2022

Riverwatch Report

An overview of Buffalo Niagara Waterkeeper's water quality sampling, restoration, and cleanup efforts

IMAGE CREDIT: Charles Oddo
Black Swallowtail Butterfly on
Purple Pickerelweed

INTRODUCTION

This report is an educational tool providing information about water quality in the Western New York Region. Buffalo Niagara Waterkeeper (Waterkeeper) works to improve water quality through volunteer citizen science and cleanup 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 Environmental Conservation (DEC) creates water quality standards and stream designations, water quality issues in streams sampled, baseline water quality data, PFAS sampling efforts, information regarding Harmful Algal Blooms (HABs), bacterial sampling results, nurdle patrol monitoring, and much more! Much of this data would not be gathered if not for our Riverwatch volunteers.

Riverwatch is a volunteer citizen science program. Waterkeeper staff train concerned community members 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.

WATERKEEPER® ALLIANCE MEMBER

Buffalo Niagara Waterkeeper is a licensed member of the Waterkeeper Alliance, a worldwide network of environmental organizations focused on clean water.

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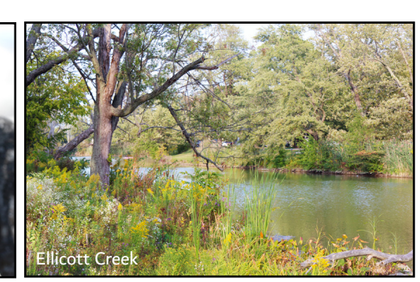
RECOGNITION

The Riverwatch Citizen Science Volunteer 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 2022 program supporters: East Hill Foundation, Community Foundation for Greater Buffalo, Cleveland Water Alliance, Ocean Conservancy, GLRI EPA Trash Free Waters, NOAA Marine Debris Program and the M&T Charitable Foundation.


Mink


Ellicott Creek


Great Blue Heron

NEW YORK STATE WATERWAYS

Sources of information: DEC 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 DEC with oversight from the United States Environmental Protection Agency (EPA). These WQS are set by first determining best usages and establishing water quality criteria. Water quality criteria are numeric and narrative descriptions of the conditions in a waterway necessary to support Best Uses.

If all WQS are met, antidegradation 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 DEC 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 for 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.

ABOUT THE NIAGARA RIVER WATERSHED

The Niagara River Watershed is located along the western most portion of New York State and encompasses lands that drain 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:

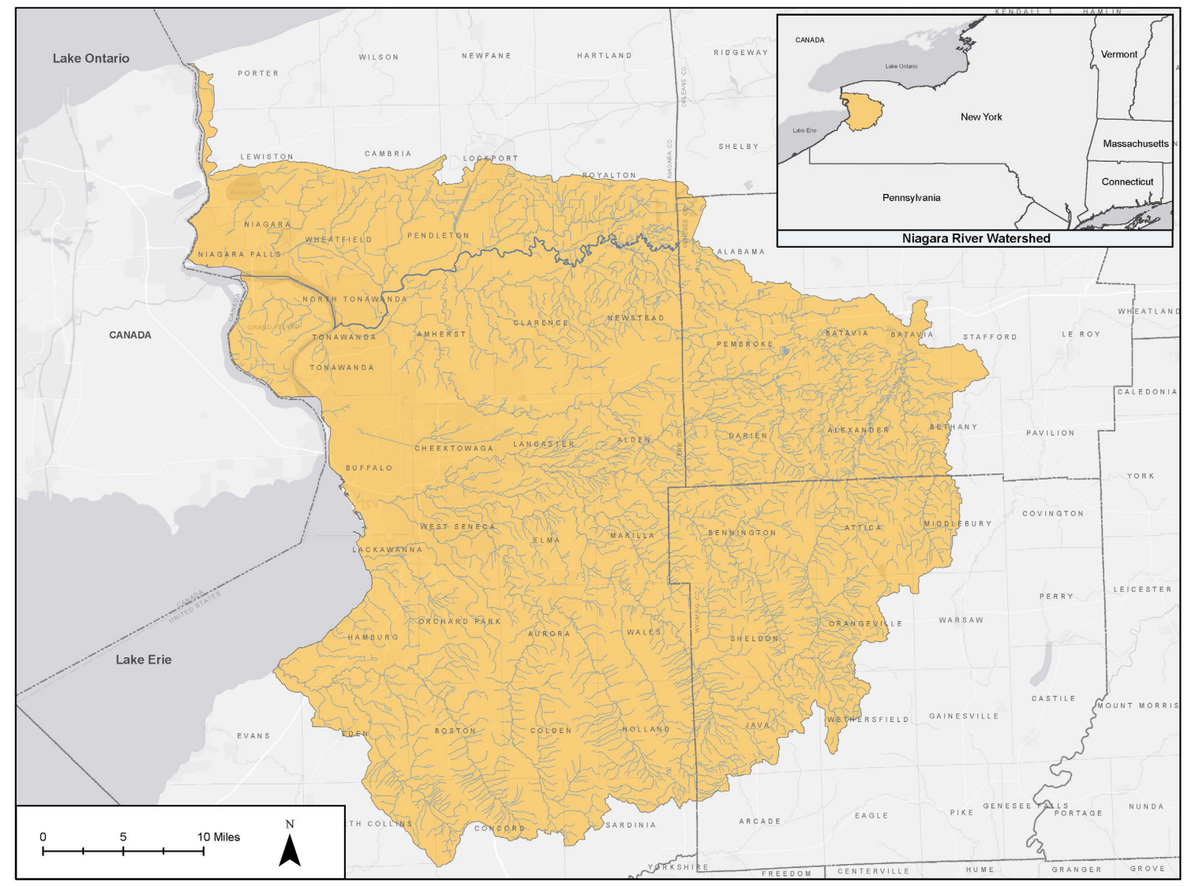
903,305 acres of land

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/healthy-niagara-watershed-plans/



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 DEC'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 DEC 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 DEC 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

