

10 years of Working Toward a Fishable, Swimmable Baltimore Harbor • September 2020

**HARBOR
HEARTBEAT
2020**

REFLECTIONS & VISION

September 2020 • 10 years of Working Toward a Fishable, Swimmable Baltimore Harbor



2020

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10 YEARS

About this Report

In 2010, the Waterfront Partnership of Baltimore set the goal of making the Harbor safe for fishing and swimming by 2020. Each year, this report card has taken the pulse of Baltimore's streams and Harbor by tracking water quality, restoration projects, and ecosystem health. In this, our 10th report card, we are taking a look back at what has been accomplished over the last ten years and celebrating the progress that has been made. While there's still much work to be done, the Harbor has seen tremendous improvement.

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 swimmers from touching the bottom.



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



Waterfront Partnership



Waterfront Partnership

Photo credit: Kaitlin Newman

REFLECTIONS & VISION

Working Toward A Fishable, Swimmable Harbor



A Message from Mike Hankin

In 2010, I stood alongside the mayor and challenged the City – its businesses, elected officials, nonprofits, and philanthropic institutions – to come together in pursuit of an ambitious goal: a fishable and swimmable Baltimore Harbor. And to do it by 2020, just ten years away. Sure, some thought the idea was crazy, but many more said it could be done, and the believers formed a community around this idea and got to work.

Waterfront Partnership has launched floating wetlands, built the now world-famous Mr. Trash Wheel, and grown over 1 million oysters in the Harbor. Our partners have accomplished great things, too, planting trees, planting rain gardens, and reducing litter by banning foam containers and plastic bags. Baltimore City has distributed trash cans to every resident, expanded street sweeping, fixed broken sewer pipes, and this year will complete a massive project that will reduce sewer overflows by over 80%.

We are thrilled to report that the water is much safer for recreation now than when we started. Water quality scores for fecal bacteria, a human health indicator, have improved significantly. Inner Harbor monitoring sites now test safe for recreation a majority of the time. It is clear that we have reached the point where, with regular monitoring, we can start managing the Harbor as a recreational natural resource for the City and State – just as they have done in cities like Boston and Chicago.

That's not to say it's all good news. When it rains, pollution still washes off our streets and into storm drains, which flow unfiltered into our streams and Harbor. This stormwater pollution continues to impact the health of plants and animals living in our waterways. Until we more fully address it, the Harbor will continue to be unsafe for recreation in the days following a rainfall. This issue is not unique to Baltimore; it is faced by communities throughout the Chesapeake Bay and around the country, but that does not mean we can become complacent.

Much of the restoration of the Harbor has been paid for by the citizens of Baltimore through taxes and higher utility bills. Let's make a pledge that, as this work continues, we will return Baltimore's Harbor to the citizens who footed the bill. Let's set a new goal for a truly accessible and recreational waterfront with water trails that connect paddlers to our marine ecosystem and maritime history, a notification system informing boaters about water quality in real-time, and a dedicated swim site where people can safely take a plunge into the Harbor.

I'm looking forward to celebrating all that's been accomplished by going for a swim in the Harbor, after the current public health crisis abates.

Sincerely,

Handwritten signature of Mike Hankin.

Mike Hankin
Chairman Emeritus and current board member
Waterfront Partnership of Baltimore

Photo credit: Shan Gordon



Photo credit: Side A Photography

A HEALTHY HARBOR STARTS HERE

SEWAGE Reduction Timeline



In Baltimore, our sewer system is nearly 90 years old and in major need of repairs. Over the last ten years, governments, nonprofits, and business leaders have come together to identify and support the best approaches for making these repairs, knowing that they will be expensive, disruptive, and take a long time, but that they are ultimately necessary for the health of our waterways.

Healthy Harbor Initiative launched



Plan for a Healthy Harbor released



Thousands of fish die in Inner Harbor



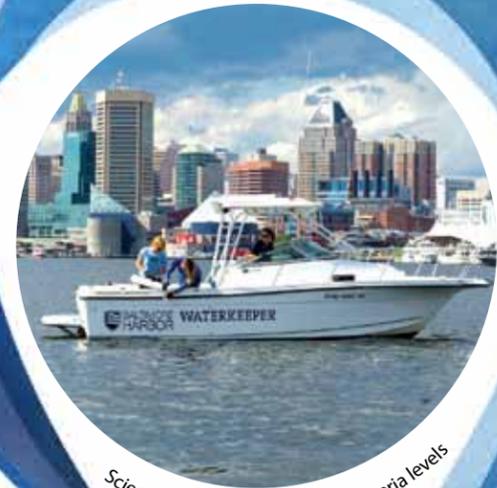
Major pollution source identified

Baltimore City breaks ground on the Headworks Project



Sources of pollution identified

Baltimore City DPW increases repair efforts



Scientists establish improving bacteria levels

Plans for a Harbor swim event



2010

Healthy Harbor Initiative launched

Waterfront Partnership chairman Mike Hankin speaks at the launch of the Healthy Harbor Initiative setting the goal of a fishable and swimmable Baltimore Harbor by 2020.

The City has been under a legal mandate to repair its failing sewer system and reduce sewer overflows since 2002, but the work has fallen far behind schedule. Millions of gallons of sewage are routinely discharged into Baltimore's streams and Harbor.

Photo credit: Waterfront Partnership.

2011

Plan for a Healthy Harbor released

Mayor Stephanie Rawlings-Blake speaks at the release of the Healthy Harbor Plan. The plan, written by the Center for Watershed Protection and Biohabitats, outlines steps to reduce the amount of sewage and other pollutants in our streams and Harbor.

Photo credit: Waterfront Partnership

2012

Inner Harbor fish kill

Thousands of fish die in the Inner Harbor during a fish kill event. The Baltimore Harbor report card shows mostly failing scores for fecal bacteria, an indication of sewage pollution in Baltimore's streams and Harbor.

Photo credit: Adam Lindquist, Waterfront Partnership

2015

Major pollution source identified

Baltimore City Department of Public Works identifies the cause of 83% of sewer overflows – a misaligned sewer pipe causing a persistent 10-mile sewage backup beneath the streets of East Baltimore.

