

**OCTOBER 3, 2019**



NEW YORK  
STATE OF OPPORTUNITY  
Department of  
Environmental  
Conservation



FRIENDS OF  
**Reinstein**  
WOODS

BUFFALO AUDUBON  
SOCIETY



**FREDONIA**  
STATE UNIVERSITY OF NEW YORK

WITH FUNDING FROM



B-WET



**REPORTS FROM THE FIELD**



## 2019 “DAY IN THE LIFE” RESULTS

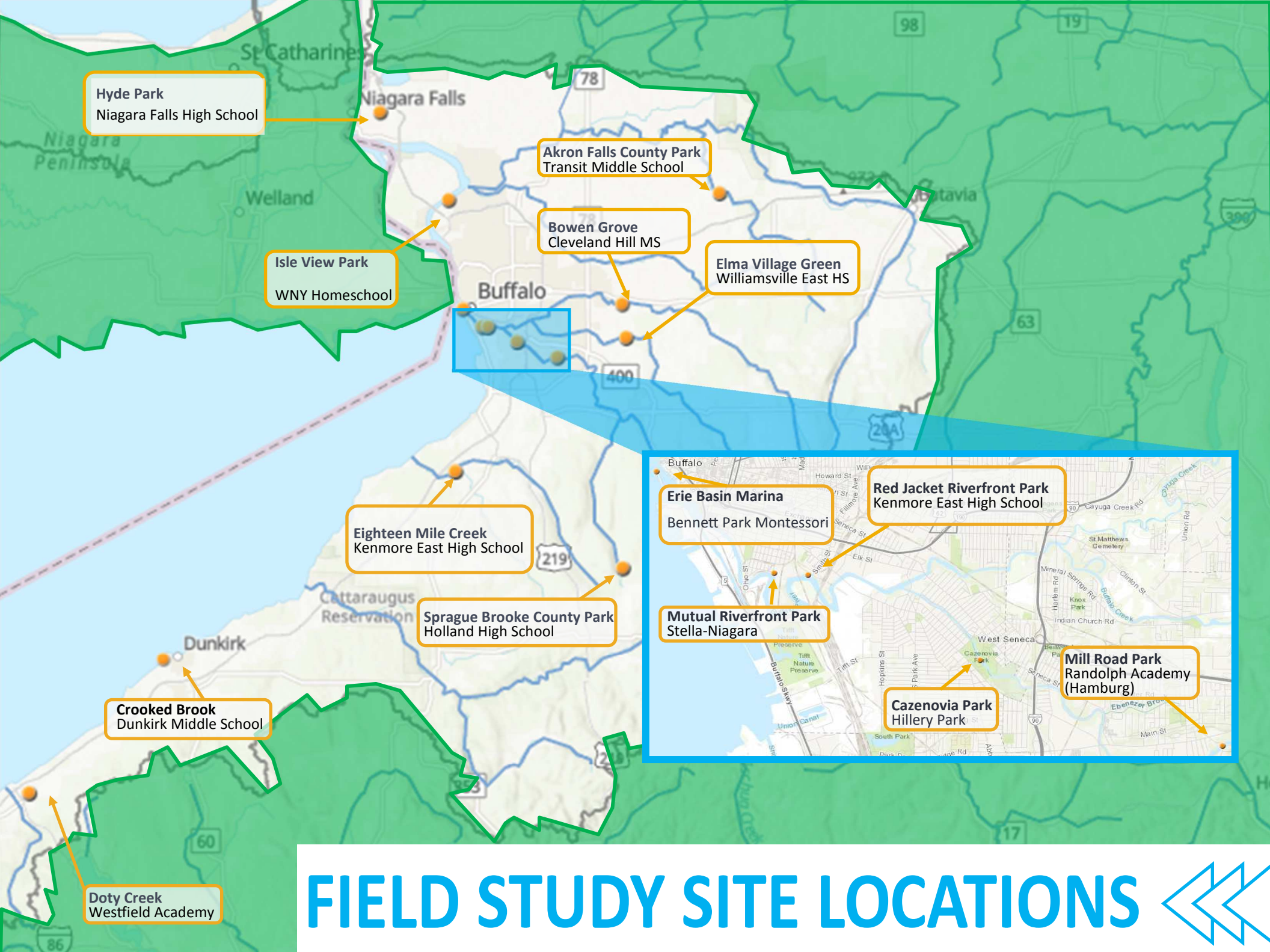
This year our “Day in the Life of the Buffalo River” program was expanded to become the “Day in the Life of the Niagara River/Lake Erie Watershed” through a watershed education grant from the National Oceanic and Atmospheric Administration. This expansion increased the geographical range and number of field study sites while also providing students with new water quality testing equipment. Teachers participated in four days of training to prepare for the field experience and integrate the experience and results into their curriculum.

Despite a rainy day, cool temperatures, and high water levels, thirteen schools totaling over 300 students participated in the event on

October 3, 2019. Students rotated through seven water quality testing stations to provide data for field study sites throughout 1,000 square miles of the watershed.



This report shows the compiled results from the “Day in the Life” event and highlights notable trends or observations. This data was also uploaded to the Global Learning and Observations to Benefit the Environment (GLOBE) database, joining countless other observations by citizen scientists from around the world.



Hyde Park  
Niagara Falls High School

Isle View Park  
WNY Homeschool

Akron Falls County Park  
Transit Middle School

Bowen Grove  
Cleveland Hill MS

Elma Village Green  
Williamsville East HS

Eighteen Mile Creek  
Kenmore East High School

Sprague Brooke County Park  
Holland High School

Crooked Brook  
Dunkirk Middle School

Doty Creek  
Westfield Academy

**Erie Basin Marina**  
Bennett Park Montessori

**Red Jacket Riverfront Park**  
Kenmore East High School

**Mutual Riverfront Park**  
Stella-Niagara

**Cazenovia Park**  
Hillery Park

**Mill Road Park**  
Randolph Academy (Hamburg)

# FIELD STUDY SITE LOCATIONS

# FIELD STUDY SITE WEATHER DATA

October 3 was a cool, wet day. Unsafe conditions— cold temperatures and murky, high water— resulted in fewer data measurements. Canadaway Creek water levels were so high that Dunkirk Middle School students were forced to sample at the safer Crooked Brook nearby.

