

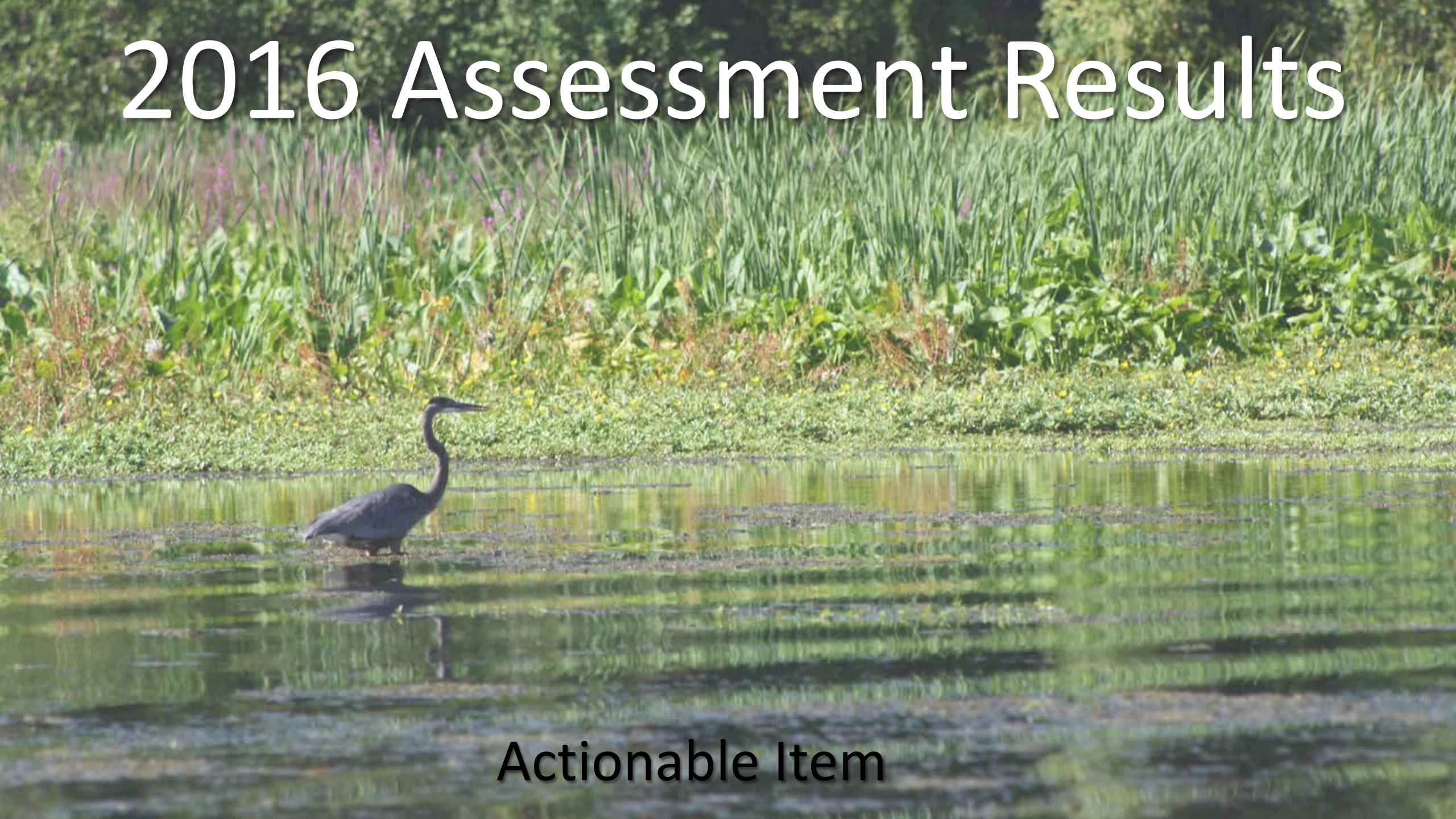
# Report of the ORSANCO Biological Water Quality Subcommittee



AGENDA ITEM 4  
216<sup>TH</sup> TEC MEETING  
FEBRUARY 7-8, 2018



# 2016 Assessment Results



Actionable Item



Pool	Fish (mORFI <sub>n</sub> )	Macros (ORMI <sub>n</sub> )
Willow Island	35.79	28.19



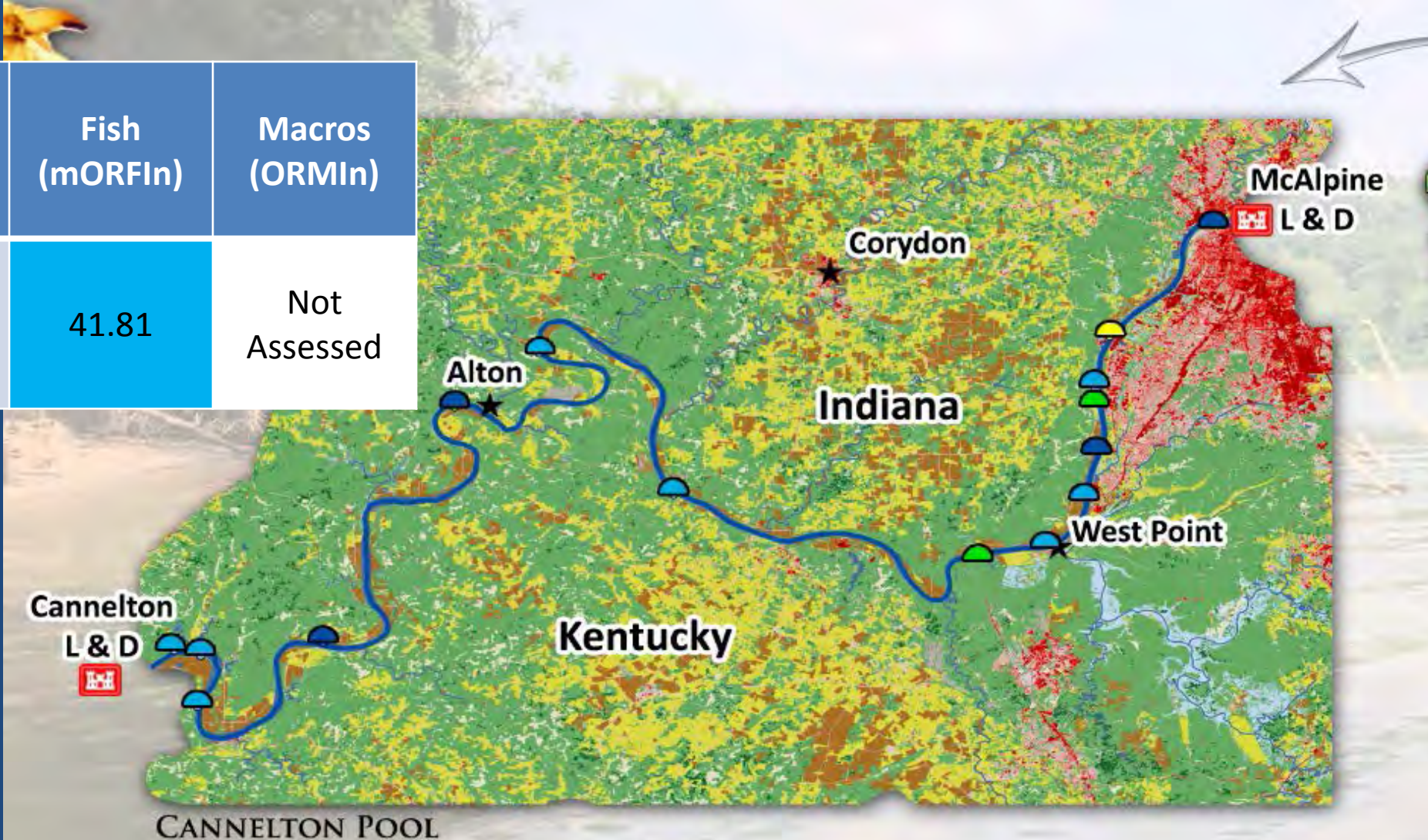


Pool	Fish (mORFIn)	Macros (ORMIn)
Greenup	44.55	22.9





Pool	Fish (mORFI <sub>n</sub> )	Macros (ORMI <sub>n</sub> )
Cannelton	41.81	Not Assessed



## AQUATIC INVASIVES WATCH



*Silver Carp*



*Bighead Carp*



*Asiatic Clams*



# 2016 Cannelton Pool Macroinvertebrate Collection

- Due to drastically high flows macroinvertebrate collection was severely depressed in 2016 compared to that of 2011.

Collection Data for Hester-Dendy (HD) Samplers			
Year	Average # of Individuals	Average # of Taxa	Average # of Zebra Mussels
2011	1641.29	29.57	996.57
2016	676.78	14.00	123.44

- There is a substantial decrease in all categories (shown above) collected from HDs in 2016 compared to 2011.
- This is evident as Zebra Mussels, a competitive invasive, decreased by 87.6%.
- Additionally, only 2 of the 15 probabilistic sites produced over 200 individuals (the requirement for analysis) via the Multi-Habitat method.
- Therefore, these data were not taken into consideration for evaluation of biological condition of Cannelton Pool.



