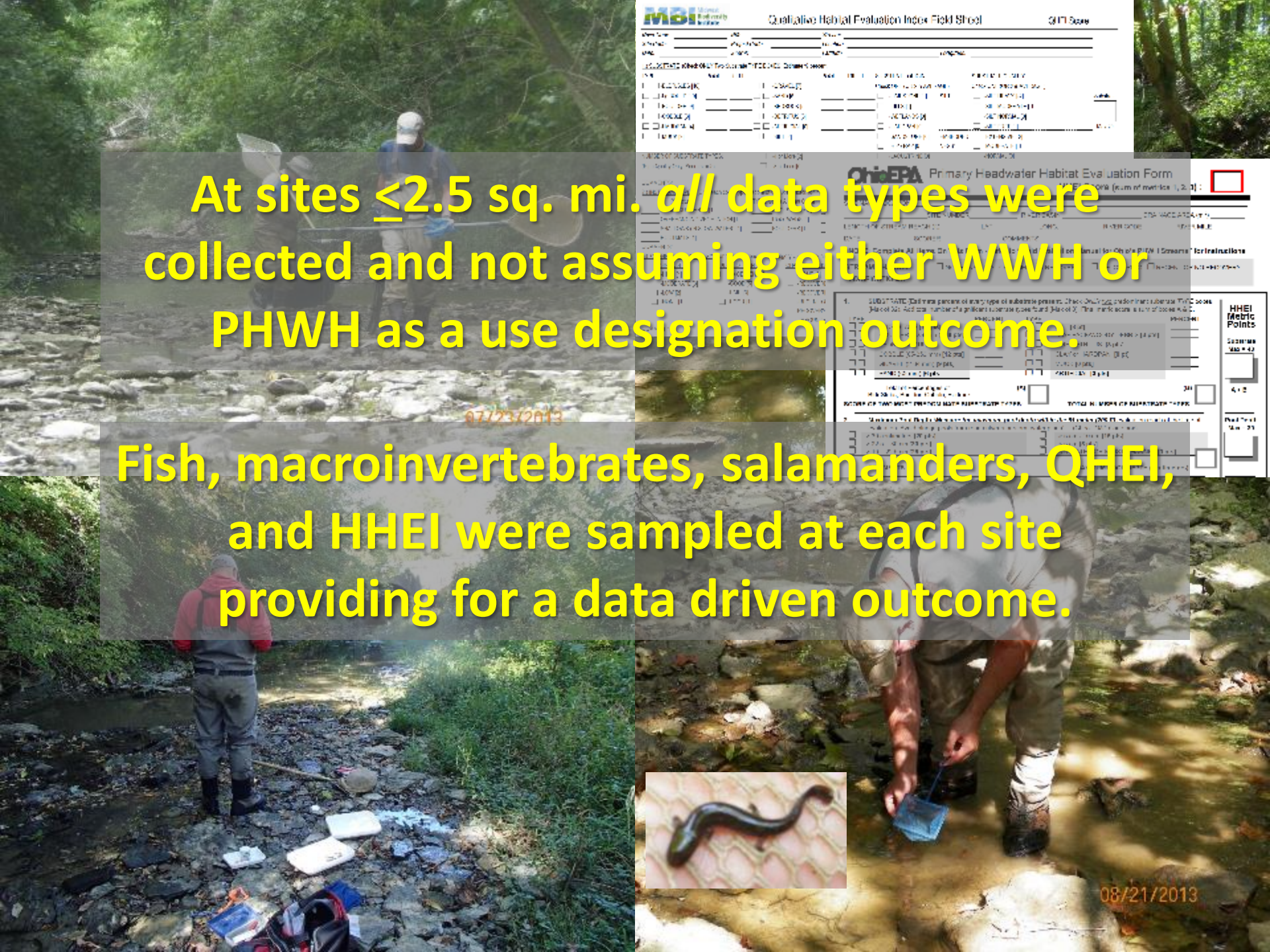
Table 5. Assessment of existing aquatic life use (ALU) designations in the Direct Tributaries and Taylor Creek watersheds in 2014. The respective biological assemblage and habitat assessment results are summarized along with the existing ALU. The recommended ALU is also listed and represents a change if different from the existing ALU.