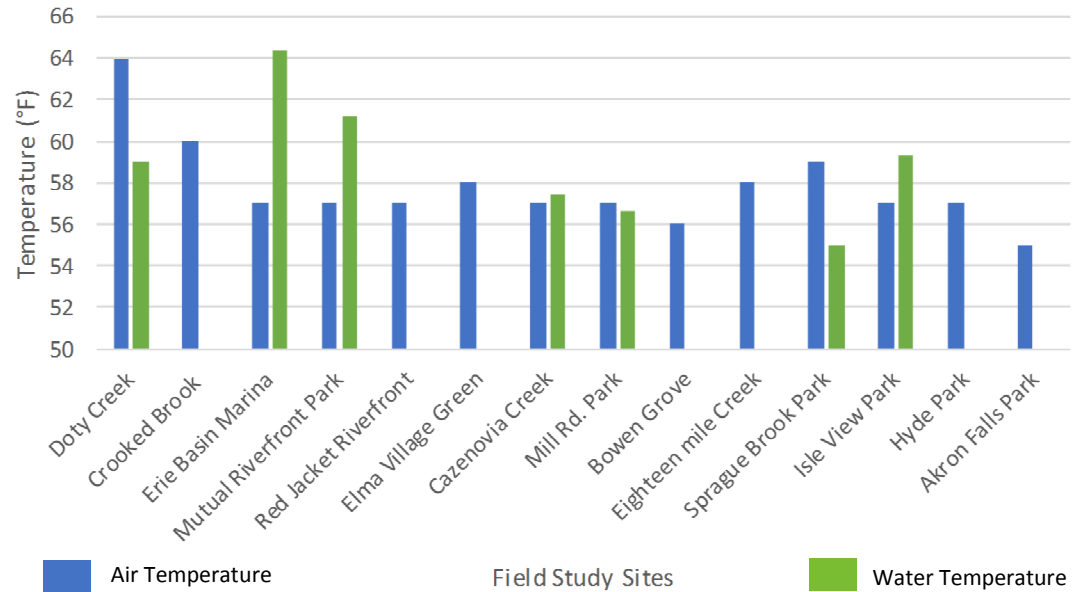
Look at the graph showing water level and precipitation amounts.



What is the relationship between these two factors? How may they have impacted other measurements during the “Day in the Life” program?

