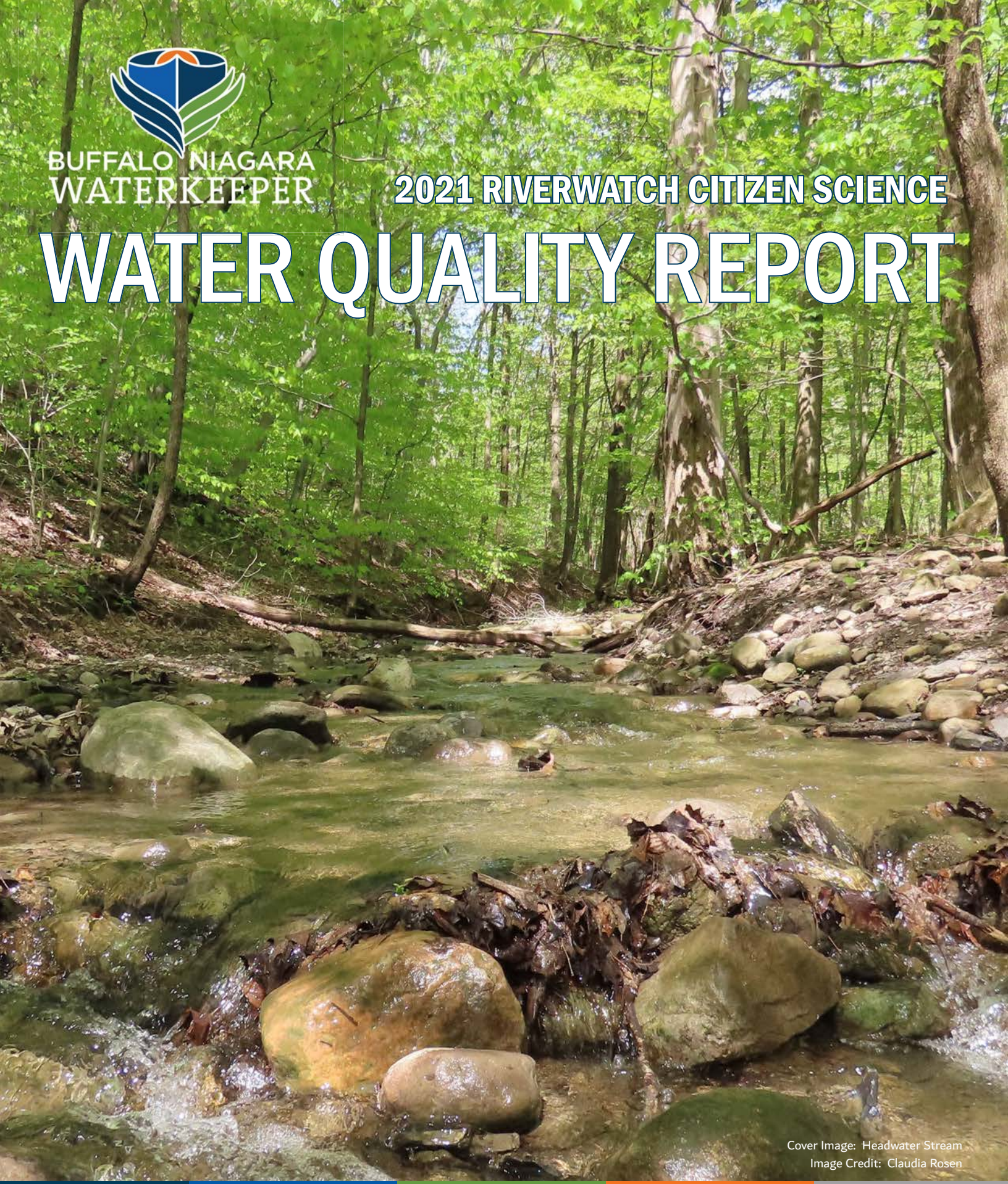
BUFFALO NIAGARA WATERKEEPER

2021 RIVERWATCH CITIZEN SCIENCE

WATER QUALITY REPORT



Cover Image: Headwater Stream
Image Credit: Claudia Rosen

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INTRODUCTION

This report is an educational tool providing information about water quality in the Western New York Region. Buffalo Niagara Waterkeeper works to improve water quality through citizen science programs, water quality monitoring, restoration projects throughout Western New York, and educational outreach. Included in this report is information about how the New York State Department of Conservation (NYSDEC) creates water quality standards and stream designations, water quality issues in streams sampled, baseline water quality data, bacterial sampling results, nurdle patrol monitoring, information regarding Harmful Algal Blooms (HABs) and solutions to ongoing pollution. Much of this data would not be gathered if not for our Riverwatch Citizen Scientists!

Riverwatch is a volunteer citizen science program. Waterkeeper staff train concerned citizens to gather important water quality data in the Niagara River Watershed. These volunteers provide a networks of 'eyes on the water' and help provide surveillance monitoring to bolster regional baseline water quality data. Waterkeeper recognizes the many barriers for full community participation in environmental volunteer programs and is continually working to reduce these barriers in our programming, including Riverwatch.

NEW YORK STATE WATERWAYS

Sources of information: NYSDEC Water Quality Standards and Classifications Webpage: http://www.dec.ny.gov/chemical/23853.html
Title 6 of the New York Codes, Rules and Regulations (6 NYCRR) Part 701 Classifications - Surface Waters and Groundwater

WATER QUALITY STANDARDS (WQS)

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Water Quality Standards (WQS) are created by the NYSDEC with oversight from the United States Environmental Protection Agency (EPA). These WQS are set by first determining best usages and establishing water quality criteria (WQC). WQC are numeric and narrative descriptions of the conditions in a waterway necessary to support Best Uses.

If all WQS are met, antidegration policies and implementation methods are employed to keep the water quality at acceptable levels. If the waterway is not meeting WQS, a strategy to reduce pollutants and meet these standards is needed. Strategies are authorized by the CWA, utilizing available tools from federal, state, and local governments and nongovernmental organizations.

BEST USES AND STREAM CLASS

Based on a waterway's existing or expected Best Use(s), the NYSDEC assigns a letter classification and standard designation, which is detailed below. Best Uses include: source of drinking water, swimming, boating, fishing, and shellfishing. There are subcategories under water-based recreation to refer to the proportion of time in which someone engaging in certain types of activities would come into direct contact with the water. Secondary contact refers to short-term contact which may include jet skiing or canoeing. Primary contact refers to long-term or whole body contact and may include swimming, kayaking or snorkeling.

A Class A fresh surface waters

Best uses: Source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival.

This classification may be given to those waters that, if subjected to approved treatment equal to coagulation, sedimentation, filtration and disinfection, with additional treatment if necessary to reduce naturally present impurities, meet or will meet NYS Department of Health (DOH) drinking water standards and are or will be considered safe and satisfactory for drinking water purposes.

B Class B fresh surface waters

Best uses: Primary and secondary contact recreation and fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival.

C Class C fresh surface waters

Best use: Fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival. The water quality shall be suitable or primary and secondary contact recreation, although other factors may limit the use of these purposes.

D Class D fresh surface waters

Best use: Fishing. These waters, which reflect the lowest classification standard, shall be suitable for fish, shellfish, and wildlife survival. The water shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. Due to such natural conditions as indeterminacy of flow, water conditions not conductive to propagation of game fishery, or stream bed conditions, the waters will not support fish propagation.

Note: Waters with classifications A, B, and C may also have a standard designation of (T), indicating that it may support a trout population, or (TS), indicating that it may support trout spawning.

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ABOUT THE NIAGARA RIVER WATERSHED

The Niagara River Watershed is located along the western most portion of New York State and encompasses lands that drains into the Niagara River, a channel that connects the Great Lakes of Erie and Ontario. The Niagara River Watershed is also part of the larger Great Lakes Drainage Basin.

The Niagara River Watershed Encompasses:

