



Department of  
Environmental  
Conservation



October 4, 2018

# A DAY IN THE LIFE OF THE BUFFALO RIVER



After heavy rainfall on October 1-2 2018, the rivers of Western New York were high and murky. These conditions, along with an early morning thunderstorm, limited the number of students who participated in “A Day in the Life of the Buffalo River” on October 4, 2018. Despite limited access to safe water for macroinvertebrate sampling and water depth measurements, more than 150 students from eight schools explored the health of the waterway through various hands-on activities, including temperature and pH measurements, turbidity readings, and more.

Three schools sampled additional sites in the following weeks for a total of eleven water quality measurement sites along the Buffalo River and its tributaries: Cayuga Creek, Buffalo Creek, and Cazenovia Creek.

This experience provides insight into the past and future of the Buffalo River. Heavy industrial use along the river, combined with municipal discharge, left the river extremely polluted and devoid of life by 1969. Ongoing efforts to remove contaminated sediments and restore the shoreline have contributed to the improved water quality of the river. The watershed continues to face threats from stormwater runoff and sewage overflow, as well as agricultural runoff and other nonpoint sources of nutrients and pollutants.

The data collected during “A Day in the Life of the Buffalo River” provides a snapshot of the watershed at one point in time. Over time, we hope this data can be used to better understand changes in the health of the watershed.

## Did You Know?

Every year, more than 255 million gallons of sewage and stormwater runoff flow into the Buffalo River following heavy rains like we saw on October 4<sup>th</sup>. The Buffalo Sewer Authority has a 20-year plan to reduce this through green infrastructure, rain barrels, and public education.

A DAY IN THE LIFE **BY THE #NUMBERS**

**240+** Students

**72°** average air temperature

**64°** average water temperature



**77** NTUs average turbidity

**1** lowest bioassessment score (Erie Basin)

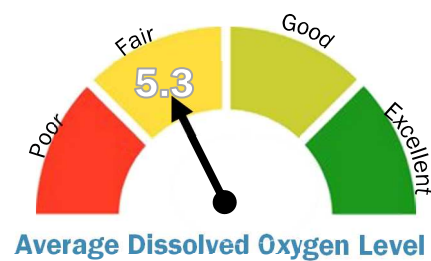
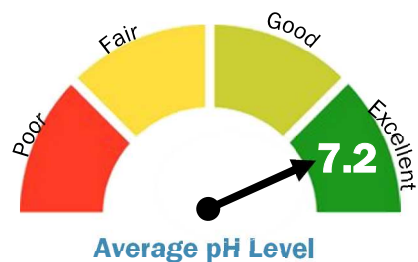
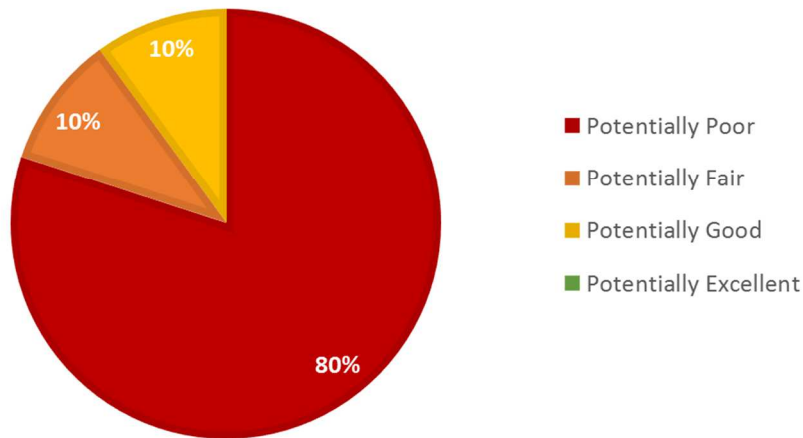
**17** highest bioassessment score (Elma Centennial)

# 2018 RESULTS

While some water quality measurements from the sample sites reflect an ecosystem that can sustain life, there are still many areas where dissolved oxygen levels are low and species that indicate good or excellent water quality were not found. Many schools noted that the stream conditions on the day of sampling limited access and likely affected overall results.