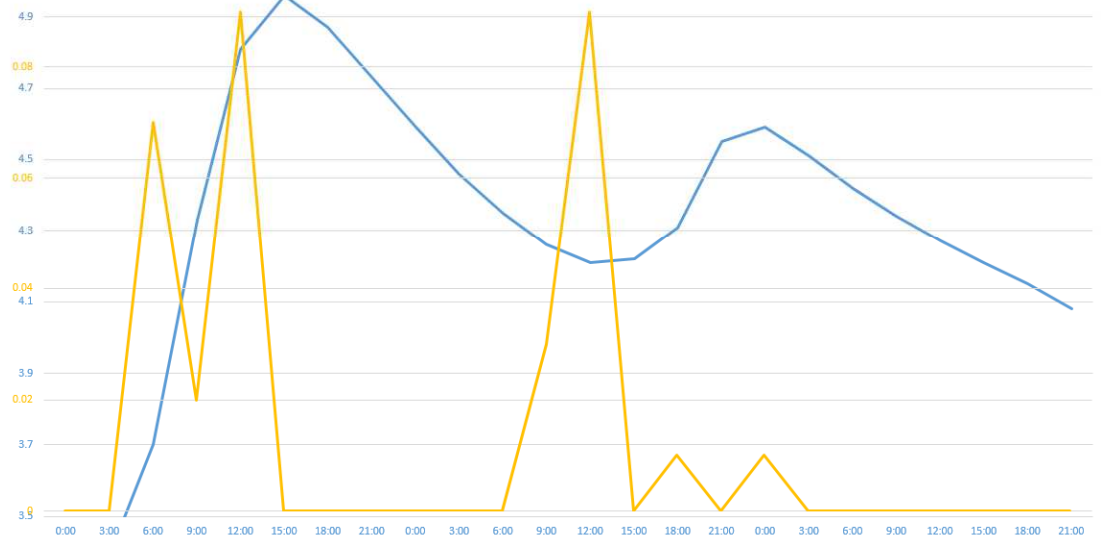


## AIR AND WATER TEMPERATURES AT FIELD STUDY SITES



## CAYUGA CREEK AT COMO LAKE PARK

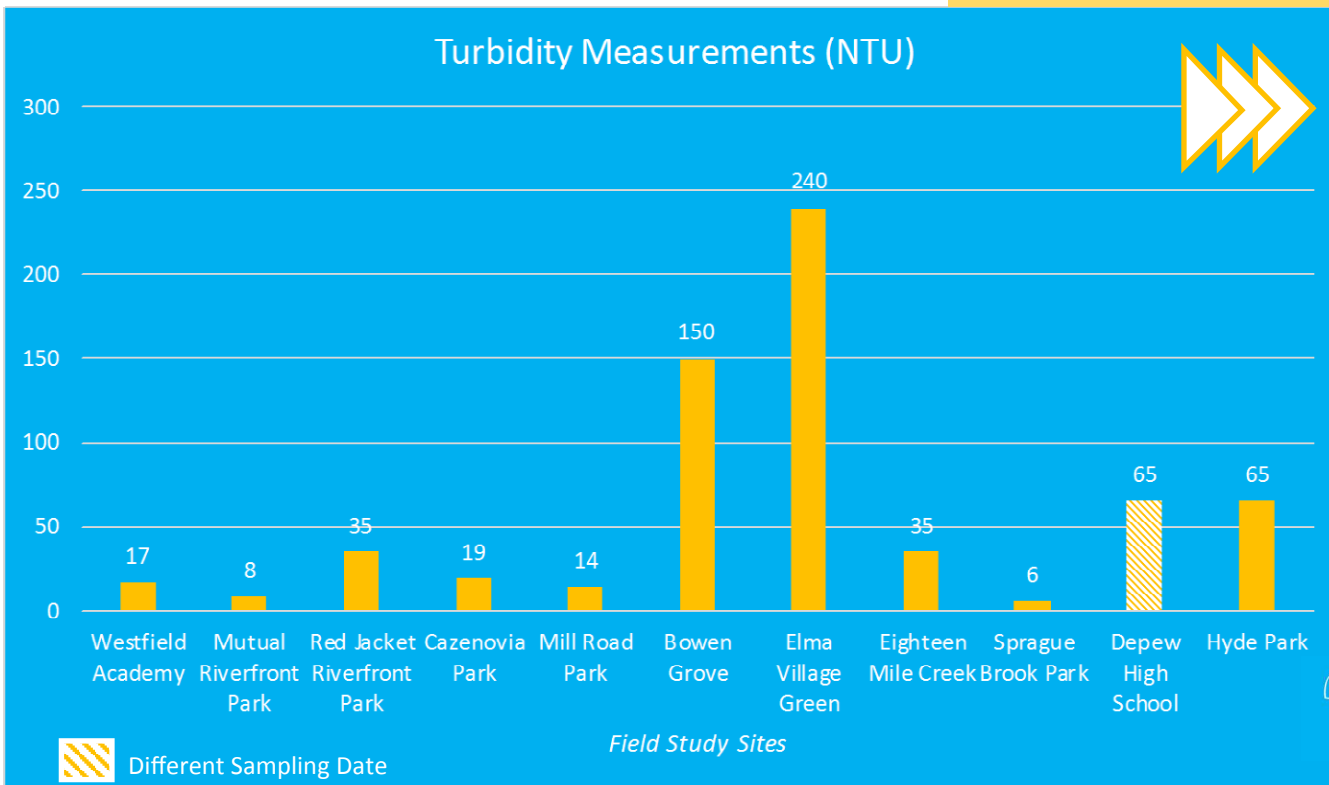
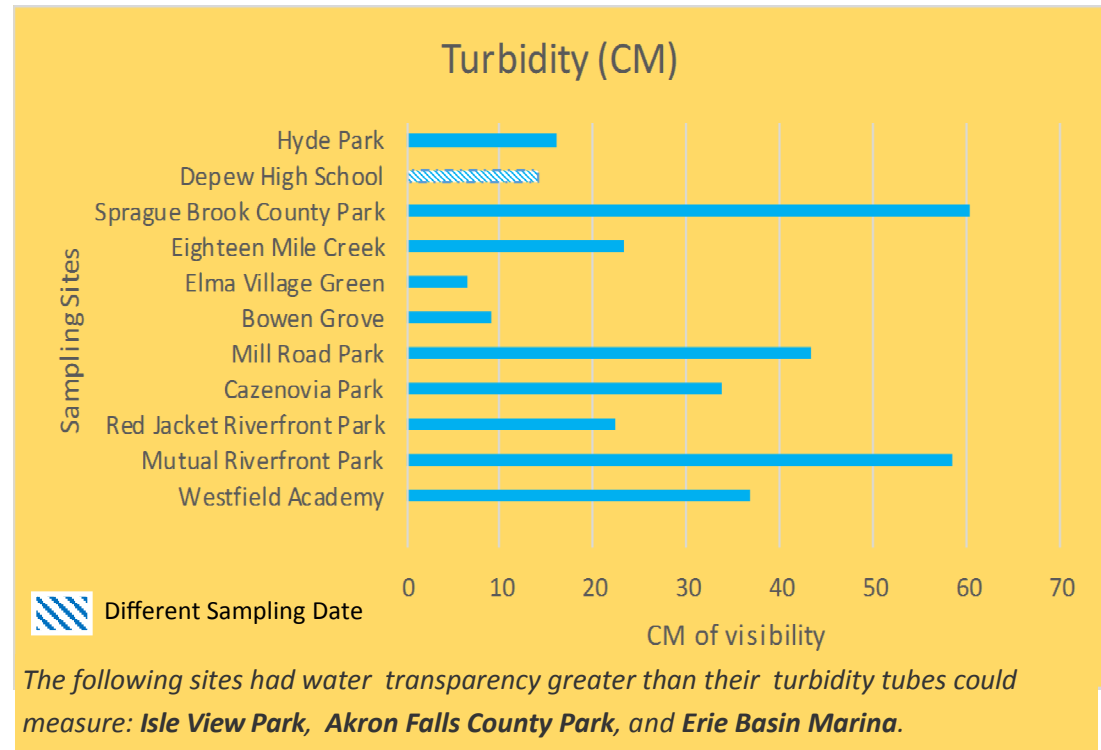
WATER LEVEL (FEET) AND PRECIPITATION (INCHES) FROM 10/2-10/4, 2019



# TURBIDITY

Turbidity is the cloudiness of the water due to suspended particles. Turbidity in centimeters (cm) is the total distance through which light can penetrate water. For example, if the water turbidity is 24 cm, then an object would not be visible in depths greater than 24 cm.

Turbidity affects plant photosynthesis and animal navigation. It can also be an indicator of other water quality problems such as sediment pollution and algal blooms.



Nephelometric Turbidity Unit, or NTU, is a unit of measurement of the scattered light from the water samples at a 90 degree angle. These numbers were calculated using a mathematical conversion formula.

A few key measurements to consider for water clarity include<sup>1</sup>:

>10 NTU = Fish and other aquatic wildlife begin to demonstrate signs of stress.

1-5 NTU = EPA Drinking Water Standards

>5 NTU = not recommended for recreational use

<sup>1</sup> Penn State Extension



**What may have caused such high NTU measurement at the field sites?**

# MACROINVERTEBRATES

## Determining water quality with bugs

Small organisms in the water called *macroinvertebrates* can give us clues about water quality.

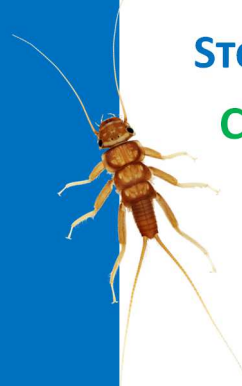
Macroinvertebrate species have specific tolerances to pollution called a Pollution Tolerance Value (PTV). According to the Leaf Pack Network, the presence of species with a low PTV may indicate good water quality. Species present with a high PTV do not necessarily indicate poor water quality; however, if a system lacks the species with a low PTV and is dominated by species with a high PTV, it may indicate poor water quality.

The biotic index is calculated using the number of organisms found and their individual Pollution Tolerance Values. This final value can indicate potential water pollution. A low biotic index may indicate good water quality.

“The total number of *Ephemeroptera* (mayflies), *Plecoptera* (stoneflies), and *Trichoptera* (caddisflies) is used to find the Percent EPT— another index value. Many species within these three groups are sensitive to changes in water quality. In general, the more EPT taxa, the better the water quality.”

