Aquatic Life Use in Ohio

Ohio's Tiered Biological Criteria

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Biocriteria Overview

- Adopted into rule in 1990

- Fish (IBI, MIwb) and macroinvertebrates (ICI, narrative)

- Tiered by:
  - ALU
  - Ecoregion
  - Stream size/sampling method

- Based on 400+ "least impacted" reference sites

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10,579 Stations Sampled 1974-2019

Macroinvertebrates (1974-2019)

15,120 samples

9,030 stations

Fish (1977-2019)

28,384 samples

9,662 stations
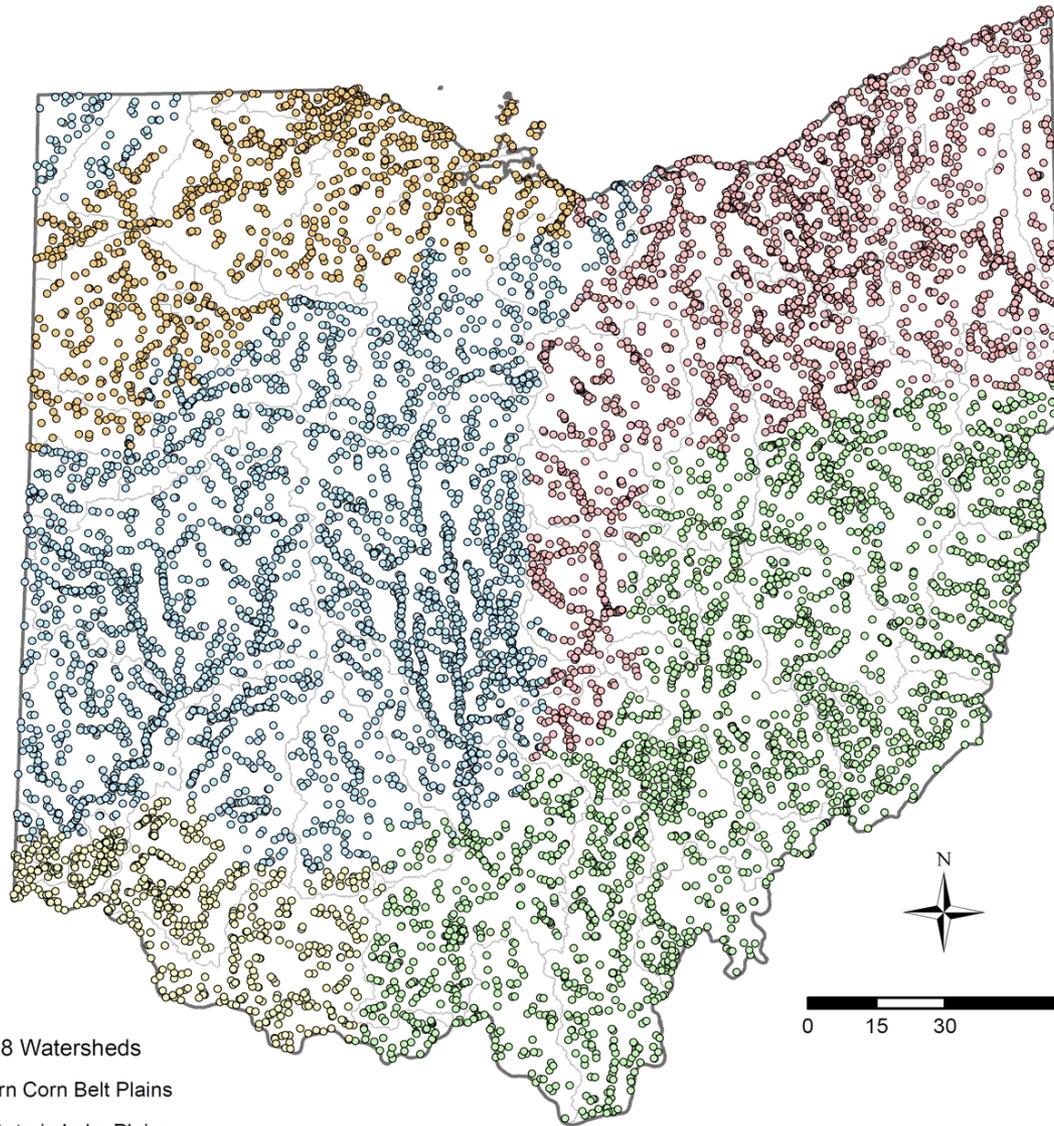
HUC 8 Watersheds
Eastern Corn Belt Plains
Erie/Ontario Lake Plains
Huron/Erie Lake Plains
Interior Plateau
Western Allegheny Plateau