Photo credit: Blue Water Baltimore

2017

The Headworks Project

Baltimore City breaks ground on the Headworks project at the Back River Waste Water Treatment Plant. The project is legally mandated under an agreement between the City, the Maryland Department of the Environment, and the Environmental Protection Agency. The project will cost \$430 million and involve building large underground tanks to capture sewage that would otherwise overflow into the Jones Falls stream. When finished, it should reduce sewer overflows in the City by over 80%.

Photo credit: Adam Lindquist, Waterfront Partnership

2019

Fecal bacteria levels improve

The Baltimore City Department of Public Works increases its efforts to identify and repair sewer leaks and resolves over 350 sources of pollution in six years.

Scientists at Waterfront Partnership and Blue Water Baltimore establish for the first time that bacteria levels are significantly improving at many monitoring sites in Baltimore's streams and Harbor.

Photo credit: Adam Lindquist, Waterfront Partnership of Baltimore

Photo credit: Damon Meledones and Blue Water Baltimore

2020

Waterfront Partnership

announces plan to permit first Harbor swim event at a designated area in the Inner Harbor once the current public health crisis abates. The organization is also waiting for the City to complete major sewer repairs, specifically the Headworks project schedule for completion by the end of 2020."

Photo credit: Biohabitats and Waterfront Partnership

IMPROVING BACTERIA SCORES Indicate Less Sewage in the Harbor

While bacteria scores vary greatly by location, we are excited to see positive trends in many stations throughout the Harbor and streams. The vast majority of sampling stations in the outer Patapsco River have always had very good scores with little room for improvement. But if we look at the other 36 stations throughout the city, 81% have shown some improvement, two-thirds of which are statistically significant trends.

This means water samples from these stations have been meeting bacteria safety standards more frequently over time. (Fortunately, this holds true for most of these stations even when including wet weather samples in the analysis!) In other good news, there is no evidence of any negative trends in bacteria scores across all monitoring stations.

We are especially pleased to see significant improvement in the Inner Harbor, particularly at the stations closer to where the Jones Falls Stream meets the Harbor. As the largest stream flowing into the Inner Harbor, the Jones Falls carries a lot of pollution from the across the city and county. Yet the stream outlet shows an overall increase in bacteria scores, which is corroborated by a decline in average bacteria levels (see page 9). Unfortunately, we have not seen similar improvement in most Middle Branch stations, although the Middle Branch has generally exhibited higher scores than the Inner Harbor.

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 in the cleanliness of our waterways. We hope to see further gains with the completion of the Headworks Project (see p. 5) and continued repair of our city's infrastructure.