 Leaf Pack Network®

# 2019 SPECIES LIST



STONEFLY\*

CADDISFLY\*

CRANEFLY

DOBSONFLY

MAYFLY\*

DRAGONFLY

BEETLE

WATER PENNIES

MOSQUITO

MIDGES

SCUD

DAMSELFLY

SNAIL

AQUATIC SOWBUG

AQUATIC FLAT WORM

CLAM

LEECH

BACKSWIMMER

BROWN BULLHEAD

ROUND GOBY

WATER MITE

WATER STRIDER

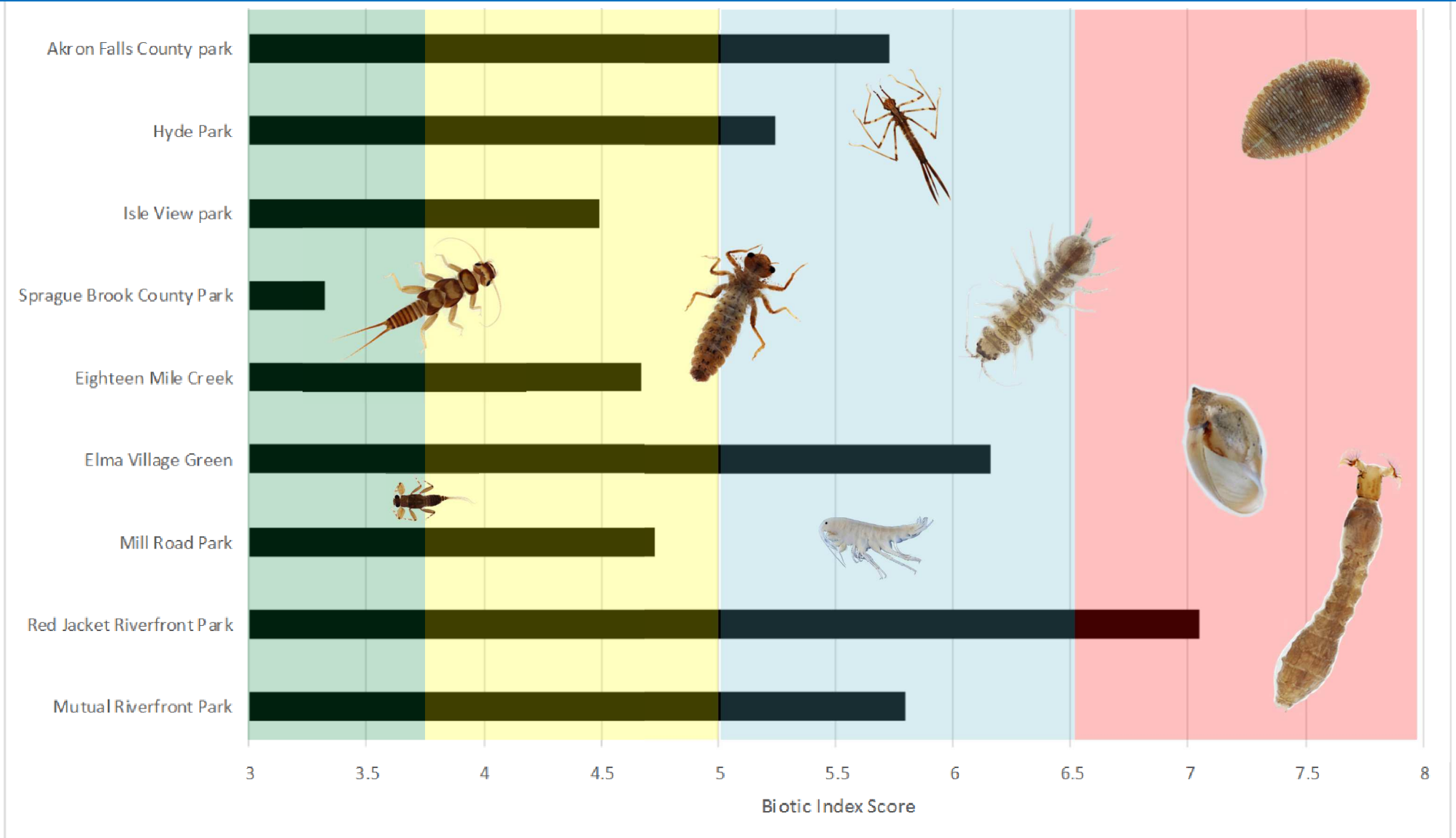


## \*EPT TAXA





# Field Study Site Biotic Index Score



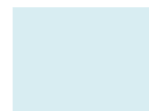
## Water Quality Key



Excellent



Good



Fair



Poor

# COMPARING TWO FIELD STUDY SITES



A lower biotic index score may indicate better water quality.

What may account for the difference in biotic index values?



