

SEPTEMBER 2021



**HARBOR
HEARTBEAT**



HEALTHY HARBOR
A WATERFRONT PARTNERSHIP INITIATIVE

**WATERFRONT
PARTNERSHIP**
OF BALTIMORE

2021

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About this Report

In 2010, the Waterfront Partnership of Baltimore launched the Healthy Harbor Initiative with the goal of making the Baltimore Harbor safe for swimming and fishing. Each year, the Harbor Heartbeat report tracks progress toward this goal by taking the pulse of the City's streams and Harbor.

The water quality data used for this report was gathered by Blue Water Baltimore in 2020 and analyzed by scientists at the Waterfront Partnership of Baltimore. Due to COVID-19, 2020 was a year like no other. Maryland state quarantine guidelines restricted the collection of some water samples. As a result, this report does not show updated bacteria scores, but ecosystem health parameters were not collected frequently enough to conduct a representative analysis. As such, the ecosystem health data within this report (pages 14-15) is from 2019, the most recent year for which we have a complete data set.

Is the Harbor Swimmable?

Yes, sometimes, but don't jump in yet! Fecal bacteria levels are significantly improving and, during dry weather, many monitoring sites meet the Maryland Department of the Environment's guidelines for recreation. This is an encouraging result, but there are other factors to consider before swimming in the Harbor:



1. The Baltimore Harbor has many uses including industrial ports and recreational marinas. Swimming should take place in a designated area that protects swimmers from boat traffic.



2. Like many urban waterways, the sediment at the bottom of the Harbor contains legacy pollutants that should not be stirred up. That means swimming should take place in an area where swimmers are kept away from the bottom, either by a barrier or in water deep enough to prevent stirring up sediment.



3. Just like every public beach in Maryland, swimmers should avoid contact with the water for at least 48 hours after a heavy rainfall. This is because rain carries pollutants off the land and into the water where they take time to dissipate.

Given these considerations, it is not recommended that anyone swim in the open water of the Harbor or that they wade in from the shore. Waterfront Partnership is working with state and city officials to determine the best way to sanction swim events as well as a permanent swim site in the Baltimore Harbor. Future swimmers should follow the Waterfront Partnership for updates on how they can join in upcoming swim opportunities.



WaterfrontPB



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HEADWORKS' RIBBON CUTTING

On December 31,
2020,

Baltimore City flipped the “on” switch for a \$430 million-dollar sewer system upgrade known as the Headworks Project. The project corrects a major flaw in the City’s sewer system that had caused tens of millions of gallons of sewage to overflow into Baltimore’s streams and Harbor every year.

The problem was caused by a large misaligned sewer pipe responsible for carrying the City’s waste beneath the communities of East Baltimore to the Back River Wastewater Treatment Plant. The misalignment caused a persistent 10-mile backup of sewage that reduced the capacity of the entire system to handle waste. When heavy storms overwhelmed the system, rainwater mixed with sewage would overflow into the Jones Falls near Penn Station.

Today, at the Back River Treatment Plant, large pumps operate continuously to alleviate the sewage backup and large tanks have been installed capable of holding up to 36 million gallons sewage. During high flow events, wastewater is stored in the tanks until it can be safely treated by the plant.

On May 10, 2021, government officials and administrators gathered with local nonprofits and media to host a ribbon cutting event celebrating the completion of the Headworks Project.

“This project is one of the largest of its kind in the Eastern United States,” said Maryland Lieutenant Governor Boyd Rutherford. “We estimate that this investment will eliminate up to 80% of the City’s sewer overflows and reduce instances of sewage backing up into people’s homes.”

“We want to see more of these transformative projects,” said Baltimore Mayor Brandon M. Scott adding, “prior to today, Headworks was treating up to 180 million gallons of wastewater per day from Baltimore City and County. This new facility will process 750 million gallons a day, which is a huge improvement.”

“The health of our streams is a good measure of the health of our communities,” said Healthy Harbor chairman Michael Hankin. “This project is hugely important and would not have happened without tremendous cooperation at every level!”

Bacteria counts in Baltimore’s stream and Harbor had already begun to see significant declines prior to the completion of the Headworks Project. The continuous monitoring of these waterways in the years ahead will show if the project is having the desired effect on the health of Baltimore’s marine ecosystem.



2020 HARBOR BACTERIA SCORES

What Do the Scores Tell Us?

These bacteria scores tell us how often dry-weather water samples met Maryland's safety standard for direct, full-body contact. In other words, the scores indicate the frequency of compliance. For example, a score of 90% means 90% of samples that year fell within the state's safety threshold. That threshold is measured by the amount of fecal indicator bacteria enterococcus. Only samples collected at least 48 hours after heavy rain were included to control for varying amounts of rain between years and because recreation is discouraged during and after rain.