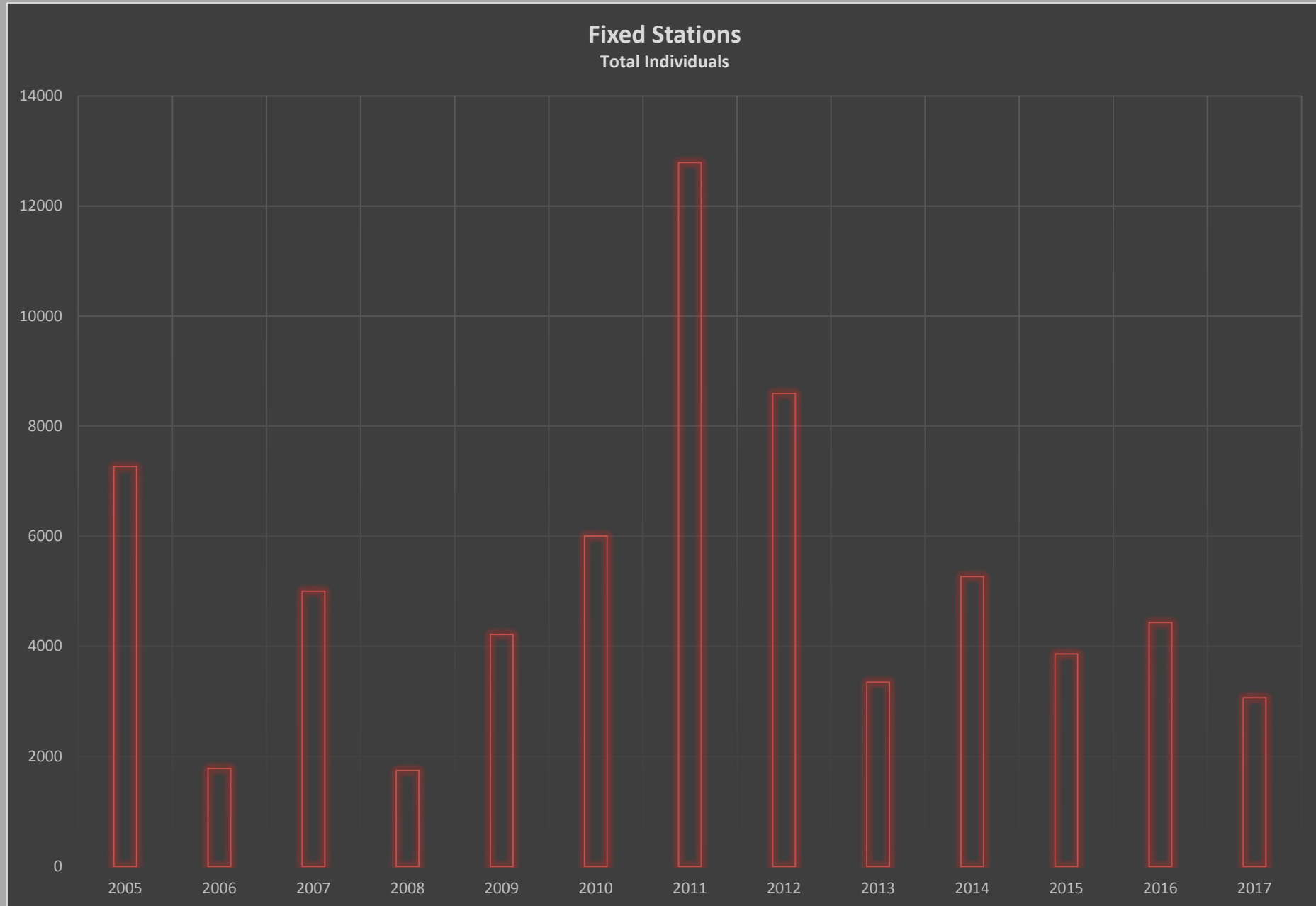
# 2017 Sampling Activities

A photograph of a sunset over a body of water. The sun is low on the horizon, creating a bright orange glow and a long, shimmering reflection on the water's surface. A small, dark boat with a canopy is visible on the right side of the water. The background shows a dark silhouette of a forested shoreline.

Informative Item



# Fixed Stations 2017

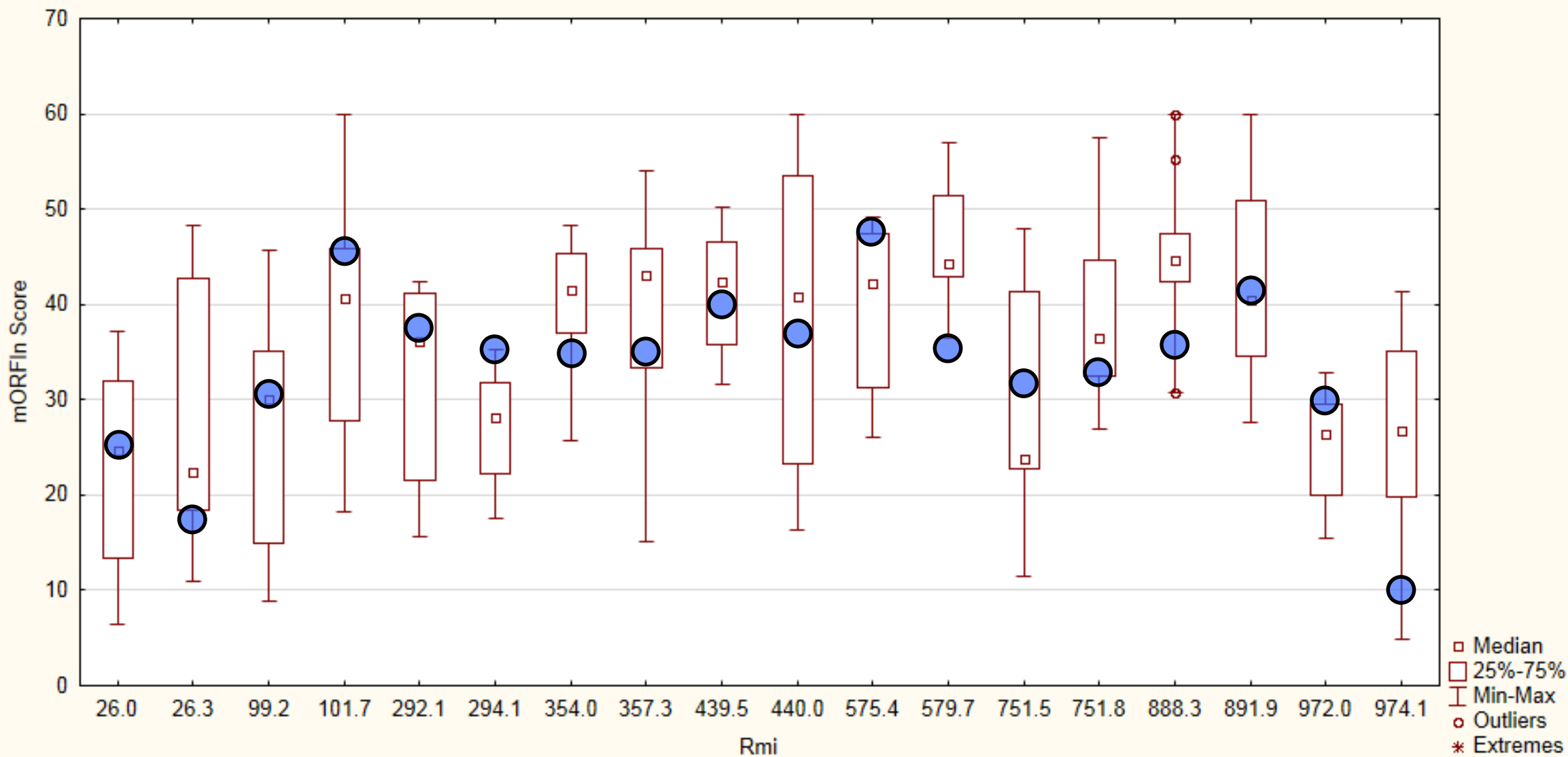




# *m*ORFIn Performance

Boxplot = 2005 - 2016

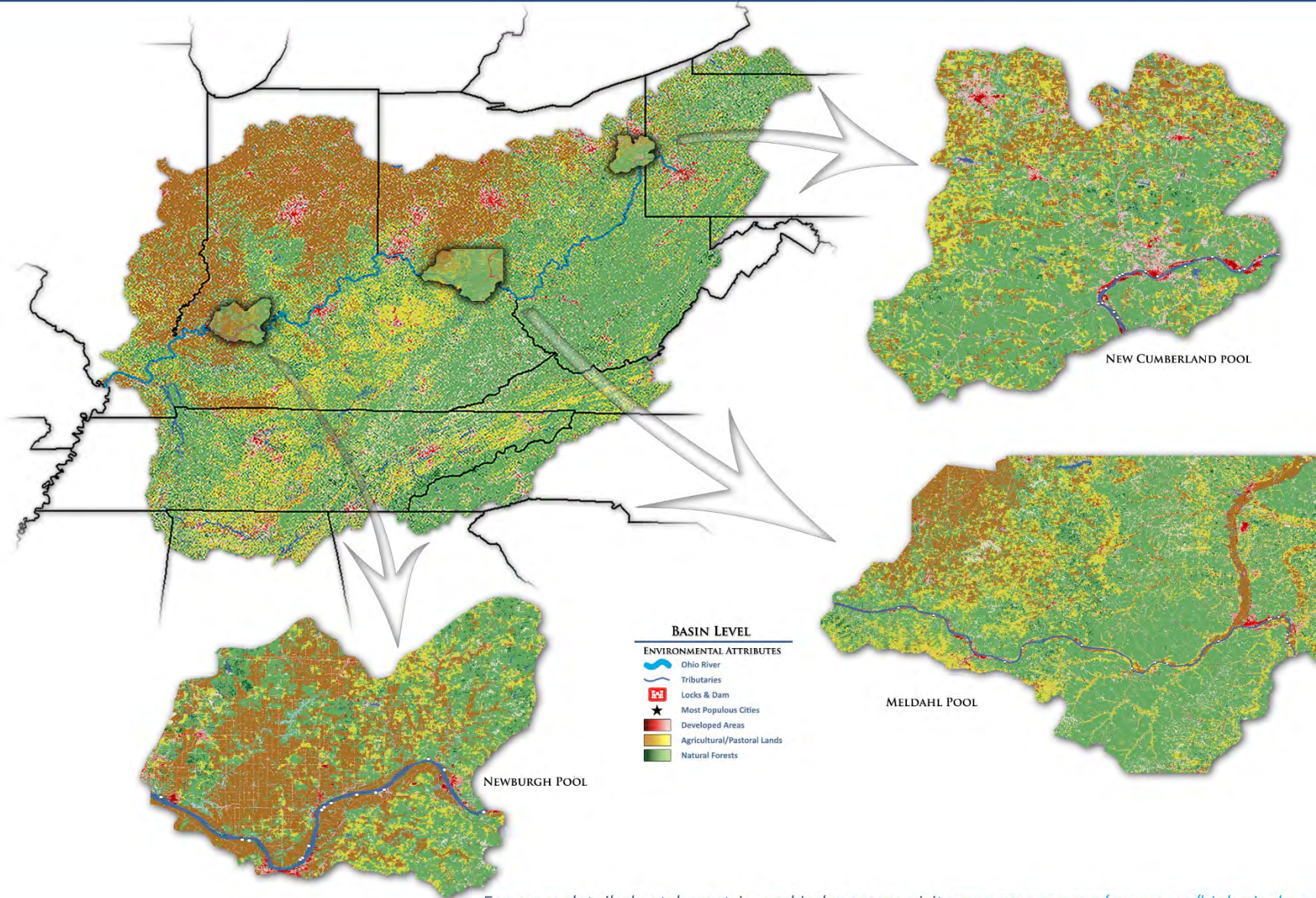
● 2017





# 2017 POOL SURVEY RESULTS

*The results of the 2017 biological surveys are detailed in the following pages (relative pool locations shown below). Included are brief descriptions of the land use & hydrology, site level mORFIn & ORMIn ratings, summaries of notable catches & instream habitat, and the overall biological condition of each pool.*