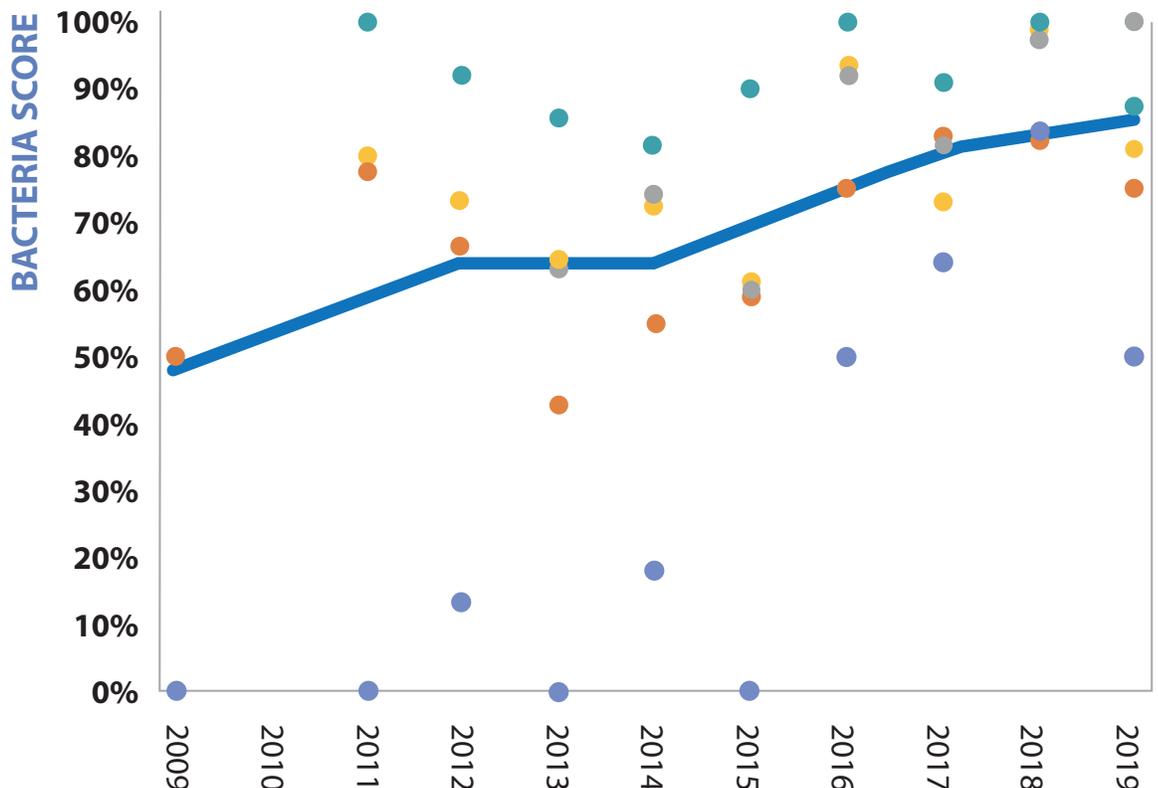


Inner Harbor

- Jones Falls Outlet
- Northwest A
- Northwest B
- Canton
- Fort McHenry

Regional Bacteria Trend

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



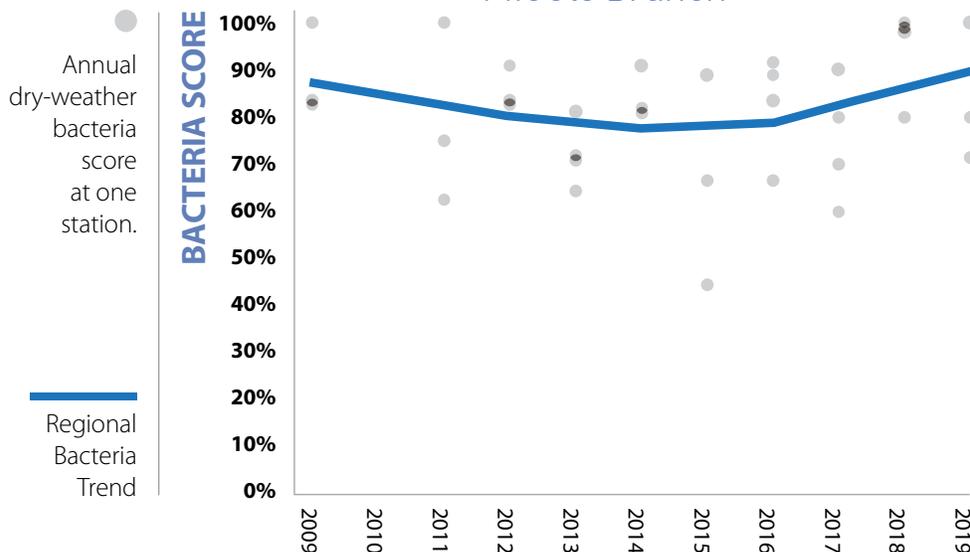
2019 HARBOR BACTERIA SCORES

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.



Middle Branch



2019 Watershed Bacteria Scores

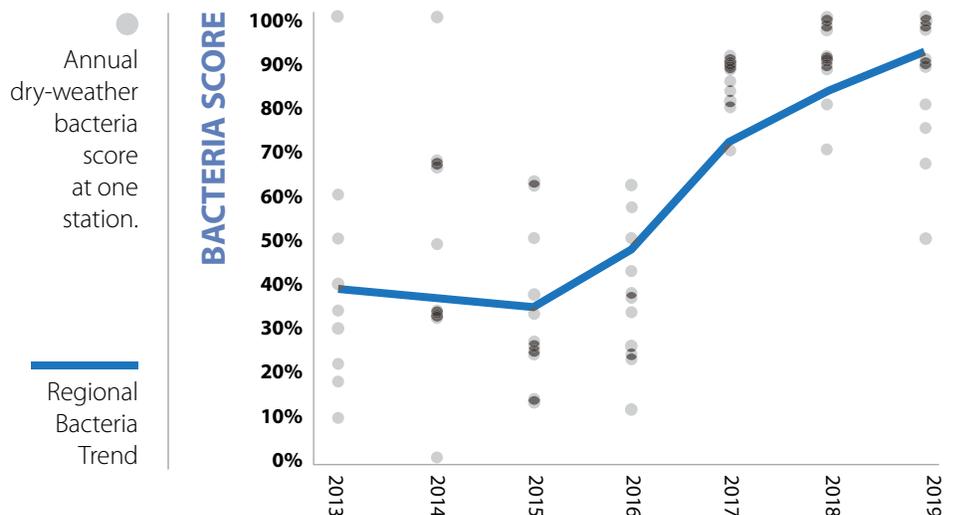
If the score is **100%** is it safe to **SWIM?**

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.