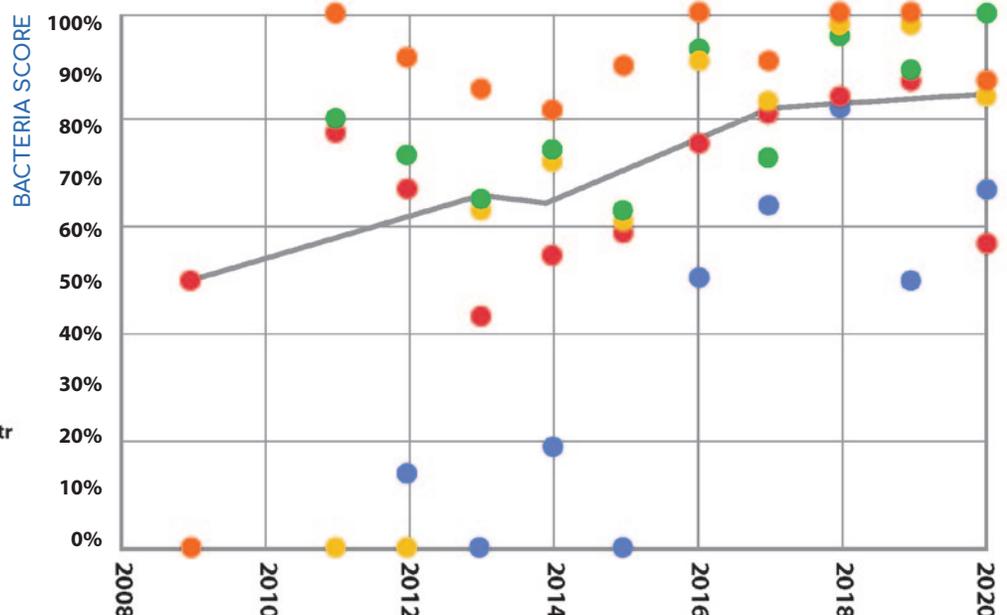
Each data point represents the annual dry-weather bacteria score at one station

- Jones Falls
- Downtown Sailing Ctr
- Northwest B
- Canton
- Fort McHenry



East Baltimore ukulele club join Healthy Harbor and the Living Classrooms Foundation for an educational and musical boat tour of the Inner Harbor.

INNER HARBOR (BACTERIA TRENDS 2009-2020)





POSITIVE TRENDS

Bacteria Scores Continue to Improve Indicating Less Sewage in the Harbor

While bacteria scores vary greatly by location, we are excited to see that the positive trends first identified in 2020 continue at many sampling sites throughout the Harbor and streams. Of the 25 sites for which enough data was available to conduct an analysis, 92% are either improving or consistently scoring very high.



This means water samples from these stations have been meeting bacteria safety standards more frequently over time.

Of the improving sites, half are showing statistically significant trends. As with last year's analysis, there were zero sites with bacteria scores trending downward.

Clearly, water quality in many areas still has a long way to go, but these results suggest that the City's investment in fixing our sewer and stormwater pipes has had a measurable impact on the cleanliness of our waterways. We hope to see further gains with the completion of the Headworks Project (see page 3) and continued repair of our city's infrastructure.

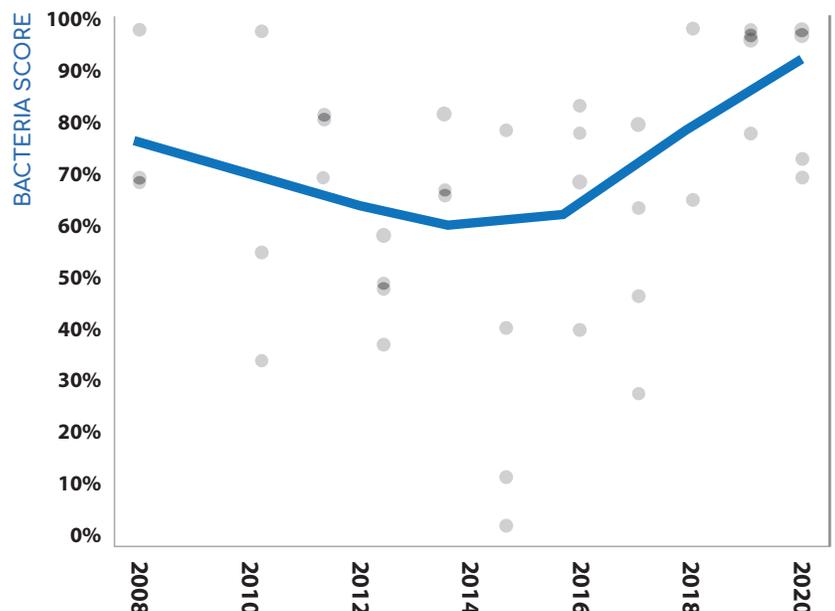
COVID-19 Impacts Sampling

The ongoing COVID-19 pandemic disrupted environmental research and monitoring efforts across the globe. As stay-at-home orders went into effect, researchers paused their work creating data gaps in every field of natural science from meteorology to wildlife ecology. Here in Baltimore, this meant that Blue Water Baltimore was unable to regularly sample water quality across the 49 sites historically sampled since 2013. In an average year, these 49 sites are sampled roughly 8-12 times. In 2020, however, only 25 sites were sampled more than 6 times. The analysis conducted for this report has been limited to just sites for which enough data was collected to assign a score.