For more detailed catch, metric, and index scores visit [www.orsanco.org/programs/biological-programs](http://www.orsanco.org/programs/biological-programs)



# Physical Parameter Comparisons

	1st	2nd	3rd
	Avg. Temp		
Meldahl	30.4	29.4	26.0
New Cumberland	26.0	25.1	25.2
Newburgh	30.2	30.0	26.3
	Avg. Conductivity		
Meldahl	499.5	455.6	379.9
New Cumberland	460.3	614.9	302.2
Newburgh	500.3	504.4	379.9
	Avg. Secchi		
Meldahl	52.6	38.5	28.3
New Cumberland	46.2	63.9	32.2
Newburgh	83.9	34.5	24.0



significant urban influences: in unincorporated sections of the pool the shoreline

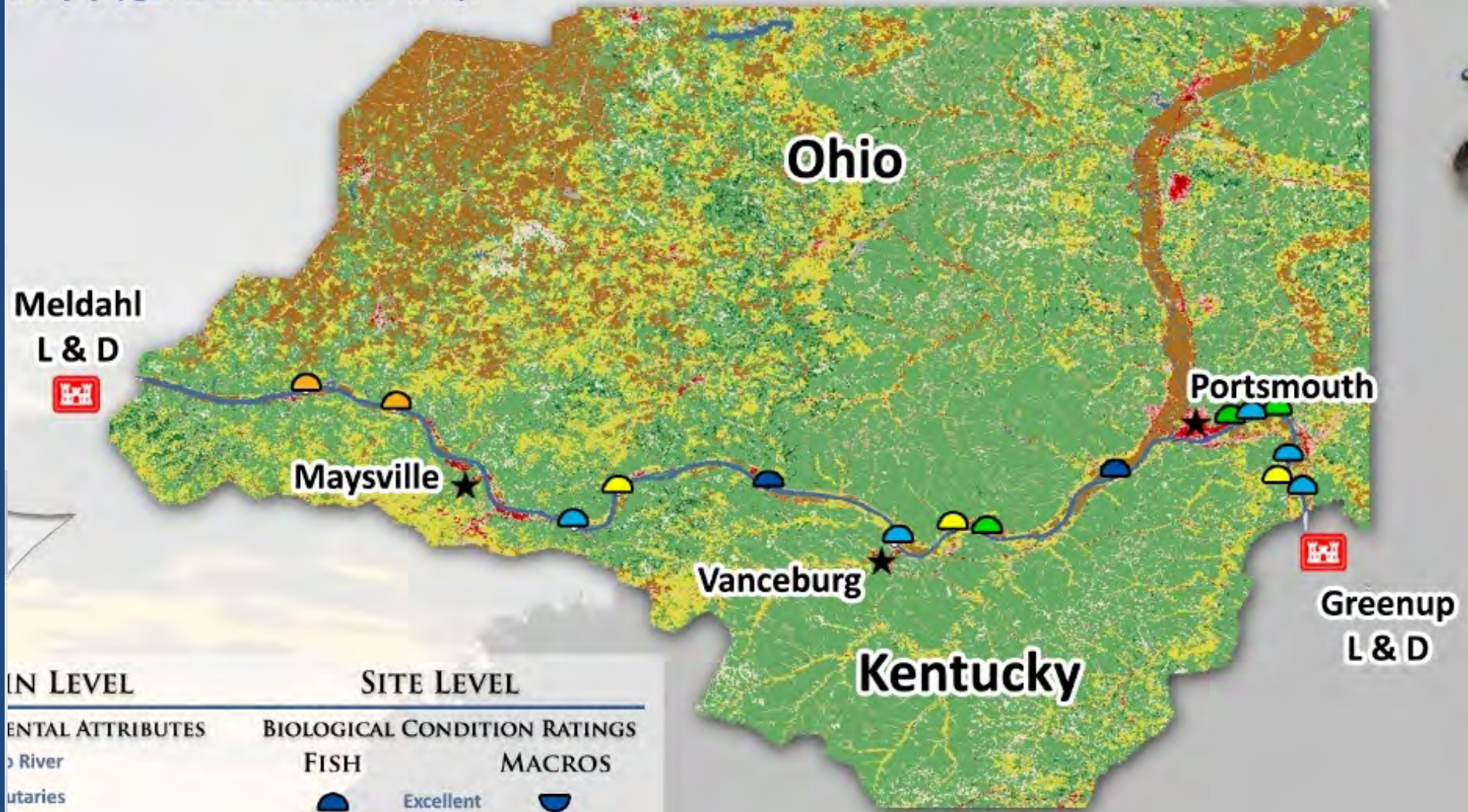


# New Cumberland Pool (2005 – 2011 – 2017)

Variable	2005	2011	2017
<i>Environmental Factors</i>			
Avg. Conductivity	460	615	302
Avg. Secchi Depth	46.2	64	32
<i>CPUE Score</i>	<b>46.9</b>	<b>34.4</b>	<b>22.5</b>
<i>Avg. % Tol Score</i>	<b>91.8</b>	<b>61.5</b>	<b>28.4</b>
Bluntnose Minnow	1	19	23
Common Carp	23	18	55
<i>Avg. % Piscivore Score</i>	<b>38.8</b>	<b>21.6</b>	<b>29.9</b>
Sauger	48	29	54
Spotted Bass	35	17	20
<i>Avg. GrRiver Score</i>	<b>42.6</b>	<b>20.0</b>	<b>8.9</b>
Channel Darter	4	1	1
Mooneye	11	9	0
Silver Chub	7	2	0
<i>Avg. Intolerant Score</i>	<b>77.7</b>	<b>35.7</b>	<b>42.5</b>
Logperch	24	9	10
Northern Hog Sucker	32.0	2.0	14.0
<i>Avg. Sucker Score</i>	<b>77.4</b>	<b>30.9</b>	<b>54.7</b>
Total Suckers:	272	209	296
<i>Assessment Result</i>			
<i>Avg. mORFI Score</i>	<b>36.3</b>	<b>24</b>	<b>27.8</b>
Fish Condition Rating	<b>Good</b>	<b>Fair</b>	<b>Fair</b>



such, forested sandy shorelines are prevalent as well as increased  
 n one large tributary the Scioto River (OH), and several smaller creeks  
 ucky (Tygarts and Kinniconick).



IN LEVEL	SITE LEVEL	
ENTAL ATTRIBUTES	BIOLOGICAL CONDITION RATINGS	
	FISH	MACROS
o River	Excellent	Excellent
utaries	Very Good	Very Good
s & Dam	Good	Good
t Populous Cities	Fair	Fair
eloped Areas	Poor	Poor
cultural/Pastoral Lands		
ural Forests		

MELDAHL POOL









# Meldahl Pool (2007 – 2012 – 2017)

Variable	2007	2012	2017
<i>Environmental Factors</i>			
Avg. Conductivity	499	456	380
Avg. Secchi Depth	52.6	38.5	28.3
<i>Avg. % Tolerant Score</i>	<b>96.9</b>	<b>93.2</b>	<b>91.4</b>
<i>Avg. % Non-Native Score</i>	<b>98.1</b>	<b>95.7</b>	<b>78.5</b>
Common Carp	7	8	12
Redear Sunfish	0	0	2
Striped Bass	0	0	3
<i>Avg. % Piscivore Score</i>	<b>62.1</b>	<b>32.4</b>	<b>22.5</b>
Sauger	63	37	40
Flathead Catfish	40	21	26
<i>Avg. Great River Species Score</i>	<b>77.8</b>	<b>57.8</b>	<b>37.8</b>
Silver Chub	16	13	8
Mooneye	12	5	0
<i>Assessment Result</i>			
<i>Avg. mORFIn Score</i>	48.09	39.89	36.15
Fish Condition Rating	<b>Very Good</b>	<b>Good</b>	<b>Good</b>



the following tributaries: Anderson River at mile point 731.5  
 k at mile point 742.2 with a drainage area of 124 square miles  
 e miles (ORSANCO 1994). The shorelines of this pool support a  
 ewburgh pool lies in a portion of the Ohio River where the land  
 so has a considerable amount of row crops (13.1%) and pasture



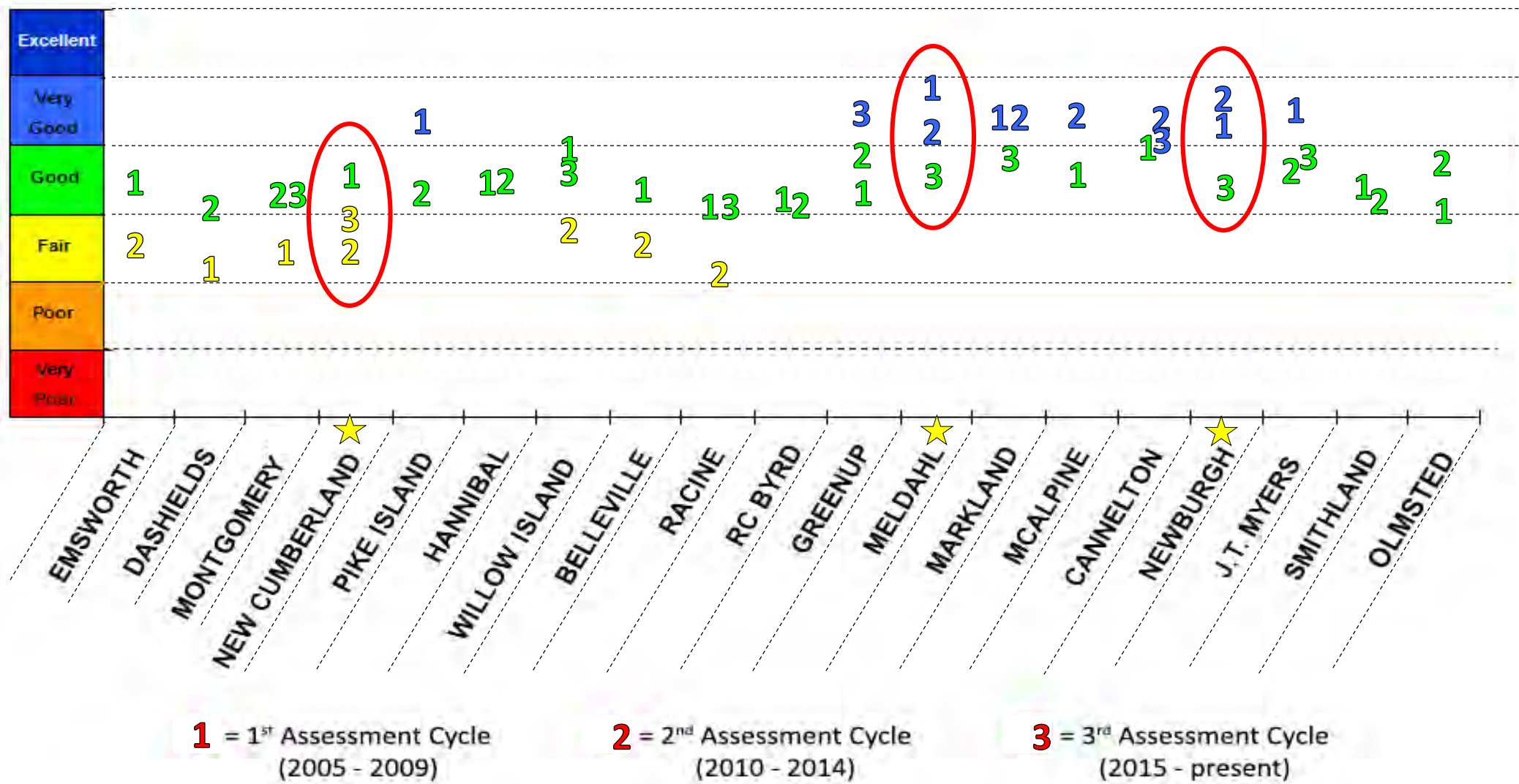
BASIN LEVEL		SITE LEVEL	
ENVIRONMENTAL ATTRIBUTES		BIOLOGICAL CONDITION RATINGS	
	Ohio River		Excellent
	Tributaries		Very Good
	Locks & Dam		
	Most Populous Cities		