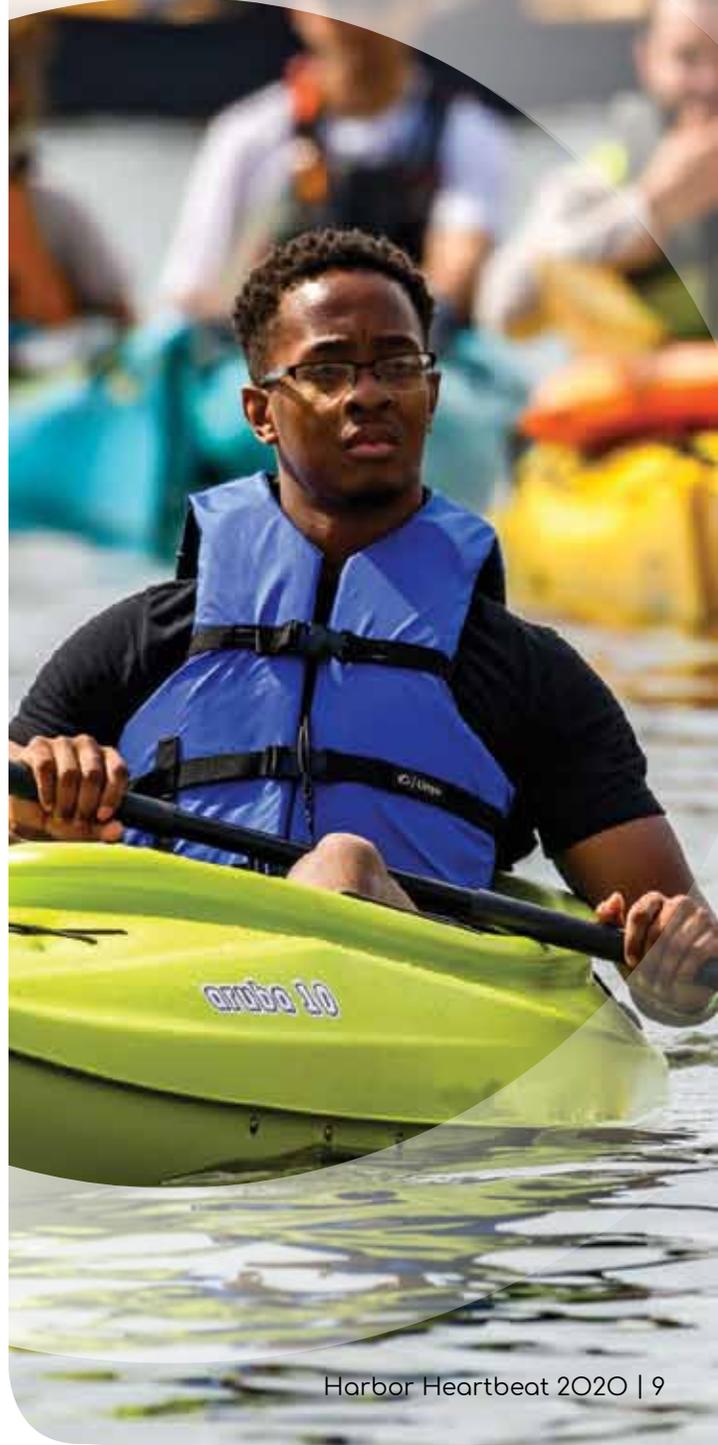


Jones Falls Stream Watershed

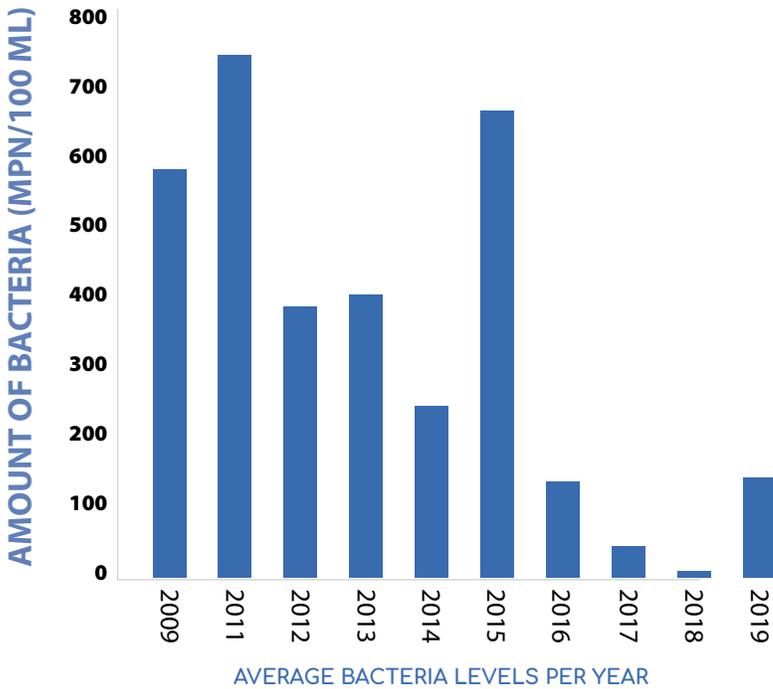


Notes about the Data

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.



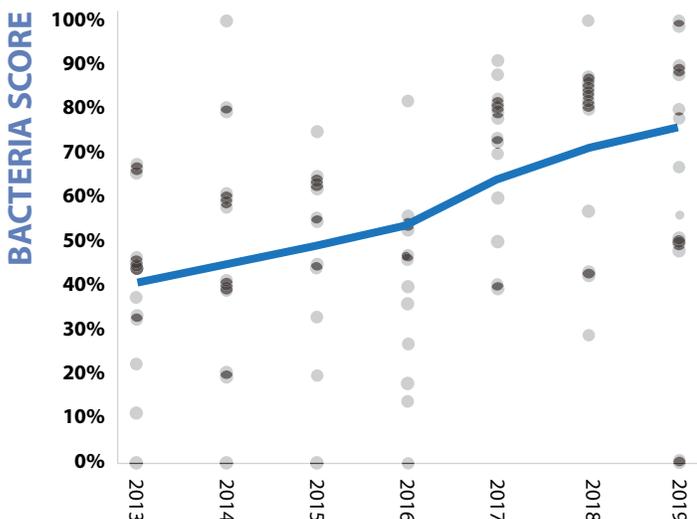
Jones Falls Outlet



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.

Gwynns Falls Stream Watershed



TRASH & LITTER Reduction Timeline

The issue of litter consistently ranks as a top concern for both City government and the people of Baltimore. While Baltimore still has a major litter problem and still has a lot of work ahead, the last ten years have seen significant progress.



2014 City issues plan to remove trash from Harbor

Baltimore City implements a legally mandated plan to remove trash from the Harbor by 2030. Baltimore County follows suit in 2016. The plan requires the City to remove 228,370 lbs. of litter per year from the Harbor and land that drains to the Harbor. The County must remove 151,000 lbs. from the Jones Falls and Gwynns Falls streams and land in the county that drains to them.

Photo credit: Maryland Daily Record

Welcome Mr. Trash Wheel™

After witnessing the success of a 2008 pilot project, Waterfront Partnership hires Clearwater Mills to install a bigger, permanent trash interceptor for the Inner Harbor. Located at the mouth of the Jones Falls, Mr. Trash Wheel becomes a global phenomenon. He uses renewable energy to eat floating litter and social media to promote behavior change. He has since collected 1,400 tons and 55,000 followers. The project was funded by the Abell Foundation, Maryland Port Administration, and Constellation.

Photo credit: Casey Merbler, Waterfront Partnership

Citywide street sweeping

Baltimore Department of Public Works announces it is expanding street sweeping to sweep every street in the City at least once a month. The expansion is funded by the City's stormwater fee and sweepers collect around 12,000 tons each year.

Photo credit: Baltimore City DPW

2016

A trash can for every home

Baltimore City Department of Public Works spends \$8.9 million to distribute 65-gallon municipal trash cans to every City resident. The cans have two wheels, a tight-fitting attached lid, and a tracking device. They have reduced requests for rat abatement by 26%.

Photo credit: Erick Ferris, Photojournalist WMAR

Professor Trash Wheel™ joins the team

After a successful crowd-funding campaign, Baltimore's second trash wheel is placed at the end of Harris Creek in Canton. She has since collected over 100 tons of trash including 865,000 cigarette butts.

Photo credit: Adam Lindquist, Waterfront Partnership

2017

Baltimore City adopts zero-waste resolution

From 2011 to 2017 the market value of Baltimore's recycled materials drops by 70% prompting the City to reconsider its waste management. While the resolution is nonbinding, it elevates issues related to landfill capacity and the impacts of waste incineration on public health.

BMORE Beautiful launched

Inspired by Waterfront Partnership's Alley Makeover Program, the Baltimore City Environmental Control Board launches BMORE Beautiful. The grassroots peer-to-peer effort works at the block level to get residents, businesses, and organizations directly involved in community cleanup and beautification activities. The program provides supplies, small grants, and jobs for Baltimore youth.

Photo credit: Leanna Wetmore, Waterfront Partnership

2018

Captain Trash Wheel™ reports for duty

The Maryland Port Administration installs Baltimore's third trash wheel at Masonville Cove, an environmental education center and the nation's first Urban Wildlife Refuge located on the South Baltimore waterfront.