Annual dry-weather bacteria score at one station.

Regional Bacteria Trend

MIDDLE BRANCH (BACTERIA TRENDS 2009-2020)





IF THE SCORE IS 100% IS IT SAFE TO SWIM?

As with other everyday activities, swimming in an open body of water requires a personal assessment of risk and benefits. Bacteria standards can greatly reduce but never eliminate risk. A score of 100% means there is a low risk of becoming sick from swimming, though this can vary. Individuals with compromised or suppressed immune systems are at higher risk of stomach or respiratory illness, and those with open wounds are at much greater risk of skin infection.

Additionally, a swimming area must be monitored to protect swimmers from boat traffic, debris, toxic algal blooms, or legacy contaminants in the sediment. For these reasons, we do not recommend swimming outside of a designated swimming area. Waterfront Partnership has begun working on creating the first such swimming area in Baltimore City. Even in such areas, state recommendations for beach safety should always be followed to increase your likelihood of enjoying the water safely.

JONES FALLS WATERSHED (BACTERIA TRENDS 2013-2020)

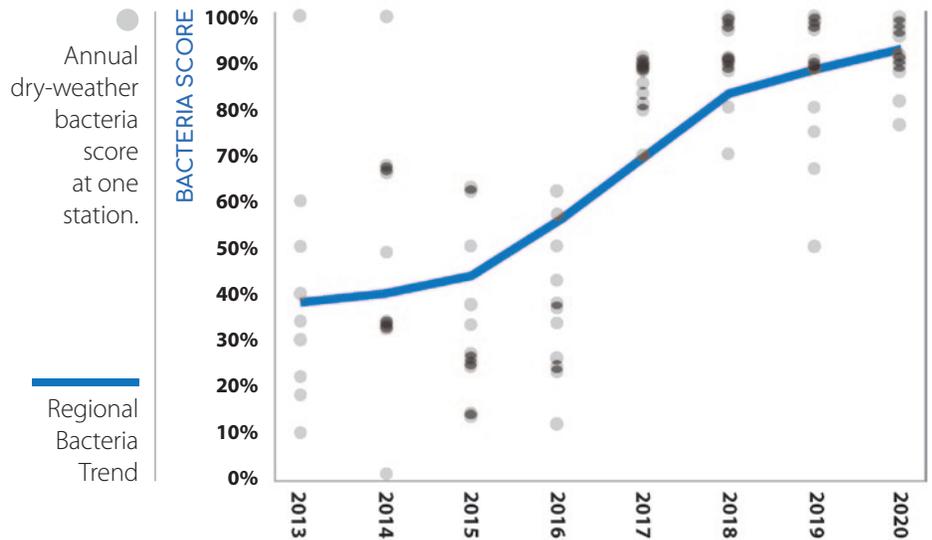


Photo credit: B More SUP and Teri Pozniak

Bacteria levels can change rapidly day to day

When it rains, bacteria levels can change rapidly by time and distance. Fecal bacteria levels may increase dramatically within just a few hours due to sewer overflows and stormwater runoff. Yet, once that input is reduced, fecal bacteria levels can drop just as dramatically in a few days.

Once the bacteria are in open water, they can be dispersed by currents, settle into sediment, or be killed by environmental factors such as UV rays, temperature, or salinity. This explains why the Jones Falls outlet (a major source of Inner Harbor pollution) can have a very poor score in the same year that the water by Fort McHenry can have a very good score. You should always avoid contact with water near a known pollution source, as well as any open water during and shortly after rainfall.





