

**Freshwater Stream  
Conditions in the Patuxent  
River Basin**

**Dan Boward, Michael Kashiwagi  
and Andy Becker**

**Patuxent River Conference**

**June 18-19, 2015**

# Information Sources

- **Maryland Biological Stream Survey**

- Fish/Benthic Indicators
- Physical Habitat
- Water Chemistry
- Land Use/Land Cover
- Patuxent - 276 Random Sites (1997 – 2014)



- **Maryland Stream Waders**

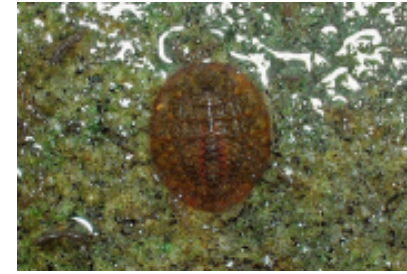
- Volunteers **are Very COOL!**
- Patuxent - 621 Hand-picked Sites (2000 – 2013)



- **CORE/Trend Program**

- Long-term Benthic Macroinvertebrate and Water Chemistry

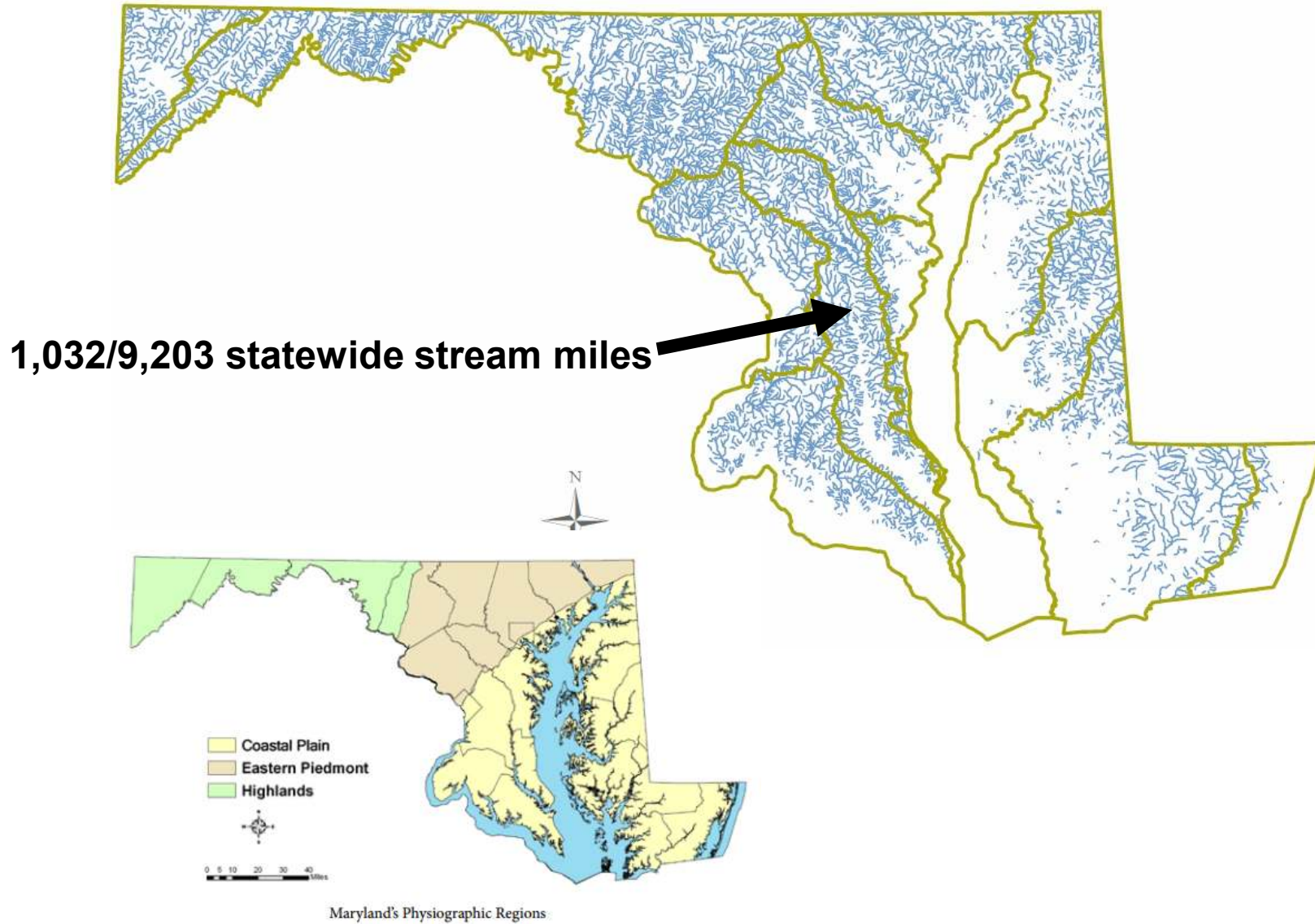
# Topics



- **Biological Condition**
- **Physical Habitat**
- **Water Chemistry**
- **Trends**
- **Want Data?**



# Maryland's 1<sup>st</sup> – 4<sup>th</sup> Order Streams

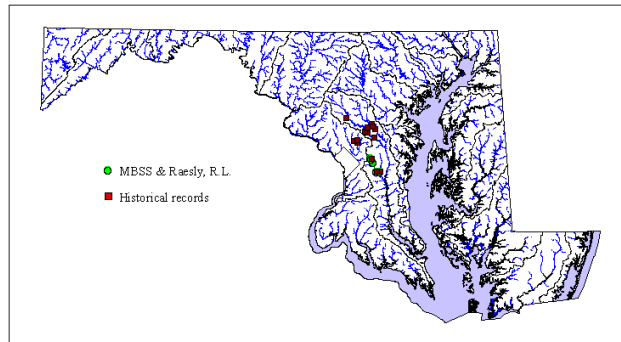
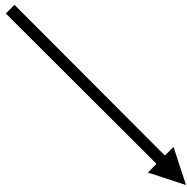


# Fish

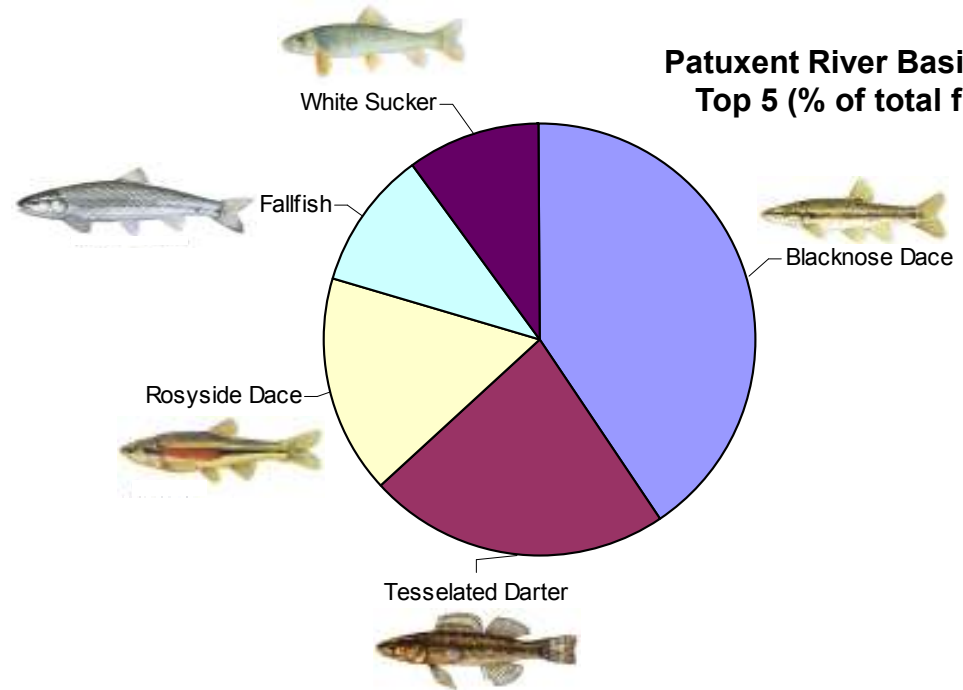
65/130 species statewide

7 RTE species

- *American Brook Lamprey*
- *Bluespotted Sunfish*
- *Glassy Darter*
- *Shield Darter*
- *Warmouth*
- *White Catfish*
- *Stripeback Darter (State Endangered)*