# Newburgh Pool (2007 – 2012 – 2017)

Variable	2007	2012	2017
<i>Environmental Factors</i>			
Avg. Conductivity	460	615	302
Avg. Secchi Depth	46.2	64	32
<i>Avg. CPUE Score</i>	<b>36.8</b>	<b>72.9</b>	<b>21.1</b>
<i>Avg. % Tol Score</i>	<b>87.3</b>	<b>92.5</b>	<b>84.2</b>
# Tolerant individuals	56	108	60
<i>Avg. Species Score</i>	<b>49.1</b>	<b>74.2</b>	<b>50.8</b>
# Species	44	44	22
<i>Total # Individuals:</i>	530	775	565
<i>Assessment Result</i>			
<i>Avg. mORFIn Score</i>	<b>42</b>	<b>46.2</b>	<b>33.6</b>
Fish Condition Rating	<b>Very Good</b>	<b>Very Good</b>	<b>Good</b>



# Past vs. Present

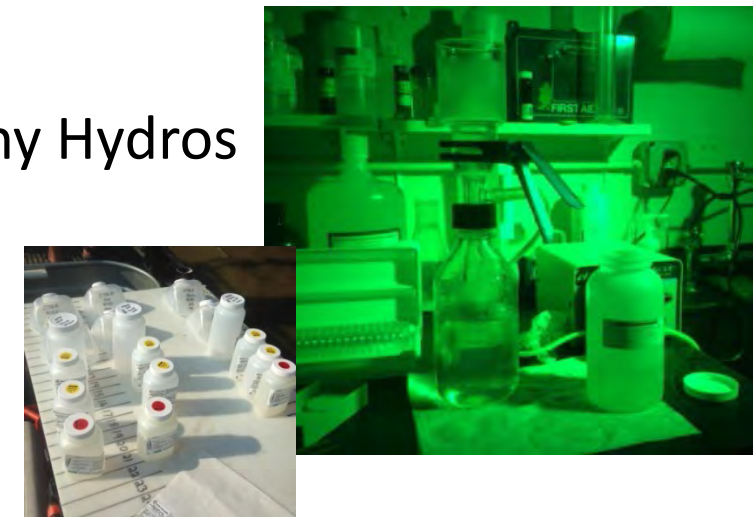


# Macros/HOBO Retrieval

*Sampled at each EF site*

*HDD and Kicks*

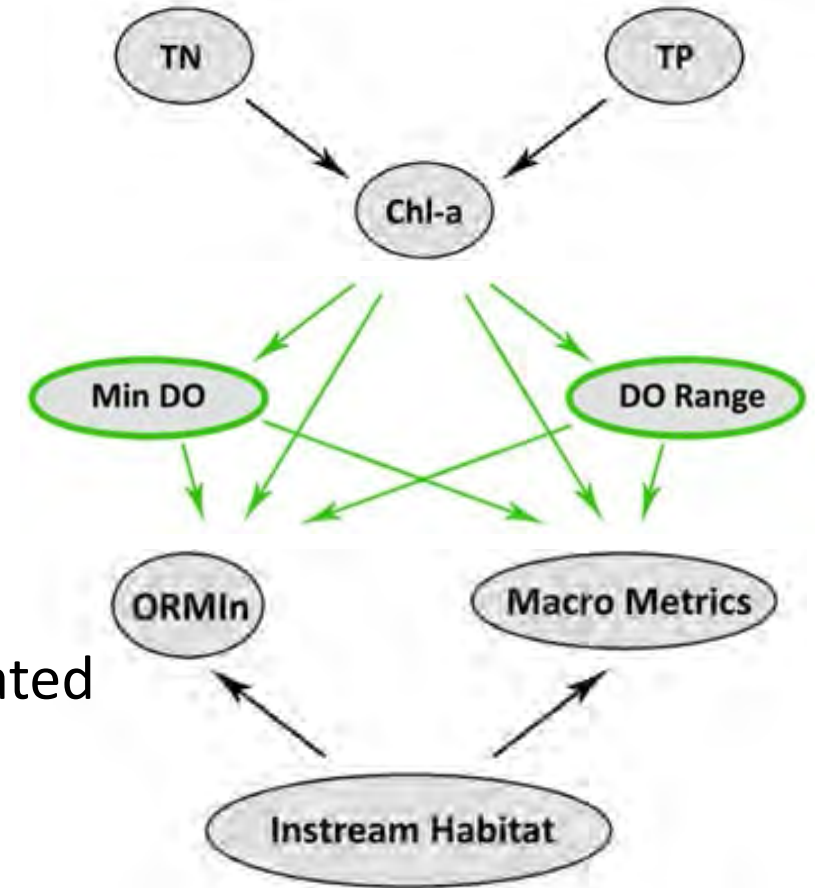
- 2017 was a success
  - 91% HDD retrieved (41/45)
    - Two due to beavers
  - 96% MH completed (68/71)
    - Barge covered 90% of zone
    - Resources/weather precluded samples at Allegheny Hydros
  - 95% HOBO DO retrieved (48/50) – Set in June
    - For Nutrient Criteria, lost and replaced one at Newburgh Hydro





# Nutrient Criteria

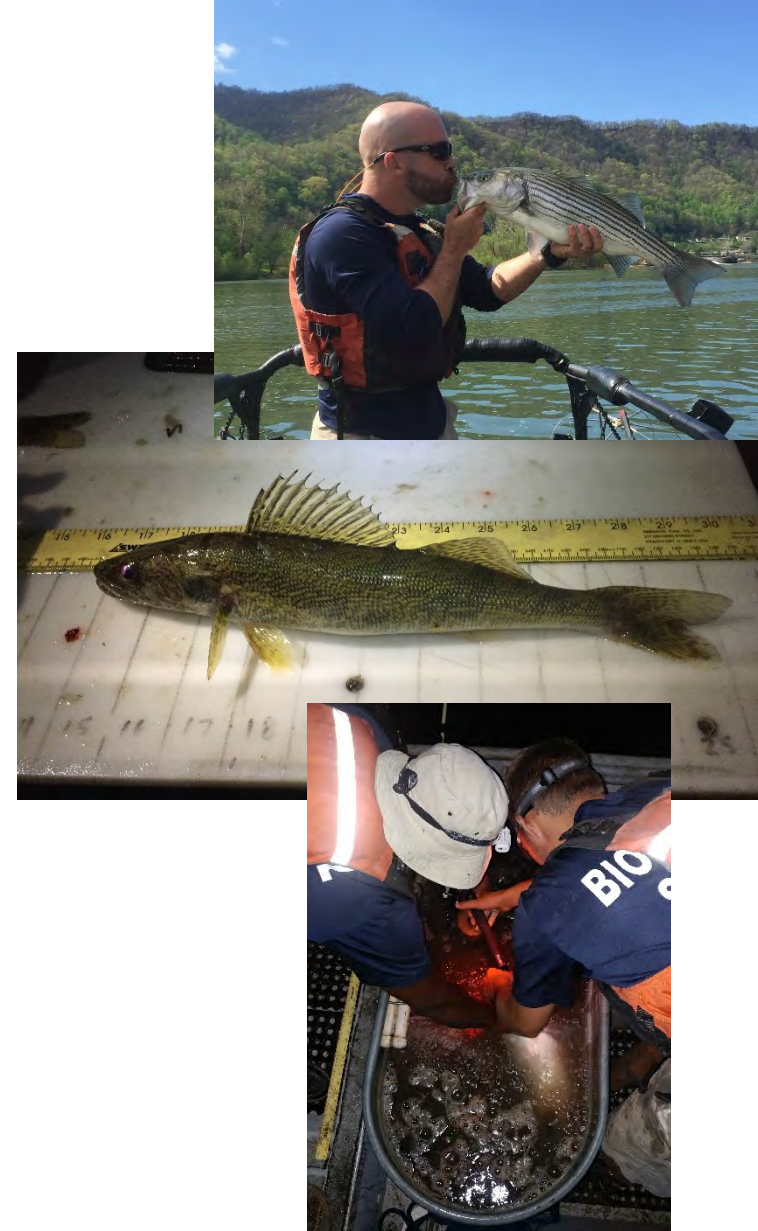
- ORMIn metrics showed responsiveness to nutrients
- Missing Piece = Continuous DO at macro sites
  - Continuous DO / Temp loggers deployed
  - 3 rounds
    - Grab samples for TKN, N-N, Ammonia, TP and Chl-a
- USACE Louisville co-op 2014-16
- 2017 samples were fully funded by ORSANCO
  - One round dropped
  - Additional sediment / surface WQ samples were eliminated
    - Repurposed funds paid for Cannelton 2016 MH processing
- All HOBO data offloaded going thru QA
- Sufficient HOBOS for 2018 deployment



ORSANCO's conceptual approach to nutrient criteria development modified from Qian & Miltner (2014, in prep)

# Ohio River Fish Tissue Update

- 27 composite fish tissue samples were submitted to the lab for analysis in 2017. Data expected by April 2018.
- Staff conducted an RFP process in 2017 and selected PACE Analytical Services LLC. to continue to provide analyses and logistical support for the next 5 years.
- 305(b) consumption-weighted methylmercury assessments are complete (2012-2016 data).