For full results, visit: <http://reinsteinwoods.org/dayinthelife/>.

## BIOASSESSMENT OF WATER QUALITY AT SAMPLE SITES



## 2018 SPECIES LIST

AQUATIC SOWBUG  
AQUATIC WORM  
BACK SWIMMER  
CATFISH  
BUTTERFLY  
CADDISFLY LARVA  
CANADA GOOSE  
CRAYFISH  
DAMSELFLY  
DRAGONFLY  
DUCKS  
FRESHWATER CLAM  
GILLED SNAIL  
HORSE FLY LARVA  
LEECHES  
MALLARD DUCKS  
MAYFLY  
MINNOW  
MOSQUITO LARVA  
POUCH SNAIL  
RAT TAIL MAGGOT  
SCUD  
SEAGULL  
STONEFLY  
WATER BEETLE  
WATER BOATMAN  
WATER MITE  
WATER STRIDER  
WATER STRIDERS



### Did You Know?

We may be familiar with the bite of the adult horse fly, but this larva has two sharp hooks for mouthparts that it uses to cut into prey. This insect is best handled with a tool, not your bare hands!

# 2018 NEW MEASUREMENTS

## NITRATE

Nitrate comes from nitrogen, an essential nutrient for the growth and reproduction of many algae and other aquatic plants.

Nitrate levels **above 4ppm** may indicate pollution from :

1. **Agricultural Runoff.** Fertilizer or animal manure contain nitrogen.
2. **Industry and Automobiles.** Airborne nitrogen particles from emissions precipitate on land.
3. **Lawn Fertilizers.** Nitrate is common in many fertilizers.
4. **Wastewater Discharge.** Sewage containing human waste has high nitrogen levels

## PHOSPHATE

Phosphate comes from phosphorus, a fertilizer for algae and other aquatic plants.

Phosphate levels **above 0.1ppm** may indicate pollution from :

1. **Agricultural Runoff.** Animal manure and many fertilizers contain phosphorus.
2. **Wastewater Discharge.** Sewage containing human waste and household soaps and detergents contains phosphates.
3. **Lawn Fertilizers.** Nitrate is common in many fertilizers.

Figure #4: Average Nitrate Levels at each Sample Site (ppm)