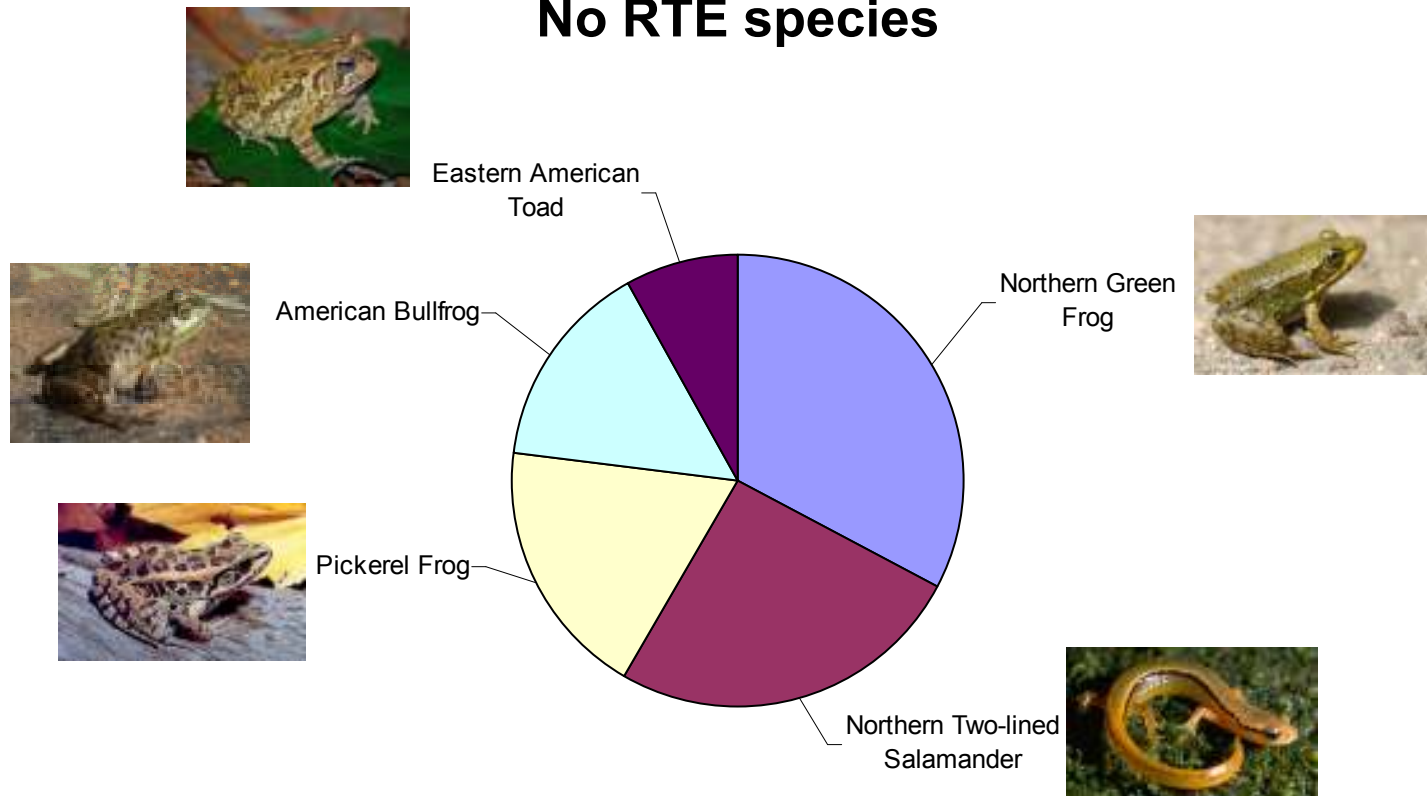
Patuxent River Basin fish  
Top 5 (% of total fish)



# Herpetofauna

42/92 species statewide

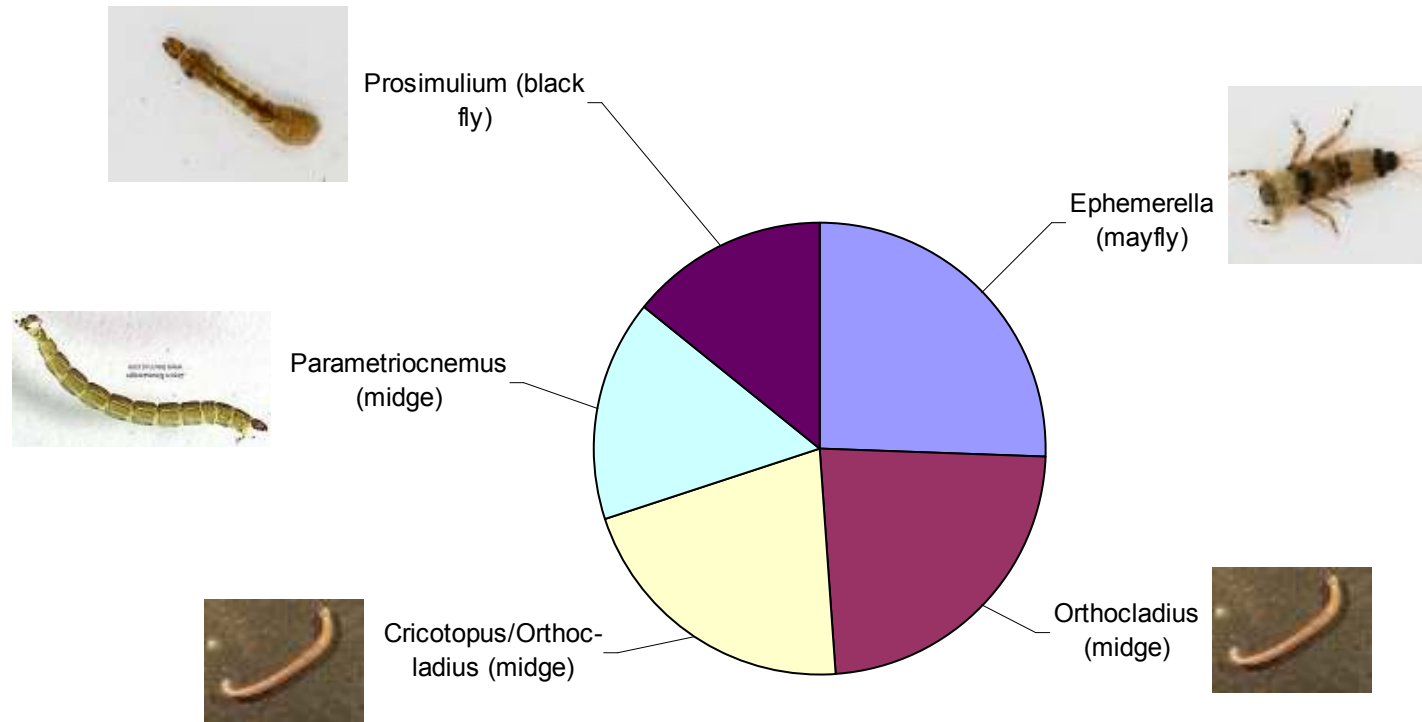
No RTE species



Patuxent River Basin herpetofauna  
Top 5, % of total sites

# Benthic Macroinvertebrates

328/643 taxa statewide



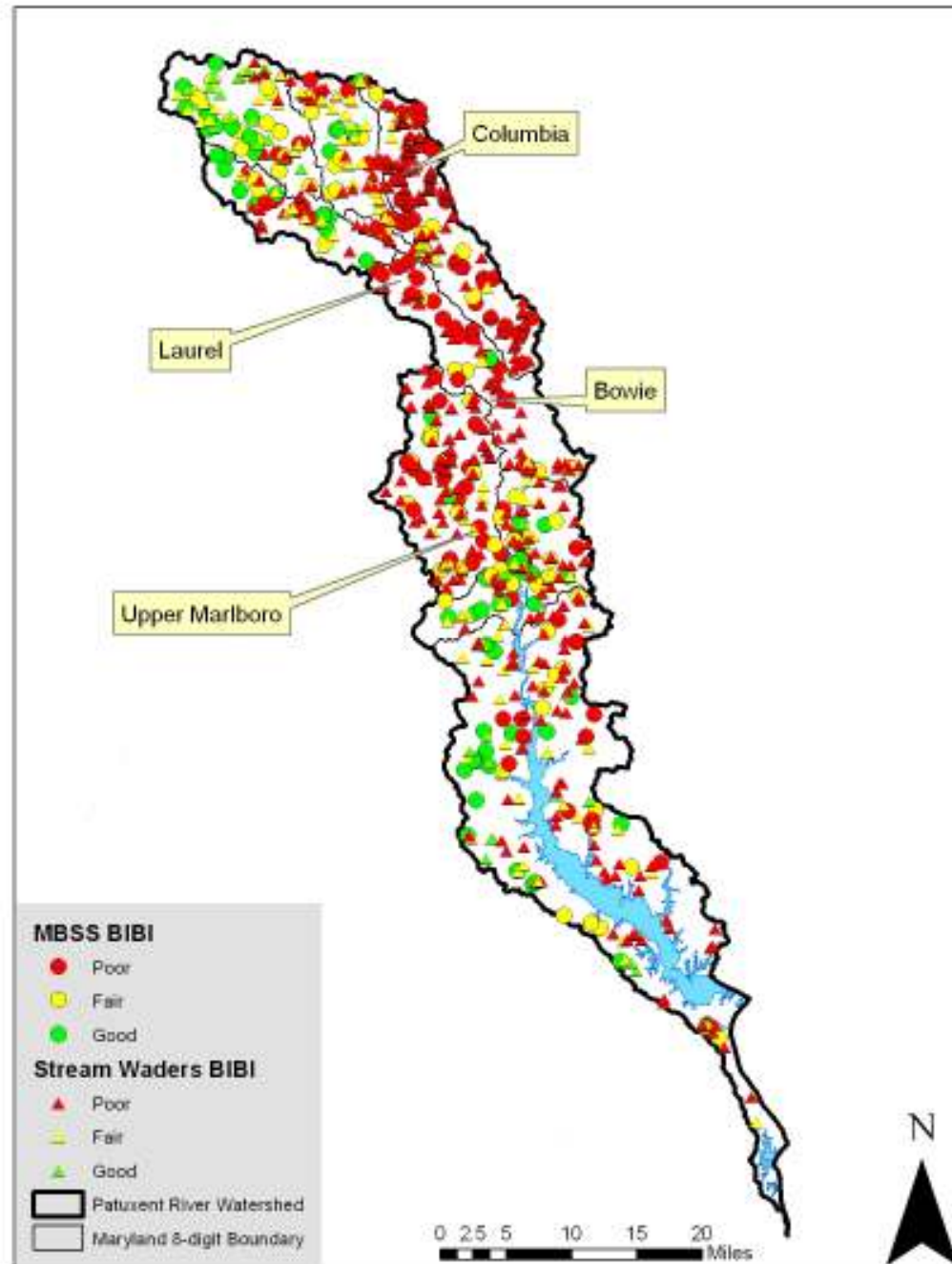
Patuxent River Basin benthic macroinvertebrates  
Top 5 (% of total invertebrates)