Photo credit: Maryland Port Administration

2019

Maryland becomes the first state to ban foam containers

Foam containers, made of polystyrene, are one of the most frequently littered items found in the Baltimore Harbor. In 2019, Maryland State Delegate Brooke Lierman successfully sponsors a bill to ban them across the state. The legislation is preceded by a citywide foam ban implemented by Baltimore the year before. It is strongly supported by a coalition of students (called Baltimore Beyond Plastic), legislators, and environmental nonprofits.

Photo credit: Adam Lindquist, Waterfront Partnership

2020

Baltimore City bans plastic bags

Frequently seen wrapped around the trees that grow along the City's streams, plastic bags are a nuisance impacting the environmental health of communities and waterways alike. In January, 2020, Mayor Jack Young signs a bill banning stores from giving out single-use plastic bags and requiring them to charge a price for alternative bags. The goal of the bill is to reduce litter and encourage residents to bring their own reusable bags.

Photo credit: Adam Lindquist, Waterfront Partnership

Trash Wheel Number Four

Waterfront Partnership announces plans to install Baltimore's fourth trash wheel at the mouth of the Gwynns Falls stream in the Middle Branch of the Baltimore Harbor. The project is funded by the Maryland Port Administration, South Baltimore Gateway Partnership, Weller Development, Continental Reality, Baltimore City, and Baltimore County.

Photo credit: Ziger/Snead Architects

Words about the Wheel

"Universally celebrated by scientists and citizens, they are arguably the most beloved and sensible anti-plastic pollution mechanisms in the country."

The New Yorker

"An example of where technology for cleaning up plastic in the oceans can have the most impact."

5 Gyres Institute

"Mr. Trash Wheel stands tall, the most visible, perhaps the only, successful engineering-based ocean cleanup project, tried and tested."

Andrew Thaler, deep-sea biologist

"You humans have given me a purpose. Unfortunately, that purpose is to eat all your discarded cigarette butts and chip wrappers. Why can't someone drop a truckload of Berger cookies on the ground for a change?"

Mr. Trash Wheel

How Baltimore's MR. TRASH WHEEL Inspired the World!

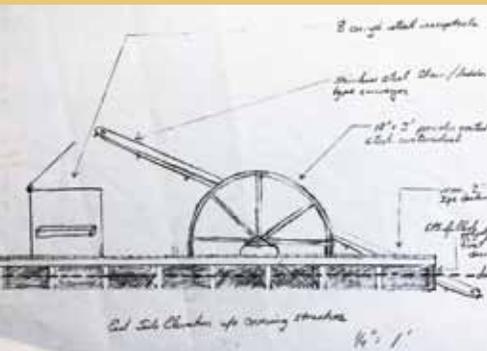
In 2007, local inventor John Kellett was tired of seeing litter float down the Jones Falls and into Baltimore's Inner Harbor. He came up with the idea of using solar and water power to run a machine that would float in the stream and scoop up the trash. In 2008, with funding from the Abell Foundation and the blessing of Baltimore City's Department of Public Works, John piloted his prototype in the Inner Harbor for eight months.

In 2010, the Waterfront Partnership of Baltimore set the audacious goal of cleaning up the Harbor in just 10 years. Impressed with what they saw, Waterfront Partnership hired John to build a bigger, stronger, permanent device. The new floating trash interceptor was installed in May 2014 and, thanks to the design services of Ziger/Snead, the device went from looking like a wooden shed to looking like a giant crustacean made of metal and sail fabric.

Now capable of picking up over 250 tons of trash per year, there was no question that the Harbor would be a lot cleaner and, for many, that was enough. But Waterfront Partnership had bigger plans. Not content to merely pick up floating trash, they wanted to clean up the City and get residents engaged in the environmental restoration of the Harbor. But how could a trash interceptor do any of that?

Enter Adam Lindquist, who was hired to run the Healthy Harbor Initiative in 2011. He wanted to leverage social media to build support for the campaign. So, he filmed a walkthrough of the technology and shared it online. Two weeks later, that video had been watched over 1 million times and gone to number one on popular website Reddit.com. To build on that success, Adam brought in Baltimore-based creative firm What Works to launch a social media campaign and, with the help of a pair of googly eyes, Mr. Trash Wheel was born.

As of June 2020, he has picked up over 1,300 tons of trash and his videos have been shared millions of times all over the world. His cute, zany, and optimistic social media persona helped bring about an anti-litter revolution in Baltimore. Trash Wheel fans have helped to ban plastic bags in the city and foam containers statewide, reducing the amount of litter ending up in our streams and Harbor. Fans wear Mr. Trash Wheel t-shirts, snuggle up with Mr. Trash Wheel plushies and even drink Mr. Trash Wheel craft beers.



Left: Conceptual plans for the trash wheel



Middle: Trash Wheel prototype



Right: Mr. Trash Wheel

Mr. Trash Wheel was born in Baltimore because we embrace the counter-culture, the start-up culture, and the creative class. We are a city that breaks things and then rebuilds them in new and interesting ways. And in so doing, we prove that audacious goals, like swimming in the Harbor, are not just helpful, but necessary, and that problems that once seemed unsolvable always deserve a fresh look. That is the enduring legacy of Mr. Trash Wheel. A relatively simple technology implemented in a novel way and executed with so much passion and creativity that the world had to stop, take notice, and then try to catch up.



MrTrashWheel



MrTrashWheel



MrTrashWheel



Trash Wheel Family Collection Totals **1,486 TONS OF TRASH**

From **May 2014 -
May 2020**



1,293,276
Chip Bags



1,170,714
Plastic
Bottles



1,236,372
Foam
Containers



730,426
Plastic Bags



11,971,798
Cigarette Butts

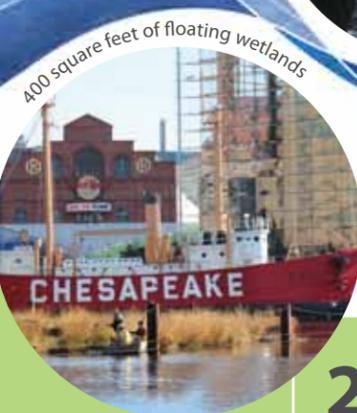
Mr. Trash Wheel's Favorite Finds



- 4,807** sports balls
- 3** beer kegs
- 1** mattress
- 1** acoustic guitar
- 1** marriage certificate
- 1** high platform stiletto shoe
- 1** creepy Elmo doll
- 1** ball python

ECOSYSTEM HEALTH

Timeline Cities like Baltimore have a lot of paved surfaces that prevent rain from soaking into the ground. Instead, it is directed into drains that flow into local waterways. Rain carries pollution off our roads, sidewalks, and alleys like pet waste, litter, and invisible pollutants like nitrogen and phosphorus. This is known as stormwater pollution, and it's really bad for aquatic life. Restoration projects help bring back the environmental functions of our ecosystem and filter pollution from the water.