Stream	No. of Sites	Size (mi.^{2})	Habitat Evaluation	Fish Evaluation	Macroinv. Evaluation	Existing ALU	Recom-mended ALU
WAU 09-05 – Taylor Creek Watershed							
Taylor Creek (14-004)	7	26.5	Fair-Excellent	Poor-Excellent	Fair-Good	WWH	WWH
Unnamed Trib. to Taylor Creek @ RM 4.9 (14-277)	1	0.9	Excellent	Good	Fair	None	WWH
Forfeit Run (Trib to Taylor Cr.@ RM1.42) (14-278)	1	1.4	Good	Fair	Fair	None	WWH
Eagle Creek (Trib to Taylor Cr. At RM 0.91) (14-279)	1	0.7	Good	-	-	None	PHW3A
Unnamed Trib to Taylor Creek @ RM1.74 (14-280)	1	0.9	Good	-	-	None	PHW2
Unnamed Trib to the GMF @ RM 0.3 (14-281)	1	0.3	Good	-	-	None	PHW3A
Briarly Creek (14-148)	5	7.1	Fair-Good	Fair-Good	Fair-Good	WWH	PHW3a(1) /WWH(4)
Unnamed Trib to Briarly Creek @ RM1.44 (14-282)	1	1.2	Good	Fair	Fair	None	WWH
Wesselman Creek (14-149)	4	7.6	Poor-Good	Poor-Excellent	Fair-Good	WWH	WWH
Unnamed Trib to Wesselman Creek @ RM2.59 (14-275)	1	1.4	Poor	-	-	None	PHW3A

Step 1: Evaluate if current uses are appropriate & attainable consistent with Ohio WQS.

Primary Headwaters in Hamilton Co.