# Patuxent River Basin

## Benthic Index of Biotic Integrity

MBSS – 1995 – 2014

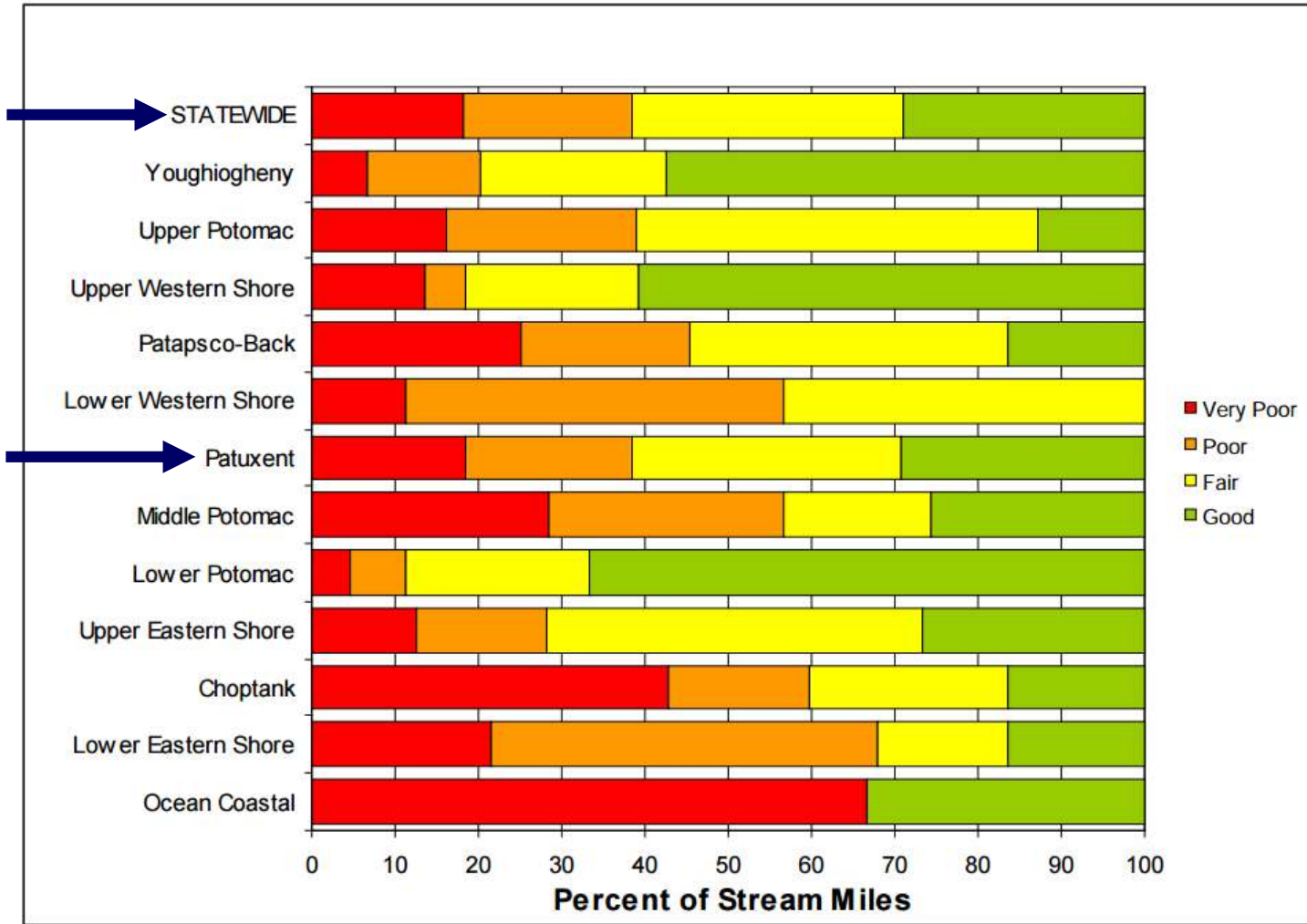
Stream Waders – 2000 - 2013





# Patuxent River Basin

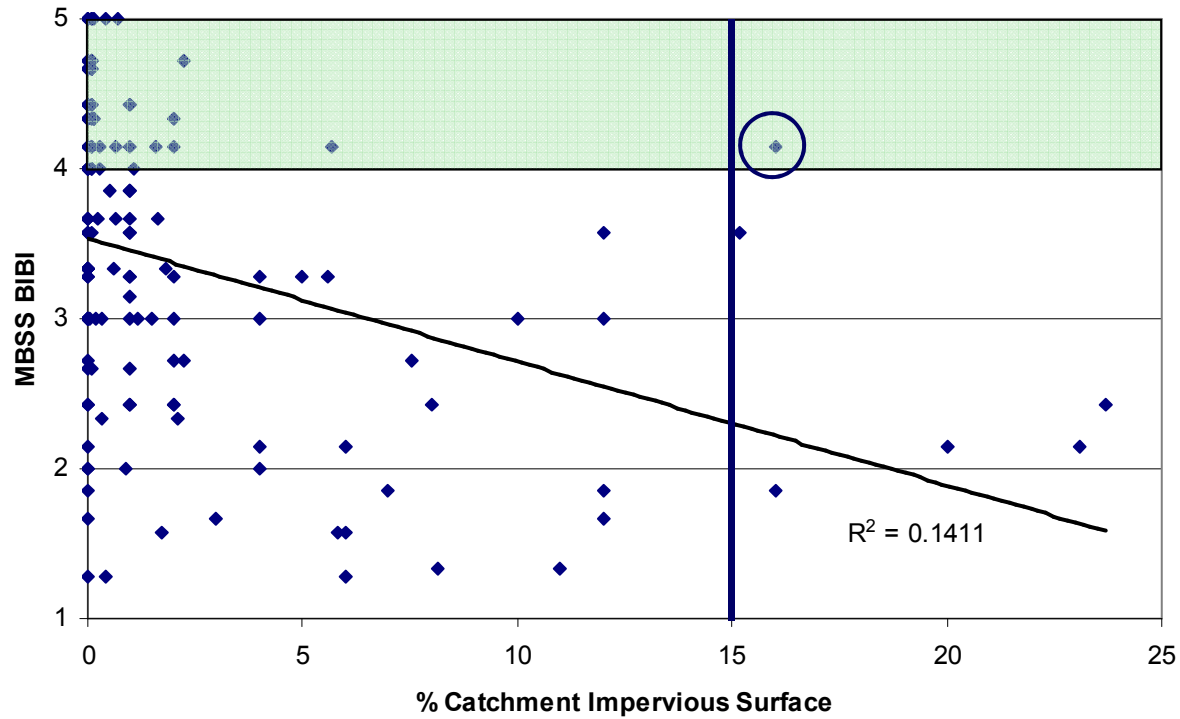
## Benthic Index of Biotic Integrity MBSS Round 3 (2007-2009)