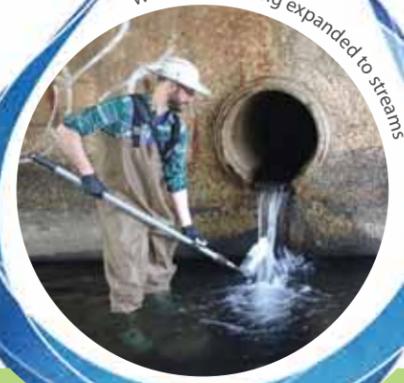
400 square feet of floating wetlands



Monitoring the health of Baltimore Harbor



1,800 square feet of new floating wetlands



Water monitoring expanded to streams



Nation's first Urban Wildlife Refuge



Great Baltimore Oyster Partnership



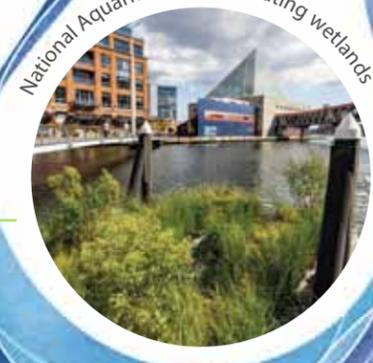
Oyster Spat



Inner Harbor converts majority of landscaping to native plants



Brown Advisory Installs floating wetlands



National Aquarium installs floating wetlands



Green Stoop Challenge



4.4 million in restoration projects

2010

400 square feet of floating wetlands

Waterfront Partnership and the National Aquarium each install floating wetlands. These wetlands replicate the natural marsh that once lined the shores. Their native grasses provide habitat for local wildlife and help to filter pollution from the water.

Photo credit: Adam Lindquist, Waterfront Partnership

2012

Monitoring the health of Baltimore Harbor

Blue Water Baltimore begins monitoring ecosystem health in the Baltimore Harbor by collecting data on multiple parameters including dissolved oxygen, nutrients, and water clarity. Data is also collected by Baltimore City.

Photo credit: Blue Water Baltimore

1,800 square feet of new floating wetlands

Waterfront Partnership expands its floating wetland footprint from 200 to 2,000 square feet. The floating islands are designed by Biohabitats and built by students from the Living Classrooms Foundation. They are initially located by the World Trade Center and can now be found at the Downtown Sailing Center.

Photo credit: Adam Lindquist, Waterfront Partnership

Maryland passes stormwater fee

This new law requires the 10 largest and most urban regions of the state to set fees to address their polluted runoff problems. In 2015, the law is revised to remove the fee requirement while increasing accountability by requiring jurisdictions to demonstrate that they have adequate funding and plans to reduce their polluted runoff.

2013

Water monitoring expanded to streams

Blue Water Baltimore expands its water quality monitoring program to the Gwynns Falls and Jones Falls streams, as well as to the entire Tidal Patapsco River and its tidal tributaries. Baltimore City and County also collect data.

Photo credit: Blue Water Baltimore

Nation's first Urban Wildlife Refuge

U.S. Fish and Wildlife Service designates Baltimore's Masonville Cove as the nation's first Urban Wildlife Refuge Partnership. The site, which was restored by the Maryland Port Administration, offers opportunities for walking, fishing, bird watching, and other recreational activities. It is home to over 230 bird species, including Baltimore's only pair of nesting bald eagles.

Photo credit: Chesapeake Bay Program

2014

Great Baltimore Oyster Partnership

The Waterfront Partnership and Chesapeake Bay Foundation launch the Great Baltimore Oyster Partnership and set the goal of planting 5 million oysters in the Patapsco River by 2020. The program helps hundreds of volunteers grow spat-on-shell (baby oysters) in the Baltimore Harbor.

Photo credit: Kaitlin Newman

2017

Inner Harbor converts majority of landscaping to native plants

Waterfront Partnership reaches the goal of converting more than half of Inner Harbor landscaping to native plants. Some gardens in the Inner Harbor are even certified as sanctuaries for Chesapeake Bay wildlife.

Photo credit: Casey Merbler, Waterfront Partnership

Brown Advisory installs 2,000 square feet of floating wetlands

Brown Advisory becomes the first private company to install floating wetlands outside their headquarters at Bond Street Wharf. The new installation brings the total floating wetlands in the Baltimore Harbor to 4,200 square feet.

Photo credit: Casey Merbler, Waterfront Partnership

National Aquarium pilots advanced floating wetlands design

This prototype incorporates components not seen in other constructed wetlands including aeration, topography, and the ability to control where it sits in the water column. Since the initial launch, 37 species of wildlife have been documented utilizing the habitat as a home, nursery, and foraging location.

Photo credit: Mark Moody, National Aquarium

2018

Environmental Impact Bonds

Baltimore City begins working with the Chesapeake Bay Foundation on an innovative new strategy for funding restoration projects. The City will issue up to \$6.2 million worth of Environmental Impact Bond financing for green infrastructure projects in Baltimore communities. Repayment of the bonds will be based on the effectiveness of the projects.

2019

Neighborhoods take the Green Stoop Challenge

Waterfront Partnership launches the Green Stoop Challenge encouraging residents to plant tree wells, parking strips, and other forgotten neighborhood green spaces with native plants. The project includes funding from the National Fish and Wildlife Foundation to plant over 6,000 native plants in East Baltimore neighborhoods.

Photo credit: Leanna Wetmore, Waterfront Partnership

2020 Chesapeake Bay Trust funded restoration projects total \$4.4 million

From 2010 to 2020, the Chesapeake Bay Trust invests \$4.4 million to fund 82 environmental restoration projects in Baltimore City. \$900,000 comes from the City's stormwater utility fee. Examples of funded projects include the planting of 300 new trees by the Baltimore Tree Trust in East Baltimore and the installation of nine bioretention cells to treat polluted runoff from parking lots at Medstar Harbor Hospital installed by Blue Water Baltimore.