Buffalo River  
Red Jacket Park  
Buffalo, NY

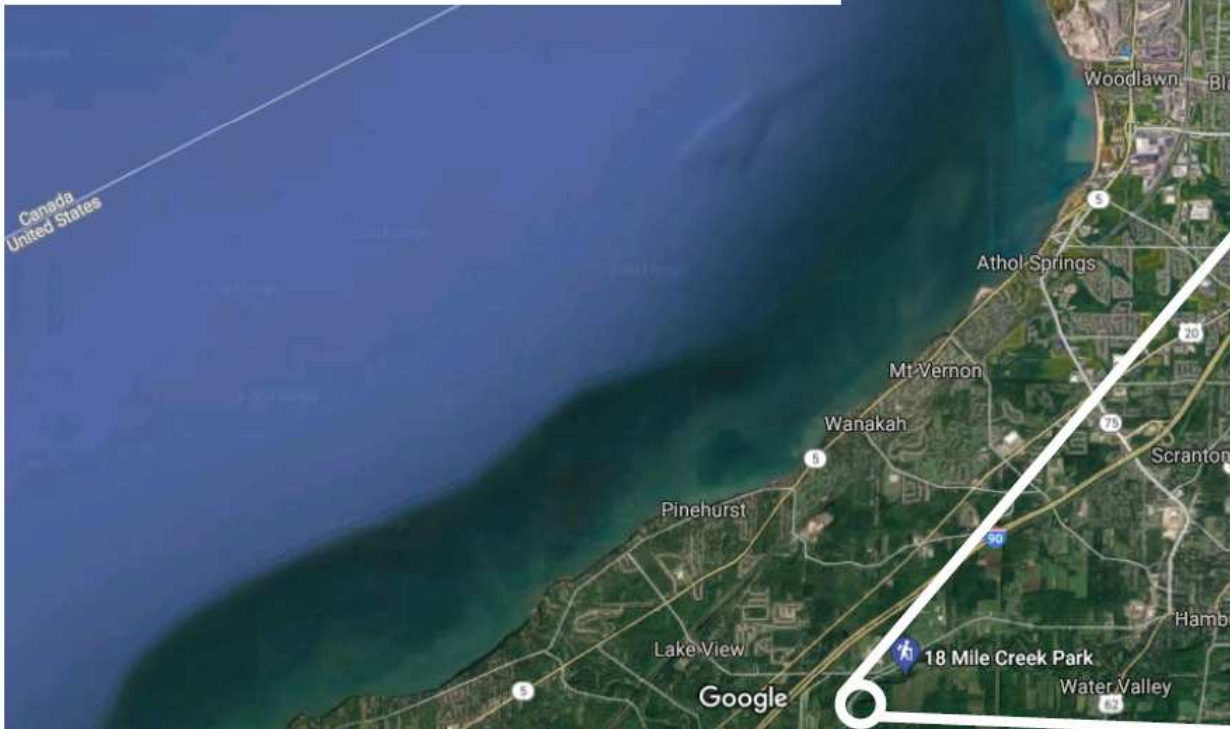
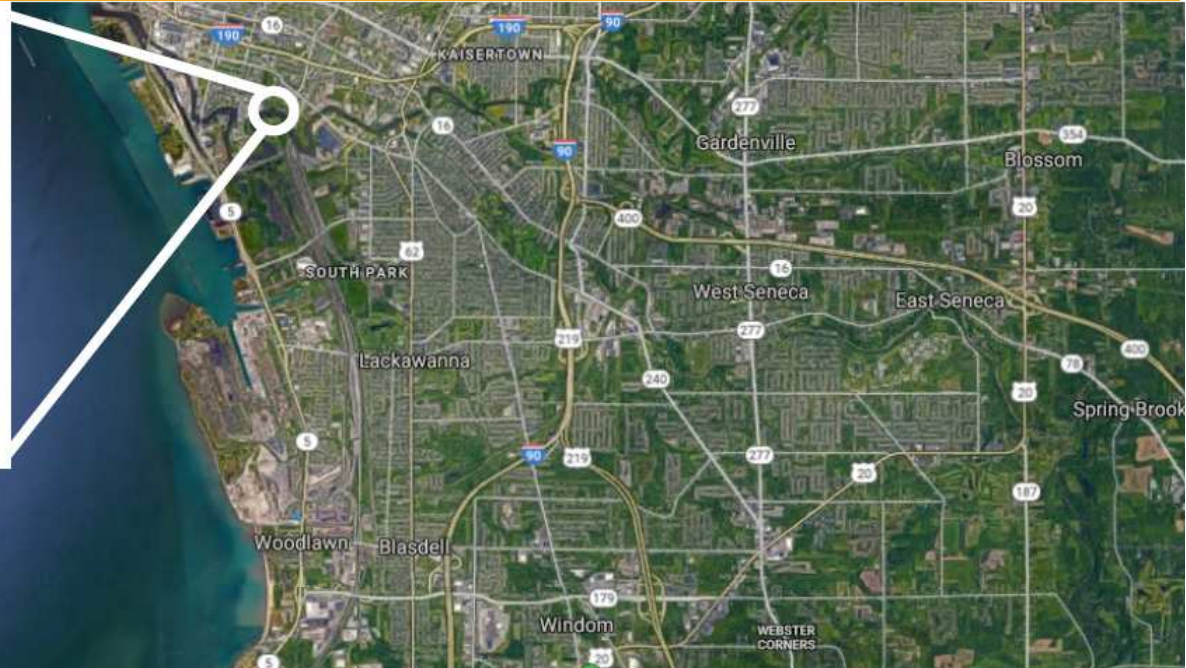
EPT: 0%

In general, the more  
EPT taxa, the better  
the water quality.

**Biotic Index: 7.05**

Poor Water Quality  
Severe pollution likely

The lower the biotic index,  
the better the water quality.



EPT: 60.6%

In general, the more  
EPT taxa, the better  
the water quality.



**Biotic Index: 4.6**

Good Water Quality,  
Some organic pollution

The lower the biotic index,  
the better the water quality.



18 Mile Creek  
Hamburg, NY



# HOW DOES PH AFFECT WATER QUALITY?

Acidic waters will react with contaminated sediment more, releasing the heavy metals and other pollutants in the sediment into the water.



A pH of 6.5 to 8.2 indicates suitable conditions for most fish.

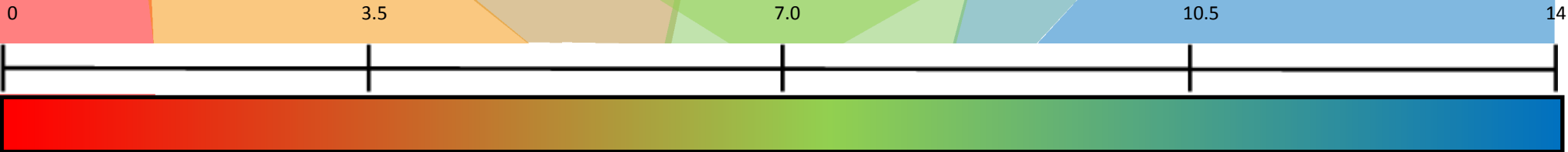
A pH exceeding 9 will start to affect growth rates.

Detergents and soap-based products released during sewage overflow events can increase pH levels.



A pH below 5 affects fish reproduction. A pH below 4.0 will begin to kill fish.

A pH of 7 indicates neutral water.



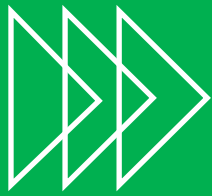
More Acidic



More Basic (Alkaline)