# Patuxent River Basin

## Impervious Surface and Stream Health

MBSS – 2000 - 2014

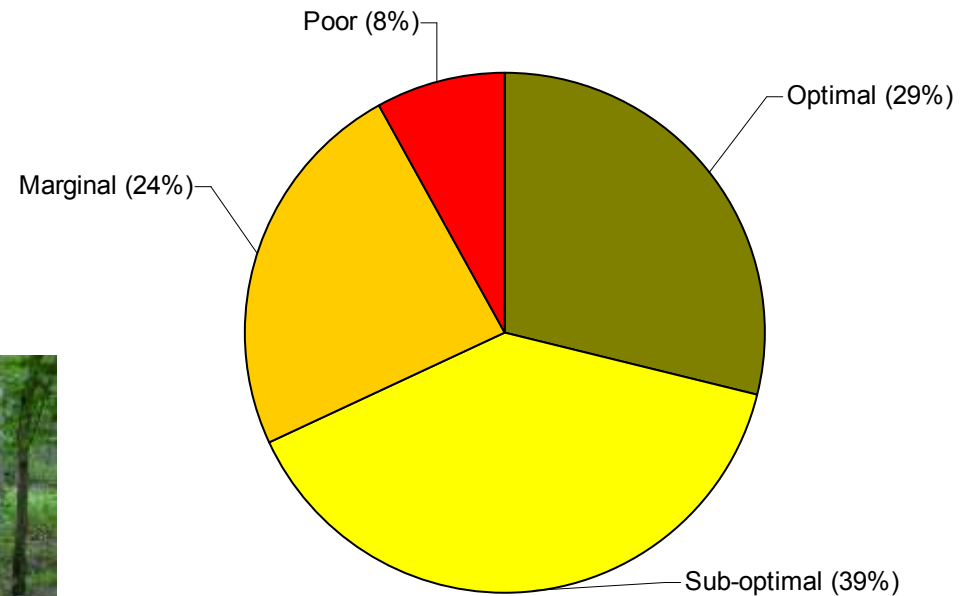


A photograph of a rocky stream in a forest. The water is clear and flows over large, light-colored rocks, creating small rapids and white water. The surrounding forest is dense with trees, many of which are bare, suggesting a late autumn or winter setting. The text "Physical Habitat" is overlaid in a large, bold, blue font in the center of the image.

# Physical Habitat

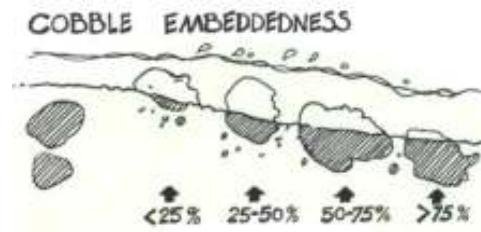
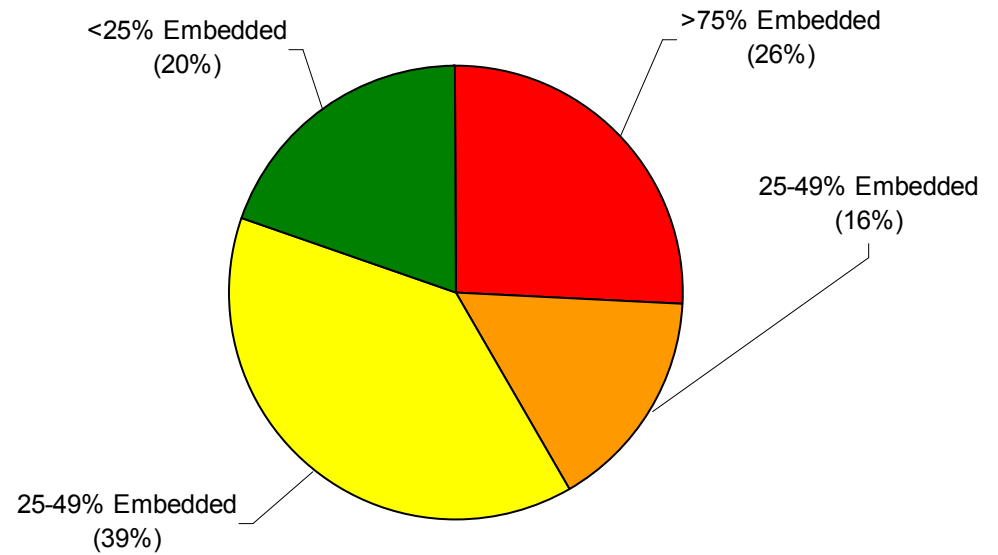
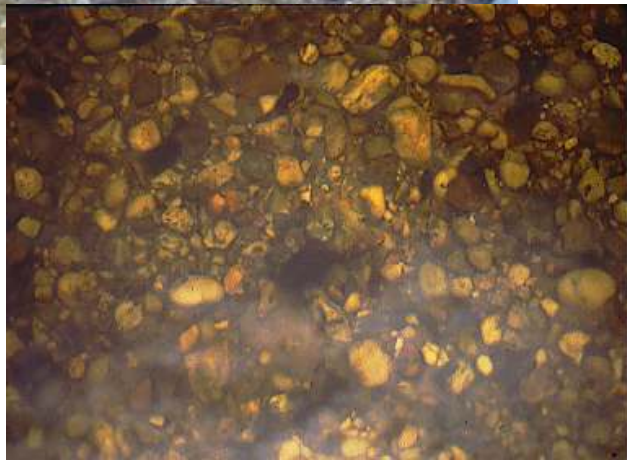
# Patuxent River Basin

**Instream Habitat - Variety and Complexity of Fish Habitat**  
**MBSS – 2000 - 2014**



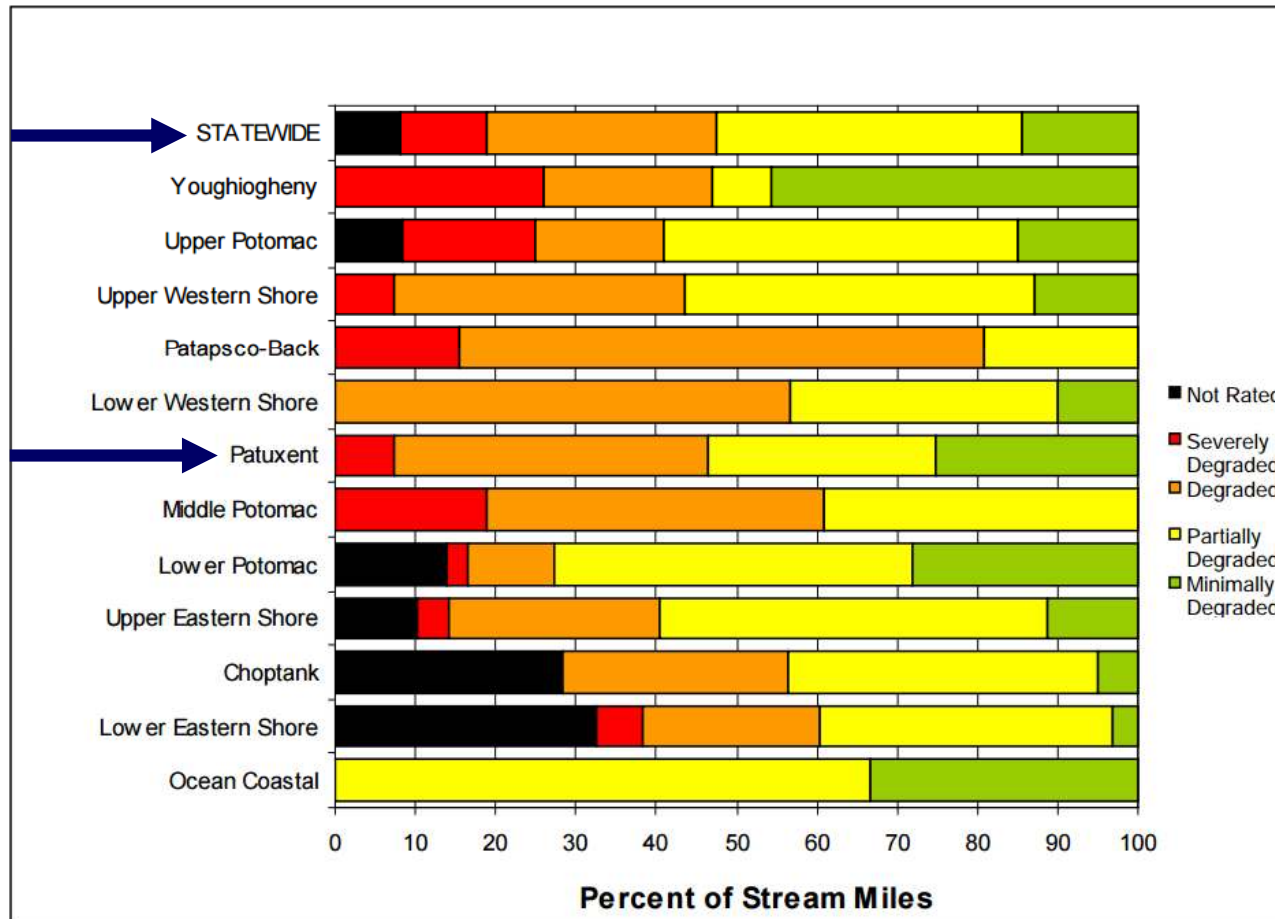
# Patuxent River Basin

Riffle Embeddedness – Spaces for Invertebrates and Fish Eggs  
MBSS – 2000 - 2014