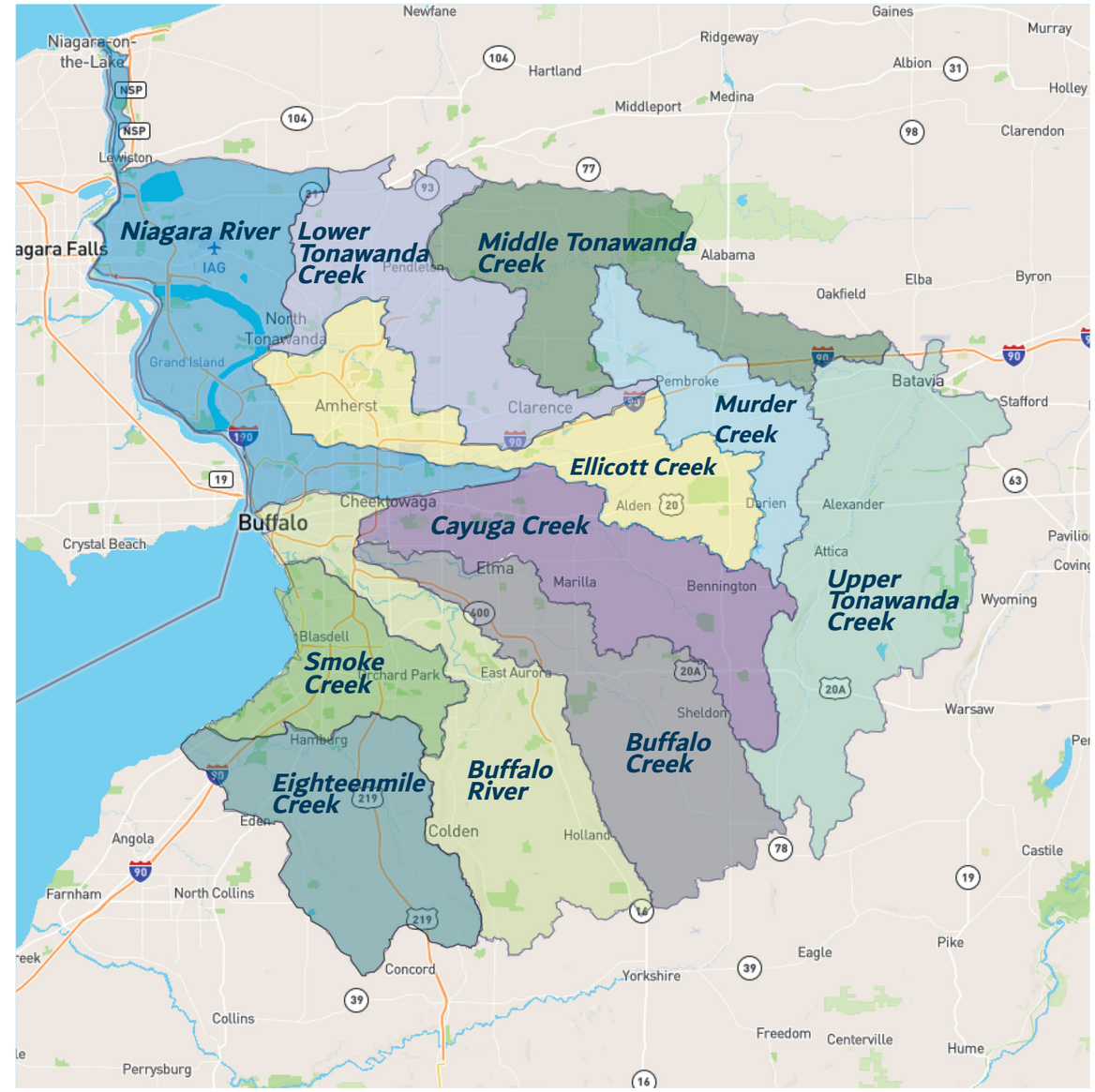
Buffalo Creek
Stream Class: Lower - B (mouth to E. Elma) ;
Upper - A (E. Elma and upstream)
Length: Lower - 63.5 miles; Upper - 285.1 miles
Water Quality Issues: Aquatic life and recreation in the lower stretch are stressed by known silt/sediment pollution from stream bank erosion and urban stormwater 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 run off 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 DEC with oversight from the EPA.

Standards are as follows:

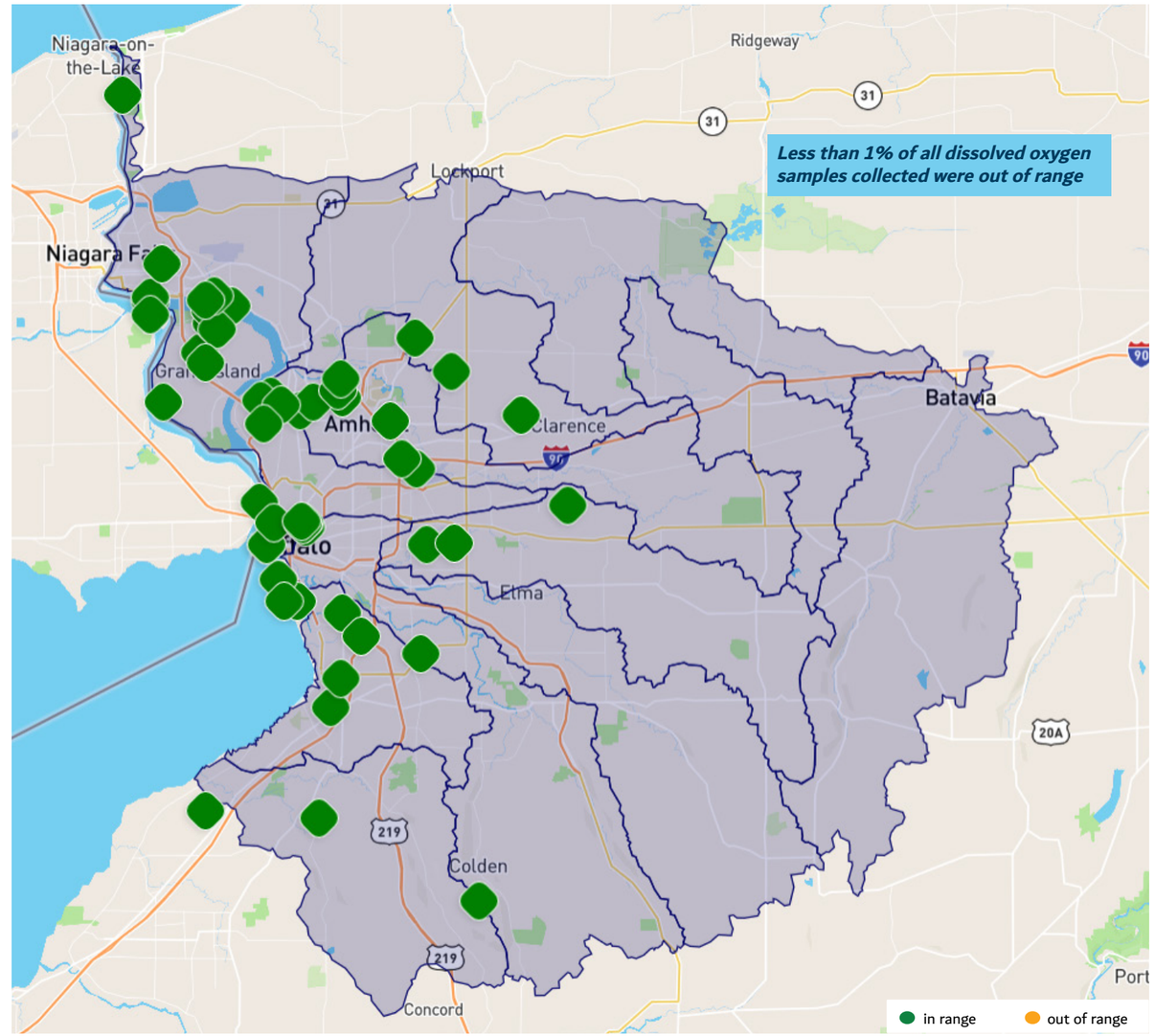
Parameter	Standard
Dissolved Oxygen	No less than 6.0 mg/L for Niagara River No less than 4.0 mg/L for all other streams
Conductivity[1]	Between 150 and 500 µS/cm
pH	Between 6.5 and 8.5
Turbidity	No more than 5.0 NTU