Miles
0   15   30   60

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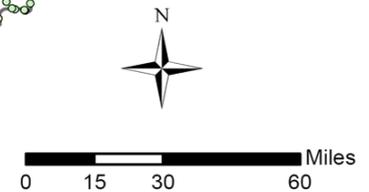
Fish Sampling Methods

Fish Assessment – IBI

- Karr (1981), Karr et al. (1986), Fausch et al. (1984)

- 12 community metrics – rating of 5, 3, or 1, based on deviation from expected scores at reference sites

- 12-60 scores

- Three basic divisions (wading, boat, headwater)

IBI Metric	Metric Description (*Indicates substitution from Karr 1981)	Headwater (<20 mi^2)	Wading (20+ mi^2)	Boat (20+ mi^2)
1	Total Native Species	X	X	X
2	# Darter Species # Darter + Sculpin Species* % Round-bodied Suckers*	X	X	X
3	# Sunfish Species # Headwater Species*	X	X	X
4	# Sucker Species # Minnow Species*	X	X	X
5	# Intolerant Species # Sensitive Species*	X	X	X
6	% Tolerant Species*	X	X	X
7	% Omnivores	X	X	X
8	% Insectivorous Species*	X	X	X
9	% Top Carnivores % Pioneering Species	X	X	X
10	# Individuals	X	X	X
11	% Simple Lithophils* # Simple Lithophilic Species*	X	X	X
12	% DELT Anomalies*	X	X	X

Fish Assessment – MIwb

- Modified from Gammon (1976)

- 4 components
  - # of individuals (excl. tolerant/exotic)
  - Biomass (excl. tolerant/exotic)
  - Shannon diversity index (numbers)
  - Shannon diversity index (weights)

Bug Sampling Methods

Bug Assessment – ICI

- Developed in-house, based on IBI (Karr 1981)

- 10 community metrics – ratings of 6, 4, 2, or 0, based on deviation from expected scores at reference sites

- 0-60 scores

- Requires quantitative and qualitative sample

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ICI Metric	Metric Description
1	# Total Taxa
2	# Mayfly Taxa
3	# Caddisfly Taxa
4	# Dipteran Taxa
5	% Mayfly Composition
6	% Caddisfly Composition
7	% Tribe Tanytarsini Midge Composition
8	% Other Dipteran and Non-Insect Composition
9	% Tolerant Organisms
10	# Total Qualitative EPT Taxa

ALU Designations

Uses with codified biocriteria targets	Other ALUs
Exceptional Warmwater Habitat (EWH)	Seasonal Salmonid Habitat (SSH)
Warmwater Habitat (WWH)	Coldwater Habitat (CWH)
Modified Warmwater Habitat (MWH)	Limited Resource Water (LRW)

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# Exceptional Warmwater Habitat