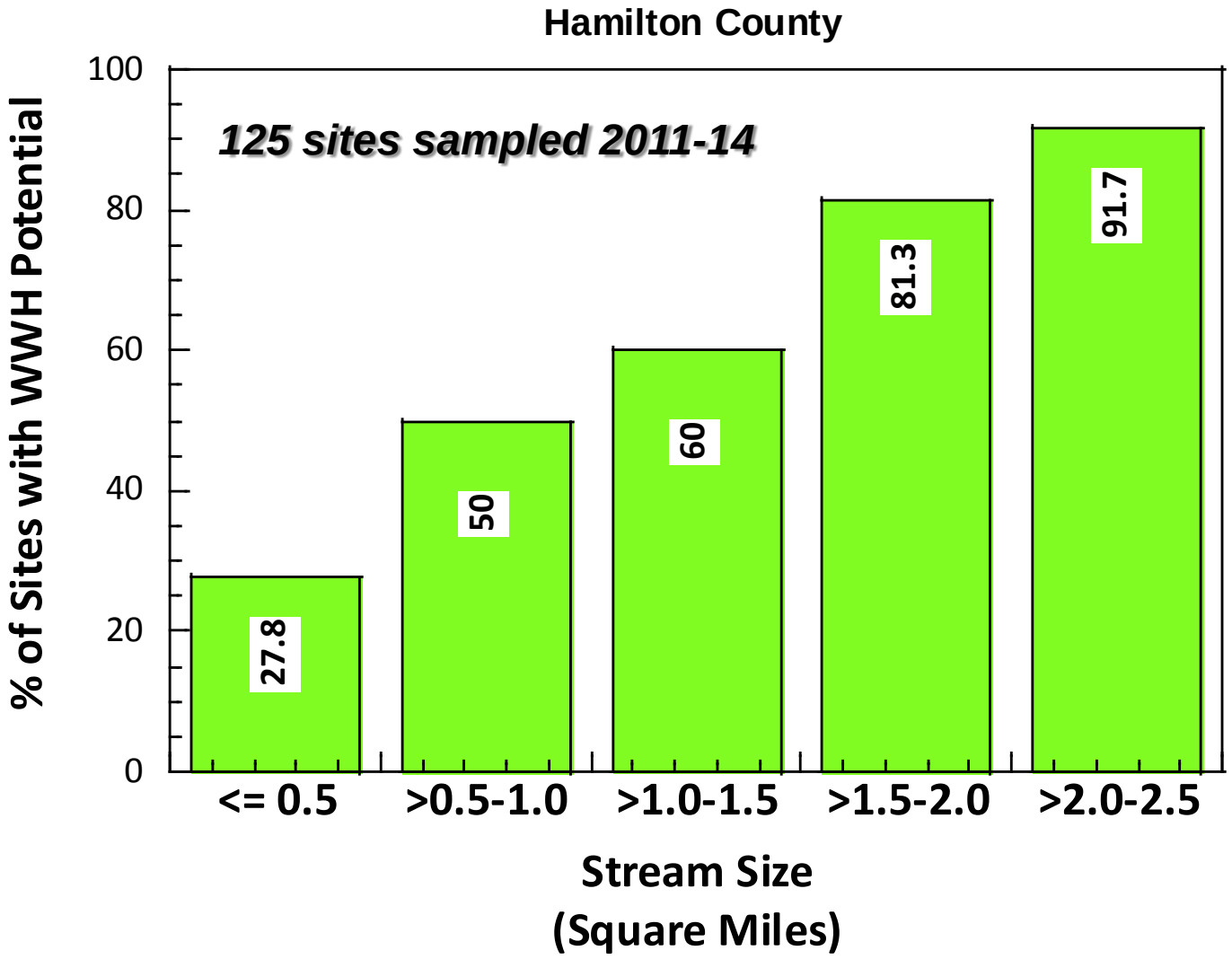


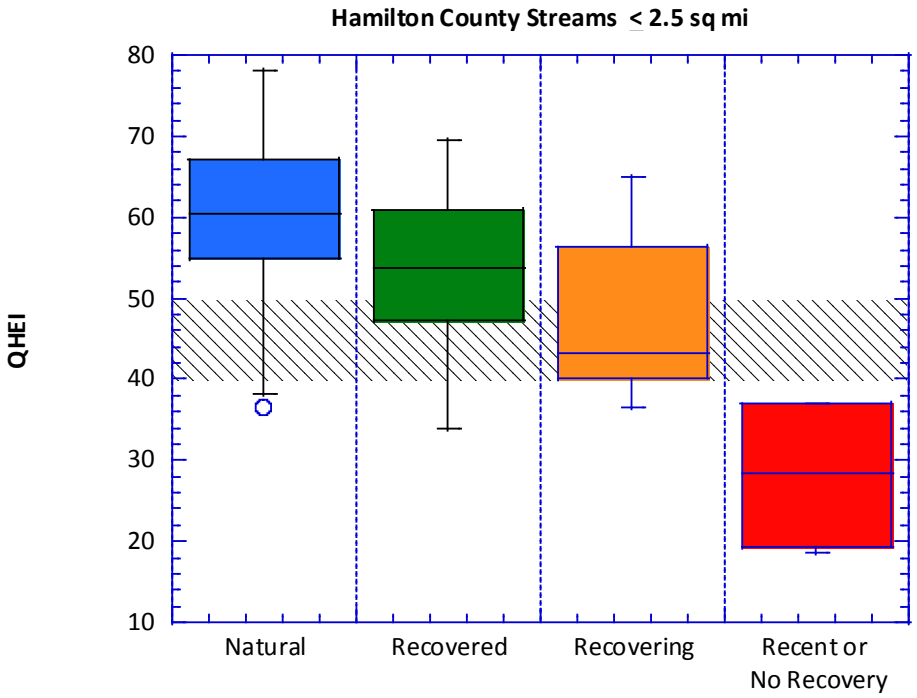


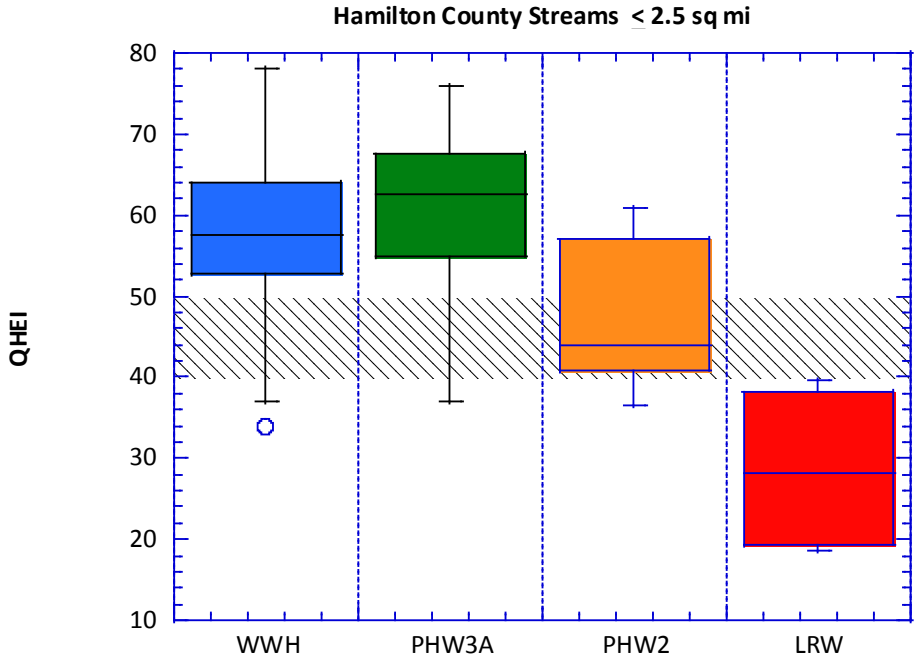
At sites ≤2.5 sq. mi. *all* data types were collected and not assuming either WWH or PHWH as a use designation outcome.