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

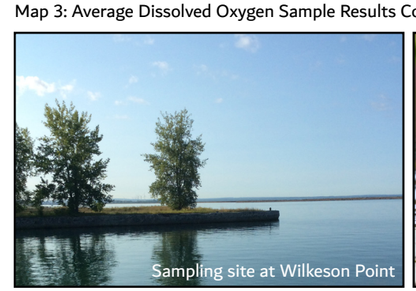
EXPLORE THIS DATA ONLINE!

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

DISSOLVED OXYGEN RESULTS COMPARED TO STANDARDS



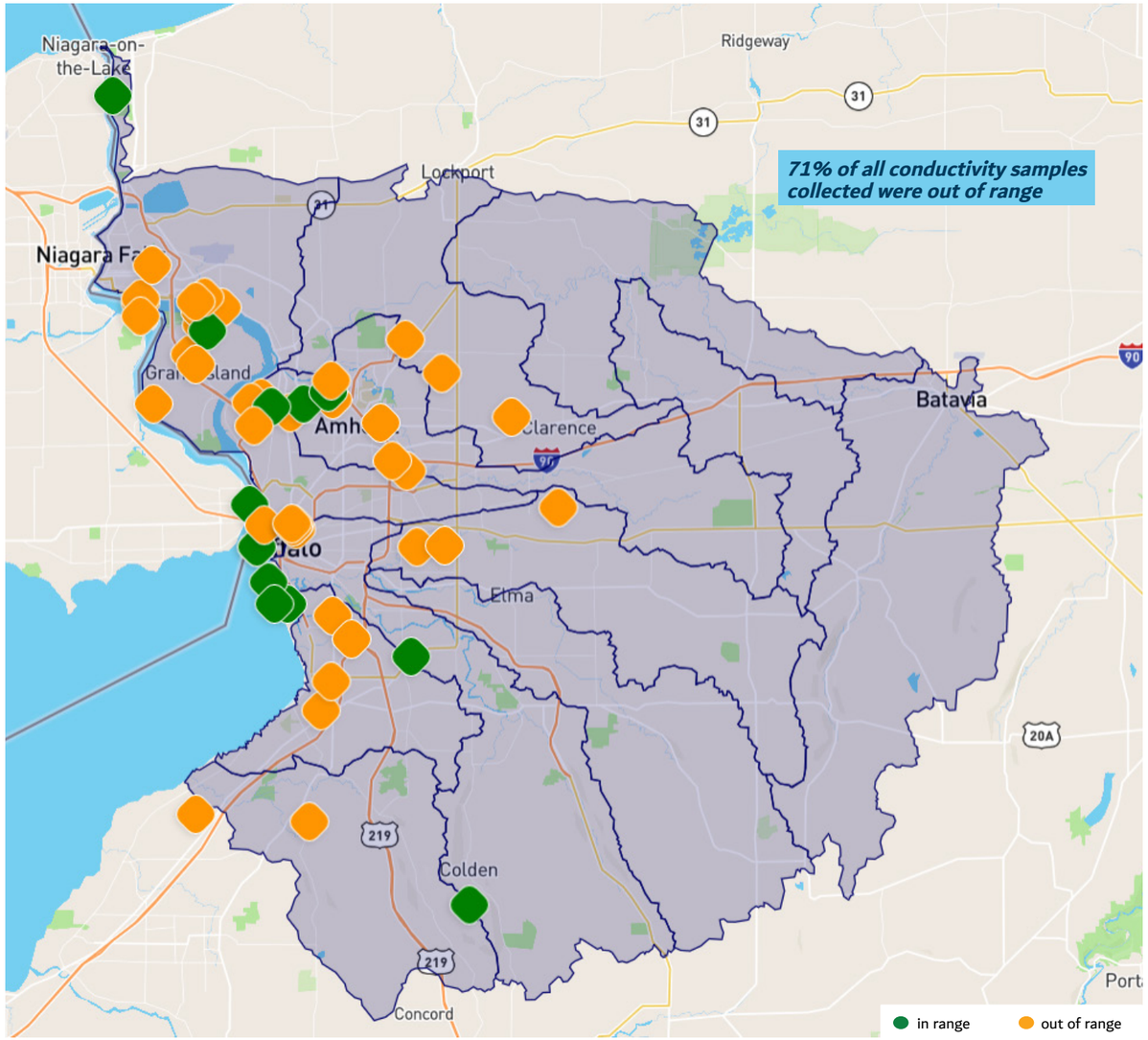
Map 3: Average Dissolved Oxygen Sample Results Compared to Standard