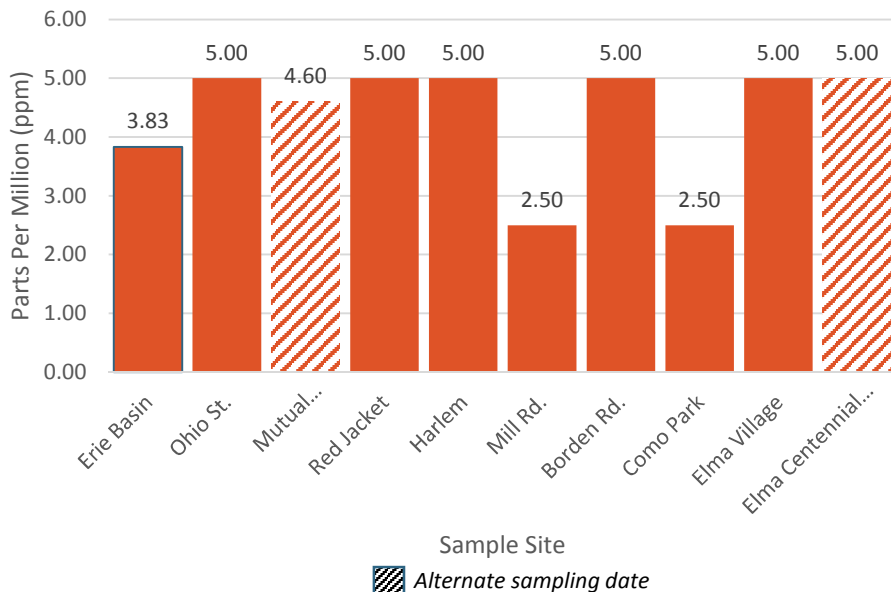
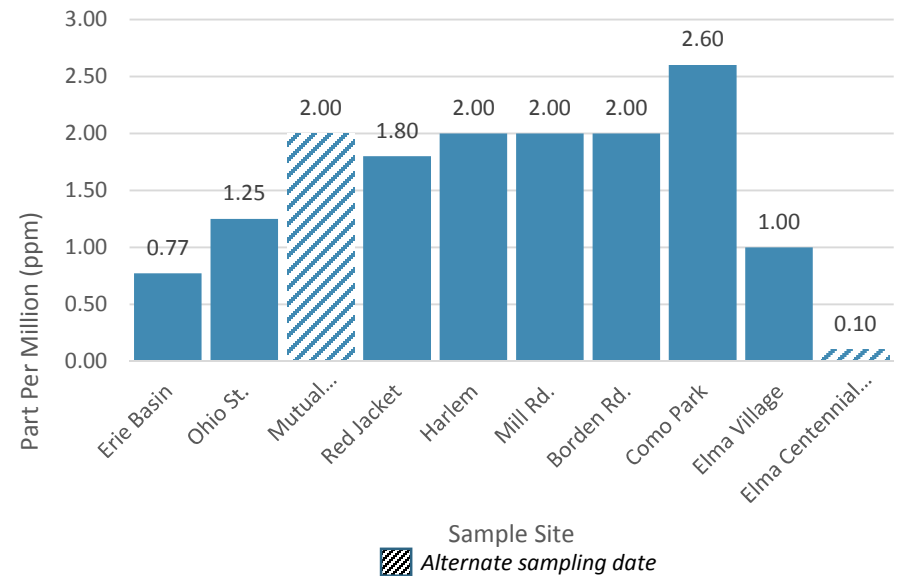


Figure #5: Phosphate Levels at Each Sample Site (ppm)



# WAS IT THE WEATHER?

Many groups noted that it had rained throughout the week of October 4<sup>th</sup>. Use the graph and guiding