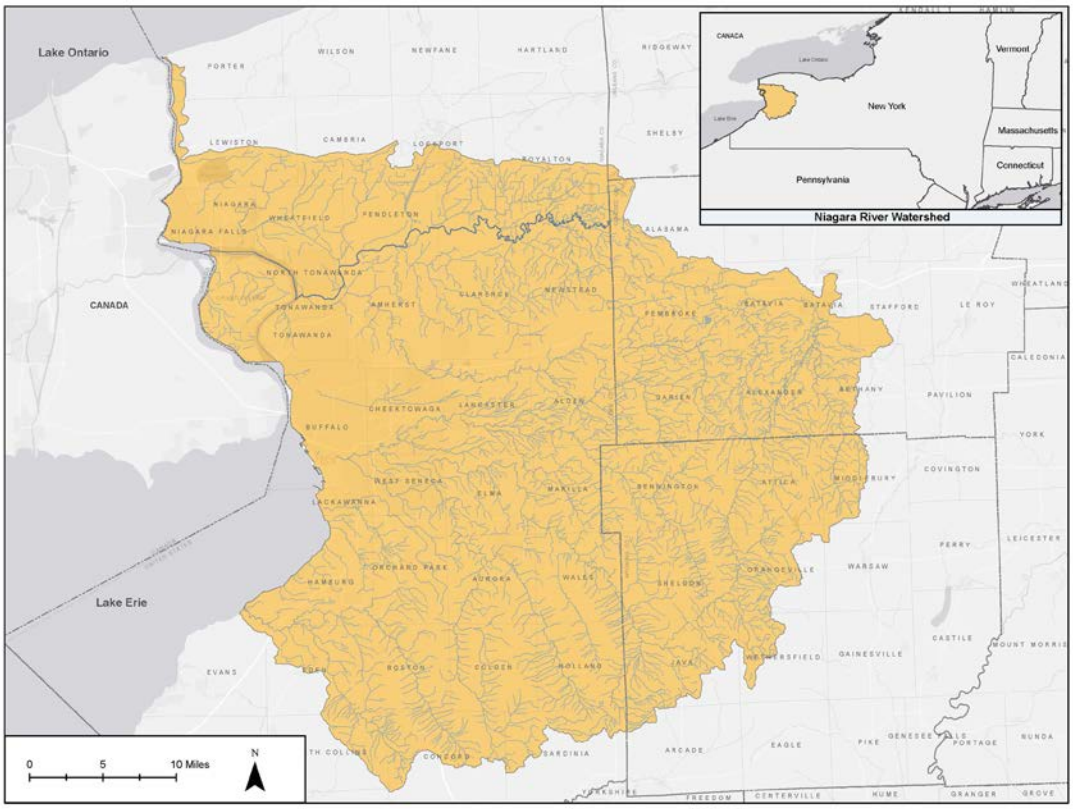
903,305 acres of land

71 municipalities

3,193 miles of watercourses

52,979 acres of state and federally listed wetlands

To learn more about the Niagara River Watershed and watershed planning visit:
bnwaterkeeper.org/projects/healthyniagara/



Map 1: Niagara River Watershed and tributaries

ABOUT THE WATERBODIES SAMPLED

The Niagara River Watershed is comprised of 11 sub-watersheds. These two pages indicate the waterbodies sampled by Riverwatch volunteers and their correlating sub-watershed. Use the map on the following page to explore locations and boundaries of these sub-watersheds. The water quality issues listed here reference the NYSDEC's Waterbody Inventory/Priority Waterbodies List. Length often includes waterbody tributaries.

Niagara River Sub-watershed

Bergholtz Creek
Stream Class: C ; Length: 33.1 miles
Water Quality Issues: Fish consumption, aquatic life, and recreation are impaired from known sources of urban stormwater runoff and toxic contaminated sediment.

Black Rock Canal
Stream Class: C ; Length: 2.2 miles
Water Quality Issues: Fish consumption is impaired due to a NYS DOH health advisory for the Niagara River. Some species of fish have elevated PCB levels. Stormwater runoff, habitat modification, and combined sewer overflows also impact the canal.

Cayuga Creek (Niagara County)
Stream Class: C ; Length: 21.6 miles
Water Quality Issues: Fish consumption is precluded while aquatic life and recreation is impaired from known sources of urban stormwater runoff and toxic contaminated sediment.

Gill Creek and Hyde Park Lake
Stream Class: Gill Creek - C (12.3 miles); Hyde Park Lake - B (28.1 acres)
Water Quality Issues: Aquatic life and recreation are impaired by stormwater runoff and suspected toxic contaminated sediment. Harmful Algal Blooms have been confirmed by the NYSDEC for the past several years, including 2018.

Grand Island Tributaries
Stream Class: All are class B ; Length: 53.7 miles
Water Quality Issues: Habitat and aquatic life in the tributaries of Grand Island are thought to be threatened by elevated stream temperatures, silt, sediment, and nutrients linked to development in surrounding areas.

Niagara River
Stream Class: A (Special - Drinking Water) ; Length: 36.8 miles
Water Quality Issues: The Niagara is a source of drinking water for much of the region. The NYSDEC considers this use to be threatened by known contamination from toxic sediment and suspected contamination from combined sewer overflows and stormwater runoff.

Scajaquada Creek
Stream Class: Lower - B (mouth to Main St, Buffalo) ; Middle - C (Main St to Cheektowaga); Upper - B (above Cheektowaga)
Length: Lower - 0.3 miles; Middle - 8.3 miles; Upper - 15.1 miles
Water Quality Issues: Aquatic life and public bathing are precluded and recreation is impaired by low dissolved oxygen, excess nutrients, pathogens, and odors. Known sources include combined sewer overflows and urban stormwater runoff.

Two Mile Creek
Stream Class: B ; Length: 7.1 miles
Water Quality Issues: Aquatic life and recreation are impaired. Sources of pollution include municipal discharges, illegal connections to the sanitary sewers, and stormwater runoff. Suspected sources include industrial discharges and toxic contaminated sediment.

Ellicott Creek Sub-watershed

Ellicott Creek
Stream Class: B ; Length: 112 miles
Water Quality Issues: Aquatic life and recreation are impaired due to excess nutrients, pathogens, silt, and sediment from urban stormwater runoff and sanitary sewer overflows.

Lower Tonawanda Creek Sub-watershed

Ransom Creek
Stream Class: C ; Length: 93.7 miles
Water Quality Issues: Aquatic life and recreation are impaired by residential sewage discharges from on-site septic systems resulting in low dissolved oxygen and excess pathogens.

Tonawanda Creek, Lower
Stream Class: C (mouth to Pendleton) ; Length: 11.9 miles
Water Quality Issues: Fish consumption is impaired, while aquatic life and recreation are stressed by known toxic contaminated sediment, urban stormwater runoff, and suspected nutrient and silt pollution from sanitary discharges and streambank erosion.

Middle Tonawanda Creek Sub-watershed

Tonawanda Creek, Middle
Stream Class: B (Pendleton to E. Pembroke) Length 49.3 miles;
Stream Class: C (E. Pembroke to Batavia) Length: 11.7 miles
Water Quality Issues: Aquatic life and recreation are impaired by elevated nutrient levels and silt/sediment, the result of sanitary discharges, stormwater runoff, erosion and agricultural activities.

Murder Creek Sub-watershed

Murder Creek, Lower
Stream Class: C ; Length: 75.5 miles
Water Quality Issues: Aquatic life and recreation are impacted by streambank erosion, nonpoint sources, and septic system discharge.

Upper Tonawanda Creek Sub-watershed

Tonawanda Creek, Upper
Stream Class: A (above Batavia) ; Length: 255.1 miles
Water Quality Issues: Water supply, recreational use and aquatic life is stressed due to elevated nutrient levels, sediment loads, and agricultural activities. Municipal discharges and hydrologic modification also impact the creek. Fisheries in this region are also under stress.

Cayuga Creek Sub-watershed

Cayuga Creek (Erie County)
Stream Class: Lower - C (mouth to Lancaster); Middle - B ; Length: Lower - 13.5 miles; Middle - 116.6 miles
Water Quality Issues: Aquatic life and recreation are stressed by known pathogen pollution and suspected nutrient, silt, and sediment pollution. Sources include sanitary discharges, suspected stormwater runoff and streambank erosion.

Buffalo Creek Sub-watershed

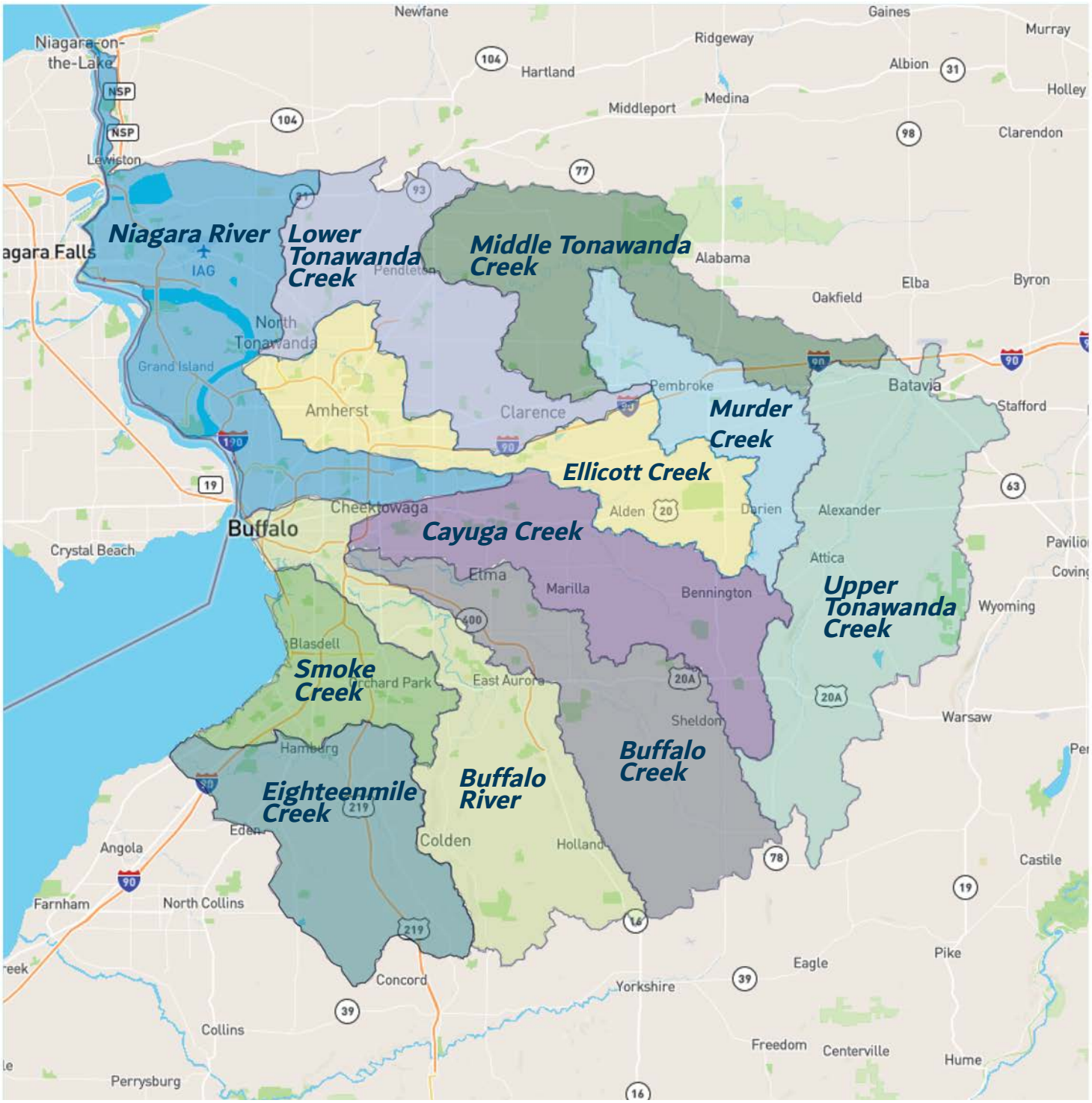
Buffalo Creek
Stream Class: Lower - B (mouth to E. Elma) ; Upper - A (E. Elma and upstream)
Length: Lower - 63.5 miles; Upper - 285.1 miles
Water Quality Issues: Aquatic life and recreation in the lower stretch are stressed by known silt/sediment pollution from stream bank erosion and urban stormwater runoff. Agriculture is a suspected pollutant source. There are no known impacts listed for the upper stretch.