Sampling site at Wilkeson Point


Spotted Sandpiper


Ellicott Creek

CONDUCTIVITY RESULTS COMPARED TO STANDARDS



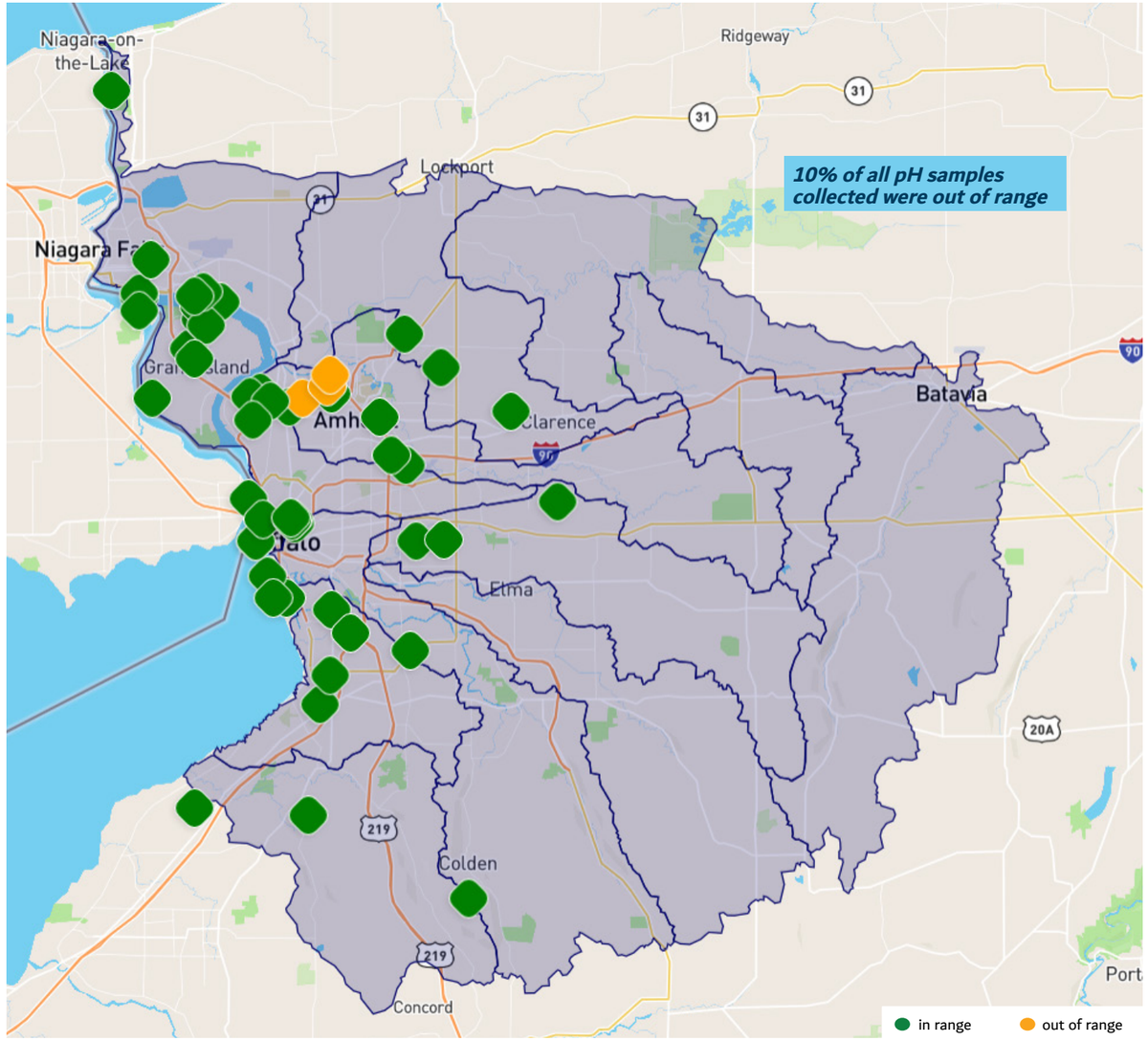
Map 4: Average Conductivity Sample Results Compared to Standard


Whitetail deer


Sampling Rush Creek


Woods Creek

pH RESULTS COMPARED TO STANDARDS



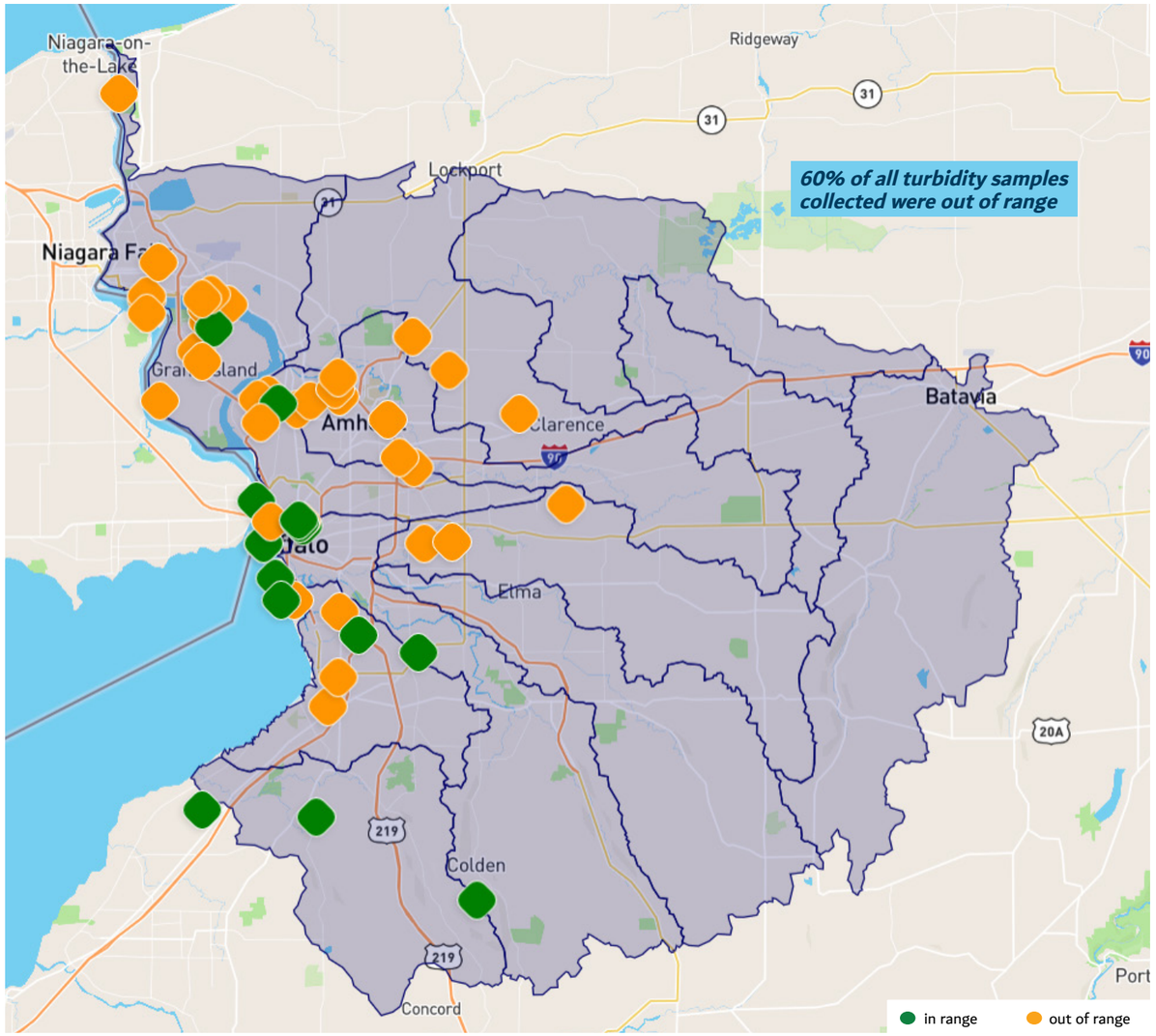
Map 5: Average pH Sample Results Compared to Standard