questions below to explore the relationship between precipitation, turbidity, and the water quality results for the event.

## Precipitation levels:

October 2: 1.00"  
October 3: 0.00"  
October 4: 0.45"

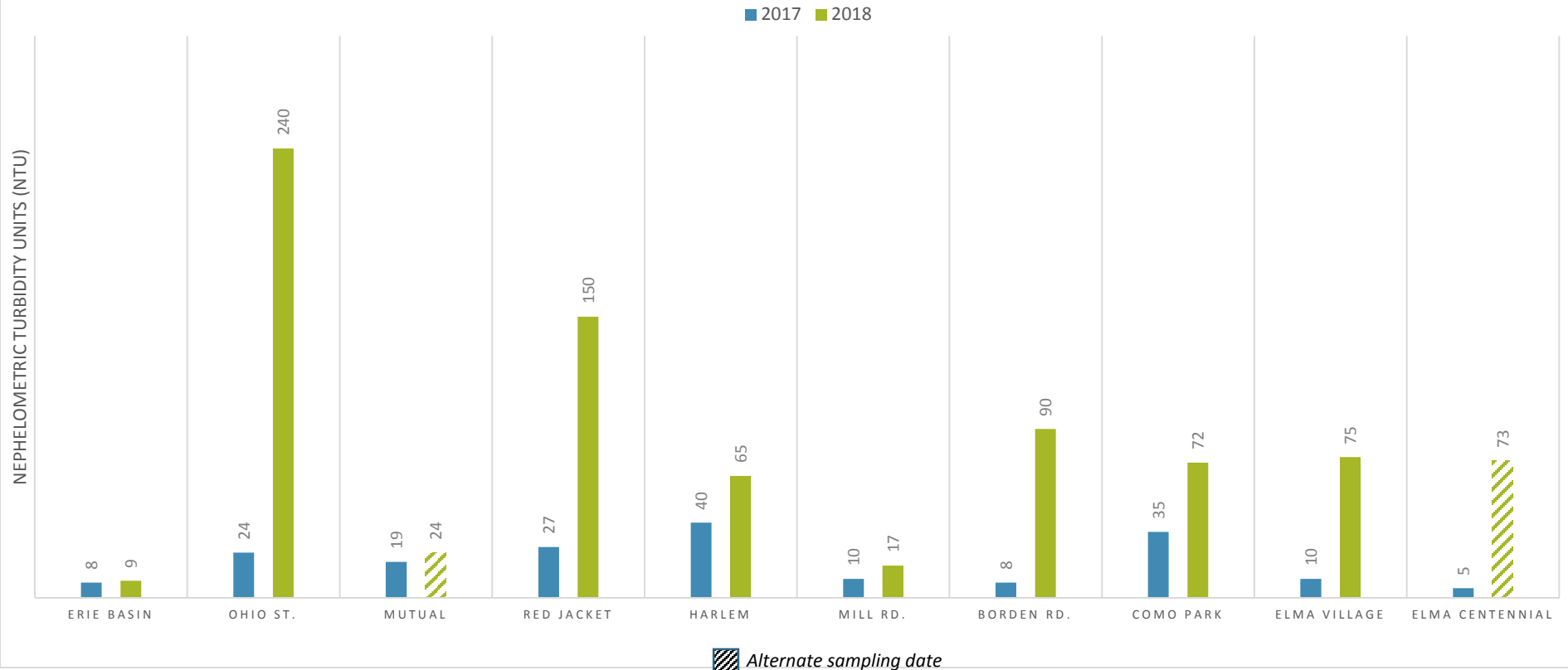
## What is turbidity?