Photo credit: Leanna Wetmore, Waterfront Partnership

ECOSYSTEM

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.



HEALTH SCORES

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

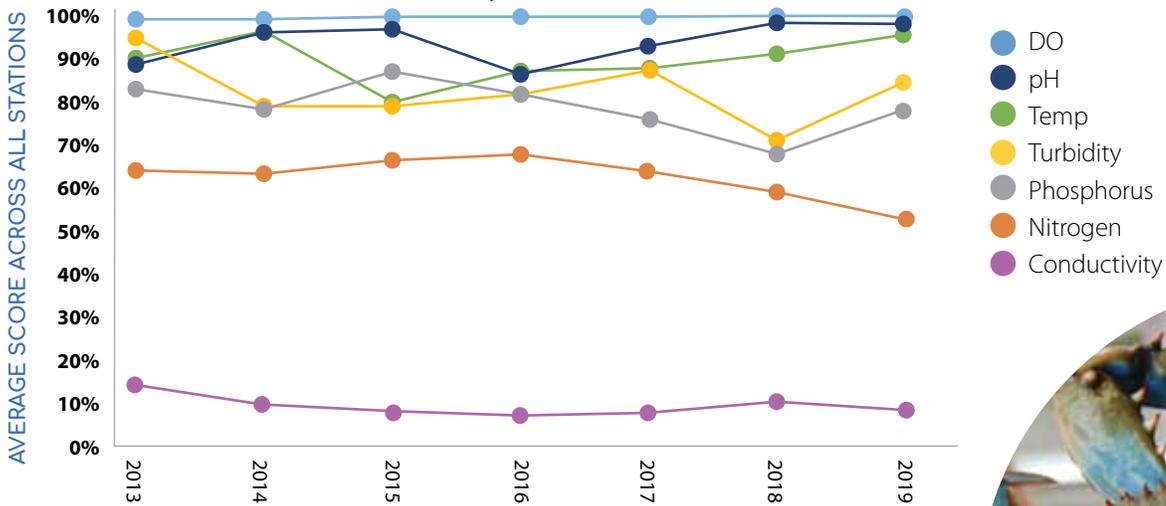
Temperature is an important measure for stream health, as many aquatic animals can only tolerate a certain temperature range. Rapid and extreme fluctuations caused by runoff, sewer overflows, or lack of shading plants can be harmful. Warmer air temperatures also cause stream temperatures to rise, lowering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

Turbidity and water clarity

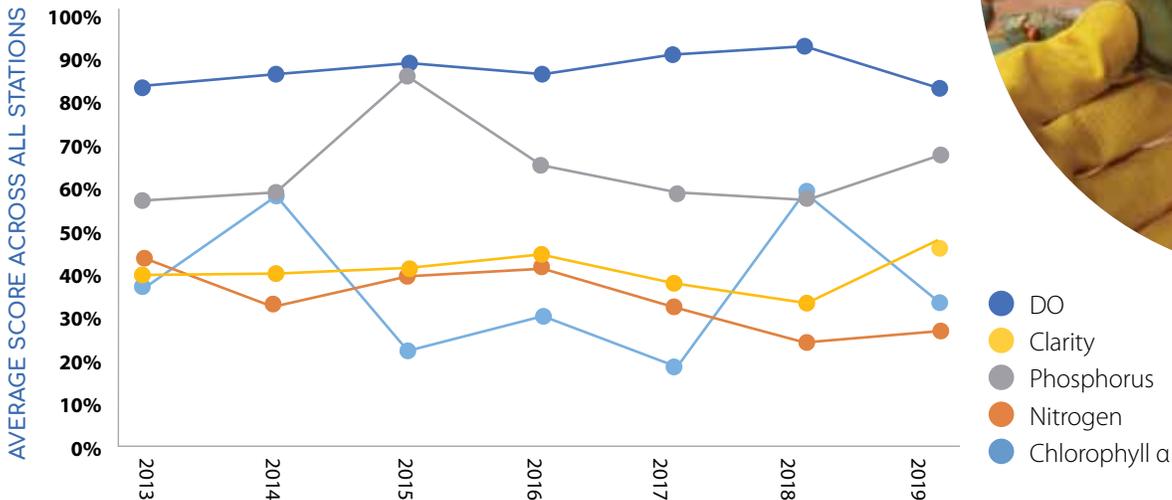
Turbidity and water clarity are different measurements to gauge clear water, which is necessary for underwater plants to receive enough light to grow and provide food and habitat for animals. Clear water is also important for animals that rely on sight to forage or hunt for prey. Too much sediment from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

*Left - Water testing with Blue Water Baltimore
Photo credit: Neil Dampier and Blue Water Baltimore*

Jones Falls & Gwynns Falls Streams



Baltimore Harbor & Tidal Patapsco River



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.



2030 VISION

A cleaner Baltimore Harbor is an untapped natural and economic resource for the region. Nationally, paddle-based recreation and fishing have a \$125 billion annual economic impact. The green jobs created by work in sustainability and restoration generate an estimated \$1.3 trillion annually and employ millions across the U.S.



The Baltimore Harbor and its continued restoration have much to offer residents and tourists alike. From the health benefits of experiencing nature, to the cultural benefits of connecting with our maritime heritage, to the financial benefits of jobs in tourism, recreation, and the environment.

Around the world cities are reclaiming their urban waterways for recreation. See Paris (left), London, Boston, New York, and Washington, DC for some great examples. With the imminent completion of major infrastructure repairs that will make the Harbor even cleaner, the time is right for Baltimore to begin planning for a recreational Harbor. A truly recreational waterfront would include kayak launches, water trails, fishing piers, and even a swim site.

Left – The Bassin de la Villette swimming pool on the Canal de L'Ourcq in Paris.

Harbor Swim Spot

Project by: Waterfront Partnership Status: Proposed

The Swim Spot is an aspirational concept showing what an Inner Harbor swim site could look like. The project would create a free enclosed space for swimming in unfiltered Harbor water. Routine monitoring would ensure the water was safe for recreation and the structure would be designed to prevent swimmers from touching pollutants on the bottom. The Swim Spot is modular and could be placed at a number of sites around the Baltimore Waterfront.