Eighteenmile Creek

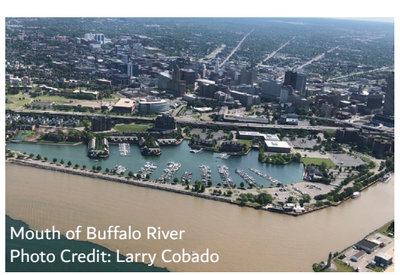

Mergansers


Buffalo River

TURBIDITY RESULTS COMPARED TO STANDARDS



Map 6: Average Turbidity Sample Results Compared to Standard


Mouth of Buffalo River
Photo Credit: Larry Cobado


Scajaquada Creek


Niagara River

PFAS SURFACE WATER TESTING

What are PFAS?

PFAS pollution is nothing new, but public information about the extent of the pollution and the negative impacts has been on the rise.

PFAS, or Per- and polyfluoroalkyl substances, are a large, diverse class of man-made chemicals. There are over 9,000 PFAS compounds, often referred to as 'forever' chemicals because they do not naturally break down. Used in a variety of industrial and consumer products, PFAS chemicals gained popularity because their application could make products water, stain, and heat resistant.

Image source: torrentlab.com/pfas-testing/

Exposure to these chemicals have been linked to a variety of health effects including cancer, liver damage, decreased fertility, and others. While some are exposed through their profession, think firefighters, the more common exposure to the general public is through ground water or drinking water. Some of the first locations of known PFAS contamination were near military bases, as they were frequent users of firefighting foam.

Experts estimate that more than 200 million Americans are exposed to PFAS through drinking water.[1] However, there are currently no enforceable regulations protecting drinking water at the federal level. It is expected to have a federal drinking water regulation by the end of 2023. Several states have moved ahead and set their own regulations, New York being one. As of 2022, the NYS Department of Health (DOH) regulates 2 PFAS chemicals in public drinking water supplies. PFOA and PFOS drinking water standards, or 'Maximum Contaminant Levels (MCLs), are set to 10 parts per trillion each for public water supplies.

Surface waters are also lacking protections from PFAS chemicals. Experts estimate that nearly 30,000 facilities discharge PFAS into surface waters in the US.[2] These discharges are currently unregulated, as the EPA has not designated any PFAS as toxic pollutants or hazardous substances under the Clean Water Act.

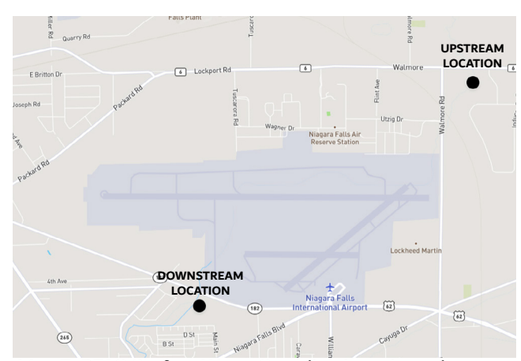
In an effort to study PFAS surface water contamination, Waterkeeper participated in a nationwide survey along with over 100 Waterkeeper groups coordinated by the Waterkeeper Alliance. The results of the study demonstrated how widespread PFAS contamination is in US surface waters. 83% of the samples detected at least one PFAS compound.

Local Surface Water Sampling

As part of this nationwide study, Waterkeeper collected multiple water samples along Cayuga Creek located in Niagara County. Samples were collected upstream and downstream of the Niagara Falls Airport. This location was selected as it is a known location with PFAS groundwater contamination. Results of samples collected from the downstream location revealed high levels of several types of PFAS chemicals, as indicated in Figure 1 below.

Samples were collected and analyzed from 12 additional sites throughout the Niagara River Watershed. Findings can be viewed at bnwaterkeeper.org/pfas-pfoa-pfos/

1 ewg.org/news-insights/news-release/study-more-200-million-americans-could-have-toxic-pfas-their-drinking
2 ewg.org/news-insights/news-release/2021/07/twelvefold-increase-suspected-industrial-dischargers-forever



Map 7: PFAS Surface Water Sampling Locations along Cayuga Creek (Niagara County)

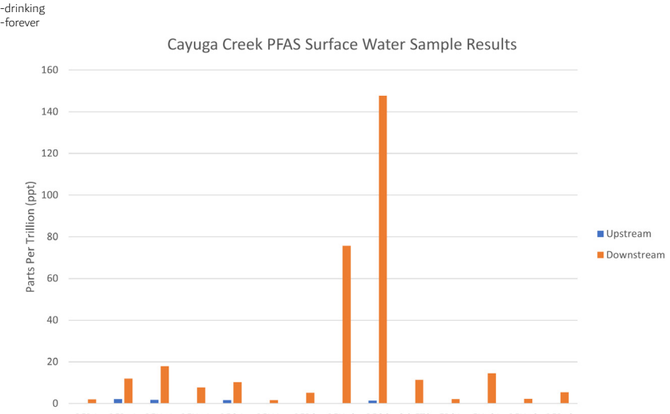


Figure 1: PFAS Compounds detected in Cayuga Creek (Niagara County) from samples collected on 6/16/2022

HARMFUL ALGAL BLOOMS (HABs)

What is a Harmful Algal Bloom?