How does precipitation affect turbidity?

How could turbidity affect other measurements during "A Day in the Life of the Buffalo River?"

What **other** measurements would be affected by a heavy rainfall?

### TURBIDITY LEVELS 2017-2018

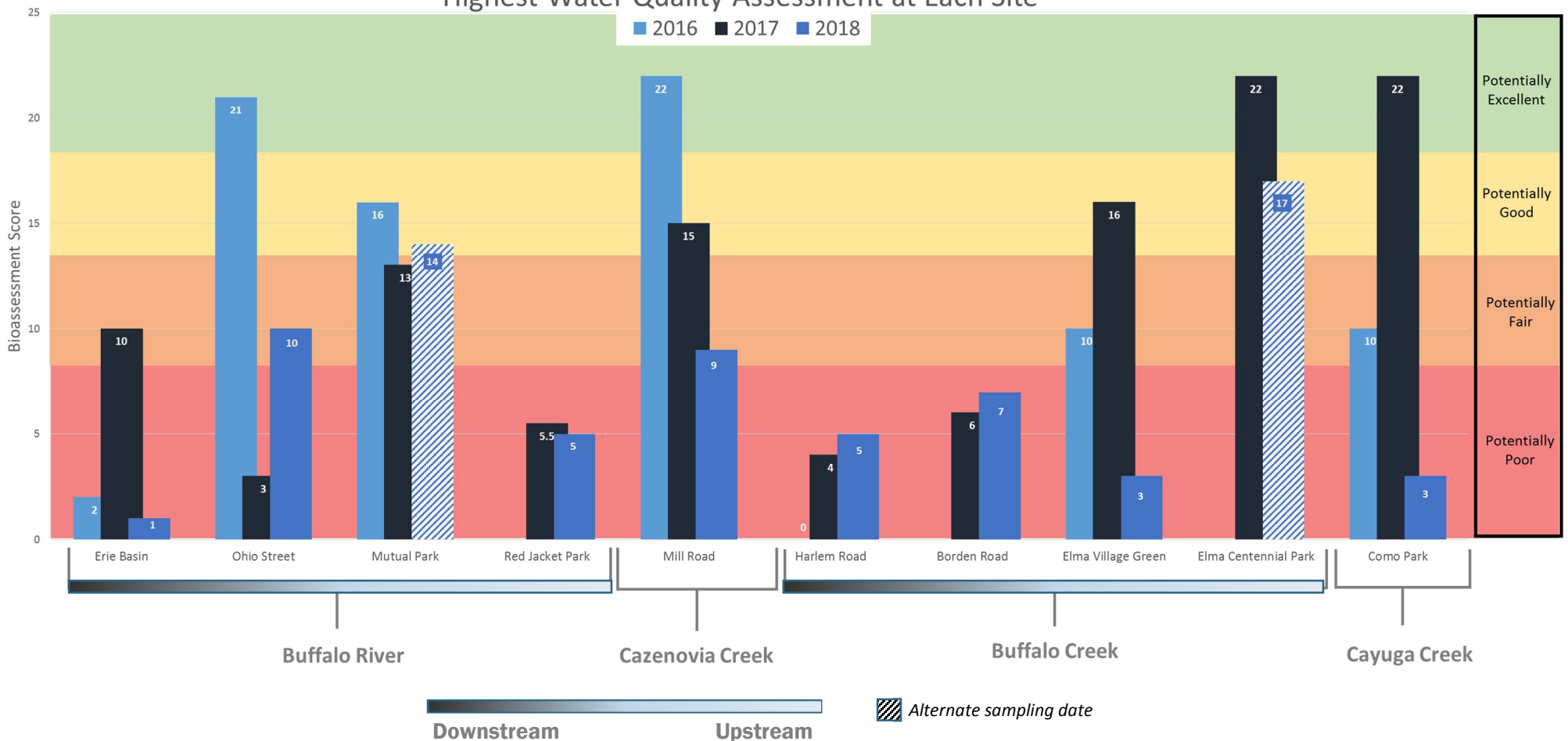


2016  
-2018

# CHANGES IN THE WATERSHED

**2018 marked the sixth year of “A Day in the Life of the Buffalo River.”** Over the years, the data collected at each site reveals changes that occur within the watershed. These changes may be a result of restoration efforts, pollution control devices, or other factors, including weather conditions. The following charts show bioassessment scores, pH levels, and dissolved oxygen levels of each tributary and the Buffalo River for the last three years. Over time, our data may be able to show larger trends that indicate overall improvement or deterioration of the watershed.