# Other Initiatives & Research





# 2017 Special Surveys: Ohio Tributary Temperature Regimes





# 2017 Special Surveys: Direct Tributary Sampling

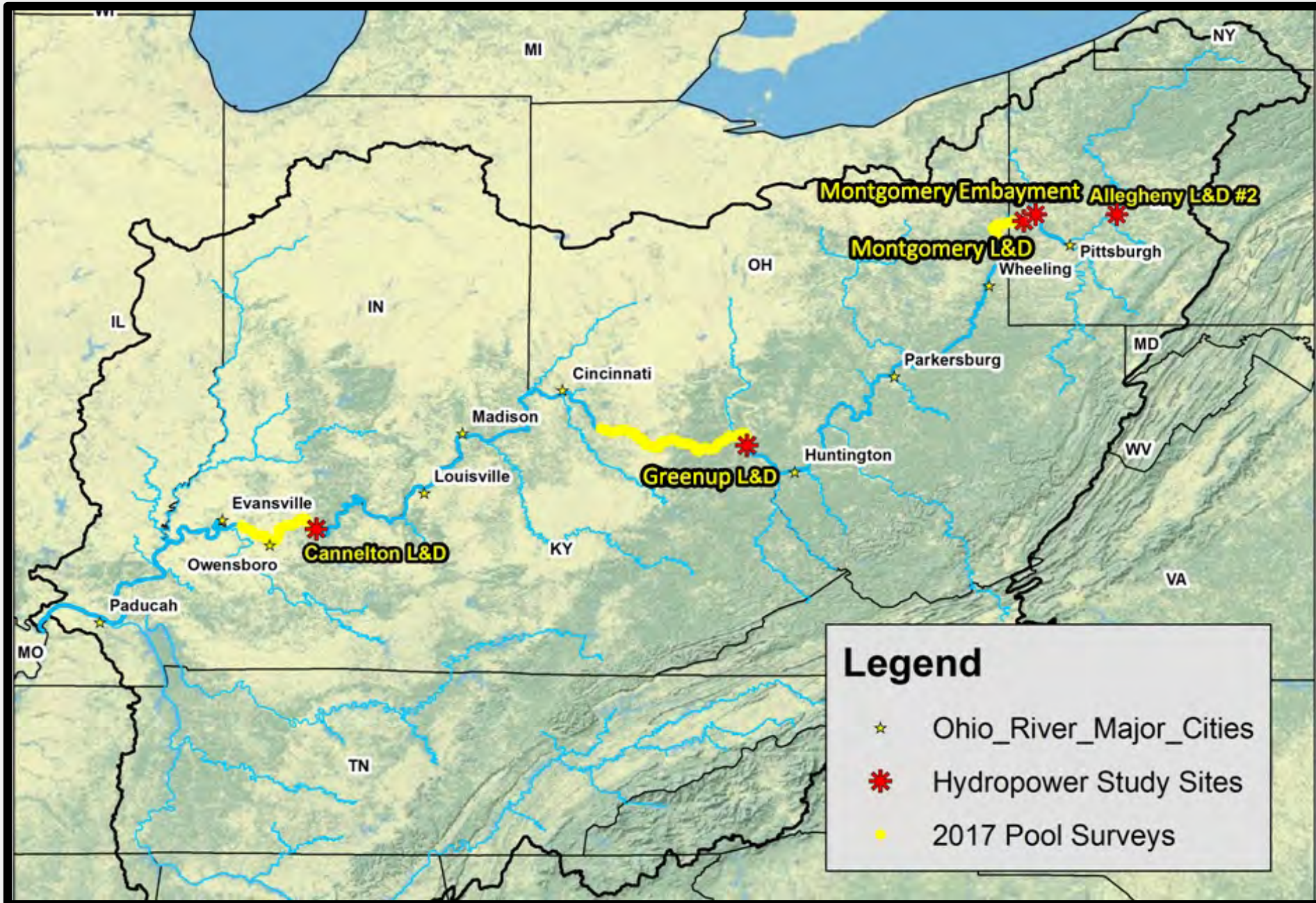


# Direct Tributary Sampling Summary:

	Deliverables			
Site	fish data	phys. parameters	Miwb Score	fish tissue
Anderson River	X	X	X	X
Blackford Creek	X	X		X
Little Beaver Creek 1	X	X		
Little Beaver Creek 2	X	X		
Little Pigeon Creek L	X	X	X	X
Little Pigeon Creek R	X	X	X	X
Little Yellow Creek 1	X	X		X
Little Yellow Creek 2	X	X		
Tygarts Creek	X			