Buffalo River Sub-watershed

Buffalo River
Stream Class: C ; Length: 8.6 miles (mouth to Cayuga Creek)
Water Quality Issues: The main stem is designated as a Great Lakes Area of Concern (AOC). Fish consumption is precluded while aquatic life and recreation remain stressed. The river is impacted by combined sewer overflows, stormwater runoff, sediment contamination, inactive hazardous waste sites, and hydrologic modification.

Cazenovia Creek
Stream Class: B ; Length: 51.7 miles
Water Quality Issues: Public bathing and recreation are stressed while aquatic life is threatened by known sources of pathogens and suspected urban stormwater runoff.

Lake Erie, Northern Outer Harbor
Stream Class: B ; Shoreline Length: 7.3 miles
Water Quality Issues: Fish consumption is impaired due to PCB contamination from historic industrial discharges and inactive hazardous waste sites.



Map 2: Niagara River Watershed with sub-watershed detail

Smoke Creek Sub-watershed

Rush Creek

Stream Class: C ; Length: 17.2 miles

Water Quality Issues: Municipal/industrial discharges (including sanitary sewer overflows) and urban stormwater runoff impact water quality. This waterway remains a suspected source of pollution, resulting in Lake Erie beach closures.

Smoke Creek

Stream Class: Lower - C ; South Branch Lower - C ; Length: Lower - 7.2 miles; South Branch - 27.2

Water Quality Issues: Urban stormwater runoff pollution elevates nutrient and sediment loads resulting in impaired/stressed aquatic life. Hydrologic modification in the main branch also impacts the creek.

Eighteenmile Creek Sub-watershed

Eighteenmile Creek

Stream Class: Lower - B(T); Middle - A ; Length: Lower - 20.8 miles; Middle - 49.5 miles

Water Quality Issues: In the lower stretch fish consumption, recreation, and fishery habitat are stressed by streambank erosion, stormwater runoff, agriculture, hydrologic modification, and toxic contaminated sediment. There are no known impacts listed for the middle stretch.

BASELINE WATER CHEMISTRY SAMPLING PARAMETERS & STANDARDS

WHAT PARAMETERS DO WE TEST FOR?

Riverwatch Baseline Water Chemistry Volunteers collect data on the following parameters using a Eureka Manta+ 20 meter and a HACH 2100Q Portable Turbidimeter.

TEMPERATURE

The temperature of water governs what aquatic life will inhabit a waterway. Additionally, temperature controls the dissolved oxygen content of water (as the temperature of water increases, the concentration of dissolved oxygen content decreases), and influences the rate of chemical and biological reactions. Water temperature can be impacted by sunlight duration and intensity, and discharges entering the waterbody.

DISSOLVED OXYGEN (DO)

DO enters water from the atmosphere, from aeration as it tumbles over rocks and falls, and from photosynthesis. DO is essential for the survival of nearly all aquatic life and levels can decrease with the introduction of various pollutants including sewage discharges, stormwater runoff, and failing septic systems.

CONDUCTIVITY

Conductivity is a measure of water's capability to pass an electrical current and indicates the presence of inorganic dissolved solids such as salts, chlorides, nitrate, sulfate, and phosphate ions. Conductivity is affected by the geology of the area through which the water flows. Elevated levels may indicate the presence of sewage or stormwater discharges and runoff. Streams outside of the standard range may not support healthy fisheries and other aquatic life.

TOTAL DISSOLVED SOLIDS (TDS)

TDS is a measure of inorganic and organic substances dissolved in water which include salts and minerals. Salts from roadways may runoff into waterways resulting in an elevated TDS reading.

pH

pH is a measurement of the potential activity of hydrogen ions (H+) in a sample. The pH reading of a water sample indicates its acidity on a scale from 0 to 14 with 7 being a neutral value. Solutions with a pH less than 7 are considered acidic and solutions above 7 are considered basic. The pH of water determines the solubility and biological availability of chemical constituents such as nutrients. The majority of aquatic animals prefer a range of 6.5 to 8.5. A pH outside this range stresses the systems of most organisms and can reduce reproduction, thereby reducing the diversity in the waterway. Pollution sources can alter the waterway's pH.

TURBIDITY

Turbidity is a measure of the clarity of a liquid. Suspended solids including soil particles, algae, plankton, and microbes impact turbidity. Erosion of sediment and stormwater runoff will increase the turbidity of waterways. High turbidity increases water temperatures, decreases DO, provides refuge for harmful microbes, and can clog the gills of fish and crustaceans.

WHAT ARE THE STANDARDS FOR THESE PARAMETERS?

This report summarizes water chemistry data collected and compares it to set standards. These standards are established by the NYSDEC with oversight from the EPA.

Standards are as follows:

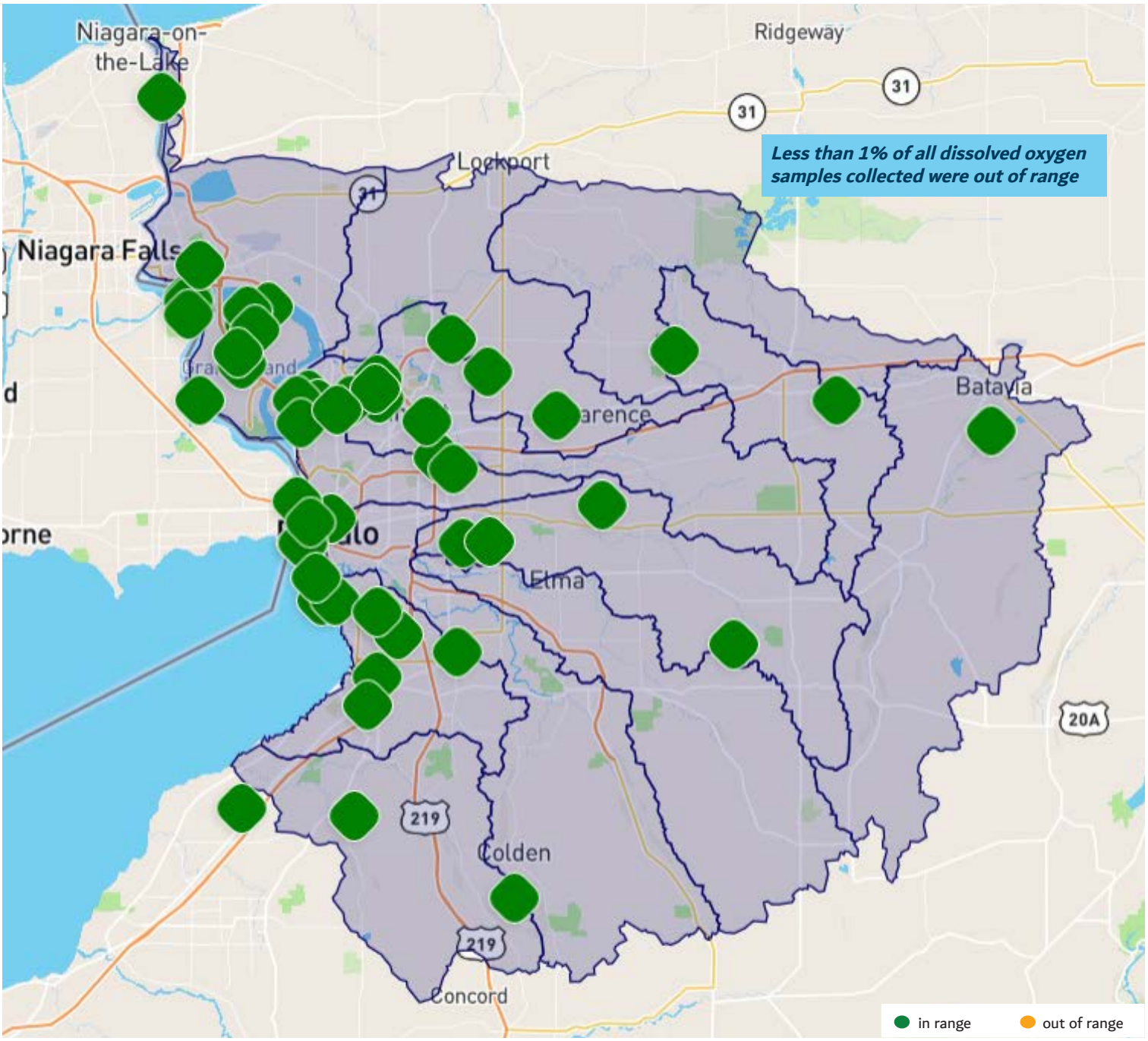
Parameter	Standard
Dissolved Oxygen	No less than 6.0 mg/L for Niagara River No less than 4.0 mg/L for all other streams
Conductivity[1]	Between 150 and 500 µS/cm
pH	Between 6.5 and 8.5
Turbidity	No more than 5.0 NTU