Harmful Algal Blooms (HABs) contain 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 are 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 Lake Erie

HABs have become prevalent in the western and central basin of Lake Erie in recent years. During 2022, there were several HABs reported at and near Presque Isle State Park, located along the Lake Erie coast in Pennsylvania. During the swimming season, the Regional Science Consortium posts HABs updates to their webpage:
regsciconsort.com/harmful-algal-blooms/local-hab-advisories/

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

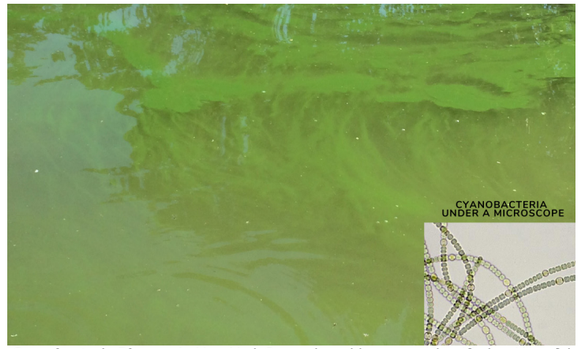
Blooms in Western New York Waterways

The DEC 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 DEC, fill out and submit a Suspicious Algal Bloom Report Form. Visit their webpage:
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 DEC. **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 DEC 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 evident when looking at a sample under a microscope.

The following waterbodies in the Niagara River Watershed were documented with blooms in 2022. This list includes both cyanobacteria blooms and *Euglena* blooms. Cyanobacteria blooms are recorded by the DEC and can be viewed here:
https://dec.ny.gov/docs/water_pdf/habsarchive2022.pdf

- **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 DEC. Samples of the *Euglena* bloom were collected in 2021 by researchers at Daemen University, who identified the *Euglena* species as *trisella.* This is not a species of *Euglena* that produces ichthyotoxins. A different type of bloom which occurred in 2021, reappeared in 2022. This is a cyanobacteria known as *Lynbya*. This type of bloom forms floating mats, showing how varied cyanobacteria blooms can truly be.
- **Hyde Park Lake** Once again, this man-made lake that is created by damming Gill Creek experienced a cyanobacteria bloom.
- **Tonawanda Creek** This waterway also experiences *Euglena* blooms near the Ellicott Island Bark Park at the Tonawanda/North Tonawanda border. Waterkeeper staff also identified *Lyngbya* near the Ellicott Island Bark Park.

Green Infrastructure Project at Hyde Park in Niagara Falls, NY

Waterkeeper recently received funding from the EPA Great Lakes Restoration Initiative (GLRI) to coordinate an exciting green infrastructure project in Hyde Park in the City of Niagara Falls. Currently there is an abundant amount of unfiltered stormwater runoff that flows into Gill Creek (which forms Hyde Park Lake). This stormwater runoff enters the creek through two outfalls and from the Hyde Park Golf Course. Waterkeeper has recorded several HABs in Hyde Park Lake just downstream from these areas.

The goal of the project is to apply green infrastructure practices throughout the area to both reduce the amount of unfiltered stormwater flowing into the waterway and improve wildlife habitat. Green infrastructure practices mimic natural hydrological processes and uses natural elements such as soil and plants to filter rainfall and increase water quality while providing other environmental, economic, and health benefits. Waterkeeper is optimistic that projects like this will have a positive impact on the water quality of Hyde Park Lake and downstream waterways, reducing nutrients that contribute to the formation of HABs. This green infrastructure project is planned to be completed by 2025.

Hyde Park Lake stormwater outfall which will be impacted by this project

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.

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.

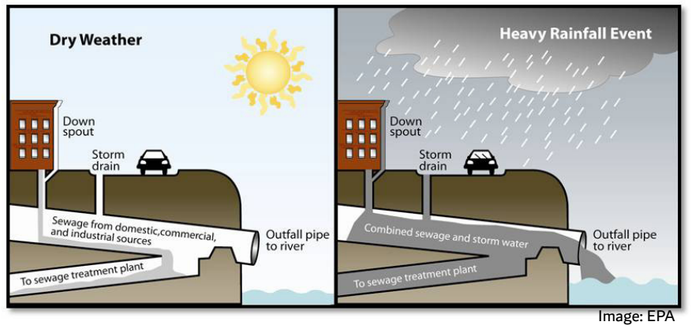


Image: EPA

Sampling

Waterkeeper staff sampled 15 sites during 2022 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. Some months only allowed for the collection of samples during either dry weather or wet weather.

- **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.

Example of CSO Signage along the Buffalo River

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 Figure 2 on the following page, higher levels of *E. coli* were recorded during wet weather periods versus dry weather periods. It continues to be very common for sampling sites to exceed the BAV after wet weather events.

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 8,000 possible swimming and water recreation locations in multiple countries. Explore Swim Guide today at theswimguide.org/ To view detailed sampling results visit bnwaterkeeper.org/our-impact/water-quality/