# PH LEVELS AT FIELD STUDY SITES



Field Study Sites

Akron Falls County Park

Hyde Park

Isle View Park

Depew High School

Sprague Brooke Park

Eighteen Mile Creek

Elma Village Green

Bowen Grove

Mill Road Park

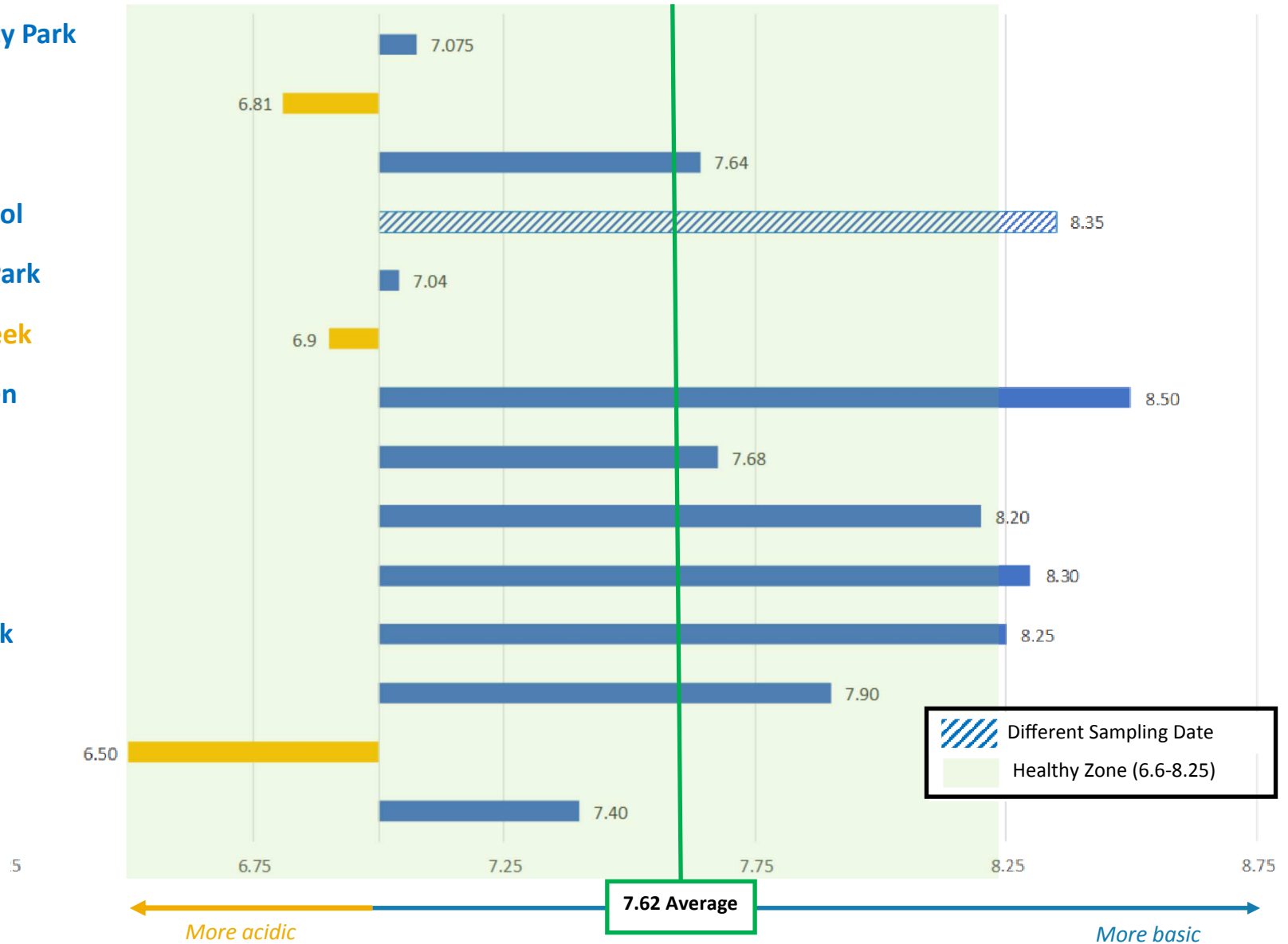
Cazenovia Park

Red Jacket RF Park

Mutual RF Park

Erie Basin Marina

Doty Creek



pH Level Found

# DISSOLVED OXYGEN

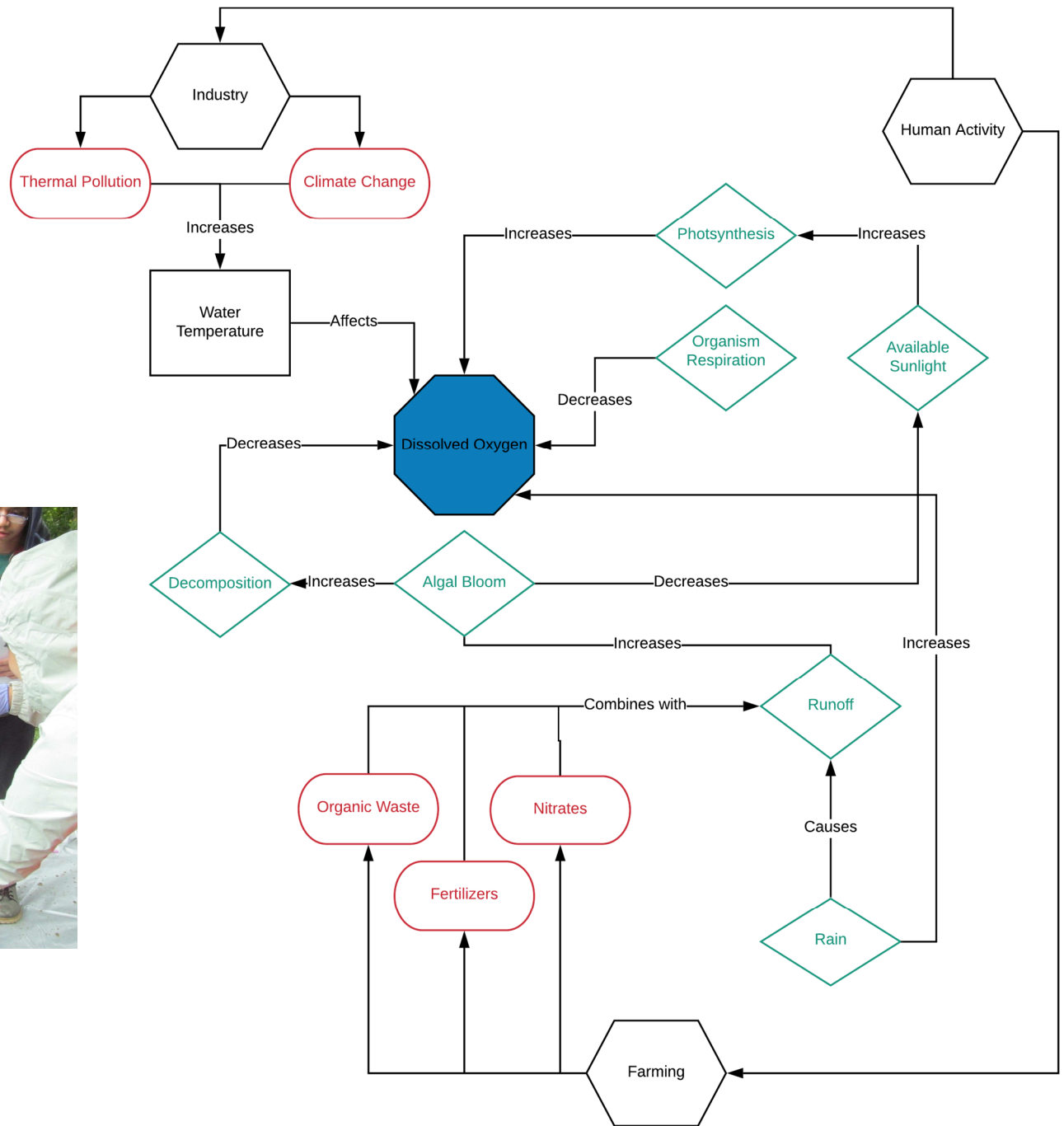
Dissolved oxygen (DO) is the amount of oxygen present in water. Dissolved oxygen is needed by fish and other aquatic organisms and each of these organisms require a certain amount of DO.