1 There is no standard set for conductivity by the NYSDEC or EPA. This range is a guideline for freshwater systems.

EXPLORE THIS DATA ONLINE!

To view data collected by Riverwatch Volunteers in an interactive format, visit bnwaterkeeper.org/water-quality-testing/

DISSOLVED OXYGEN RESULTS COMPARED TO STANDARDS



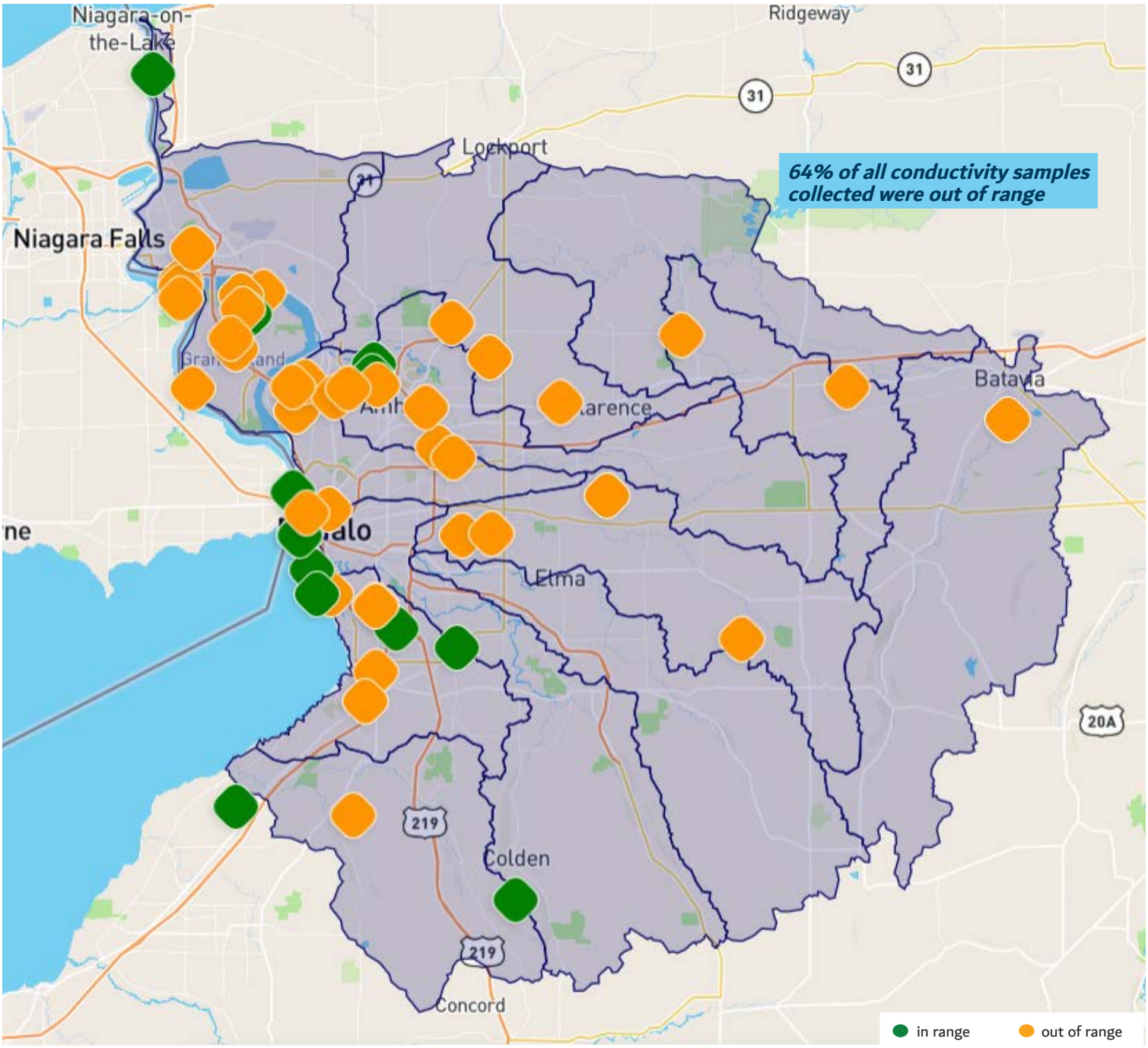
Map 3: Average Dissolved Oxygen Sample Results Compared to Standard


Volunteers collecting data along Cazenovia Creek


Sampling along Smoke Creek

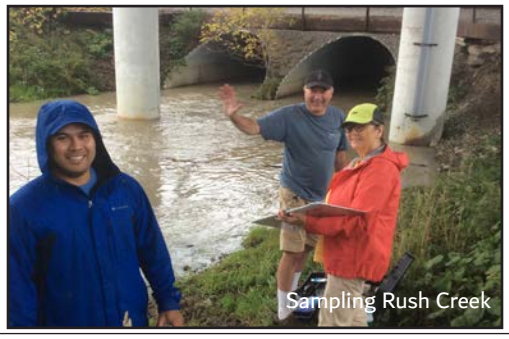

Niagara River in the City of Tonawanda

CONDUCTIVITY RESULTS COMPARED TO STANDARDS



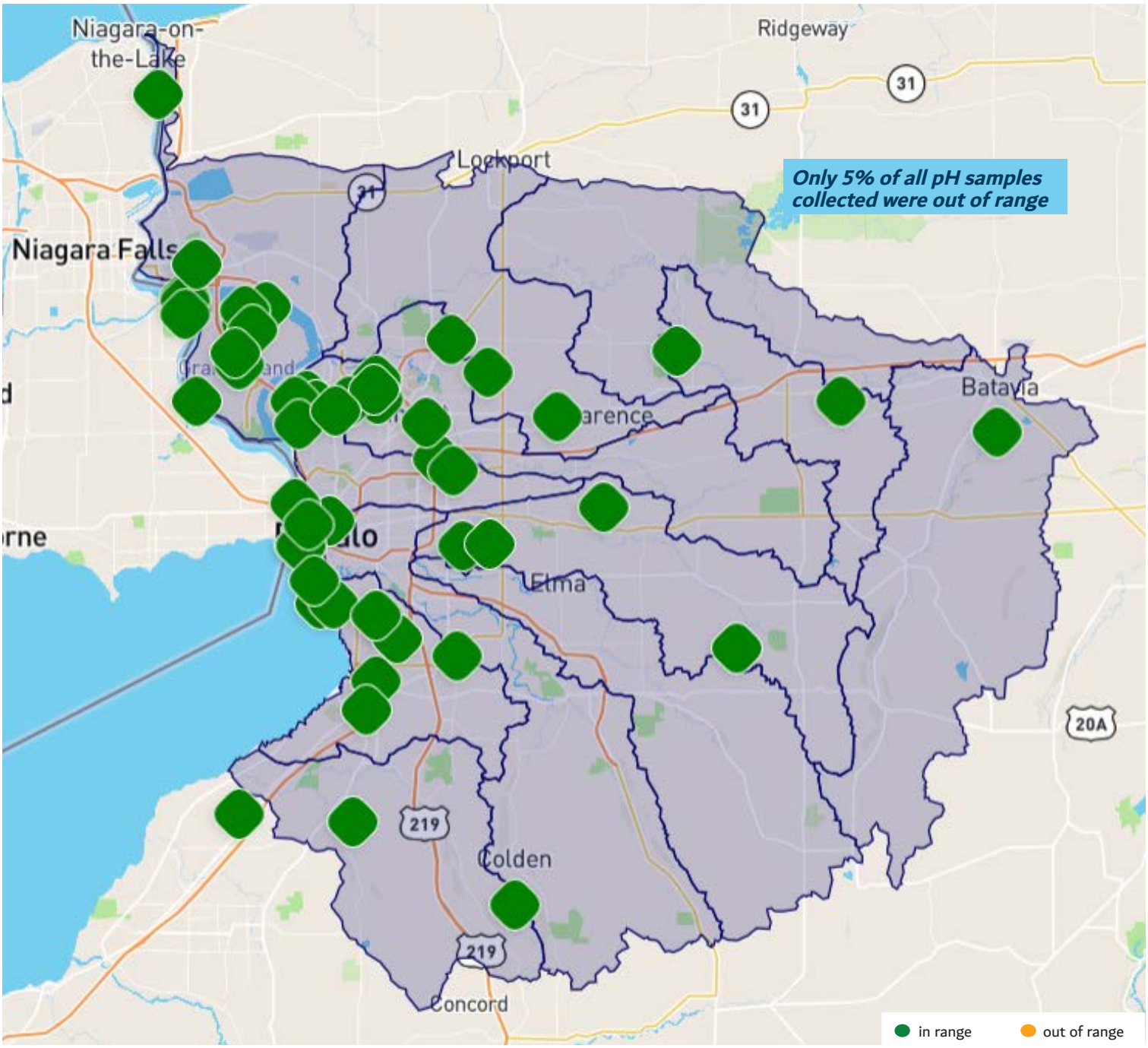
Map 4: Average Conductivity Sample Results Compared to Standard