# Patuxent River Basin

## Physical Habitat Index MBSS Round 3 (2007-2009)

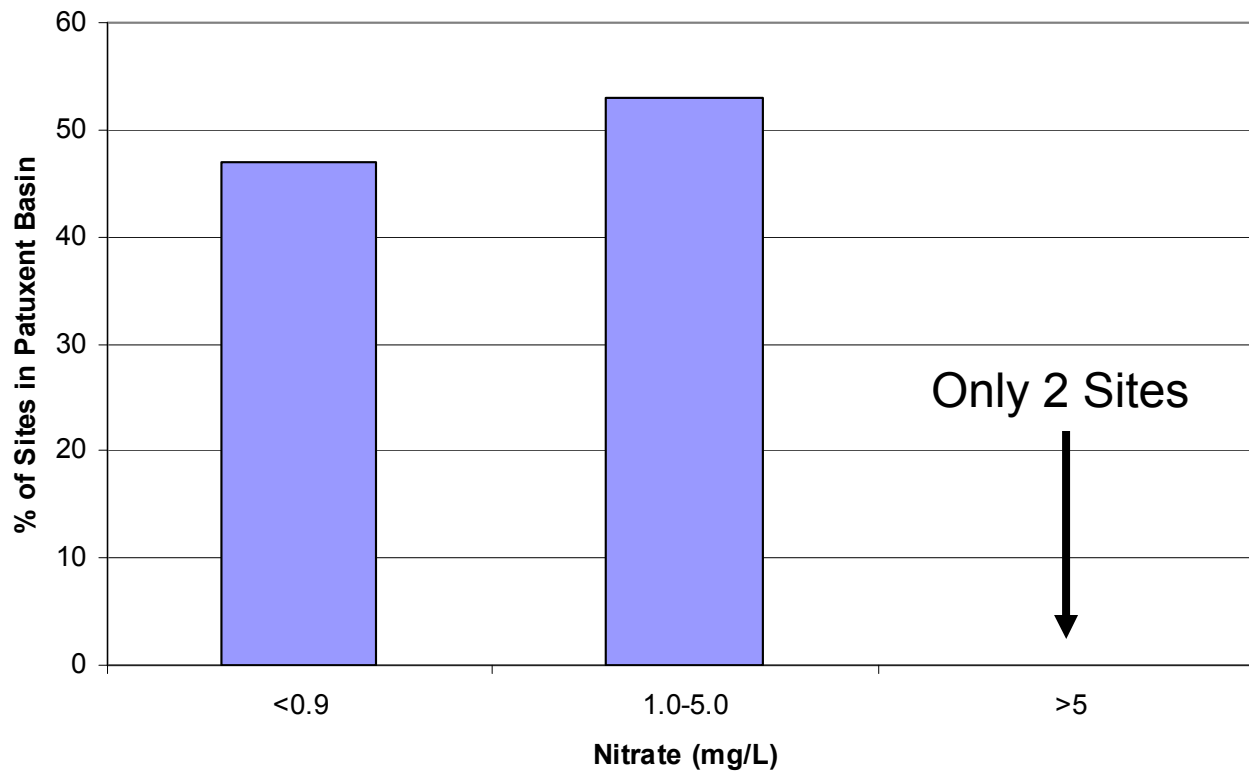




# Water Chemistry

# Patuxent River Basin

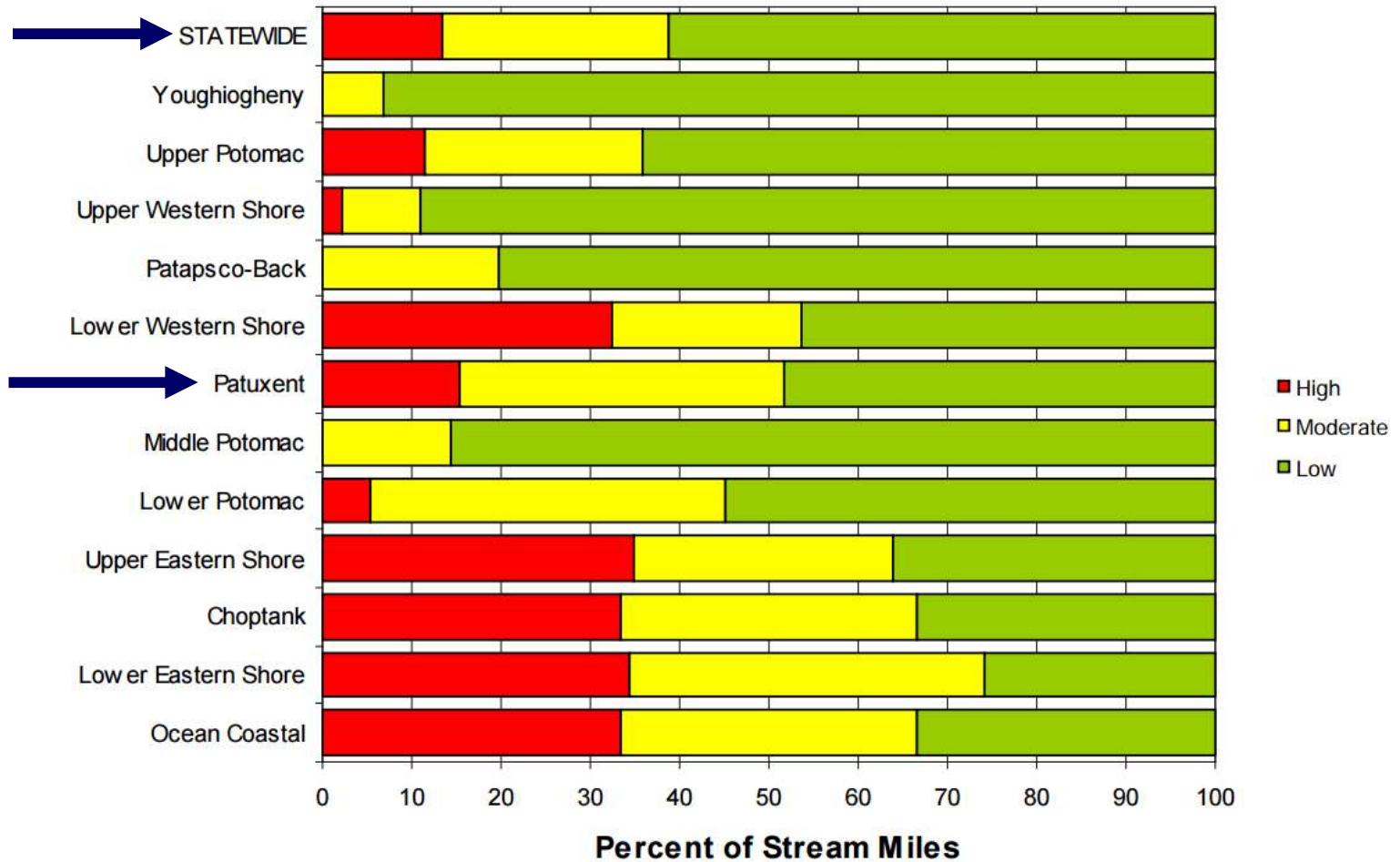
Nitrate Concentration  
All MBSS Sites (1995-2014)