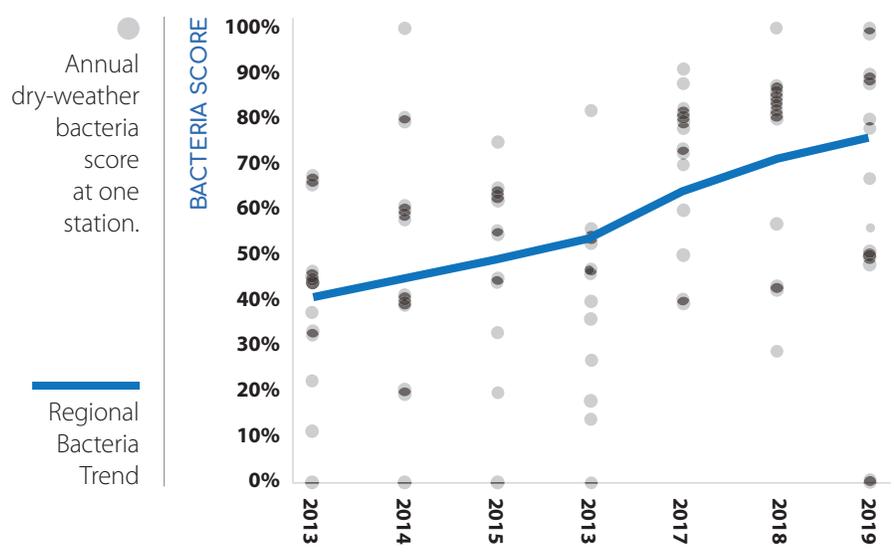
2020 Watershed Bacteria Scores



Notes about the Data

The bacteria data referenced in this report are collected, prepared, analyzed, and distributed by Blue Water Baltimore and can be accessed at BaltimoreWaterWatch.org. Waterfront Partnership provides analysis and conclusions for this report. Water samples are collected from each station twice monthly between April and November. Dry weather samples were defined as those collected over 48 hours after rainfall greater than half an inch. This analysis uses Maryland's threshold of 104 MPN/100 mL (the Most Probable Number of bacterial cells per 100 mL of water), which is the maximum number of enterococci we would want to see at any given time at a swimming beach.

GWYNNS FALLS WATERSHED (BACTERIA TRENDS 2013-2019)





A Letter from Mr. Trash Wheel

Wheel hello there, my faithful humans. I am back reporting on my past year of being a sentient trash interceptor in Baltimore, Maryland. Thanks to the global pandemic, the last year was a doozy for humans and trash wheels alike. I gobbled up some new and interesting garbage including face masks, latex gloves, and a whole lot of cicadas (so crunchy!). I munched on my usual snacks like plastic bottles, bags, and cigarette butts too.

In 2020, I also went on a foam container diet. Maryland became the first state to ban these single-use items back in 2019 and the law went into effect last October. Let me be the first to tell you, there has been a huge reduction in the amount of foam ending up in my dumpster belly. I cannot thank the students of Baltimore Beyond Plastic enough for their help passing this legislation.

I can't wait to stop eating so many plastic bags in the year ahead. I know I can continue to make a difference in the health of the Baltimore Harbor and Chesapeake Bay so long as I have the support of trashtastic fans like you!

Mr. Trash Wheel



There's no place like home for
GWYNNDA
The Good Wheel of the West

On March 11, 2021, the Waterfront Partnership of Baltimore unveiled the newest member of Baltimore's growing Trash Wheel family: Gwynnda the Good Wheel of the West. Just three months later, Gwynnda was officially installed at the mouth of the Gwynns Falls in Baltimore's Middle Branch.

Unique to Gwynnda is a large grappling arm designed to move logs out of her way so that she can get to the floating trash that she loves to eat. A kayak gate has also been installed in the system of booms that funnel trash to the front of the device in order to allow paddlers access to the river. She is the largest such device to date and will pick up an estimated 300 tons of trash and debris from the Gwynns Falls each year.

"She's kind of a big wheel," joked Adam Lindquist, who oversees the trash wheel program for the Waterfront Partnership. "Over 6,000 people voted and sent in name ideas, but it was two Baltimore City residents, Zachary Yarosz and Monica Meade, who submitted the winning entries. It's the perfect name for a project that will help cleanup the Gwynns Falls in West Baltimore."

"My partner and I bike and fish along the Gwynns Falls and absolutely love everything about the trash wheels," said Zachary Yarosz. "I guess I'm just a punny guy. I wanted to think up something extra special and magical for the Westside."

The project was made possible with funding from the Maryland Department of Transportation Maryland Port Administration, Weller Development, the South Baltimore Gateway Partnership, Continental Realty, WIN Waste Innovations, Baltimore City, and Baltimore County.

From 2014 thru 2020,
the Mr. Trash Wheel family
has collectively eaten

1,608
TONS OF
TRASH



730,426
Plastic Bags



1,307,482
Foam
Containers



1,293,276
Chip Bags



1,170,714
Plastic
Bottles



12,192,998
Cigarette Butts

SPECIES spotlight



Greetings!

My name is Dr. Micah Miles, the new staff scientist at Waterfront Partnership. I study the plants and animals living in cities and towns to better understand how people and nature can live and grow alongside one another.

Did you know that the Baltimore Harbor is full of incredible creatures? Clean water is essential to life on earth for people, animals and plants alike. So, we decided to spotlight some of the wildlife living in and around the Inner Harbor so everyone can learn about the amazing creatures that call the harbor home.

We hope you enjoy!