Highest Water Quality Assessment at Each Site



# pH

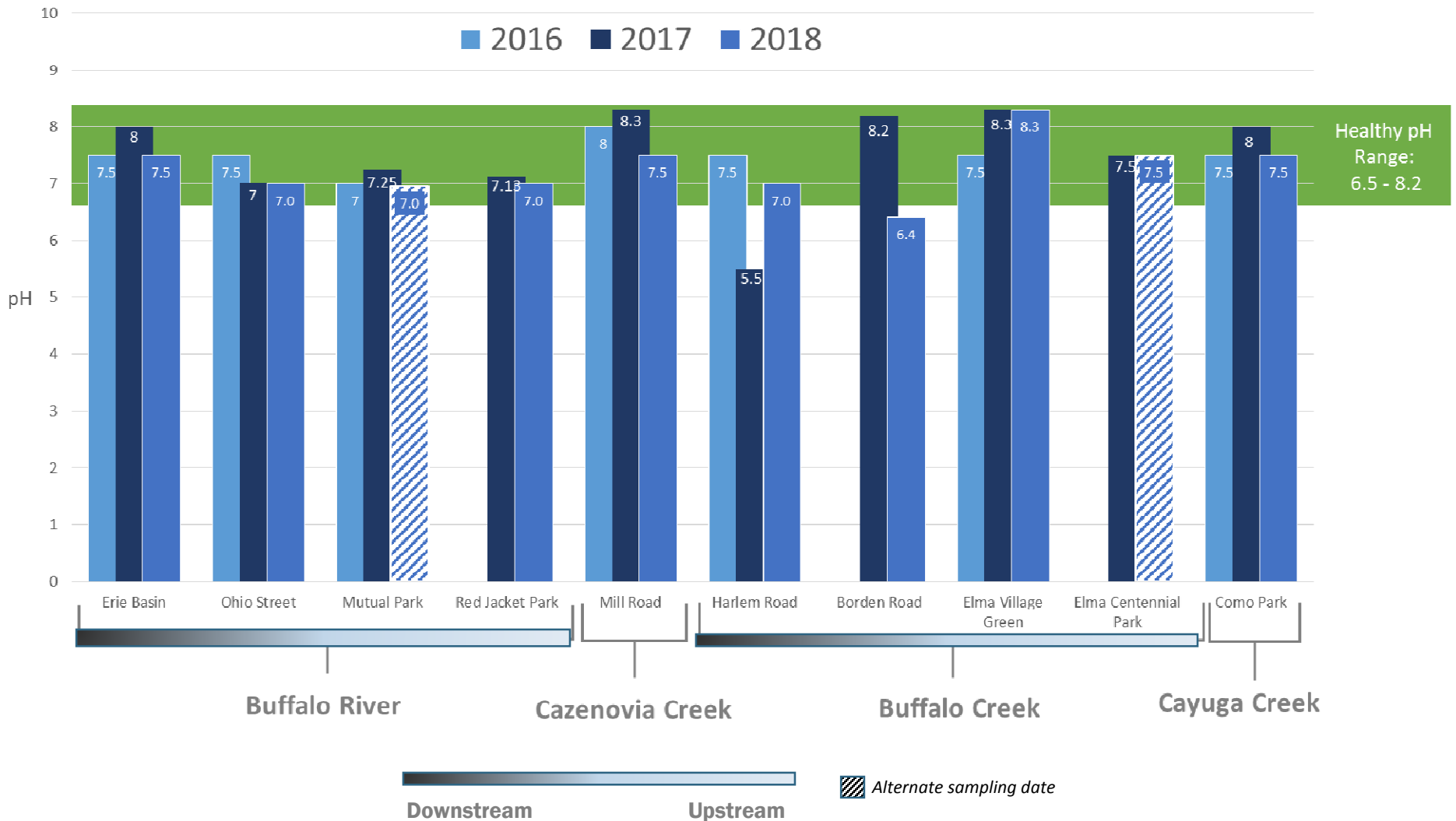
The pH scale measures how acidic or basic (alkaline) a solution is on a scale of 0 to 14.

Most river animals are very sensitive to pH changes, and may die if the pH falls outside of the healthy range.

Low or high pH levels may indicate pollution from :

1. **Acid Rain.** Emissions from factories and vehicles can cause acid rain which lowers pH levels in a body of water.
2. **Industrial or Agricultural Runoff.** Chemical or other material discharge may affect the pH levels.
3. **Wastewater Discharge.** Detergents and soap-based products can increase pH levels.

## Average pH at Each Sample Site



# DISSOLVED OXYGEN

Oxygen that is mixed into water is called “dissolved oxygen” (DO). It is a measure of how much oxygen is in the water for fish and other organisms to use. It is measured in parts per million (ppm).