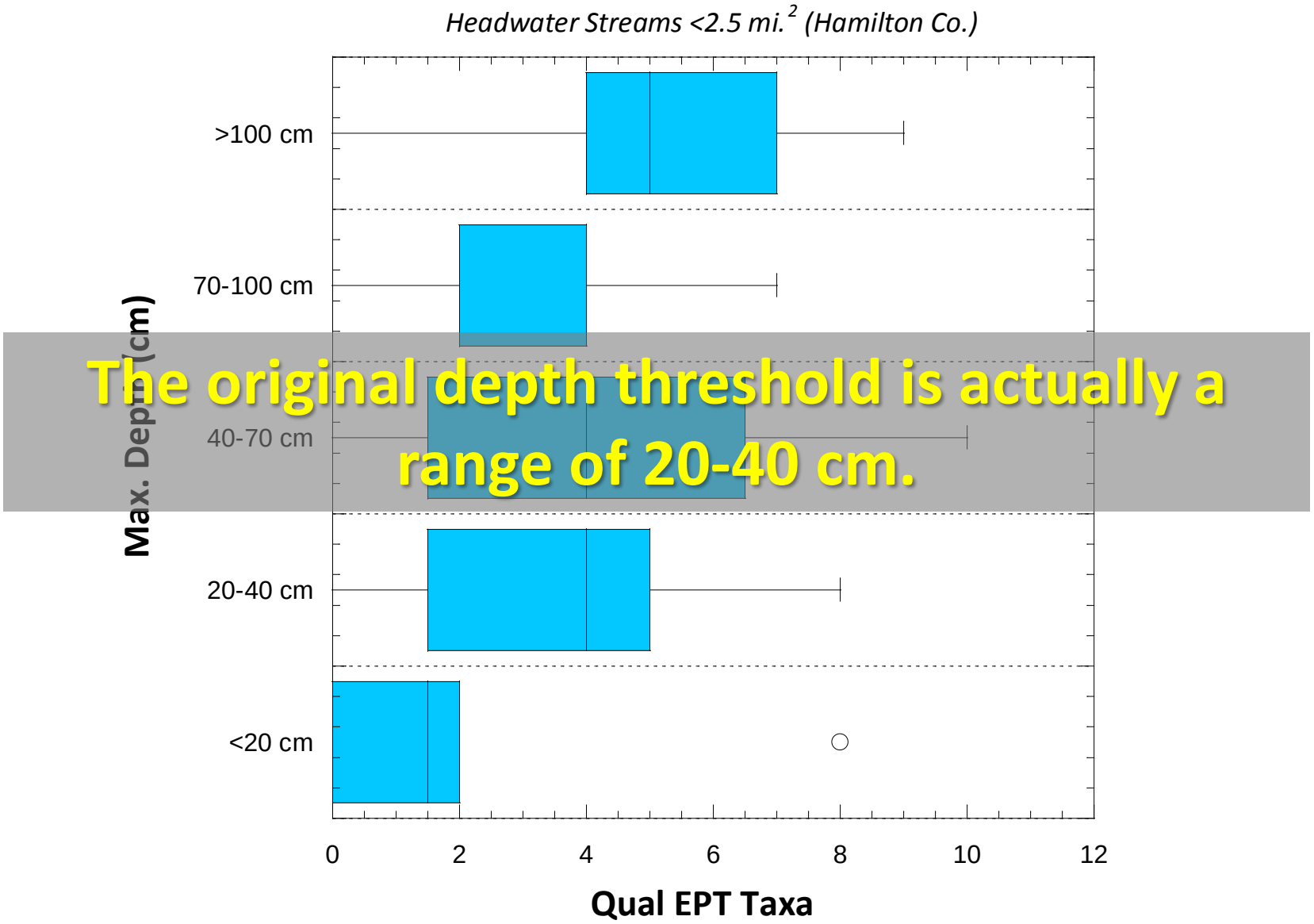
Fish, macroinvertebrates, salamanders, QHEI, and HHEI were sampled at each site providing for a data driven outcome.