Dissolved oxygen levels rise when plants release oxygen during photosynthesis, or when wind stirs up the water.

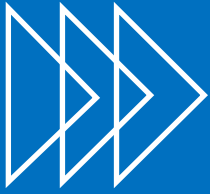
Cold water can hold more dissolved oxygen than warm water and thermal pollution that warms water can decrease DO.



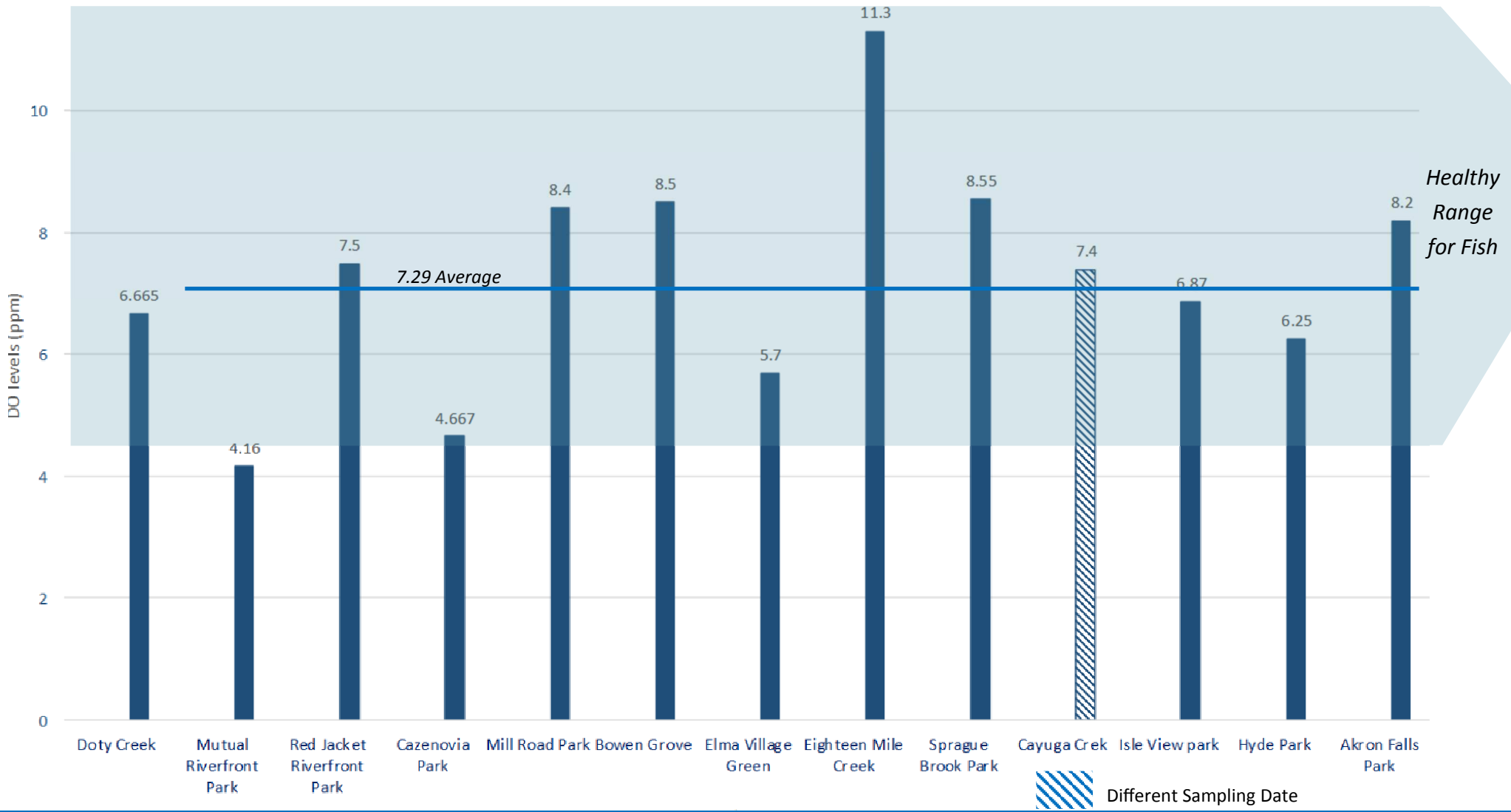
Sewage and fertilizer pollution can lead to excessive algal growth in water. When they die and decompose, they utilize high amounts of oxygen in the process, resulting in low dissolved oxygen levels.



This concept map shows you a small relationship between human activity and dissolved oxygen levels. Which factors may have impacted dissolved oxygen levels at or near your site?



# DISSOLVED OXYGEN LEVELS AT FIELD STUDY SITES



For trout spawning waters the DO concentration shall not be less than 7.0 ppm from other than natural conditions.

For trout waters, the minimum daily average shall not be less than 6.0 ppm, and at no time shall the concentration be less than 5.0 mg/L.

For nontrout waters, the minimum daily average shall not be less than 5.0 ppm and at no time shall the DO concentration be less than 4.0 mg/L.