# 2017 Special Surveys – Hydropower Impact Estimate



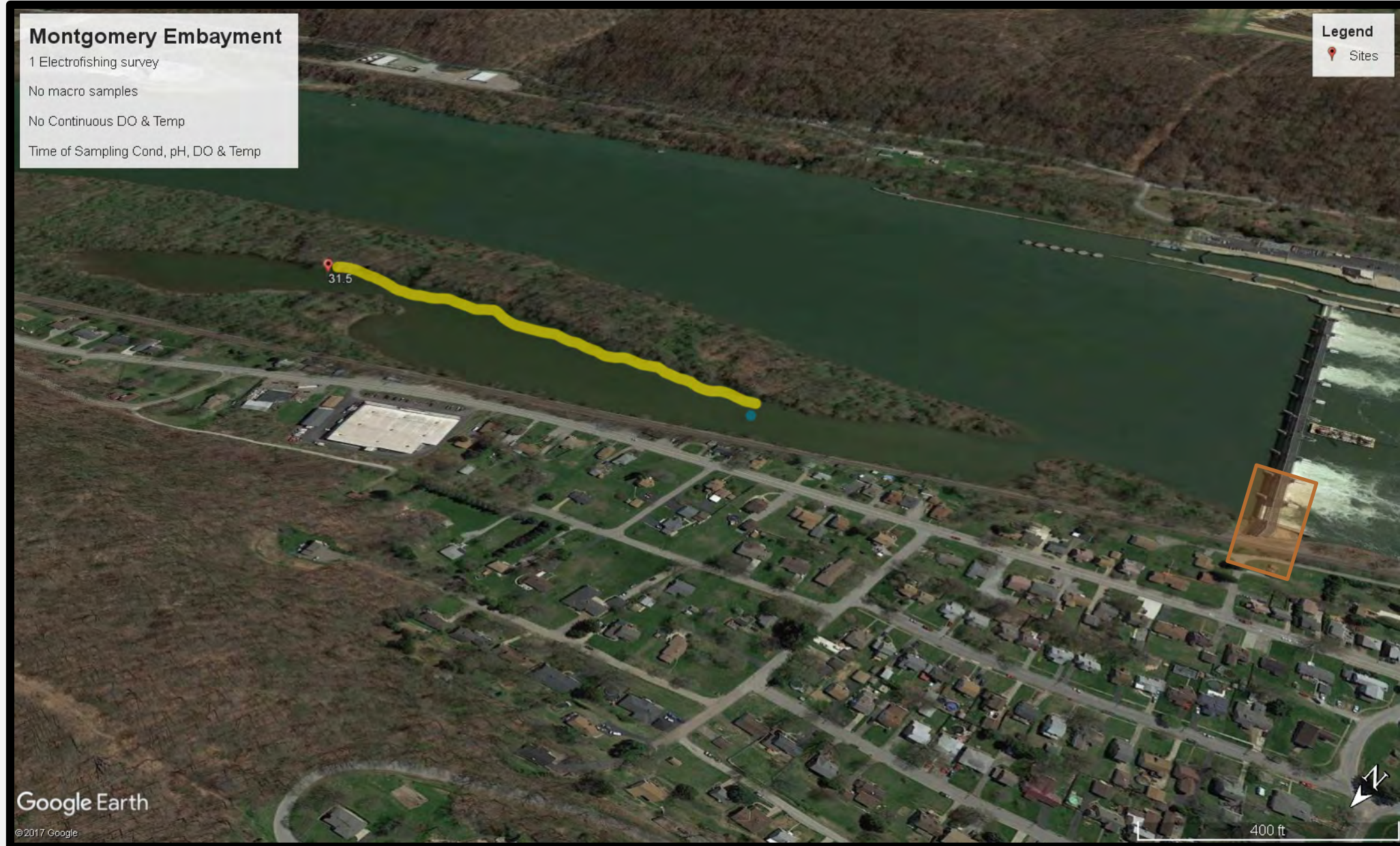


# Allegheny L&D 2 Tail Waters – Hydro Planned





# Above Montgomery L&D – Hydro Planned





# Montgomery Tailwaters – Hydro Planned

## Montgomery L&D


3 Electrofishing survey

3 MH macro samples

Continuous DO & Temp

Time of Sampling DO & Temp Profile

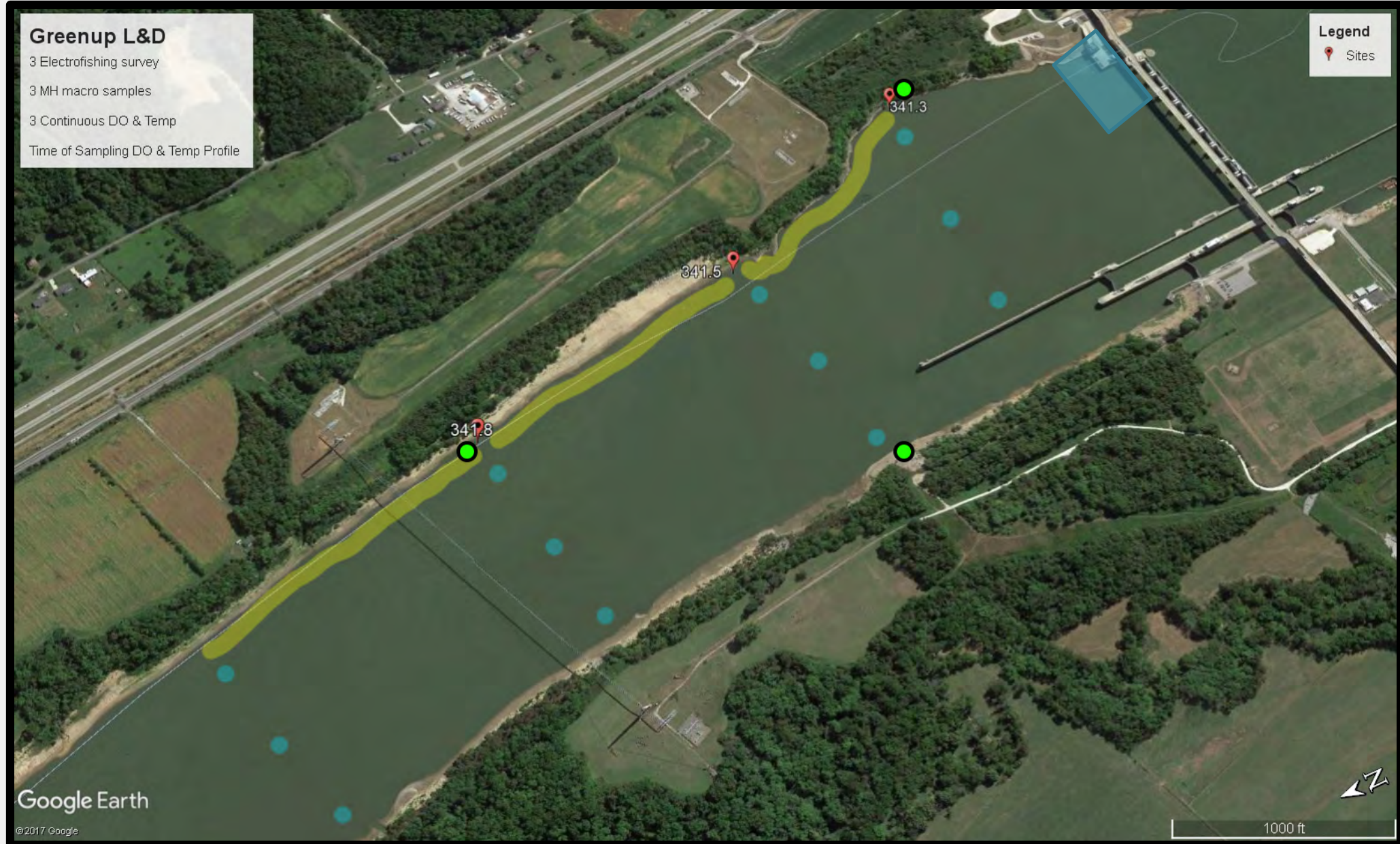
## Legend

 Sites

Generate mORFI<sub>n</sub> Scores for up to 11 “Sites” DS of Hydro

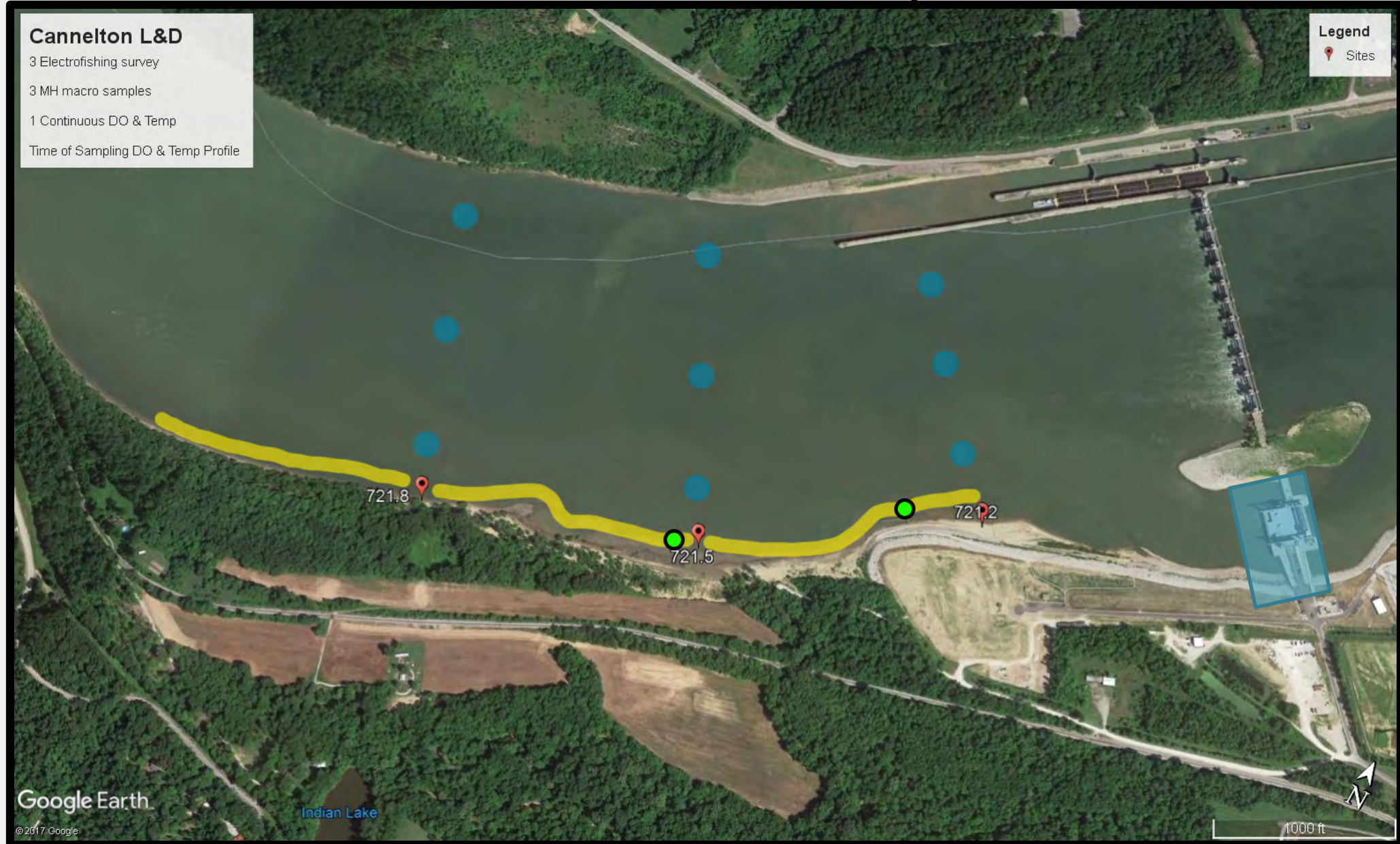


# Greenup Tailwaters – Hydro Present





# Cannelton Tailwaters – Hydro Present





# Desired Hydro Analyses - TBD



- Allegheny L&D 2 and Montgomery Embayment
  - No continuous data
  - lack paired pool survey information (Emsworth – '12, Mont – '15)
  - mORFIn, MH ORMIn, other IBI scores can be generated as baseline
    - Site placement precludes using sliding zone approach
- Montgomery Tailwaters
  - IBI scores can be calculated as a reference
  - Continuous DO data can be summarize for reference

# Desired Hydro Analyses - TBD



- Greenup and Cannelton Tailwaters
  - IBI scores of hydro sites can be compared to probabilistic sites throughout the downstream pool
  - Use sliding zone approach to generate scores and determine if a gradient/pattern in condition exists downstream of hydro
  - Compare 2017 scores, substrate compositions, DO and Temp values to historical values for sites in the same vicinity (if present)
- Group Input – other analyses required?



# EPRI Agreement – Mussel Survey & Database

- Awarded October 2017 an agreement that:
  - Funded a probabilistic survey of Newburgh Pool sites for mussels
    - Newburgh Pool was the site of our only other mussel survey in 2012
    - Subcontractor complete last week of October, data has been returned
  - Requires staff to generate an Ohio River Basin Mussel DB
    - With at least 50 mussel surveys from the ORB
- Final Database and Report of Survey due April 2018
  - Currently soliciting agencies for Ohio River survey data for addition to the database



Transect 200 m

Transect 100 m

Transect 0 m

10m

- Segment 1
- Segment 2
- Segment 3
- Segment 4
- Segment 5
- Segment 6
- Segment 7
- Segment 8
- Segment 9
- Segment 10