Eighteenmile Creek


Sampling Rush Creek


Caspian Tern

pH RESULTS COMPARED TO STANDARDS



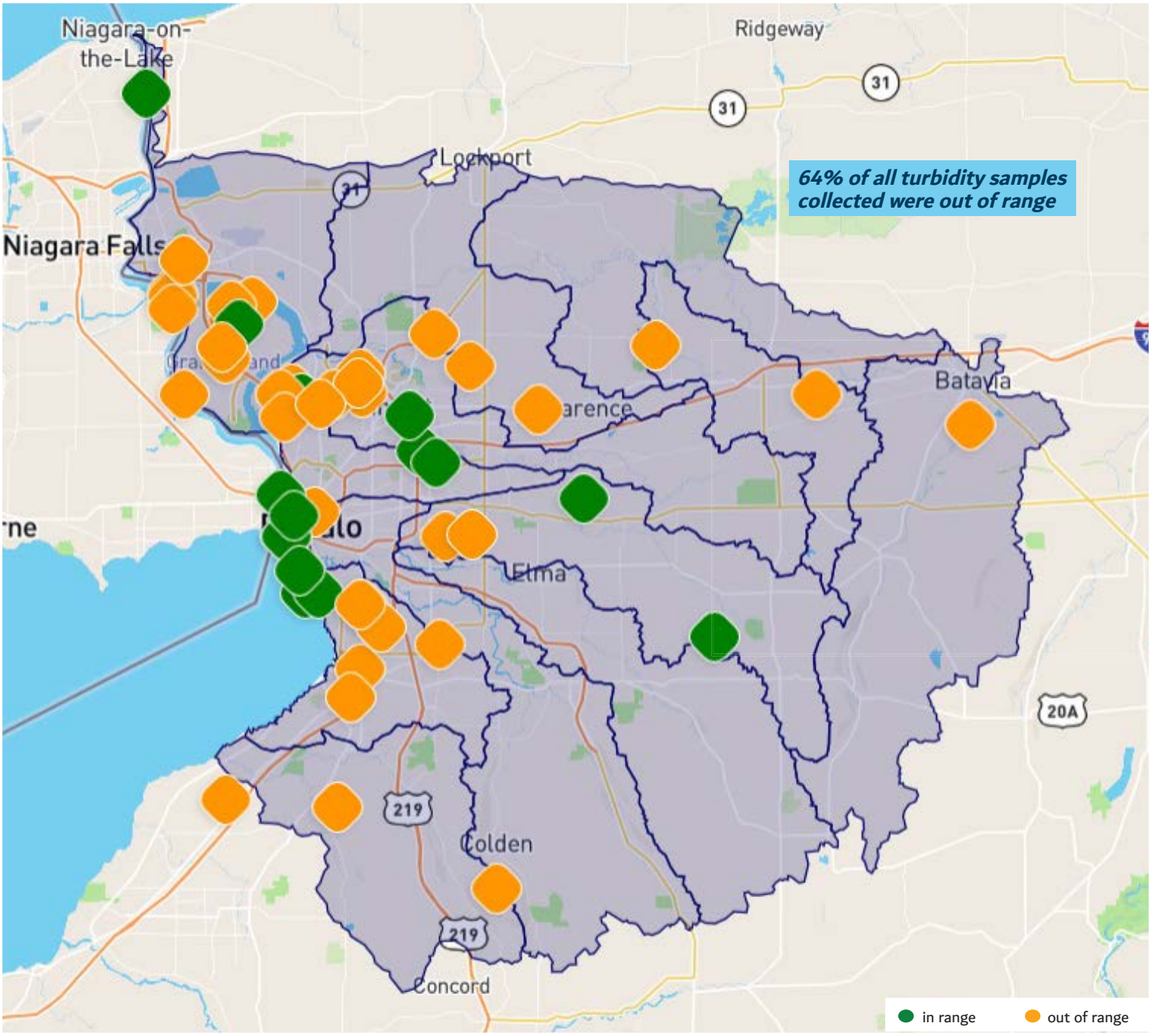
Map 5: Average pH Sample Results Compared to Standard


Buffalo River


Sampling Scajaquada Creek


Ellicott Creek

TURBIDITY RESULTS COMPARED TO STANDARDS



Map 6: Average Turbidity Sample Results Compared to Standard


Mouth of Buffalo River
Photo Credit: Larry Cobado


Woods Creek


Cauyga Creek, Niagara County

RESTORATION PROJECT HIGHLIGHT

Little Beaver Island Shoreline Restoration

Waterkeeper is focused on taking a holistic approach to revitalize waterways throughout the Niagara River Watershed to improve water quality and ecological conditions. This work is done through the implementation of restoration projects and innovative design-management strategies. One example is our recent restoration project at Little Beaver Island, part of Beaver Island State Park located on the southern end of Grand Island in New York.

Waterkeeper focused on enhancing about 1,250 linear feet of shoreline and nearshore habitat on Little Beaver Island. This project site sits alongside a very high energy section of the Niagara River and required the collaboration of many different organizations with different expertise. The project team included: Anchor QEA, LDC Construction, Applied Ecological Services, NYS Parks, NYSDEC, US Army Corps of Engineers, and the Niagara Relicensing Ecological Standing Committee.

Construction began in December of 2018 and was completed in December of 2021.

Work took place to:

- Address extreme shoreline erosion and property loss from high velocity currents, high wind energy, and ice scour
- Improve coastal resiliency
- Create new and restored areas of coastal wetland habitat
- Reduce the presence of invasive species
- Increase and improve coastal wetland habitat

Restoration measures included:

- Shoreline regrading
- Installation of rock barrier reefs and large woody debris
- Invasive species management
- Planting of upland and in-water vegetation
- Creation of no-mow areas

Many exciting things were observed at this site toward the end of the construction period including:

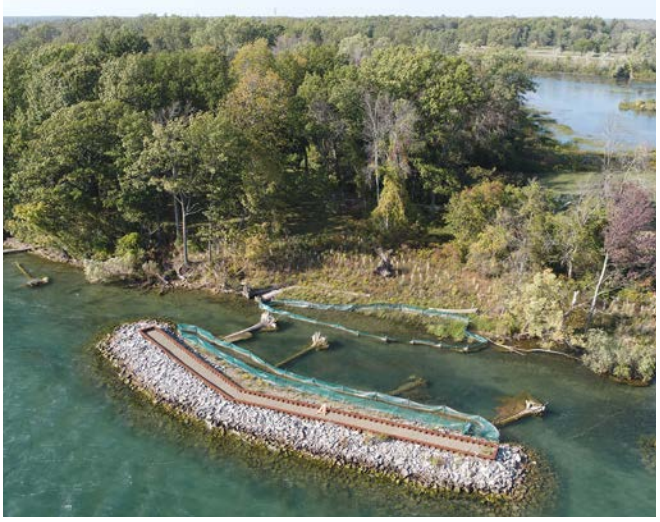
- Wildlife including small mouth bass, snapping turtles, mink and various waterbirds
- Meadows in no-mow areas have attracted a variety of pollinators and other wildlife
- The establishment of many wetland and riparian plant species along the shoreline
- Increased number of paddlers along this section of the River

Learn more about this project at:
bnwaterkeeper.org/little-beaver-island/

Funding for this project was provided by the New York Power Authority through the Habitat Enhancement and Restoration fund and administered by the Niagara Relicensing Ecological Standing Committee

BEFORE: Extreme shoreline erosion

MID CONSTRUCTION: Shoreline is regraded to a gentle slope including native plantings



AFTER CONSTRUCTION: Rock Barrier Reefs slow wave action and limits shoreline ice scour

HARMFUL ALGAL BLOOMS (HABs)

What is a Harmful Algal Bloom?

A Harmful Algal Bloom (HAB) contains organisms that can produce toxins. Most algae are harmless and are components of a healthy aquatic ecosystem. The most accurate name for these blooms in Western New York are **Cyanobacteria Blooms**. Cyanobacteria are a phylum of bacteria and are aquatic and photosynthetic. The most widespread cyanobacterial toxin is **microsystin**.