# NITRATE LEVELS AT FIELD STUDY SITES

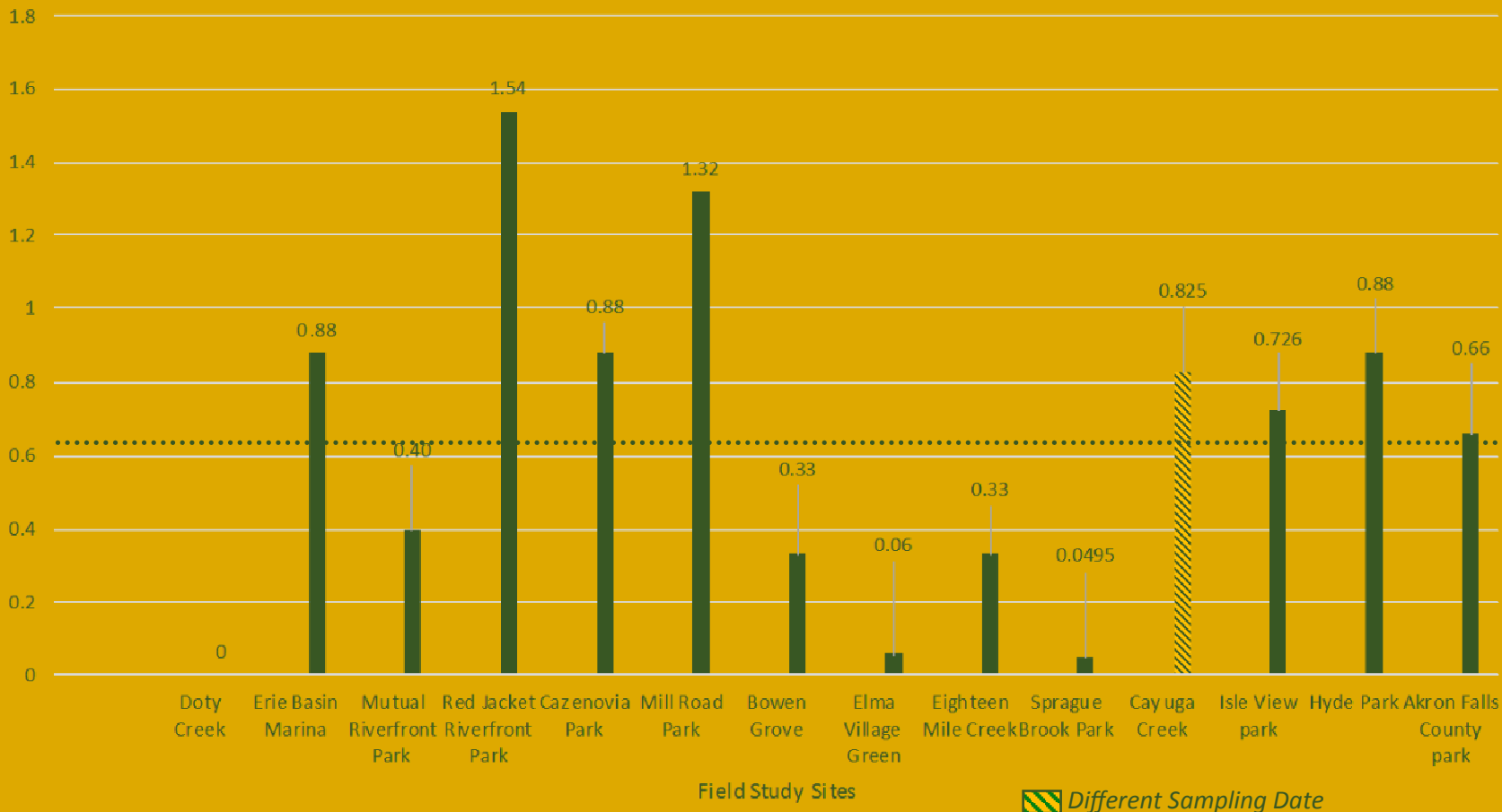


Originating from nitrogen, Nitrate is found naturally in our waterways, but can reach harmful levels. Finding levels above 4ppm could potentially indicate pollution from:

- 1.) Wastewater discharge (i.e. from combined sewer overflows). Human waste contains high nitrogen levels.
- 2.) Lawn fertilizers commonly contain nitrogen.
- 3.) Fertilizers or animal manure from agricultural runoff.



Water Sampling Nitrate Results (ppm)



All measurements are less than 4 ppm, which *may* indicate no pollution issues.

.634 average

# THINKING BEYOND “A DAY”

As a result of Hurricane Sandy in 2012, 11 billion gallons of untreated and partially treated sewage flowed into NYC and New Jersey waterways<sup>1</sup>. Climate scientists predict more frequent major storms as a result of climate change. **How would a major storm impact some of the water quality measurements we took as part of the “Day in the Life” field study?**

<sup>1</sup><https://www.climatecentral.org/news/11-billion-gallons-of-sewage-overflow-from-hurricane-sandy-15924>

How may the implementation of Best Management Practices (BMPs) such as creating rain gardens, planting buffer strips, planting native plants, and educating citizens affect:

- Nitrate Levels
- Turbidity
- Dissolved Oxygen

If you were a NYS fish biologist, at which field study site(s) would you chose to release trout, knowing the following information:

	Optimum Habitat Requirements	Reproduction Requirements
Temperature	12 - 19°C 53 - 66°F	10 - 15.5 °C 50 - 60°F
pH	6.5 – 8	7.0 – 8.0
Dissolved Oxygen	at least 7.0 mg/l	at least 7.0 mg/l

# NEXT STEPS: ANALYSIS AND ACTION



Data collected by students is entered into the GLOBE database, joining thousands of citizen scientist observations from around the world.



Students analyze their findings.

*CALCULATE BIOTIC INDEX*

*COMPARE FIELD STUDY SITES*

*EVALUATE LAND COVER RELATIONSHIPS*



Students share their results with a larger audience.

*DISPLAY BOARD*

*COMMUNITY PRESENTATION*

*ONLINE REPORT*



Students participate in a stewardship action project to improve water quality within the Niagara River/Lake Erie Watershed.

*RIVER CLEAN-UP*

*INVASIVE SPECIES REMOVAL*

*RAIN GARDENS*



# 2019 PARTNERS



We are very grateful to the organizations and volunteers who help make “A Day in the Life of the Buffalo River” event possible. This year, partners from the following organizations helped lend their expertise at one of our sample sites:

- Alliance for the Great Lakes
- Buffalo Audubon Society
- Buffalo Niagara Water Keeper
- Erie County Department of Environment and Planning
- NYS DEC Great Lakes Program
- State University of New York at Fredonia Institute for Research In Science Teaching
- U.S. Fish & Wildlife Service

Thank you to the Friends of Reinstein Woods volunteers who helped lead activities throughout the event:

- Anne Keller
- Bob Klick
- Brian Engler
- Mary Hughes
- Mike Gettings

A special thank you to our grant partners who assisted with the Summer Teacher Institutes, “Day in the Life” event, in-school programming, and data entry.



Funding for the 2019-2020 “Day in the Life of the Niagara River/Lake Erie Watershed” program was provided by the National Oceanic and Atmospheric Administration Bay Watershed Education and Training (B-WET) program.