Great Blue Heron

Ardea herodias

The great blue heron eats mostly fish, but will also feed on insects, amphibians, crustaceans, and other small animals. It silently stalks its prey in shallow waters, then plunges its bill into the water to capture it. It will spend about 90 percent of its waking hours hunting for food. Great blue herons are the largest heron in North America and have been known to choke to death while trying to swallow prey that is too large.

Black-crowned Night Heron

Nycticorax nycticorax

These herons nest and breed in colonies. The Bay's largest breeding colony is on Fisherman's Island at the mouth of the Bay, but other colonies are located near Baltimore Harbor, Mobjack Bay in Virginia, and on islands near Tangier and Pocomoke sounds. If disturbed, young black-crowned night herons may regurgitate their food onto the intruder.



Northern Water Snake

Nerodia sipedon sipedon

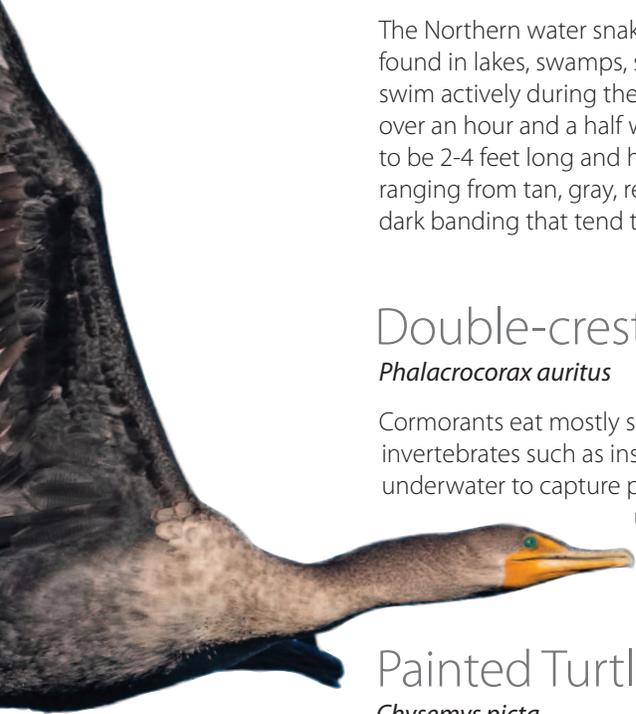
The Northern water snake is a non-venomous aquatic snake found in lakes, swamps, streams, and other waterways. They swim actively during the day and night and can hold their breath for over an hour and a half without coming up for air. They can grow to be 2-4 feet long and have highly variable color and patterning, ranging from tan, gray, reddish or brownish black, and variations of dark banding that tend to disappear as they get older.



Double-crested Cormorants

Phalacrocorax auritus

Cormorants eat mostly small fish, but will also feed on aquatic invertebrates such as insects, crustaceans and amphibians. They dive underwater to capture prey in their long, hooked bills. They can stay underwater for over a minute and sometimes surprise onlookers when they suddenly emerge from a long dive, hopefully with a fish in their mouth.



Painted Turtle

Chrysemys picta

Painted turtles are active year-round, and are easily observed basking on fallen logs and debris from April to September, especially in the early morning, midday and early afternoon. Nesting occurs in loose soil from late May to early July and females can lay as many as 9 eggs in a single season.



species SPOTLIGHT

Eastern Oyster (far right)

Crassostrea virginica

The eastern oysters are a keystone species of the Chesapeake Bay. They are filter-feeders that eat plankton by opening their shells and pumping water through their gills to trap food particles. This is known as “filter feeding” and also helps to clean the water. An adult oyster can filter up to 50 gallons of water in one day. The Eastern Oyster forms reefs in brackish and salty waters throughout the Chesapeake Bay that provide habitat and protection to many small and juvenile species.