# Patuxent River Basin

## Total Phosphorus Concentration MBSS Round 3 (2007-2009)

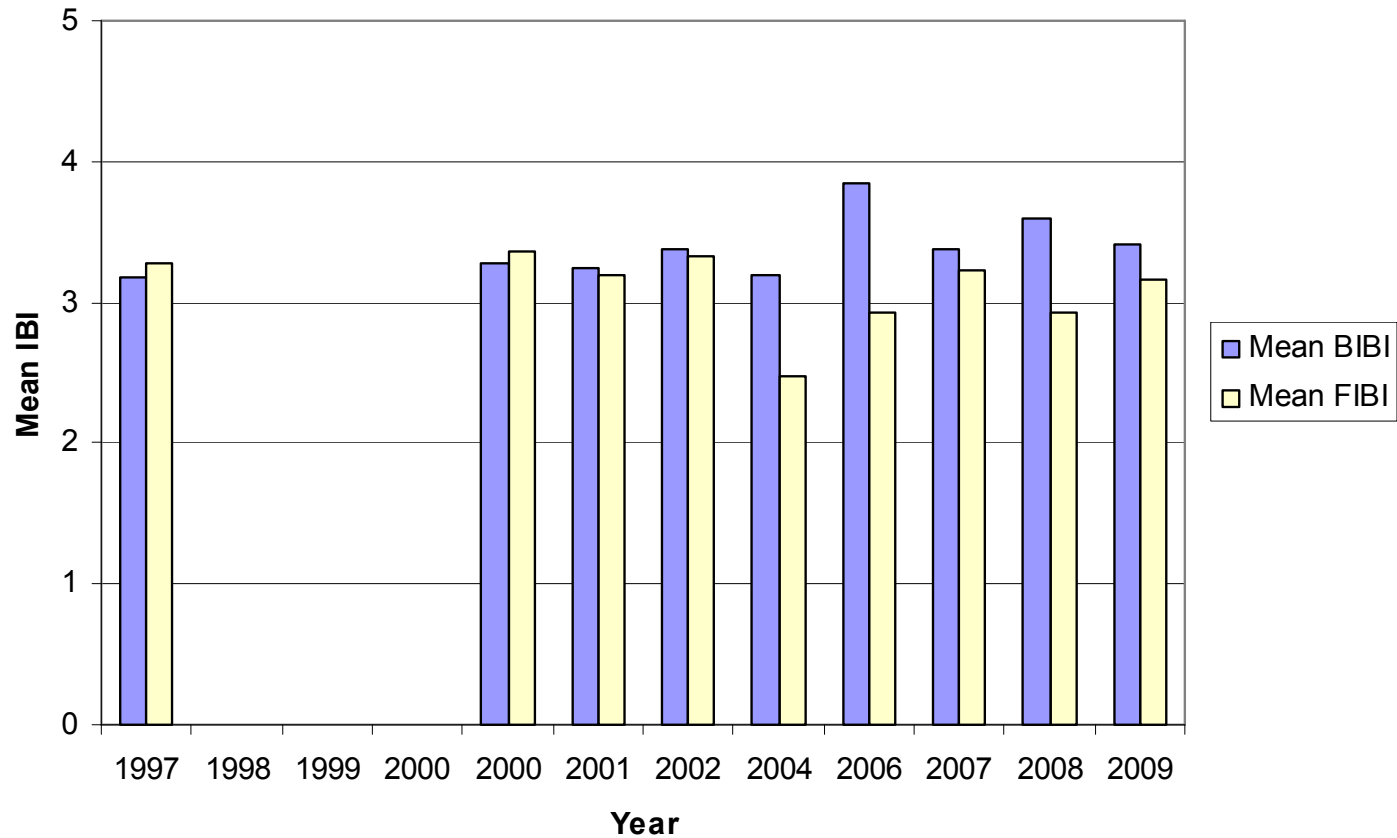




# Trends

# Patuxent River Basin

Mean FIBI and BIBI  
MBSS (1997-2009)



Sites/year  $\geq 10$

# Patuxent River Basin

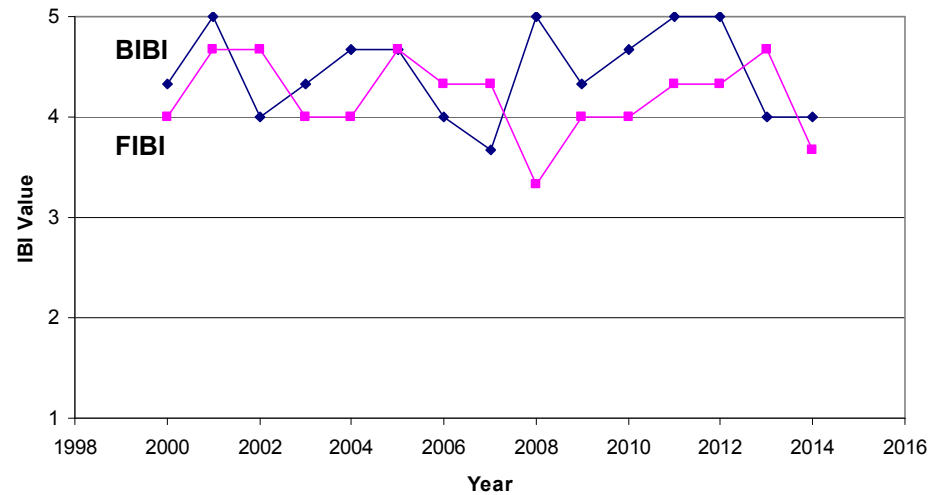
## Sentinel Sites – Trends at “Stable” Sites