What Causes Harmful Algal Blooms?

HABs are likely to occur in slow moving water with excess nutrients like nitrogen and phosphorus. Warm temperatures and abundant sunlight also create ideal conditions for blooms. HABs are more likely to occur with our changing global climate.

What is the Health Risk?

HABs are harmful to people and animals. Symptoms coinciding with contact of HABs include stomach, skin, eye, and throat irritation, allergic reactions or breathing difficulties. If you think you're experiencing health risks associated with a HAB, consider visiting a healthcare professional. Pets should not enter water with a suspected HAB. Dogs and livestock that swim or drink water that contains microsystin and other cyanotoxins can become severely ill or die. Even after visible blooms subside, the toxins may still be present in the water.

Blooms in the Western Basin of Lake Erie

HABs have become prevalent in the western basin of Lake Erie in recent years. During 2021 there were several HABs reported at and near Presque Isle State Park, located along the Lake Erie coast in Pennsylvania. During the swimming season Erie County in Pennsylvania posts updates related to HABs and other swimming related water quality tests here: https://eriecountypa.gov/departments/health/what-we-do/beach-water-testing-results/

For additional information including forecast models visit: www.glerl.noaa.gov/res/HABs_and_Hypoxia/

Blooms in Western New York Waterways

The NYSDEC HABs Program documents blooms into 3 categories:

1) Suspicious

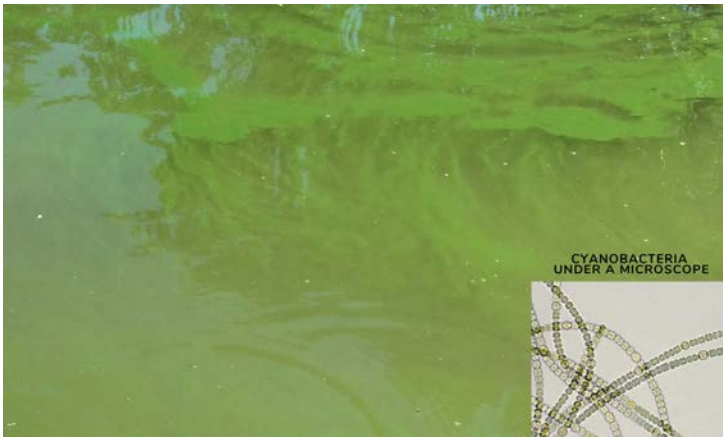
DEC staff determined that conditions fit the description of a cyanobacteria HAB based on visual observations and/or digital photographs.

2) Confirmed

Water sampling results have confirmed the presence of a cyanobacteria HAB which may produce toxins or other harmful compounds.

3) Confirmed with High Toxins

Water sampling results confirmed that there were toxins present in quantities to potentially cause health effects if people or animals came in contact with the water.



Cyanobacteria Bloom - In New York State, these blooms are classified as Harmful Algal Blooms

Euglena Bloom - In New York State, these blooms are **NOT** classified as Harmful Algal Blooms

Report a HAB

To report a potential bloom to NYSDEC, fill out and submit a Suspicious Algal Bloom Report Form. Visit their webpage:

www.dec.ny.gov/chemical/77118.html

You can also notify Waterkeeper by emailing a photo and location information to Wendy Paterson at wpaterson@bnwaterkeeper.org

For additional information visit:
bnwaterkeeper.org/harmful-algal-bloom/

HARMFUL ALGAL BLOOMS (HABs)

Waterkeeper staff respond to HAB reports made by Riverwatch Volunteers and community members throughout the year. A water sample may be collected by trained staff if deemed necessary and identified using a microscope. Sample results are then forwarded to the NYSDEC for confirmation. **HABs are dangerous and should not be touched without proper training and protective equipment.**

Some inland waterways experience **euglena blooms**, which are not considered a Harmful Algal Bloom in the NYSDEC HABS Program. Euglena are single-celled flagellated microorganisms that feature both plant and animal characteristics. Some species of Euglena are known to produce ichthyotoxins. To the bare eye, euglena blooms and cyanobacteria blooms look very similar. The difference is obvious when looking at a sample under a microscope.

The following waterbodies in the Niagara River Watershed were documented with blooms in 2021. This list includes both cyanobacteria blooms and euglena blooms. Any Cyanobacteria blooms are recorded by the NYSDEC and can be viewed here: www.dec.ny.gov/docs/water_pdf/habsarchive2021.pdf

- **Eighteenmile Creek** Waterkeeper staff viewed this cyanobacteria bloom near the mouth of Eighteenmile Creek in Hamburg, NY at the end of August. It did not persist in the waterway for long and was not visible the following day.
- **Ellicott Creek** For several years, this waterway has experienced frequent and persistent euglena blooms throughout the summer and fall. This type of bloom is not considered a HAB by the NYSDEC. New to 2021 was the identification of a cyanobacteria bloom near the Ellicott Creek Park kayak launch, near Niagara Falls Blvd. The bloom was identified as Lyngbya, which forms floating mats showcasing how varied cyanobacteria blooms can truly be!
- **Gill Creek** Just downstream of Hyde Park Lake in Niagara Falls, a cyanobacteria bloom was identified by Waterkeeper volunteers at Gill Creek Park in August.
- **Hyde Park Lake** Once again, this man-made lake that is created by damming Gill Creek experienced multiple cyanobacteria blooms. The blooms persisted for the better portion of the summer and into the fall, making water recreation unsafe.
- **Mirror Lake** This small lake in Forest Lawn Cemetery in the City of Buffalo experienced a cyanobacteria bloom in September.
- **Tonawanda Creek** This waterway also experiences euglena blooms near the Ellicott Creek Bark Park at the Tonawanda/North Tonawanda border. In September, Waterkeeper staff identified a Lyngbya bloom near the North Tonawanda Botanical Gardens.

Cyanobacteria blooms can be a white color and often look like spilled paint, like this cyanobacteria bloom at Hyde Park Lake

Location Spotlight: Hyde Park Lake, Niagara Falls

Persistent HABs in Hyde Park Lake have made the lake unsafe for recreational activities. Waterkeeper no longer deems the lake safe for paddling from July on. Blooms have also impacted outdoor activities with neighboring school groups.

The lake receives high amounts of runoff during and after rain events washing in excess nutrients and soil from eroding banks. This is resulting in high turbidity and high levels of nutrients which contribute to HABs.

In 2021, Waterkeeper began testing for HAB toxins in Hyde Park Lake as part of a pilot project coordinated by Bowling Green State University and LightDeck Diagnostics. Water samples were collected over the course of 22 weeks to analyze the concentrations of two toxins: microcystin and cylindrospermopsin. These are both potent toxins that can cause damage to the liver and kidneys of people and pets even at low concentrations.

Over the course of the sampling period it was observed that microcystin levels varied depending on the conditions of the water. After a HAB was identified at Hyde Park lake in August, the concentration of microsystin more than doubled in comparison to the previous weeks sample. The level of microcystin remained elevated the week after the bloom was identified, illustrating that as the algae decay and their cell walls break down, toxins continue to be released.

The cyanobacteria bloom extends under the pedestrian bridge leading to Duck Island

BACTERIA SAMPLING

Bacteria Basics

Bacteria are single-celled organisms naturally found in the environment. Some bacteria are harmless to humans and can actually help aid natural processes. *Escherichia coli (E. coli)* is a bacterium found in the environment, foods, and intestines of people and animals. Many strains of *E. coli* are harmless to humans. However, some strains can result in serious health problems and sickness. *E. coli* is a strong indicator of sewage pollution or animal waste contamination when found in local waterways.

Combined Sewer System 101

Most older cities and municipalities in New York State, including the Cities of Buffalo and Niagara Falls, have combined sewer systems. In contrast, most outlying suburban areas utilize separate storm and sanitary sewers.

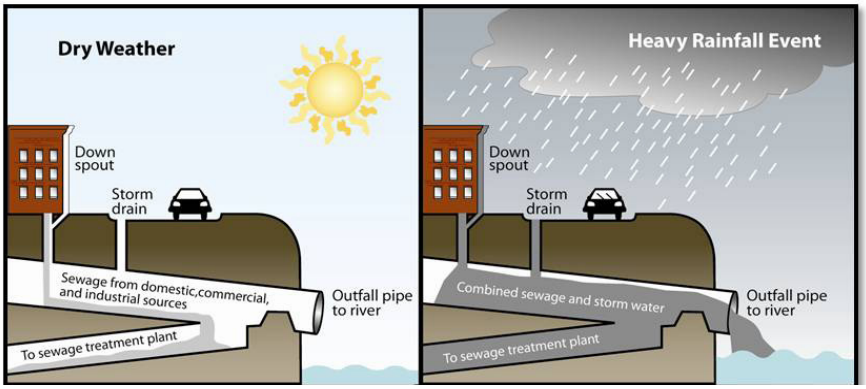


Image: USEPA

During rain events in a combined sewer system, water from streets, roofs, and lawns flows into storm drains and combines with sewage in one system. When there is heavy rainfall, the volume of water overwhelms the system and overflows into local waterways by design. These overflows are referred to as Combined Sewer Overflows (CSOs). These overflows contain not only stormwater, but untreated human waste, toxins, and debris. When improperly maintained, septic systems also have the potential to discharge bacteria and pathogens into area waters.