Periodical Cicada

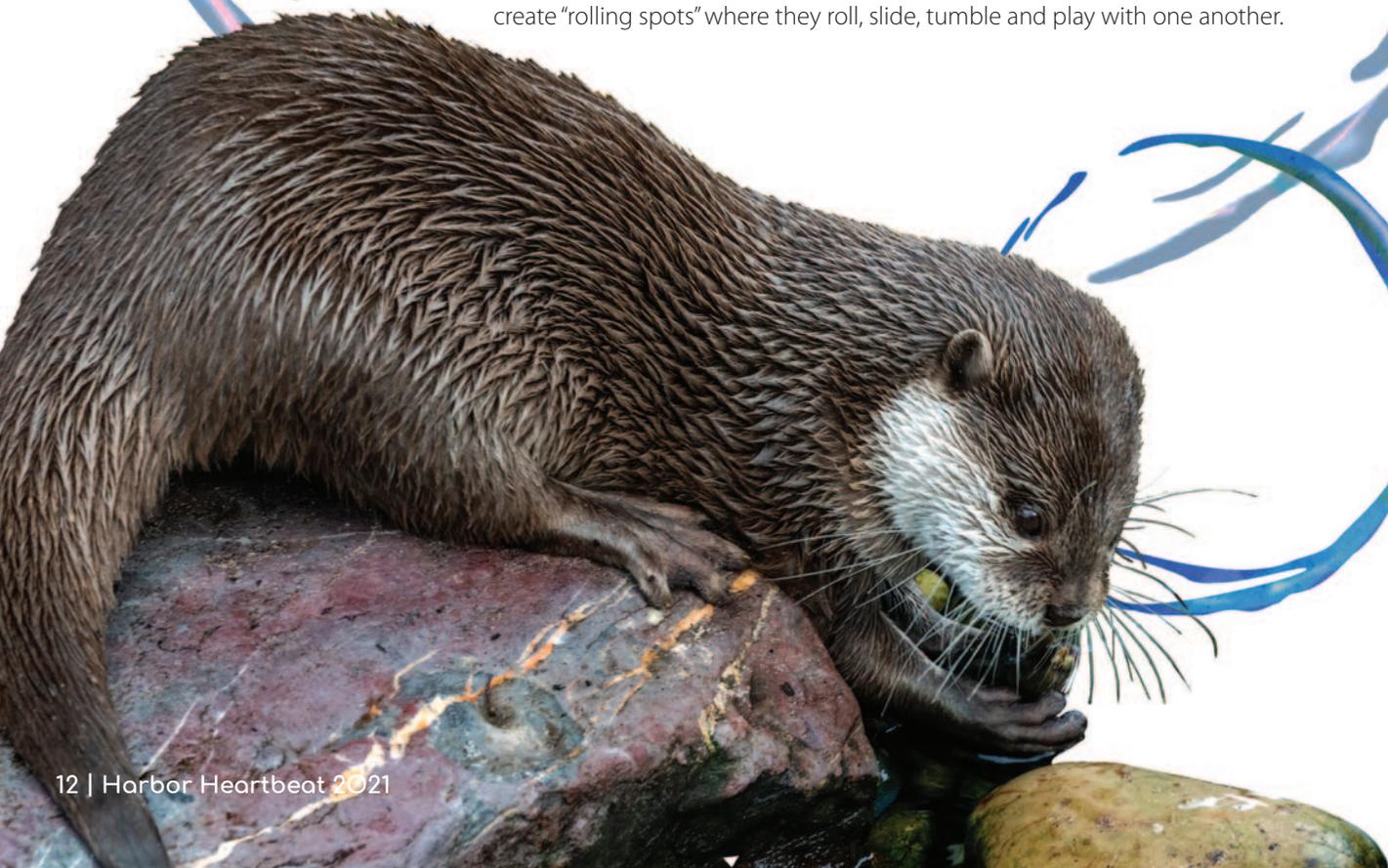
Magicicada spp.

Cicada nymphs begin their lives underground, feeding off of the roots of trees for the first 13-17 years of their lives. An entire cicada brood will emerge around roughly the same time and crawl onto nearby surface to shed their exoskeleton and become adults. At this point, males will begin ‘singing’ as a mating ritual to attract females, by vibrating a portion of their abdomens. After mating, females lay eggs in the young branches of trees and both male and female cicadas will fall to the ground and die. In 6-10 weeks, the eggs will hatch and the nymphs will fall to the ground and dig into the soil to begin feeding on tree roots for the next 13 or 17 years.

River Otter

Lontra canadensis

River otters are able to communicate with one another using vocalizations such as whistling, growling, chuckling and screaming. They are remarkable and graceful swimmers that can remain submerged for several minutes, dive over 55 feet in depth, and swim up to a quarter of a mile underwater. Playful and energetic, otters often create “rolling spots” where they roll, slide, tumble and play with one another.



Blue Crab

Callinectes sapidus

The blue crab's scientific name comes from the Greek words for "beautiful" and "swimmer." Blue crabs will feed on virtually anything they can find, including clams, oysters, mussels, and plant or animal detritus. Male blue crabs are known as "jimmies," while mature females are called "sooks." After mating, females develop an external egg mass or sponge that can contain between 750,000 and 2 million eggs. After the larvae are released, currents transport the larvae to the ocean where they molt and develop several times into megalops and then immature crabs. Immature crabs must molt several times before reaching maturity, roughly 12-18 months after hatching.



Hogchoker

Trinectes maculatus

The hogchoker is a small, flat, brown fish with a rounded body that remains abundant in the Baltimore Harbor throughout the year. As a bottom-dweller, hogchokers prefer sandy, silty or muddy bottoms of tidal freshwater areas around the Chesapeake Bay.

The name hogchoker comes from farmers who used to feed this fish to their hogs. Their scales feel smooth in one direction but are rough like sandpaper in the other. The hogs often struggled to eat them, thus they received this unusual name.