MBSS – 2000 - 2014



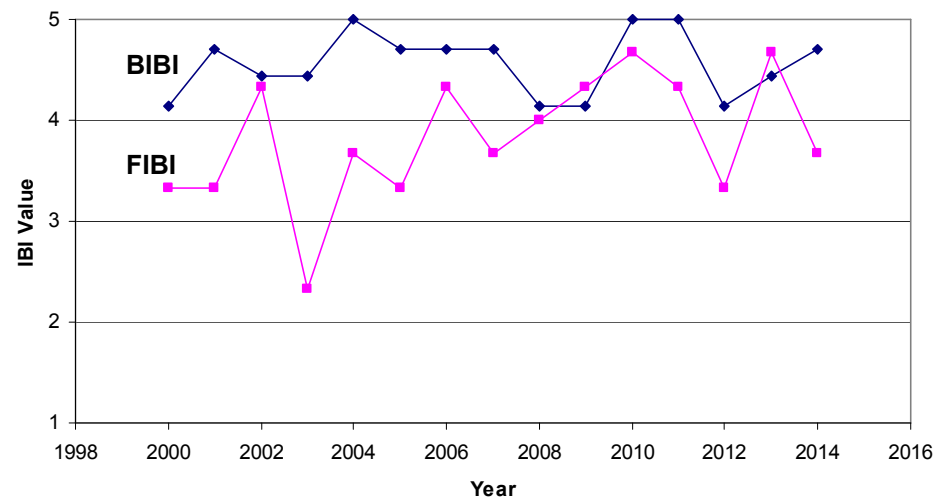
UT to Pax River Sentinel Site

UT to Pax River Sentinel Site



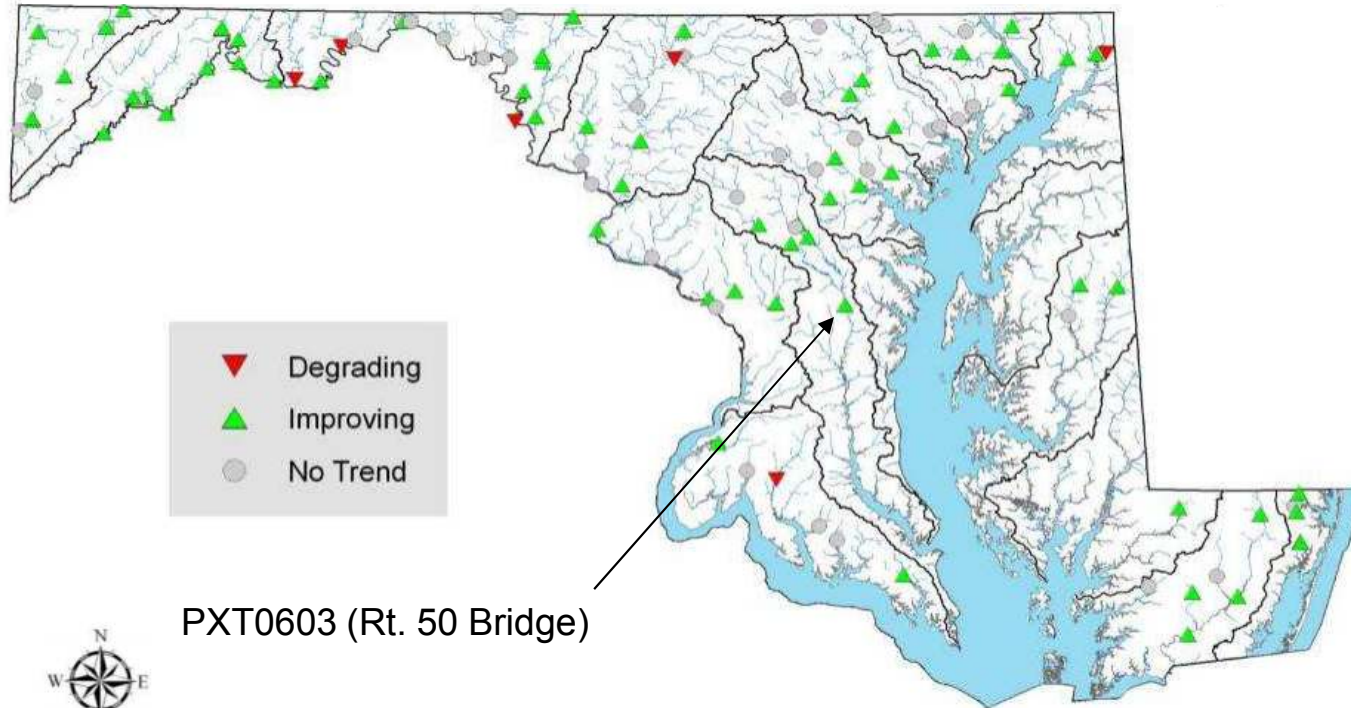
Swanson Cr. Sentinel Site

Swanson Cr. Sentinel Site



# CORE/Trend Program

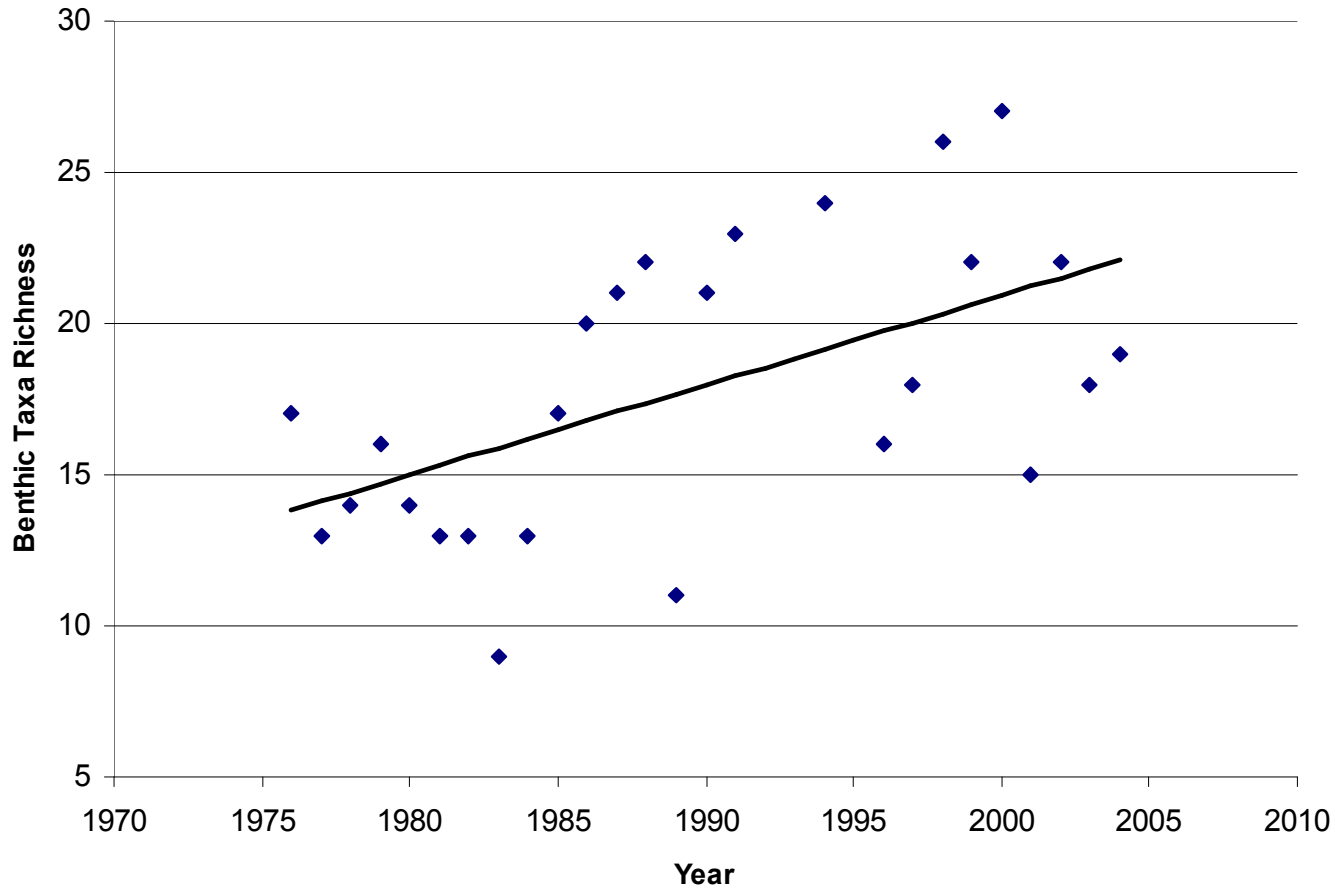
Benthic Macroinvertebrates – 1976-2015



# CORE/Trend Program

Patuxent River at Rt. 50 Bridge (PXT0603)

Benthic Macroinvertebrates – 1976-2015

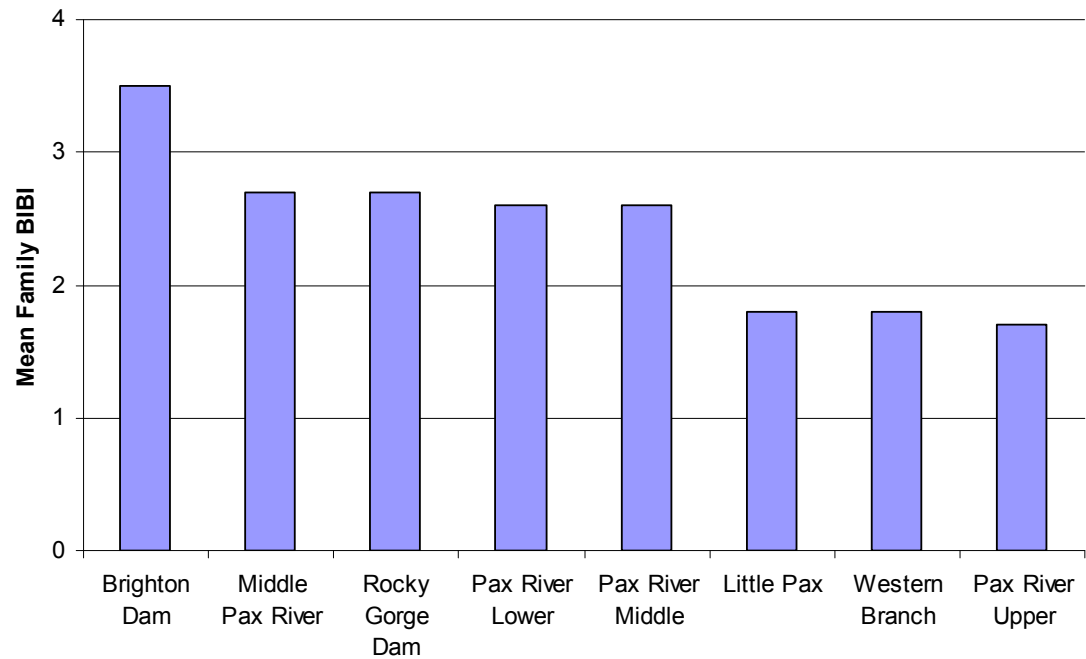


A photograph of a rocky stream in a forest. The water is clear and flows over large, light-colored rocks, creating small rapids and white foam. The surrounding forest is dense with thin, bare trees, suggesting a late autumn or winter setting. The word "Volunteers!" is overlaid in large, bold, blue text across the center of the image.

**Volunteers!**

# Patuxent River Basin

Stream Waders Results - 2000 - 2014





# Patuxent River Basin

## Stream Waders Volunteer's Comments

Construction on road at bridge crossing. **Sulfur dioxide odor** and gas welling up from sandy/silt sediment. Very sandy bottom.

**UNBELIEVABLE! They bury trash underground**, including cars, refrigerators, etc. Pictures taken! Sand is placed over the trash to bury it. Dumpsite right at the end of the road. Trash dump, 50-100m long, 5m tall.

Lots of fish. Lots of bank erosion and fallen trees and debris. Has a flood plain of at 10-15 yards. Many stagnant pools. **Owner inquired about re-enforcing banks** and debris clean up.

**Multiple beaver dams** with significant beaver activity. Sample collected from beaver dam 25 m upstream to downstream.

Downstream of Columbia Association Stream Restoration. Not yet done.

Stream entirely within Patuxent River Park Boundaries. **Extensive bank erosion**.

Very **"flashy"**. **Eroded stream channel**.

Some aquatic vegetation. Very little. Snails and snail egg cases and 1 leech. **Filthy with bitter smell** in and around stream.

**Lots of golf balls**. Adjacent to Crofton Country Club. North of Walleye Drive. **Caddy** corner from the First Baptist Church.

**Very trashy**. Bullfrog tadpoles. Water strider, boatman. 3" fish. 2 salamanders. This stream should be improved and cleaned up! **Requested county to clean and they did**. Requested state to improve site.



# Want Data?

[michael.kashiwagi@maryland.gov](mailto:michael.kashiwagi@maryland.gov)

Google “maryland stream health”