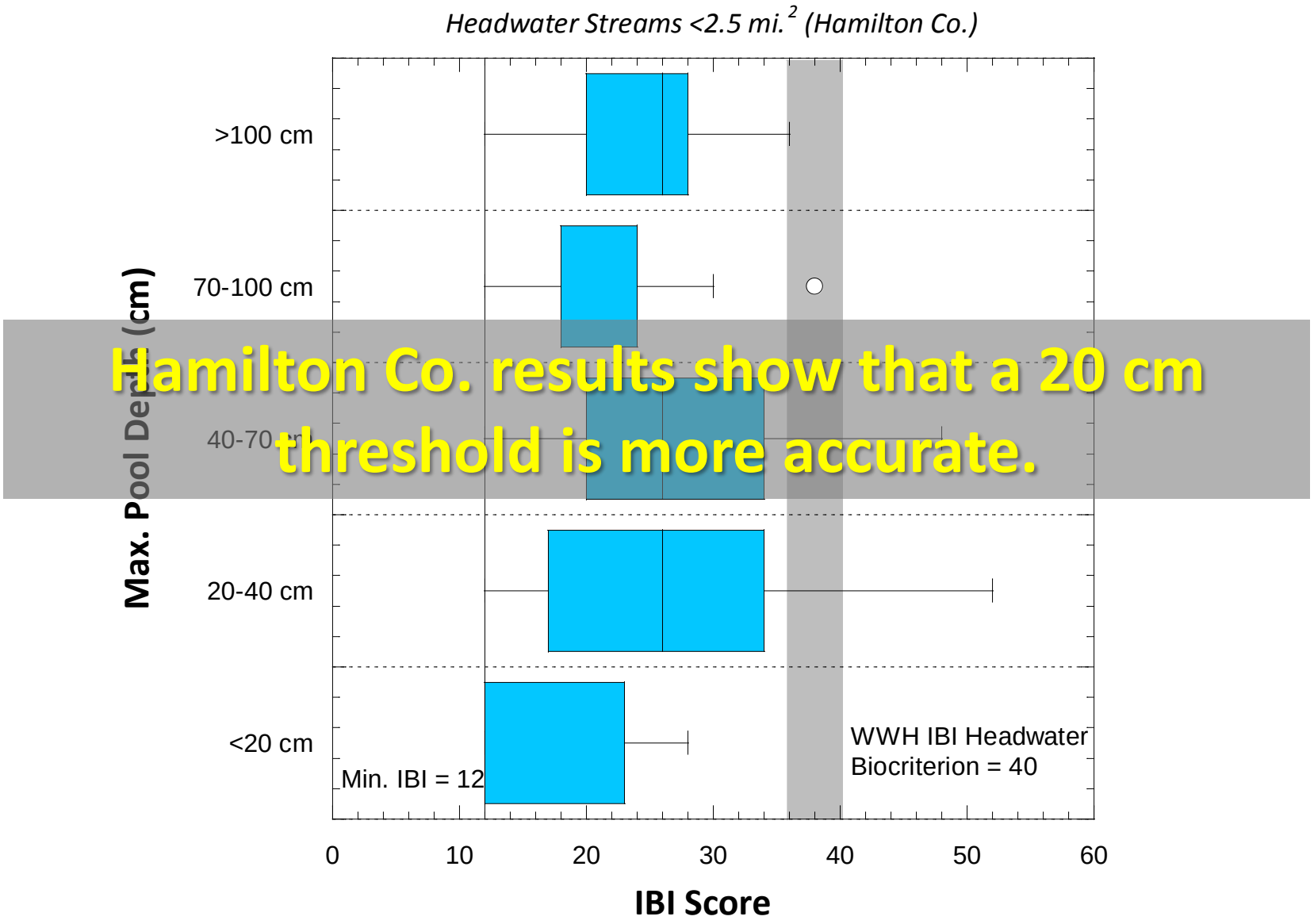
Occurrence of WWH Potential by Stream Catchment Size




Hamilton County Streams < 2.5 sq mi
QHEI
80
70
60
50
40
30
20
10
Natural
Recovered
Recovering
Recent or
No Recovery


Hamilton County Streams < 2.5 sq mi
QHEI
80
70
60
50
40
30
20
10
WWH
PHW3A
PHW2
LRW


Headwater Streams <2.5 mi.2 (Hamilton Co.)
>100 cm
70-100 cm
40-70 cm
20-40 cm
<20 cm
Max. Depth (cm)
0
2
4
6
8
10
12
Qual EPT Taxa
The original depth threshold is actually a range of 20-40 cm.



Hamilton Co. results show that a 20 cm threshold is more accurate.

Some Conclusions

- **The methods used to assess small streams in Ohio can affect classification and assessment outcomes.**
- **Currently used rules-of-thumb such as 1 sq. mi. and 40 cm maximum depth can lead to the flawed execution of regulatory programs.**
- **Based on the Hamilton Co. study the misclassification of streams could be as high as 40-45%.**
- **There is no way to predict at what drainage area a stream will fall under the WWH suite of uses or the PHWH methodology.**
- **Maximum pool depth of >20 cm is a more reliable & accurate screening benchmark.**
- **Better first order screening criteria are needed so that monitoring resources are not wasted on "obvious" situations (see next slide).**


NAKU
10/12/2012

Remaining Questions

- **How applicable are the Hamilton Co. results to the remainder of the state?**
  - ✓ **Very much so where the key physical features are the same (i.e., in the dissected regions of northern, eastern, & southern Ohio).**
  - ✓ **Northwest Ohio is an outlier with few if any intact headwater streams due to land use practices.**
- **Is there sufficient monitoring capacity to support a data driven approach in Ohio?**
  - ➢ **Yes, because the training, methodological, and regulatory frameworks are already in place.**
  - ➢ **Most field surveys can be completed in a single day.**