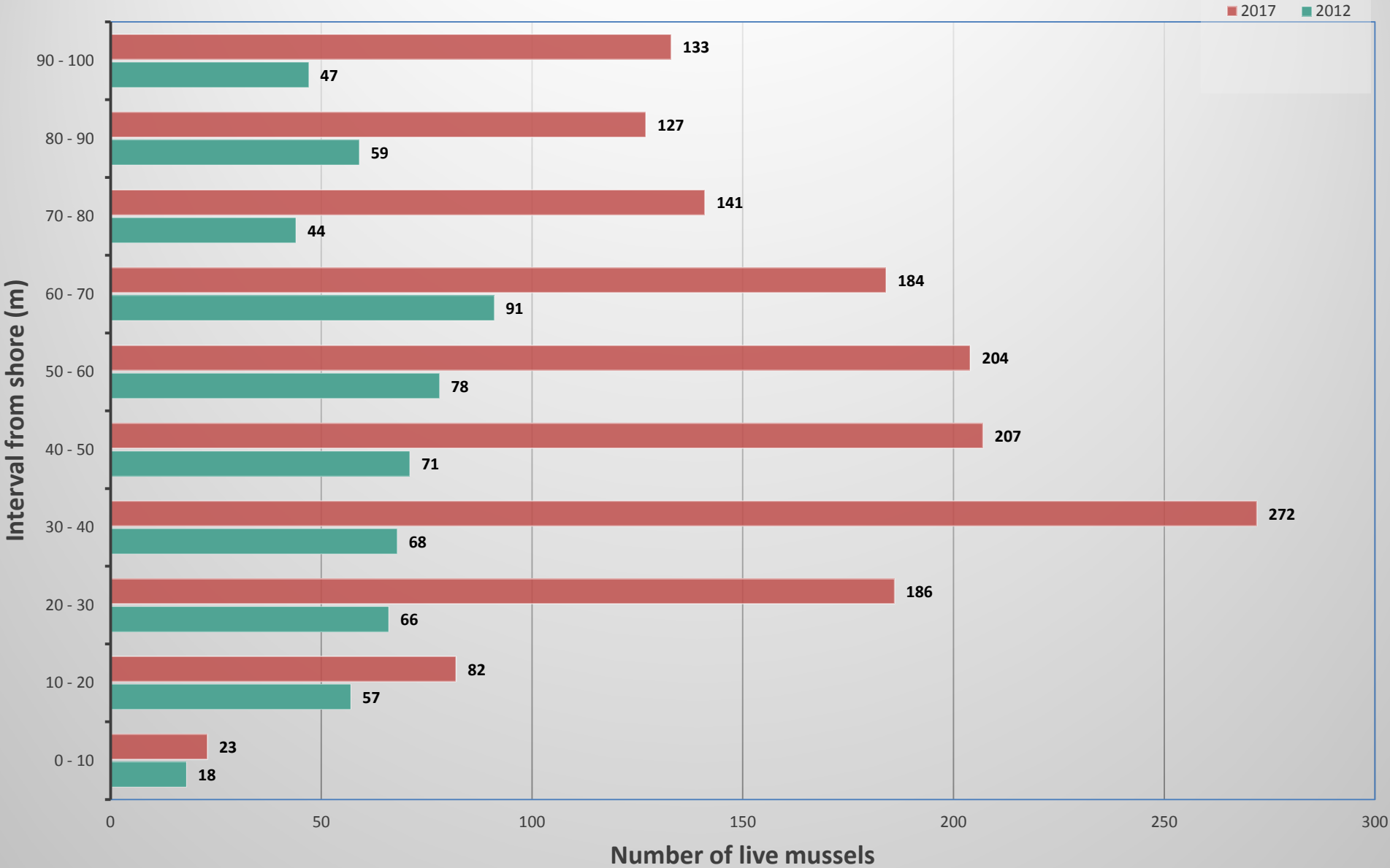
100 m

100 m

Flow



# Live mussels found per interval from shore



Species Name	Threatened & Endangered	2012	2017
<i>Amblema plicata</i>		180	353
<i>Arcidens confragosus</i>			1
<i>Cyclonaias tuberculata</i>	T	1	
<i>Ellipsaria lineolata</i>	E & T	10	54
<i>Elliptio crassidens</i>	E & T	2	1
<i>Fusconaia ebena</i>	E	95	339
<i>Fusconaia flava</i>		14	65
<i>Lampsilis cardium</i>		8	1
<i>Lampsilis ovata</i>	E	1	5
<i>Lampsilis teres</i>	E		1
<i>Lasmigona complanata</i>			1
<i>Leptodea fragilis</i>	E & T	1	2
<i>Ligumia recta</i>	E & T	15	23
<i>Megalonaias nervosa</i>	T	6	12
<i>Obliquaria reflexa</i>		100	258
<i>Obovaria olivaria</i>		4	11
<i>Plethobasus cyphus</i>	E	1	1
<i>Pleurobema cordatum</i>	E		9
<i>Potamilus alatus</i>		27	24
<i>Quadrula metanevra</i>	E & T	13	54
<i>Quadrula nobilis</i>		1	
<i>Quadrula nodulata</i>		37	113
<i>Quadrula pustulosa</i>	T	57	173
<i>Quadrula quadrula</i>		24	56
<i>Tritogonia verrucosa</i>	T	1	1
<i>Truncilla truncata</i>			1
<b>Grand Total</b>		<b>598</b>	<b>1559</b>

- **53%** of the species found are listed as endangered or threatened
- There is a **38%** increase in total individuals found from 2012 to 2017
- Known taxa in Newburgh pool: **30**
- Taxa observed in 2012: **22** (73%)
- Taxa observed in 2017: **24** (80%)

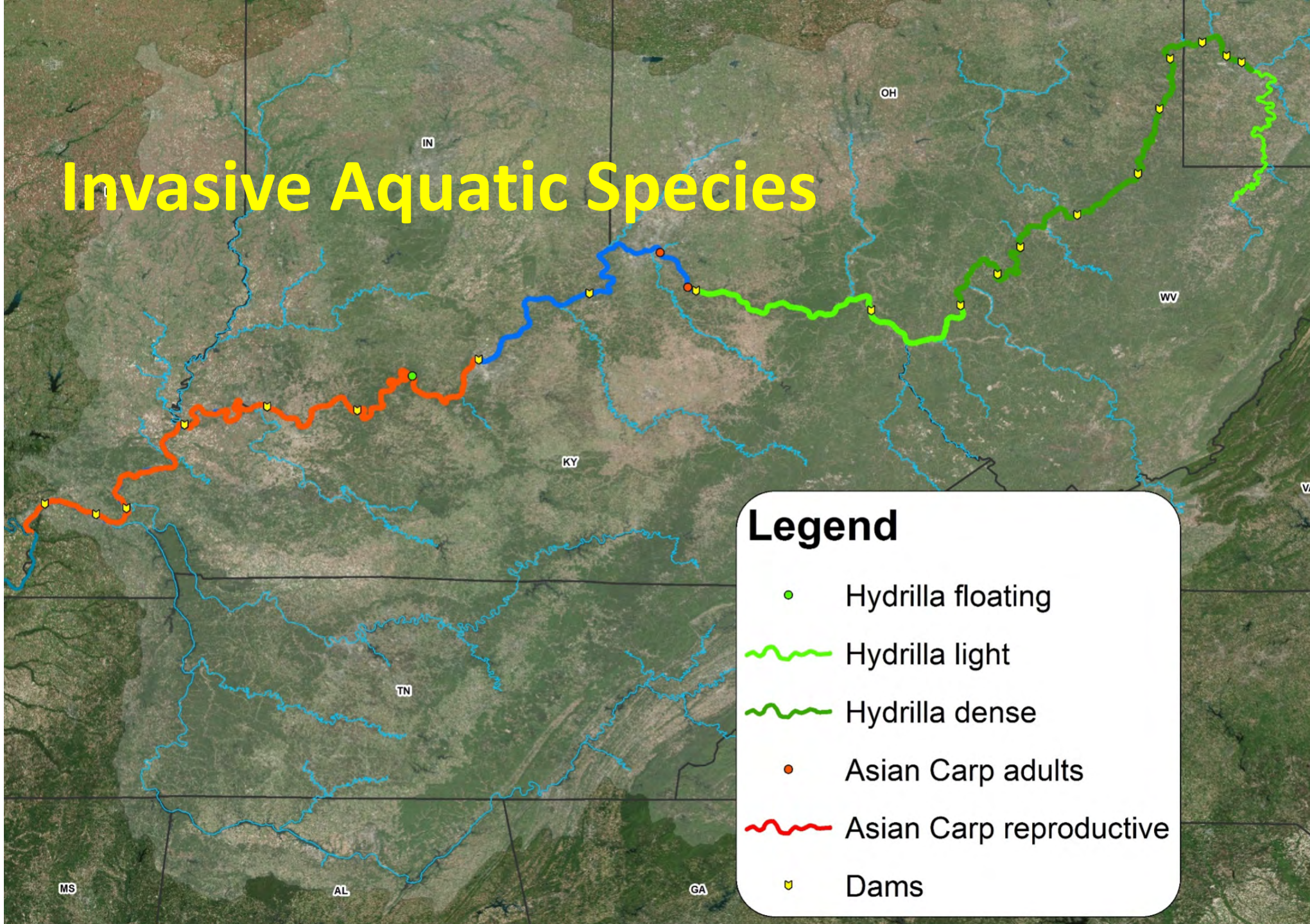




# Invasive Aquatic Species

## Legend

- Hydrilla floating
- Hydrilla light
- Hydrilla dense
- Asian Carp adults
- Asian Carp reproductive
- Dams







# Submerged Aquatic Vegetation (SAV) Summary



New Cumberland			
All Vegetation		Invasives	
% Sites	% Transects	% Sites	% Transects
100	72.62	92.9	63.1

- All sites and a majority of transects in New Cumberland had submerged aquatic vegetation.
- 92.9% of sites with vegetation included invasives and 88.5% of transects with vegetation included invasives.

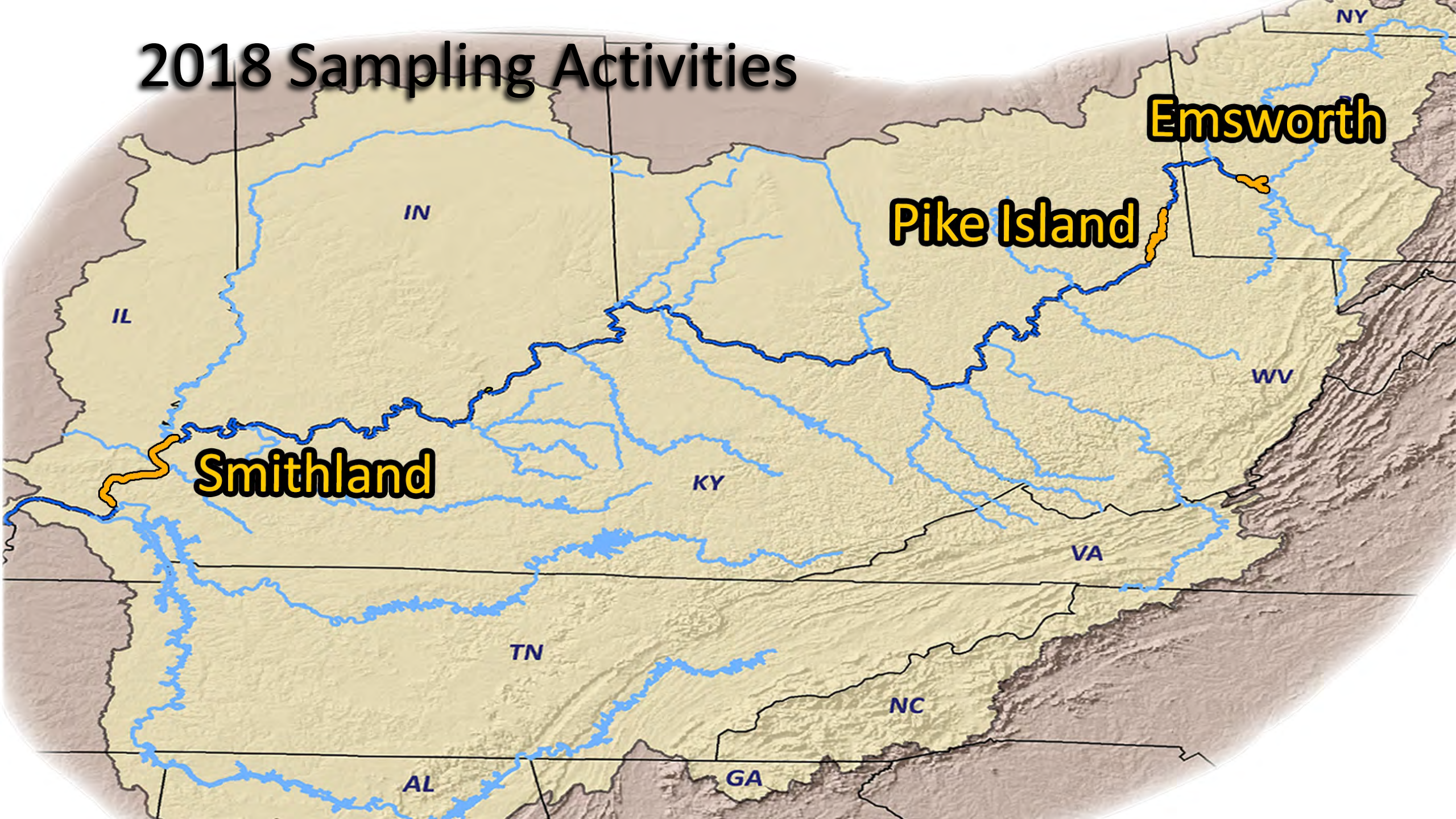
Meldahl			
All Vegetation		Invasives	
% Sites	% Transects	% Sites	% Transects
13.3	6.67	13.3	5.56

- Very few site in Meldahl had any submerged aquatic vegetation collected or observed.
- 100% of sites with vegetation included invasives and 83.3% of transects with vegetation included invasives.