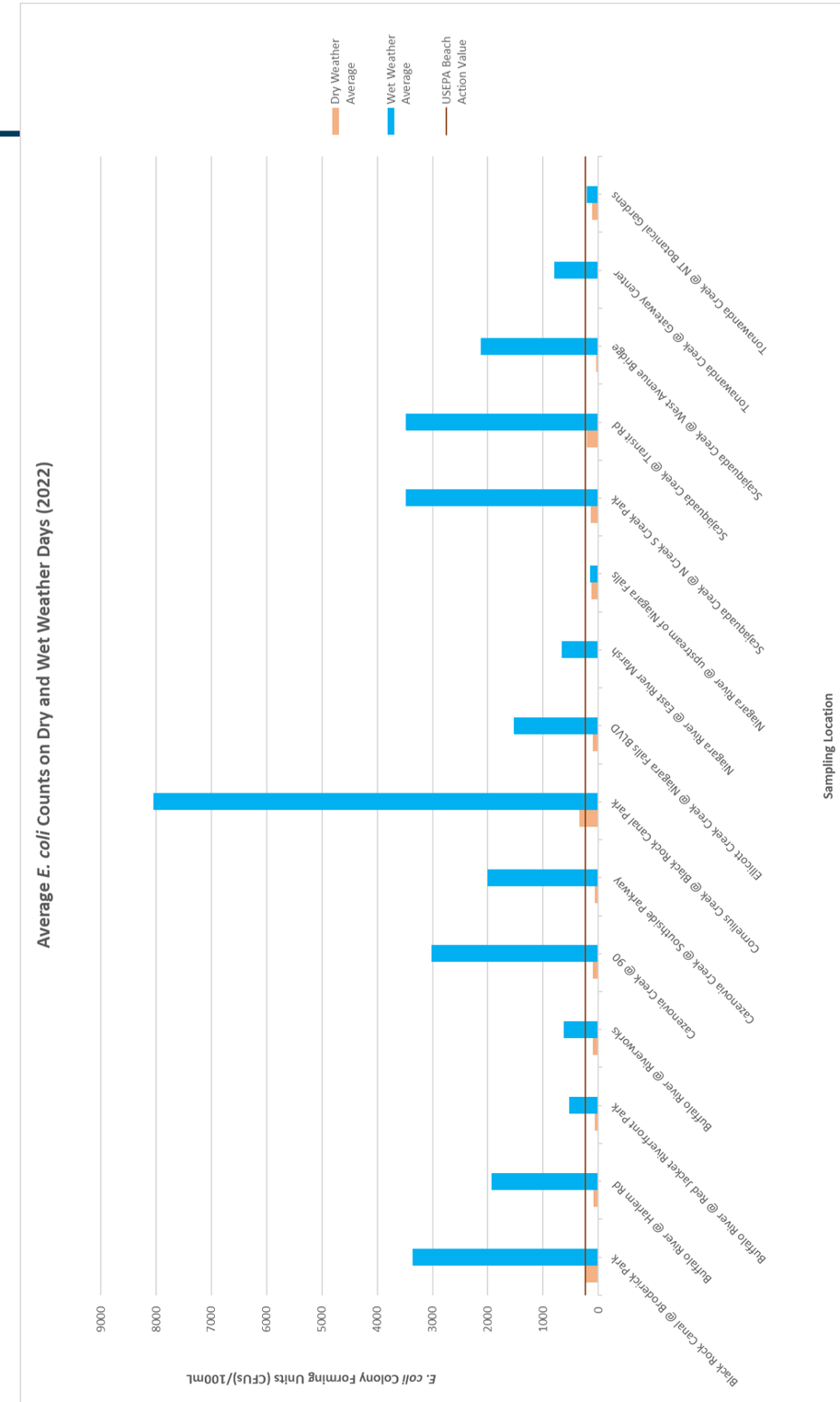


Figure 2: *Escherichia coli* results in comparison to the EPA BAV
NOTE: Due to staff restrictions, no samples were collected in April during dry weather conditions, in May for wet weather conditions, and in September for dry weather conditions.

RESTORATION PROJECT HIGHLIGHT

Cayuga Creek Stream and Floodplain Restoration Project

The Cayuga Creek Restoration project is located in the Town of Niagara just south of the Niagara Falls Airport and Air Reserve Station.

Over many decades, a combination of water pollution, surrounding development, and creek channel alterations have left the creek's water quality and habitat in an impaired state, and the surrounding community with persistent flooding issues.

In 2018, after over 10 years of coordinated efforts, approximately 30 acres of land along Cayuga Creek was donated by Joseph C. Weber, Inc. to the Town of Niagara. This area contained a section of the creek that had been channelized and disconnected from its historic floodplain, and was identified as a regional priority for restoration. In partnership with the Town of Niagara, Waterkeeper worked over 4 years to secure funds, collect and analyze data, and develop project designs focusing on flood mitigation and habitat restoration.

Primary project partners for the restoration included the Town of Niagara, Barton & Loguidice, and Ecological Restoration Inc., the U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program, and a Technical Advisory Committee of local experts.

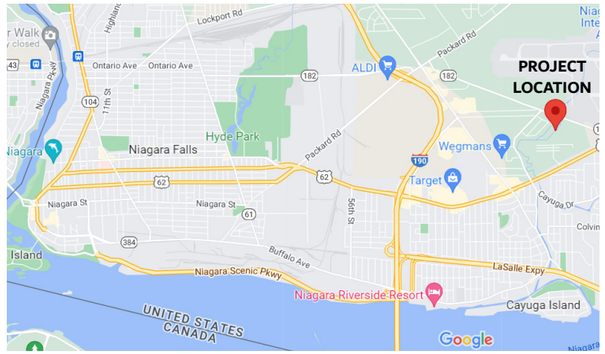
Construction began in March and was completed in June of 2022.

Restoration measures included:

- Constructing a new creek channel to replace the previous channelized and bermed creek channel, as shown in the photo to the right. This reconnected the creek to its floodplain, significantly increasing flood storage in this section of the creek.
- Creating vernal pools which hold excess water during flooding events and provide valuable habitat.
- Creating habitat features including riffles in the creek and upland plantings.
- Installing a trail system to allow community members to interact with and enjoy the property.
- **Waterkeeper also worked with the Buffalo Niagara River Land Trust to apply a conservation easement on the Town-Owned land to permanently protect this space, and to also acquire an additional 12 acres of adjacent intact forested wetland.**

Learn more about this project at:
bnwaterkeeper.org/cayuga-creek/

Funding for this project was provided by the Environmental Protection Fund Title 15 – Climate Smart Community Projects as administered by the New York State Department of Environmental Conservation; Love Canal, 102nd Street and Forest Glen Mobile Home Natural Resources Damage Assessment and Restoration Trustees; New York Power Authority – Niagara Power Project Relicensing Settlement Agreement and the Fish and Wildlife Habitat Enhancement and Restoration Fund; the Ralph C. Wilson, Jr. Foundation; Sustain our Great Lakes Program through the National Fish and Wildlife Foundation; the Host Community Greenway Fund Standing Committee; the US Environmental Protection Agency; and the Coors Seltzer Change the Course Partnership.



Map 8: PROJECT LOCATION


MID CONSTRUCTION: Site conditions as of Spring 2022


AFTER CONSTRUCTION: Site conditions as of Fall 2022

RESTORATION PROJECT HIGHLIGHT

Crow Creek

Crow Creek is a headwater stream, or source water stream, within the Tonawanda Creek sub-watershed. In addition to feeding into the Attica Reservoir, a water supply reservoir for the Village of Attica, this stream supports critical cold-water habitats for species like the native Eastern Brook Trout.

For the last decade, the population numbers of the native Brook Trout have been declining in WNY. Native Brook Trout are one of the natural indicators of the health of a waterway and an ecosystem. Stream passage barriers, water quality issues, streambank erosion, pollutants, and climate change can all negatively impact Brook Trout and a decreasing population can alert agencies to these stressors.

Recent studies, which assessed fish barriers, indicated that the numbers of native Brook Trout in Crow Creek were impacted by an under-road culvert that was too narrow, crooked, and placed too high relative to the creek's water line for the fish to pass through and successfully spawn. The improper culvert was also causing creek channel issues upstream and downstream.

Waterkeeper, with the partnership of the DEC, the US Fish and Wildlife Service - Lower Great Lakes Fish and Wildlife Conservation Office, Wyoming County Highway, Wyoming County Soil and Water Conservation District and WNY Trout Unlimited redesigned and replaced this culvert, which opened up 1.5 additional miles of cold-water habitat for the native Brook Trout. The culvert was replaced in 2022, prior to their spawning period. Additional work took place to properly align the stream channel and install several instream habitat features to support the passage of the native Brook Trout.

A 1000% increase in the number of native Brook Trout upstream was observed just 3 months after the installation of the new culvert.