Overview | **How To** | Contents | Add Data

Smart, Green and Growing Atlas

Ag Print

Green Print

Growth Print

Stormwater Print

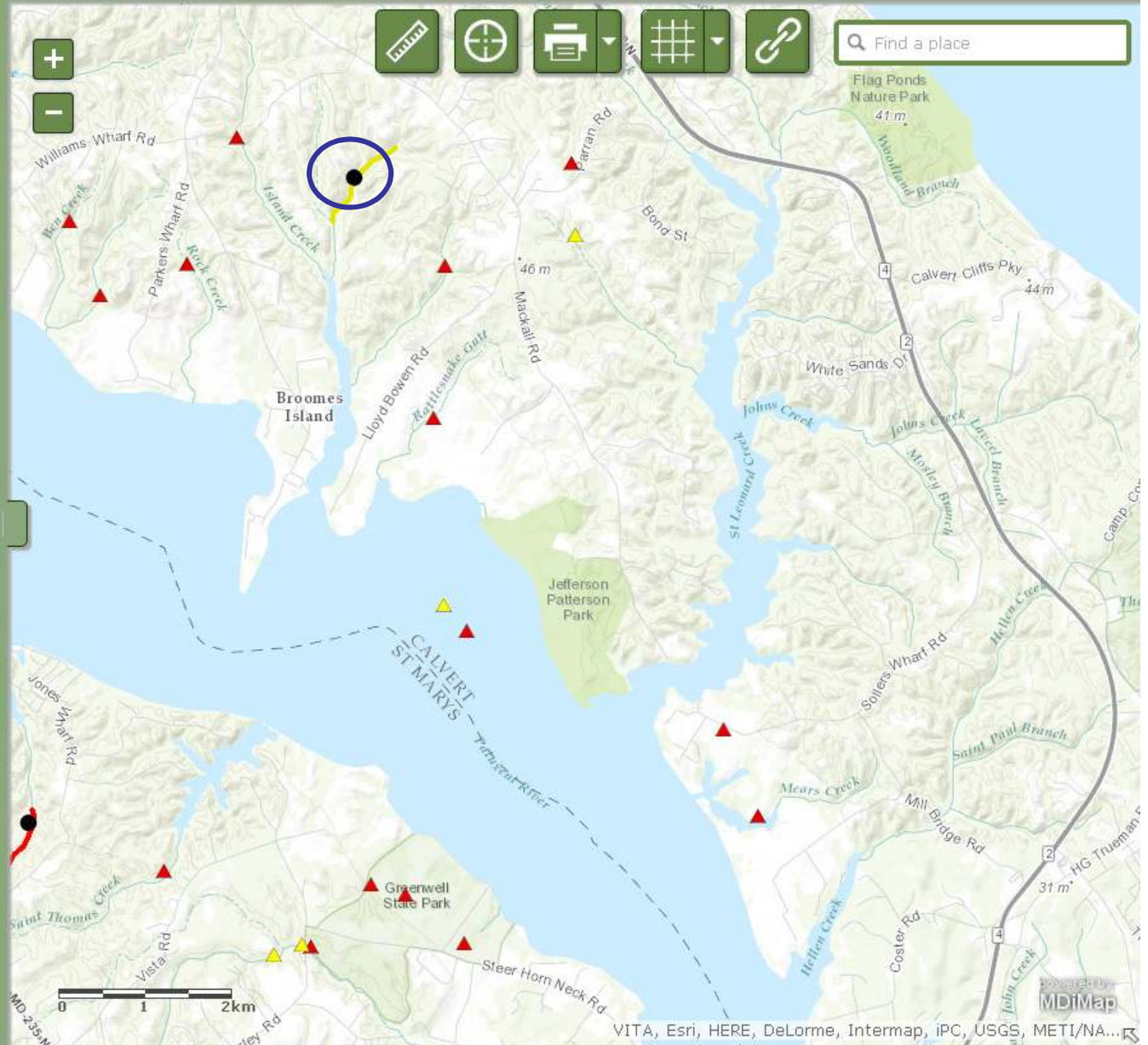
**Stream Health**



StreamHealth

StreamHealth shows the current health of Maryland streams and factors that impact that health.

Create Your Own Map





Overview | **How To** | Contents | Add Data

Smart, Green and Growing Atlas

Ag Print

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Stormwater Print

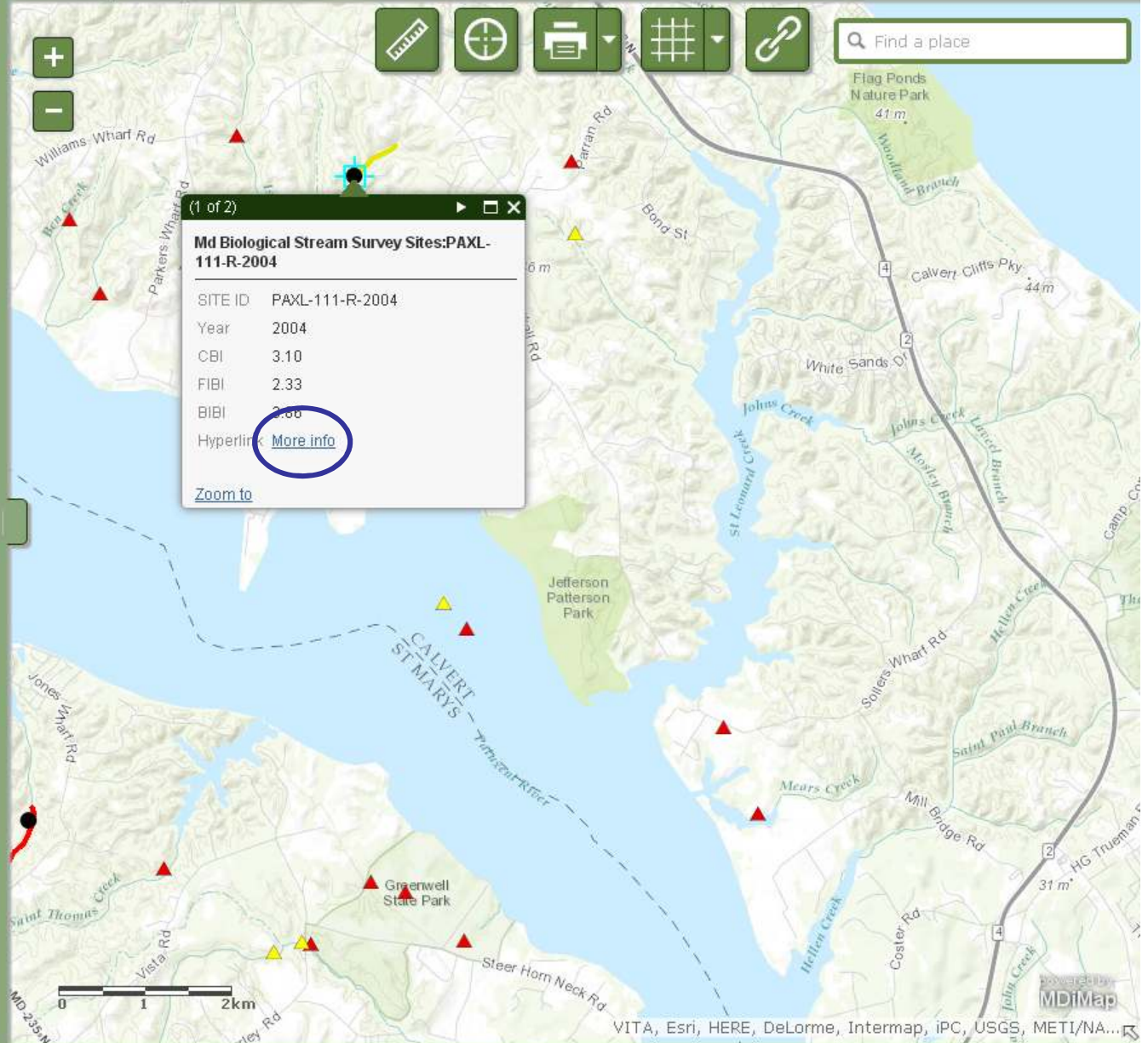
**Stream Health**



*StreamHealth*

StreamHealth shows the current health of Maryland streams and factors that impact that health.

Create Your Own Map



Data Summary for: **PAXL-111-R-2004**



- [New Search](#)
- [Search Tips](#)
- [About the MBSS](#)
- [Fish Distributions](#)
- [1076.jpg - MIDPOINT DOWNSTREAM](#)
- [1077.jpg - MIDPOINT UPSTREAM](#)
- [Your Feedback](#)

PAXL-111-R-2004 is located on **island cr ut** in the Patuxent River lower watershed, 8-digit code: (02131101). This stream was visited in the spring on 3-3-2004 and again in the summer on 7-8-2004.

Fish IBI	2.33	Poor
Benthic IBI	3.86	Fair

Catchment area	409.7 acres	Instream Habitat	4.0 (Poor)
<a href="#">Urban</a>	5.1 %	<a href="#">Epifaunal Substrate</a>	7.0 (Marginal)
<a href="#">Agricultural</a>	23.2 %	<a href="#">Velocity/Depth Diversity</a>	7.0 (Marginal)
<a href="#">Forest</a>	71.7 %	<a href="#">Pool Quality</a> Pool Extent = 10.0 of 75.0 meters	5.0 (Poor)
<b>Amphibians and Reptiles</b>		<a href="#">Riffle Quality</a> Riffle Extent = 75.0 of 75.0 meters	12.0 (Suboptimal)
AMERICAN BULLFROG		<a href="#">Shading</a>	95.0 %
FOWLER'S TOAD		<a href="#">Embeddedness</a>	100.0
NORTHERN GREEN FROG			
NONE			
NORTHERN COPPERHEAD			
NORTHERN TWO-LINED SALAMANDER			
PICKEREL FROG			
SOUTHERN LEOPARD FROG			
		<a href="#">Acid neutralizing capacity</a>	947.4
		<a href="#">Dissolved organic carbon</a>	1.9
		<a href="#">pH (lab)</a>	7.45
		<a href="#">pH (field)</a>	7.16
		<a href="#">Temperature</a>	20.4 °C
		<a href="#">Dissolved oxygen</a>	8.1
		<a href="#">Conductivity</a>	0.17

The following fishes were collected at PAXL-111-R-2004

Common name	Percent of total
<a href="#">AMERICAN EEL</a>	40.0
<a href="#">BLACKNOSE DACE</a>	33.3
<a href="#">PUMPKINSEED</a>	26.7

Fish IBI metrics	value
Number of native sp.	
Number of benthic fish sp.	0.0
% abundance of dominant sp.	40.0%
Percentage of tolerant sp.	60.0%
biomass (g) per sq. meter	1.7

A scenic view of a river flowing through a forest. The water is clear and flows over large, light-colored rocks. There are several fallen logs in the water, creating small rapids. The background is filled with tall, thin trees, mostly without leaves, suggesting a late autumn or winter setting. The overall atmosphere is peaceful and natural.

# **Thank You!**

**Dan Boward**  
**[dan.boward@maryland.gov](mailto:dan.boward@maryland.gov)**