Atlantic Menhaden

Brevoortia tyrannus

The Atlantic menhaden is a silvery blue herring with dark spots on its sides, that travels in large schools. They are one of the most important food sources for larger predators, such as bluefish, striped bass, sharks, and fish-eating seabirds and mammals. Native American communities likely used menhaden to fertilize their corn fields; the Algonquian tribe called this fish "munnowhatteaug" which means fertilizer.



American Eel

Anguilla rostrata

American eels live in freshwater but spawn in the ocean during January, specifically the Sargasso Sea, east of the Bahamas. After the eel larvae drift in the oceans for 9-12 months, they morph into successive stages before returning to the Bay and becoming adults.

An adult American eel was recently found swimming in a lower portion of the Jones Falls in Baltimore. Since these animals are very sensitive to water pollution and low levels of dissolved oxygen, this find suggests that the Jones Falls is slowly but surely recovering and supporting more sensitive species.



ECOSYSTEM HEALTH SCORES

The ecosystem health data referenced in this report are collected, prepared, analyzed, and distributed by Blue Water Baltimore and can be accessed at BaltimoreWaterWatch.org. Waterfront Partnership provides analysis and conclusions for this report.

The 2020 sampling season was severely impacted by COVID-19. Therefore, updated ecosystem health scores are not available. Instead, the most recently available data from 2019 has been included here.

What do the water quality indicators mean?

Chlorophyll a

Chlorophyll a tells us if there is too much algae in the water due to excess nutrient pollution. Algal blooms may be toxic to fish and humans and may block sunlight to underwater plants. Dead zones can also be created when the algae die and are eaten by microbes that use up most of the oxygen in the water, leaving little or none for aquatic animals.

Conductivity

Conductivity tells us if there are too many salts and chemicals in the streams that could harm fish and other organisms. Freshwater plants and animals cannot survive in an environment that is too salty. Over-application of road salts, polluted stormwater runoff, and sewage overflows all contribute to dangerously high conductivity levels.

Dissolved oxygen

Dissolved oxygen is important for all aquatic animals. Just like animals that live on land, fish, shellfish, and even zooplankton need sufficient oxygen in order to survive.

Nitrogen and phosphorus

Nitrogen and phosphorus are nutrients that all living things need to grow. However, when excess nutrients from human activity end up in the water, they cause algae to grow too rapidly, creating harmful algal blooms. Common sources of nutrient pollution are fertilizer, sewage, stormwater runoff, and air pollution from the burning of fossil fuels.

pH

pH can tell us if the water is too acidic or too basic to be suitable habitat for most organisms. Abnormal pH levels are often a sign of pollution. Increasing carbon dioxide in the air also causes increasing acidity.

Temperature

Temperature is an important measure for stream health, as many aquatic animals can only tolerate a certain temperature range. Rapid and extreme fluctuations caused by runoff, sewer overflows, or lack of shading plants can be harmful. Warmer air temperatures also cause stream temperatures to rise, lowering the amount of dissolved oxygen the water can hold.

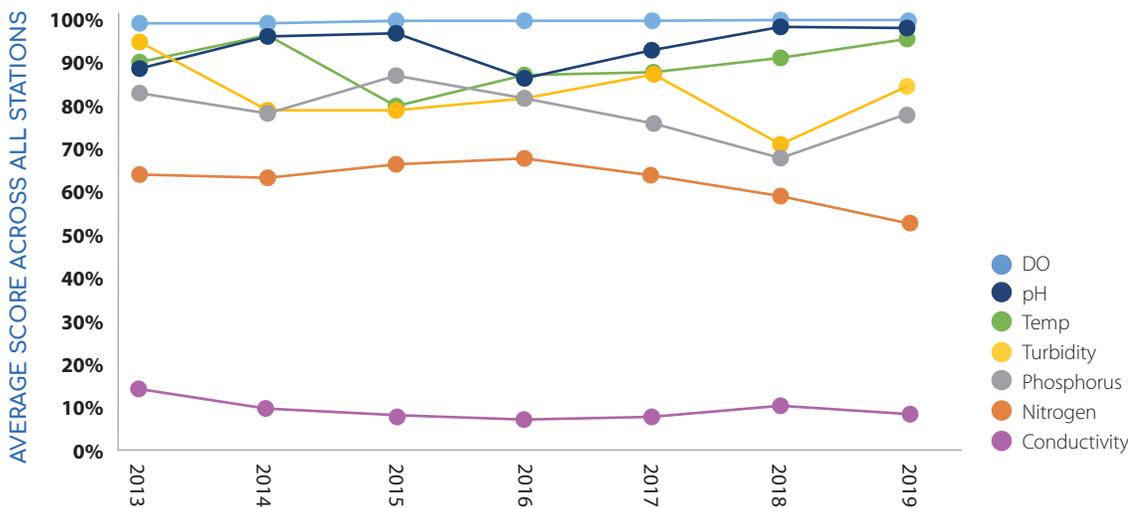
Turbidity and water clarity

Turbidity and water clarity are different measurements to gauge clear water, which is necessary for underwater plants to receive enough light to grow and provide food and habitat for animals. Clear water is also important for animals that rely on sight to forage or hunt for prey. Too much sediment from poor construction practices, stormwater runoff, and erosion can cause poor water clarity.