Warmwater Habitat

Modified Warmwater Habitat

# Conceptual Relationship Between ALU and Biotic Integrity
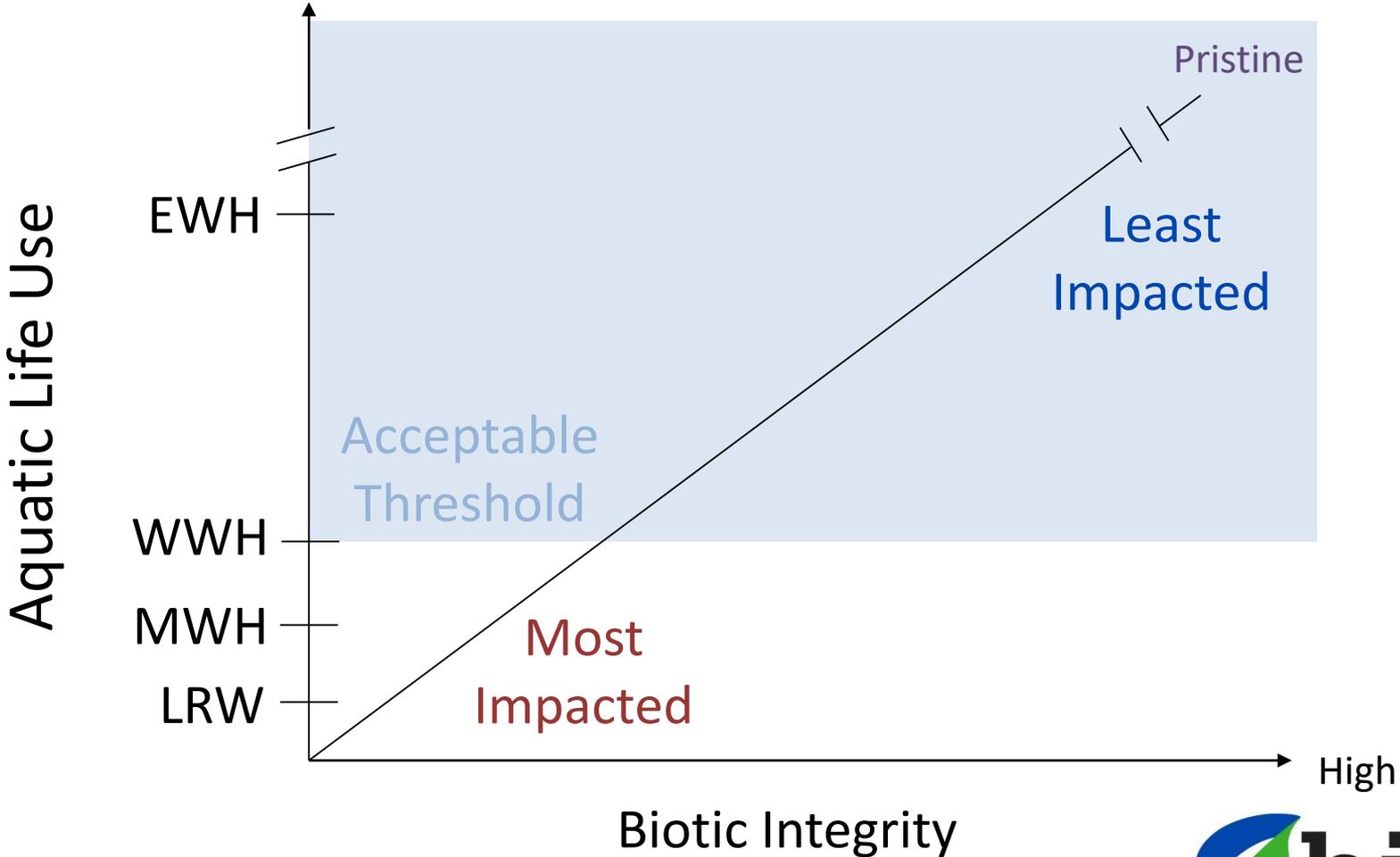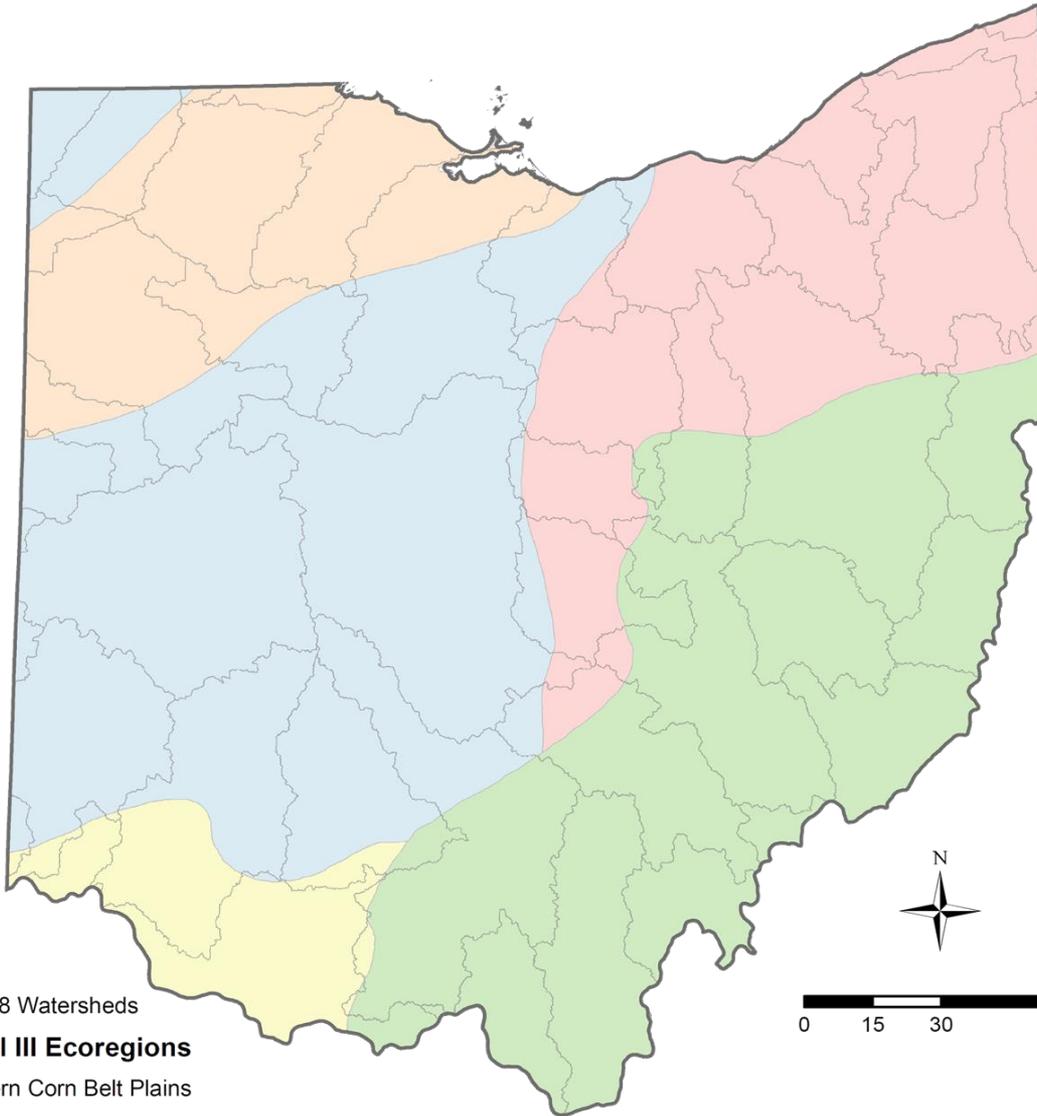
HUC 8 Watersheds