Example of CSO Signage along the Buffalo River

Sampling

Waterkeeper staff sampled 19 sites during 2021 between the months of April and October for *E. coli* bacteria. Locations were selected based on the presence of combined sewer outfall pipes nearby or the presence of a kayak launch. Some sites were not sampled each month due to access issues or weather related events. Samples were analyzed using the Coliscan Easygel Method. Samples were collected during a dry weather period and a wet weather period.

- **Dry Weather Period:** A water sample can be collected at the sample site if there has been no rain in the past 3 days.
- **Wet Weather Period:** A water sample can be collected at the sample site during a rain event or immediately after a rain event. A qualifying rain event is 5 hours of rain OR ½ inch of rain at the sample site.

Results

Sampling results were compared to the EPA's Beach Action Value (BAV) of 235 cfu/100mL. This value is often used for making beach notification decisions (i.e., closures or advisories). As seen in the figure on the following page, higher levels of *E. coli* were recorded during wet weather periods versus dry weather periods. One sampling location, Black Rock Canal at Broderick Park, had sampling results that deviated from this statement. For a period in the summer during a very dry period multiple samples collected indicated high *E. coli* levels. Waterkeeper staff paddled the length of the canal looking for any visible CSO leak and also sent in a water sample to be analyzed for DNA, to help determine the source of the *E. coli*, which indicated a human source. The Buffalo Sewer Authority and the NYSDEC was informed of these testing results.

Caution should be made when recreating in local waterways during or soon after wet weather periods. Waterkeeper will continue to conduct bacteria sampling of local waterways to better inform community members of waterway conditions and to track down pollution sources.

These results were uploaded to Swim Guide, a website and app that presents free water quality information for over 7,000 possible swimming and water recreation locations in multiple countries. Explore Swim Guide today at www.theswimguide.org/ To view all sampling results visit bnwaterkeeper.org/water-quality-testing/

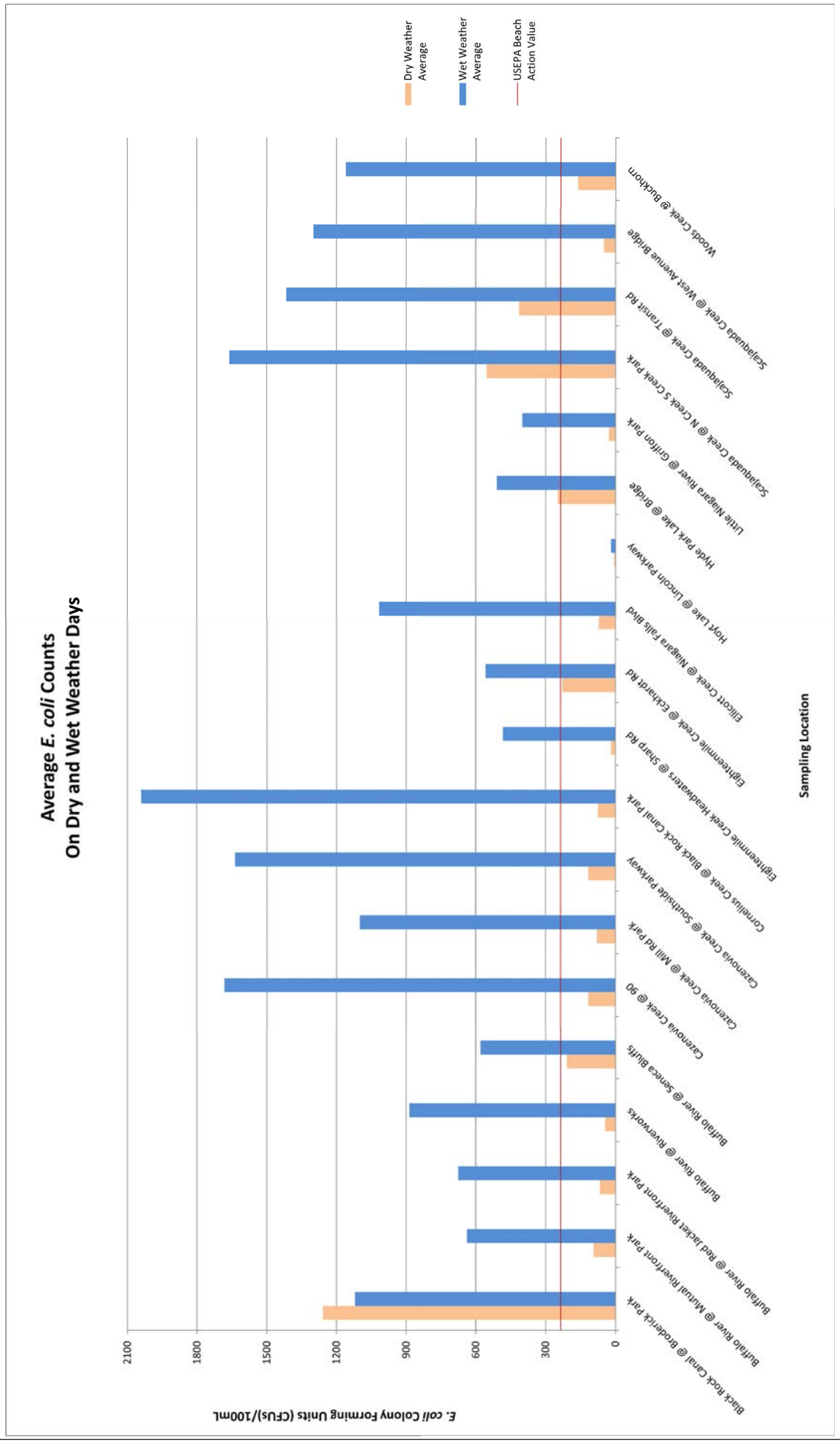


Figure 1: *Escherichia coli* results in comparison to the EPA BAV

NURDLE PATROL

Tiny plastic pieces create big problems for aquatic ecosystems

What is Plastic?

Found in many forms in our everyday life, plastic is a lightweight, durable material that can be made into almost anything. Plastics are polymers, which are modeled after naturally occurring polymers like in hair, skin, and DNA. Most plastic is made of synthetic polymers derived from fossil fuels, a non-renewable resource.

Plastics degrade over time. This process is accelerated when the plastic is exposed to heat, light, chemicals or natural processes. Chemical additives are often mixed into the plastic polymer to slow this breakdown. These additives are not chemically bound to the polymer and they can leach out into the environment in certain conditions.

More Plastic, More Pollution

Plastic use and production has increased over time, specifically in the Post-World War II era with increased consumerism and the mass production of goods. There are 300 million tons of plastic produced each year, of which 91 percent is not recycled. By 2015, humans had generated 8.3 billion tons of plastics.[1] Of that staggering amount, 6.3 billion tons had already become waste. Only a small percentage of this plastic waste is recycled, and many items find their way into water resources. The negative impacts can be seen worldwide, with numerous species of birds, turtles, and fish becoming entangled in or ingesting plastic material. Often, the plastics being ingested are tiny microplastics, smaller than 5mm in length. Studies have estimated that microplastics make up approximately 90% of plastic pollution in marine environments.[2] In addition to the plastic pollution at the end of the material life cycle, the generation of plastic materials contributes to atmospheric pollution and relies on non-renewable fossil fuels. New ethane cracker facilities and existing petrochemical plants are often located in poor, minority communities, contributing to environmental justice challenges.

Nurdles and other plastics litter the Niagara River Shoreline

Nurdle Patrol Efforts

In the summer of 2020 a large concentration of nurdles was found along the banks of the Niagara River in Gratwick Park in North Tonawanda. After this discovery, Waterkeeper joined a larger North American wide citizen science project known as Nurdle Patrol. To learn more about this project visit: www.nurdlepatrol.org

NURDLE PATROL.org

Nurdles are plastic pellets, about the size of a lentil, that are the raw material used in the manufacturing of plastic products. Nurdles get shipped around the world via ship, train, and truck to plastic manufacturers. Nurdles have been known spill due to transport issues or escape through holes in shipping containers. The small, lightweight nurdles can then be blown by the wind or washed away down storm drains or into waterways.

In the spring, Waterkeeper staff trained over 20 Riverwatch Volunteers to collect nurdle data following the 10-minute Nurdle Patrol Survey technique. These Nurdle Patrol Volunteers have found and collected nurdles at 14 different locations in the Niagara River Watershed. In 2021 over 10,000 nurdles were collected in total.

Nurdles are collected and counted during a 10-minute timeframe

Take Action!

The Great Lakes system, which includes the Niagara River, provides drinking water for nearly 40 million people, including nearly 1 million residents here in Western New York.[3] To protect our water resources, wildlife, and human health, the production of plastics intended for wasteful single-use applications must be reduced. Individuals can conduct an audit of the plastics used in their daily life, and we can also advocate to our elected officials to support policy that limits the production of single-use plastics.

If you are interested in learning more about nurdles and joining Waterkeeper in our Nurdle Patrol Efforts, send an email to Liz Cute at ecute@bnwaterkeeper.org so you can be informed about future training opportunities.