Photo credit: The Baltimore Sun

JONES FALLS & GWYNNS FALLS STREAMS ECOSYSTEM HEALTH SCORES (2013-2019)



Ecosystem parameters continue to face challenges.

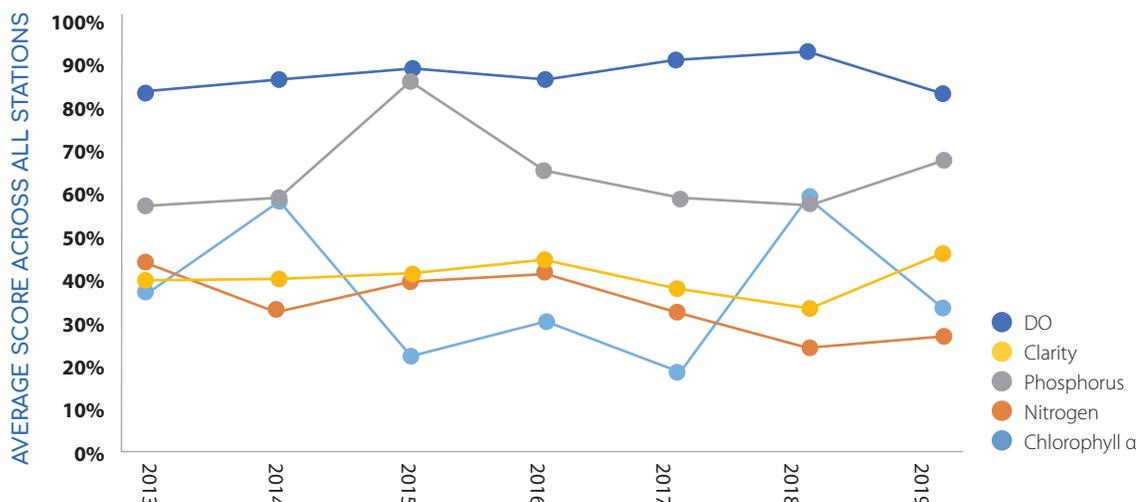
While Baltimore has made substantial progress in repairing old sewer pipes, the city has invested significantly less in stormwater management, and this is reflected in the data. On average we see no significant change in any of the ecosystem health indicators since 2013.

Our waterways exhibit a mix of good and poor ecosystem indicators. The streams have exhibited consistently high scores for dissolved oxygen, pH, and temperature, three parameters that are considered “vital signs” for the basic health of a stable freshwater ecosystem. In contrast, the Harbor’s only indicator that is consistently good to moderately good is dissolved oxygen. This does not eliminate the possibility of temporary low oxygen events caused by algal blooms, but it is a good sign that we have not seen a large fish kill due to low oxygen in the Harbor since 2014.

Unfortunately, the rest of the story is far less rosy. Stream conductivity routinely scores in the single digits, impacting the suitability for plants and animals. Both streams and the Harbor have received increasing amounts of excess nutrients over time, causing a variety of algae to bloom and discolor the Harbor too frequently. And there is still too much sediment flowing into the Harbor from stormwater and constant stream erosion.

These generalizations do not apply evenly across our city, and some areas face different challenges than others. But overall, we can easily see that we need to drastically reduce the amount of nutrients, salts, and sediment in our waterways to create truly healthy and robust ecosystems.

BALTIMORE HARBOR & TIDAL PATAPSCO RIVER ECOSYSTEM HEALTH SCORES (2013-2019)





Harbor Scholars

5th grade teachers from Baltimore City Public Schools participate in a professional development day as part of Harbor Scholars, a partnership between Healthy Harbor, Towson University, and the Baltimore City School System. Teachers learn how to teach their students about the Chesapeake Bay and are provided support throughout the year to help students take actions for a cleaner Harbor and Bay. The project is funded through grants from the Chesapeake Bay Trust and The National Oceanic and Atmospheric Administration.

Harris Creek Connected

Funded by a grant from the Chesapeake Bay Trust, this group of 50 east Baltimore community leaders come together to clean and green neighborhoods located in Baltimore's Harris Creek watershed. Residents participate in civic ecology workshops, take educational boat rides with the Living Classrooms Foundation, and plant thousands of native plants in community parks. In the spring, community members host plant and seed swap workshops to learn more about how plants beautify communities, provide habitat, and filter stormwater runoff.



The Healthy Harbor Initiative is supported by:



Morgan Stanley



An Exelon Company



Clayton Baker Trust



BALTIMORE COMMUNITY FOUNDATION



THE CAMPBELL FOUNDATION



Anonymous

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