Native Brook Trout - Photo Credit: Scott Cornett (DEC)

Funding for this project was provided by US Fish and Wildlife Service and the National Fish and Wildlife Foundation


BEFORE CULVERT REPLACEMENT


MID INSTALLATION


AFTER INSTALLATION: Site conditions as of Fall 2022

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. Currently, nearly 400 million metric tons (8.8 billion pounds) of plastic produced each year, of which less than 10% is recycled.[1] By 2015, humans had generated 8.3 billion tons of plastics.[2] 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.[3] 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 documented 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:
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 to spill due to transport issues or escape through holes in shipping containers. The small, lightweight nurdles can then be blown by the wind, washed away down storm drains, or directly into waterways.

In 2022, a total of 3,289 nurdles were collected locally and the data was uploaded to the Nurdle Patrol Project. The majority of these nurdles were collected along the Niagara River shoreline at Gratwick Park in North Tonawanda. Waterkeeper was able to train 20 additional volunteers on the nurdle patrol data collection process.


Nurdles are collected and counted during a 10-minute time-frame

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.[4] 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 can also advocate to 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 learn about nurdles and data collection process

1 https://www.unep.org/interactives/beat-plastic-pollution/
2https://www.unenvironment.org/interactive/beat-plastic-pollution/
3 https://www.epa.gov/trash-free-waters/science-case-studies
4 https://www.epa.gov/greatlakes/facts-and-figures-about-great-lakes

CLEANUP PROGRAM

Great Lakes CleanUP

The 2022 Spring Sweep was part of the 2nd Great Lakes CleanUP! Waterkeeper received federal funding from the EPA Great Lakes Restoration Initiative to coordinate this collaborative single-week trash removal event to protect habitats throughout the Great Lakes Basin. In 2022, Waterkeeper and 18 partner groups came together and 4,962 volunteers participated and collected 74,152 pounds of litter across all 5 Great Lakes Basins.

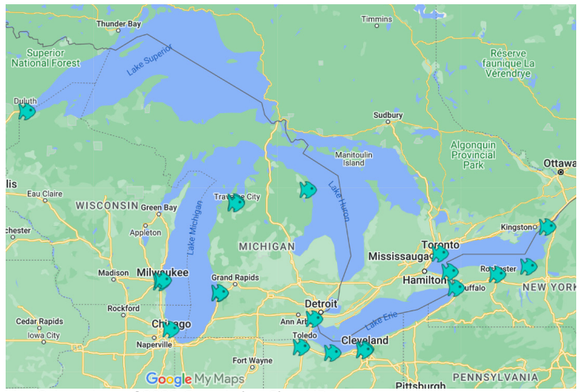
In Western New York, nearly 1,400 volunteers participated in Waterkeeper's Spring Sweep, part of the Great Lakes CleanUP. Together these volunteers collected 19,665 pounds of litter. Volunteers were encouraged to input data on litter collected into the Ocean Conservancy's Clean Swell App. Over 45,000 pieces were recorded! Of these items recorded in CleanSwell, 78% were plastic.

The total numbers collected are staggering!

- **7,411 cigarette butts**
- **3,421 food wrappers**
- **2,105 plastic beverage bottles**
- **2,342 plastic beverage caps**

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
greatlakescleanup.org/



Map 9: Locations of 2022 Great Lakes CleanUP partners

Scajaquada Sweep

September 1st marked the 3rd Scajaquada Sweep - a cleanup event dedicated to cleaning up litter along one of the most impaired waterways in the Niagara River Watershed. This Sweep is part of the International Coastal Cleanup, led by the Ocean Conservancy. 68 volunteers in WNY joined volunteers worldwide to cleanup litter and collect data on what was found. In just 3 hours, over 600 pounds of trash was collected along Scajaquada Creek! Learn about this work and the vision for a holistic restoration of the creek at:
www. bnwaterkeeper.org/scajaquada/

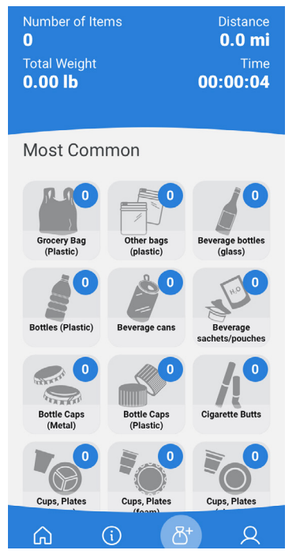

Sweep volunteers celebrate a job well done

Solo Sweeps

In 2020, Waterkeeper developed a Solo Sweep Program to allow volunteers the opportunity to clean up litter anytime, any place that works for them, and encourage these volunteers to record important data on the items collected. This was a safe way for us to continue to engage with volunteers during the Covid-19 Pandemic and now allows volunteers to support our work and keep our waterways clean when it fits their schedule.

In 2022, 51 volunteers signed our "Solo Sweep Pledge" and 82 solo sweeps were recorded in the CleanSwell App. Over 10,000 pieces of litter were collected through 82 solo sweeps.

The Solo Sweep Program will continue to be part of our programming in the coming years and we are excited to continue to collect important litter data!



A look at the CleanSwell App interface

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:

An Egret #fauna eyeballing dinner along the shoreline of the lower Tonawanda Creek

#WNYCSO #northcreeksouthcreekpark

#Scajacuadacreek #Livingshoreline #Northcreeksouthcreekpark

Upper Niagara River sadly subjected to continuing #plasticPollution including, #nurdles. My observations lead me to conclude a high percentage travels through sewer outfalls.

#emergentwetland-so beautiful our planet!

This is a huge empty barge being pushed by a tiny tug #commerce up the Erie Canal/lower Tonawanda Creek. Guessing headed to Lockport quarry to collect a load of at armor rock for shoreline riprap.

Big bloom on Freeman Pond in Orchard Park, but no characteristics of HAB

After a summer downpour, Two Mile Creek is "flushing" into the Upper Niagara River. Note the high turbidity #waterQuality.

View from hole 3 at Cazenovia (creek) golf course. Shows potential of run off from course to the creek.

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/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/cleanups/

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/ambassadors/

RestoreCorps

Learn about riparian and park reforestation and adaptive management of shoreline restoration sites 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/restorecorps/

YOUR SUPPORT MAKES A *Splash!*

Look at these amazing

WATER QUALITY WINS

we were able to achieve in 2022!

FLOODPLAIN RESTORATION PROJECT

Cayuga Creek

CULVERT REPLACEMENT & FISH PASSAGE

Crow Creek

WE CAN'T DO THIS WORK WITHOUT YOUR SUPPORT.

OUR WATER.
OUR FUTURE.