\*\*\* No submerged aquatic vegetation was collected or observed in Newburgh Pool



# 2018 Sampling Activities





# 2018 Pool Schedule

Pool	Times Assessed	Yrs Since last Assmnt	Cycle 1					Cycle 2					Cycle 3					Cycle 4							2028		
			2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026		2027	
Emsworth	2	5			X					X					X								X				
Dashields	2	4				X					X						X							X			
Montgomery	3	2		X				X					X						X								
New Cumberland	3	-	X							X				X								X					
Pike Island	2	5			X					X					X								X				
Hannibal	2	4				X					X						X							X			
Willow Island	3	1		X						X				X						X							
Belleville	2	3					X					X						X							X		
Racine	3	2	X					X					X						X								
RC Byrd	2	4				X					X						X						X				
Greenup	3	1		X						X				X						X							
Meldahl	3	-			X						X				X						X						
Markland	3	3	X				X					X						X							X		
McAlpine	2	3					X					X						X							X		
Cannelton	3	1		Xa	Xb					X			X							X							
Newburgh	3	-			X						X				X						X						
IT Myers	3	2	X					X					X							X							
Smithland	2	4				X					X					X						X					
Olmsted	2	3					X					X					X					X	or----->		X		
Open Water	2	3					X					X					X					X	or----->		X		
Everything past the double yellow line is hypothetical																											



# Bio Studies Prioritization

- \_\_\_A) Collect **water/sediment chemistry** at fish/bug sites
- \_\_\_B) **Revisit** pool from previous year with borderline results (In 2018-2019, the revisit would have to substitute for one of the two scheduled pools)
- \_\_\_C) Determine effects of **seasonal influences** on mORFIn scores
- \_\_\_D) Incorporate **targeted sampling**
- \_\_\_E) Conduct **Asian Carp surveys** to determine upstream breeding extent
- \_\_\_F) Contract out **Mussel surveys**
- \_\_\_G) Impacts of **microplastics/microbeads** on aquatic life
- \_\_\_H) Biological surveys of lower reaches of direct **tributaries**
- \_\_\_I) Targeted sampling to determine **Hydropower** impacts



# National Rivers and Streams Assessment (NRSA) for 2018-2019



- A national probability-based survey of rivers and streams based on physical, chemical and biological data collected and analyzed using standardized field and laboratory methods.
- The goals of the NRSA are:
  - to determine the extent to which rivers and streams support a healthy biological condition and the extent of major stressors that affect them.
  - to determine whether our rivers and streams are getting cleaner and how we might best invest in protecting and restoring them
- ORSANCO has participated in all EPA NRSA events since inception (2008).
- Funding from NRSA helps support multiple ORSANCO programs



PA – 18 Sites  
WV – 4 Sites  
OH – 39 Sites  
KY – 37 Sites

**Legend**

**Sites**

- Wadeable
- Large Boat
- Small Boat
- Revisits

0 25 50 100 150 200  
Miles

Source: USGS, NOAA, NASA, CIGAR, In situ, NCAS, ILES, DOD, MPA, Ecolab, etc. and the OES User Community

# NRSA Plan for 2018-19

- Sample 57 sites in 2018 field season and 37 in 2019. “Front load” sampling in the event of 2019 weather issues
- Large boatable sites (13) can be done with our current electrofishing gear
- Small boatable (33) sites will require purchase of a 14 foot jon boat (to be purchased in 2017) and outfitted with electrofishing equipment. This boat may also be used in support of aquarium displays
- Wadeable Sites (48) will require the purchase of a backpack electrofisher
- Crew will consist of 1 ORSANCO employee, 1 contract biologist, and 2 seasonal biologists.
- ORSANCO will retain all equipment purchased



# New NRSA Tributary Workboat



# NRSA 2.0

- Planning for new strategy to commence after 2021 – Wetlands

Current Cycle

	2022	2023	2024	2025	2026
Lakes	50				
Rivr&Strms		32	32		
Coastal				11	
Wetlands					26

Proposed Cycle

	2022	2023	2024	2025	2026
Lakes	10	10	10	10	10
Rivr&Strms	13	13	13	13	13
Coastal	2	2	2	2	3
Wetlands	5	5	5	5	6

- Pros: Track trends, even out money and workload
- Cons: Hiring contractors, feasibility of training
- How would this effect your state/agency involvement?





# LifeBelow<sup>the</sup>Waterline

- Operated by ORSANCO since 2002
- 10-15 events each year in the Ohio River Basin
- Features fish species local to each event
- Educates the public on local fish diversity and aquatic ecology to encourage greater appreciation and understanding of the value of the Ohio River
- Presenters pay an operation fee to partially cover expenses





## 2017 Events:

1. OSU Museum Open House
2. Dayton Children's Water Festival
3. AEP Conesville Earth Day
4. River Sweep
5. Water For Life, KY
6. Outdoor Adventure Expo
7. Inland Waterways Festival
8. Boy Scout Conference
9. New Richmond River Days
10. Rural Heritage Festival
11. ALCOSAN Open House
12. Safety Fair, IN
13. BBQ on the River, KY
14. Subaru Outdoor Experience, OH
15. Adventure in Water Festival, KY
16. Patoka Wildlife Refuge, IN





New Paint in  
2017






# New Life Below the Waterline Website

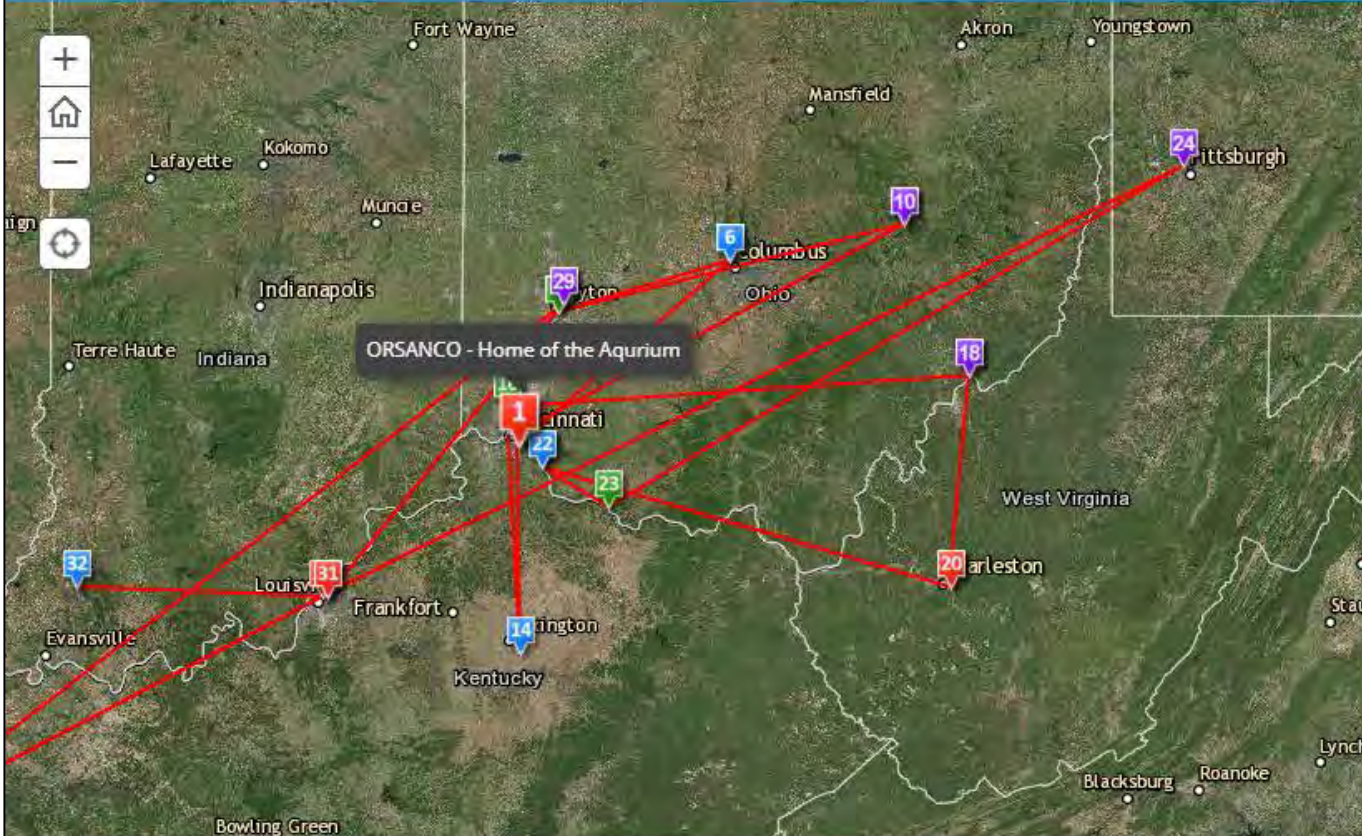
## Life Below the Waterline

Below is a tour of our traveling aquarium with info about how it works, what we offer and how you can get it. Also,


Switch to builder mode

ORSANCO






ORSANCO - Home of the Aquarium




**ORSANCO - Home of the Aquarium**


The Life Below the Waterline traveling Aquarium can be taken anywhere to display fish from your own "backyard" and then released back into the same body of water. Contact Steve Braun (sbraun@orsanco.org) for more information or an application




1 ORSANCO - Home of the Aquarium




2 placeholder




3 The Aquarium at Night




4 Knowledge is Power




5 Ohio State University Biological Museum Open




6 OSU Biological Museum Open House



7 Dayton, OH Children's Water Festival



8 Dayton's Children's Water Festival



9 AEP Conesville En Appreciation I



# **BWQSC Recommendations Summary**

- Accept the 2016 pool assessments indicating the macroinvertebrate (macro) and fish assemblages in Willow Island and Greenup pools were in 'Fair' or better condition. The Cannelton Pool assessment was based only on the fish survey and was assessed to be in 'Very Good' condition.**
- Accept the 2017 fish survey results which indicated the New Cumberland, Meldahl, and Newburgh pools as being in 'Fair' or better condition.**
- Analyze both the modified Ohio River Fish Index (*mORFI*n) and Ohio River Macroinvertebrate Index (*ORMI*n) for seasonality effects.**
- Sample 57 National Rivers and Streams Assessment (NRSA) sites in 2018 and the remaining 37 in 2019, at the expense of 1 biological pool survey per year.**
- Conduct probabilistic sampling in Emsworth and Pike Island pools in 2018. Proceed as planned with the current 6-7 year assessment cycle for the entire Ohio River.**
- Maintain current fixed station effort for 2018 and conduct targeted sampling, as resources allow, within the two probabilistic pools as directed by relevant state and federal agencies.**