Ohio Level III Ecoregions

- Eastern Corn Belt Plains
- Erie/Ontario Lake Plains
- Huron/Erie Lake Plains
- Interior Plateau
- Western Allegheny Plateau

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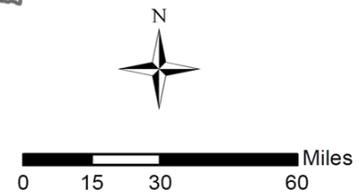
Example of Biocriteria (WAP)

IBI			MIwb		ICI	Narrative Evaluation
Headwater	Wading	Boat	Wading	Boat	All	
50-60	50-60	48-60	≥9.4	≥9.6	46-60	Exceptional
46-49	46-49	44-47	8.9-9.3	9.1-9.5	42-44	Very Good
Western Allegheny Plateau						
44-45	**44**-45	**40**-43	**8.4**-8.8	**8.6**-9.0	**36**-40	Good
40-43	40-43	36-39	7.9-8.3	8.1-8.5	32-34	Marginally Good
28-39	28-39	26-35	5.9-7.8	6.4-8.0	14-30	Fair
18-27	18-27	16-25	4.5-5.8	5.0-6.3	8-12	Poor
12-17	12-17	12-15	0-4.4	0-4.9	≤6	Very Poor
Modified Warmwater Habitat (WAP)						
24	24	24	6.2	5.8	22	Channel Modified
--	--	30	--	6.6	--	Impounded
24	24	24	5.5	5.4	30	Mine Affected

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303(d)/305(b) ALU Assessment
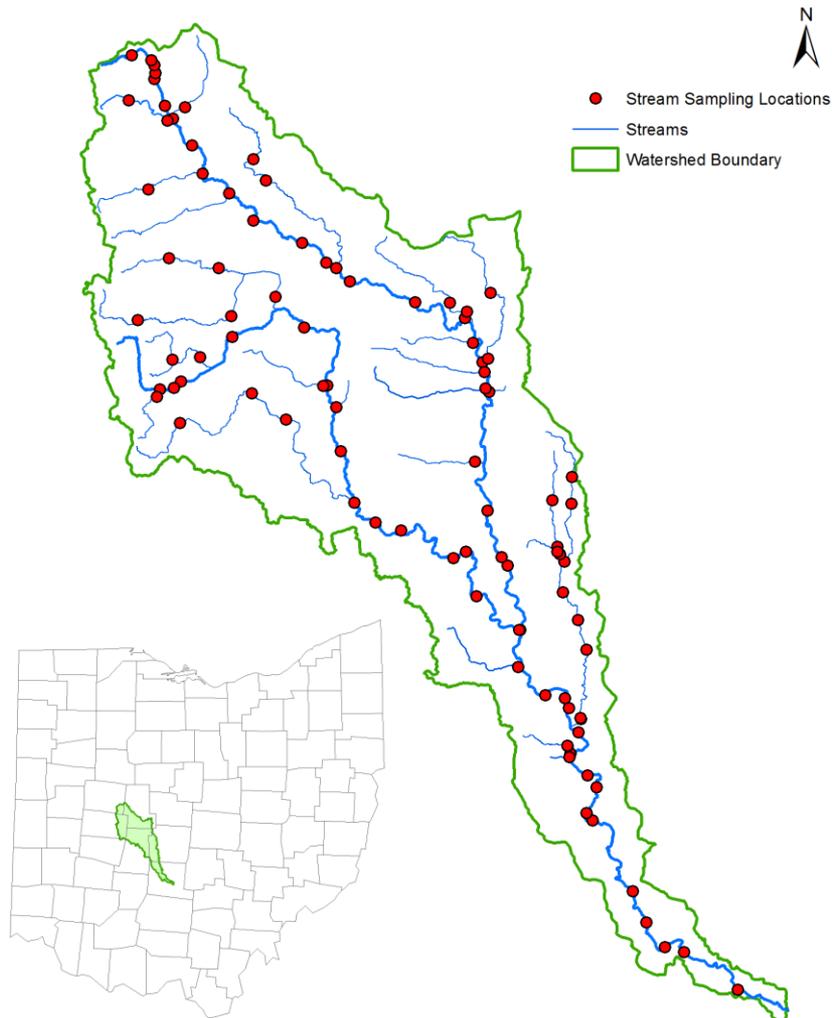
- Rotating basin approach

- Full/Partial/Non attainment

- Aggregated to the HUC-12 scale

References

- Biological sampling manuals and references:
  epa.ohio.gov/dsw/bioassess/BioCriteriaProtAqLife

- Ohio water quality standards:
  epa.ohio.gov/dsw/wqs/index

- Ohio biological criteria:
  epa.ohio.gov/portals/35/rules/01-07.pdf

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