Volunteers collect nurdles along the Niagara River shoreline

1 https://www.unenvironment.org/interactive/beat-plastic-pollution/
2 https://www.epa.gov/trash-free-waters/toxicological-threats-plastic
3 https://www.epa.gov/greatlakes/facts-and-figures-about-great-lakes

CLEANUP PROGRAM

Great Lakes CleanUP

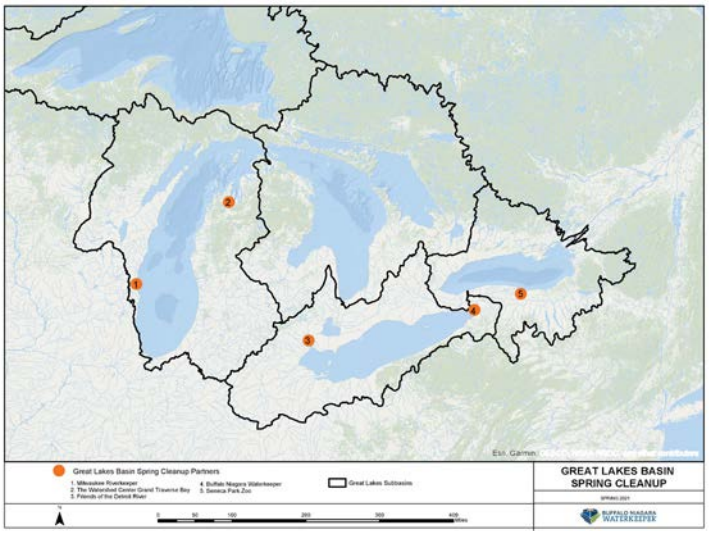
The 2021 Spring Sweep was officially part of the newly created Great Lakes CleanUP! Waterkeeper recieved federal funding from the USEPA Great Lakes Restoration Initiative to coordinate this collaborative single-week trash removal event to protect habitats throughout the Great Lakes Basin. In 2021, nearly 3,000 volunteers participated in this effort and collected 72,356 pounds of litter across 4,500 acres.

In Western New York nearly 1,300 volunteers participated in Waterkeeper's Spring Sweep, part of the Great Lakes CleanUP. Together these volunteers collected 72,356 pounds of litter. Volunteers focused on counting 3 specific types of litter: cigarette butts, plastic bags, and styrofoam. The total numbers collected are staggering!

- **15,342 cigarette butts**
- **3,725 plastic bags**
- **8,535 pieces of styrofoam**

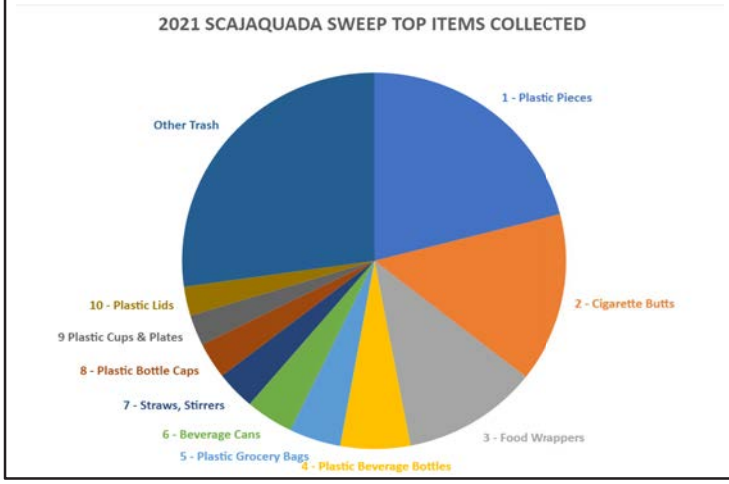
These items will continue to be collected and counted in future cleanups. With the recent NY State Bag Ban and Polystyrene Ban, the hope is that less and less of those items will end up as litter. The stewardship efforts of volunteers also support Waterkeeper's advocacy work through the power of data collection.

Learn more about the Great Lakes CleanUP at www.greatlakescleanup.org/



Scajaquada Sweep

Waterkeeper coordinated cleanup events on 2 weekends in September focusing on Scajaquda Creek in the City of Buffalo. This creek once served as the main drinking water source for the city, but is now one of the most polluted waterways in New York State. Volunteers collected 1,735 pounds of litter! Volunteers utilized the Ocean Conservancy's Clean Swell App to record what items they picked up. Top items collected included: plastic pieces, cigarette butts, and food wrappers.



On-Water Cleanups

Waterkeeper volunteers cleanup on land and also on the water! We coordinated several on water kayak cleanups in 2021 focusing efforts on the Buffalo River. On-water cleanups are a fun way to paddle and participate in stewardship! All volunteers were provided an on-land safety demonstration prior to heading out on the water.

A kayaker collects a discarded tire from the Buffalo River during a cleanup event

WATER REPORTER

In 2019, Waterkeeper started using the program Water Reporter to help with water quality data visualization. By uploading data collected by our Baseline Water Quality Volunteers, our staff is able to create interactive maps that are housed on our website and easily accessible by the public. We also use Water Reporter to create the maps you see in this Water Quality Report.

Water Reporter has several other functions that Waterkeeper has started to utilize. One of these functions involves photography - how fun! Our Water Reporter Volunteers now can download the Water Reporter App to their smart phone or other device and collect photos of waterway conditions in Western New York. Volunteers are emailed a photo challenge each month. The saying a "picture is worth a thousand words" is true! Photo submissions are tied to GPS coordinates and help Waterkeeper staff and other community members learn about the Niagara River Watershed and waterway conditions. To view past photo submissions and to read instructions on how use the Water Reporter App visit bnwaterkeeper.org/become-a-water-reporter/

Here are a few examples of volunteer photos submissions:

A discarded and full plastic single-use waterbottle found during my neighborhood walk. With droughts and wildfires plaguing so many people and places, and the #greatlakes vunerable to diversion or being profited from by bottling companies, it's especially hard to see this irresponsibilty. (I gave the water to my potted plants and recycled the bottle.) #PlasticPollution #cleanwatermatters

Lots of activity on the Buffalo River. #recreation

The Glen Falls of Ellicott Creek. #WNYwaterways

7/01/2021 Mussels pulled out of the mouth of lower Tonawanda Creek/Erie Canal on a shopping cart. #WildLife

There a lot of #plasticpollution clogging up the end of the Ship Canal Shoreline Trail waterway. #BuffaloNiagaraWaterkeeper

The #WaterQuality of Ellicott Creek consists of large blooms of algae. The creek is usually a greenish blue color, but it has been mostly bright green over the last few days due to the algae blooms.

RECOGNITION

The Riverwatch Citizen Science Program would not be possible without the dedication of our amazing volunteers. Thank you for the countless hours of dedication to Buffalo Niagara Waterkeeper, the Riverwatch Citizen Science Program, and to our freshwater resources!

Thank you to our 2021 program supporters: The East Hill Foundation, The Community Foundation for Greater Buffalo, and The Cleveland Water Alliance

SOLUTIONS TO ONGOING POLLUTION

You can help reduce stormwater and sewage pollution!

Below are three different green or living infrastructure solutions you can apply at your home to reduce stormwater runoff.

Downspout Disconnection

Downspouts on many homes are connected directly to the sewer system, contributing to sewer overflows. By disconnecting downspouts from the sewer system, water is able to drain to lawns or gardens, thereby allowing water to soak slowly into the ground as plants and soils filter out pollutants.

Rain Barrels

Rain barrels are containers that collect and store rain water for future uses (like watering a garden) while decreasing the amount of stormwater runoff that leaves your property. A rain barrel is placed under the downspout to channel rainwater into the barrel for later use. You can purchase one at our office or at various events we attend during the year! Learn more:
bnwaterkeeper.org/programs/rainbarrels/

Reduce Single-Use Plastic Use

Plastic continues to litter our waterway shorelines and communities. By switching from single-use plastic items to reusable wherever possible, you can help reduce plastic pollution! Another way to help is to call your elected officials and let them know you support legislation that limits single-use plastic pollution! Learn about more tips to reduce plastic waste here:
bnwaterkeeper.org/less-plastic/

PREVENT POLLUTION WITH BUFFALO NIAGARA WATERKEEPER

Waterkeeper hosts various volunteer events to clean up local waterways and prevent pollution.

For additional information on these events and our other programs, please visit our website - bnwaterkeeper.org

Cleanup Programs

Targeting shoreline sites, thousands of volunteers come out each year to engage in direct action by picking up litter and other debris. These volunteer efforts make our community a better place and reconnect the public with the region's most valued asset - our water. Get involved:
bnwaterkeeper.org/cleanup

Volunteer Ambassador Program

The Volunteer Ambassador Program raises community awareness of water pollution issues in Western New York and direct actions to reduce pollution. Ambassadors are highly trained volunteers who represent the organization at various community, school, and organization events and programs. Learn more:
bnwaterkeeper.org/ambassador

Restore Corps

Learn the proper way to plant native trees and shrubs while helping reduce stormwater runoff from entering local waterways. These plants also absorb excess nutrients, stop litter from blowing directly into the water, and provide habitat for wildlife! Check the schedule of events:
bnwaterkeeper.org/programs/restorecorps/

Buffalo Niagara Waterkeeper protects and restores our water and surrounding ecosystems for the benefit of current and future generations.

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