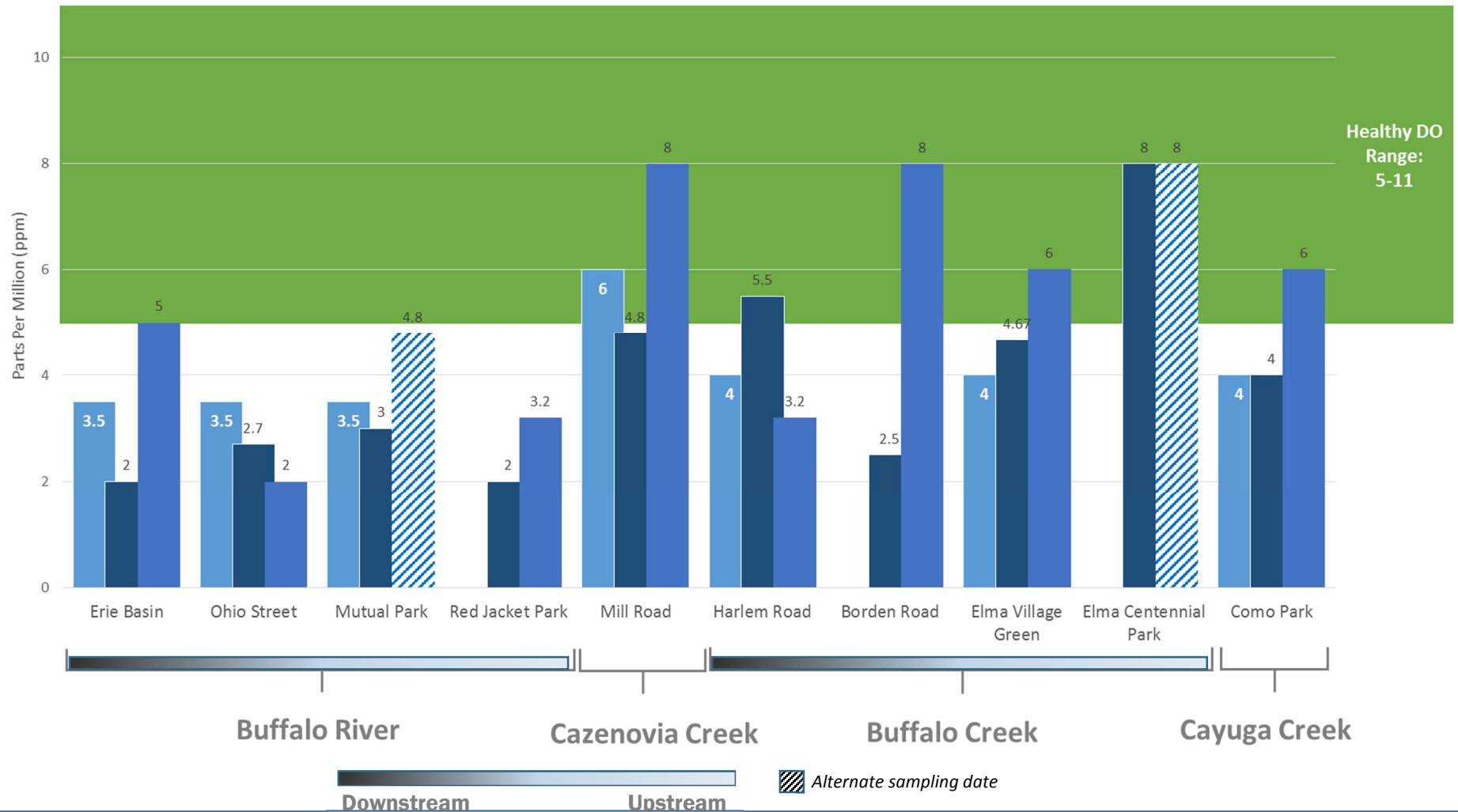
DO increases when wind mixes up the water or when river plants make oxygen during photosynthesis. DO decreases when it is used by river animals to breathe, when photosynthesis stops during the night, or when the water is polluted.

## Low DO levels may indicate:

1. **Thermal Pollution.** Warm water holds less oxygen than cold water.
2. **Sewage and Fertilizer Pollution.** Nutrients from these sources can cause algae and aquatic plants to grow. When these producers die, bacteria break them down and use up much of the oxygen in the process.

### Average Dissolved Oxygen Level at Each Sample Site

■ 2016 ■ 2017 ■ 2018





# Thinking Beyond "A Day"

What are some indicators that the restoration efforts in this watershed are working?



Do you think there are still sources of pollution in this watershed? What results support your conclusion?



How does the bioassessment of your site compare with other sites in the same creek or river? Other tributaries?

What tributary do you think is the healthiest? Why?



What natural factors may affect dissolved oxygen levels?



How could an increase in turbidity affect dissolved oxygen levels?



What sampling methods or outside factors may have affected the accuracy of this data?



# 2018 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:

- Erie County Department of Environment and Planning
- Erie County Parks, Recreation, and Forestry
- NYS DEC Great Lakes Program
- Buffalo Niagara Waterkeeper



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

- Brian Engler
- Mary Hughes
- Ann Keller
- Bob Klick



Find out more about this event and view collected data from 2013-2018 at <http://reinsteinwoods.org/dayinthelife>