The next steps toward building a permanent swim site in the Harbor are to conduct a feasibility study and host a swim event in the Harbor to increase support for the project.



Waterfront Campus

Project by: National Aquarium Status: Planned

This exciting project will reintroduce celebrated Chesapeake Bay biodiversity into the Inner Harbor. By installing a network of floating wetlands between Piers 3 and 4, the project will create habitat for native species and gradually improve the Harbor's water quality.

Terraced edges and walkways will allow individuals to get closer to the water's edge and provide engaging activities to educate guests about the importance of the Harbor and Bay.



2030 VISION



Middle Branch Waterfront Revitalization

Project by: To Be Determined Status: Planned

Strategic placement of dredge material will create more than 270 acres of marsh, wetland, and tidal creek habitat that will increase water quality through nutrient uptake, provide greater shoreline and flood protection, and increase carbon sequestration while supporting increased biodiversity.

The goal is to return the Middle Branch of the Baltimore Harbor to a healthy and clean waterbody for the residents to enjoy through the use of paddle-craft and water adjacent activities like fish and crabbing.



Baltimore Blueway Water Trail

Project by: Waterfront Partnership
Status: Proposed

Baltimore is a stop on two national water trails – the Captain John Smith Chesapeake trail and the Star-Spangled Banner trail. The Baltimore Blueway will connect residents to these historic water trails using signage, maps, and a website. New public access points in the Inner Harbor and Middle Branch will provide tangible connections between the waterfront and the Bay. Access sites should include launches and other amenities such as bathrooms and parking.

To encourage equitable access to paddling, the project will be paired with programs for first-time paddlers.

Inner Harbor Flagging System

Project by: Waterfront Partnership Status: Proposed

A public notification system, such as flying flags of different colors to indicate water quality, will let people know when the water is safe for paddling, sailing, and other recreation. In Boston, the Charles River Watershed Association has been flying flags to communicate water quality since 1998. In 2019, +Pool installed a floating LED sculpture in New York City's East River that changes color based on water quality.

An Inner Harbor flagging system would use testing, weather trends, and historic data to determine current water quality and then inform the public about when there is an increased risk for recreation. A blue flag would indicate that the Harbor is safe and a red flag would indicate that contact should be avoided. Flags should be located in areas of the Inner Harbor where there is potential for water contact.



Chase Pier

Project by: Biohabitats, Inc. Status: Proposed

This concept involves transforming a dilapidated pier into a "life zone" for the Baltimore Harbor. Polluted water is pumped out of the Harbor onto the pier where it flows through a series of wetland treatment cells that remove harmful nutrients. Cascading waterfalls send oxygen-rich water back into the Harbor.

The project could remove 95% of bacteria, 10% of nitrogen, and 25% of phosphorus from treated water while increasing dissolved oxygen by 200%. It could treat over 2 million gallons of water per day.



10 ACTIONS FOR THE NEXT 10 YEARS

Baltimore's streams and Harbor have seen tremendous improvements over the last ten years, but there is still much work to be done. Here are ten issues that the Baltimore region must prioritize to continue the push toward a clean and healthy environment.



The Human Element

1. Provide Recreational Water Access

Improving recreational access to the Baltimore Harbor is good for both people and the environment. Studies have shown that water recreation improves physical and mental health, especially for low-income urban communities that often have less access to nature. Individuals exposed to nature are also more likely to take actions to protect it.

The Baltimore Harbor should be developed, promoted, and managed as a premier recreational natural resource for the region. A truly accessible Harbor should include new access points, fishing spots, launches for personal paddle craft, and a designated swimming area. Recreational facilities must be paired with programming to ensure equitable access to the benefits of being on and in the water.

2. Make Baltimore a Hub for Green Jobs

As this report has shown, Baltimore is a place where exciting things are happening in the environmental field. A cleaner Harbor is both an opportunity for Baltimore to position itself as a leader in environmental restoration and for City residents to learn about and pursue careers in the industry. As environmentalism goes mainstream, green jobs are thriving across professions. The Harbor is a powerful example of the impact that such jobs can have on a local level, whether you are a scientist, an artist, an engineer, or a writer. Baltimore must leverage its accomplishments to promote itself as a leader in the environmental movement and to help more young people gain access to environmental jobs.

Bacteria

3. Get Serious About Pet Waste

Scientists are increasingly turning to microbial source tracking, which uses DNA markers to determine if bacteria in our waterways are coming from humans, pets, or wildlife. Early results have indicated that pets and wildlife may play a much larger role than initially thought. This comes as no surprise considering that Baltimore's dogs excrete an estimated 24.6 million pounds of waste annually, an estimated 40% of which is left on the ground. That waste is carried by rain into our streams and Harbor, so a public education campaign is sorely needed.

Trash & Litter

4. Make our future Zero Waste

Zero waste is the conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials with no discharges to land, water, or air that threaten the environment or human health. The concept seems lofty but is within our reach through legislation, smart recycling practices, and thinking creatively about reuse. Combined with changing our personal behaviors - simply using less - we can achieve zero waste.

5. Pay-as-You-Throw

The City should create a pay-as-you-throw program for the management of solid waste. These programs charge users based on the amount of trash they generate (but not for waste that is recycled or composted). This results in a more equitable distribution of services as households producing more trash pay more than households that produce less. It also incentivizes recycling, composting, and a reduction in packaging as consumers opt for lower-waste products.

6. Rethink Recycling

Baltimore must rethink single-stream recycling, the practice of combining all our recyclable materials into one bin. In 2000, much of the nation shifted to single-stream to make residential recycling easier, thinking it would increase the recycling rate. Twenty years later we know that this has led to increased contamination of the recycling stream and a decrease in the value of recyclable materials. In Baltimore, the recycling rate is just 19%, but an estimated 80% of Baltimore's trash can be recycled or composted. We can do better!

7. Waste-to-Wealth

The Baltimore Office of Sustainability's Waste-To-Wealth Initiative aims to "capture valuable resources before they enter the waste stream as a means of creating jobs, combating blight, and revitalizing our neighborhoods." Food waste, construction and demolition waste, and wood are examples of potentially high value items that should be extracted from the waste stream and put to better use.

Ecosystem Health

8. Take Action Against Climate Change

Climate change is causing Maryland to become warmer with wetter springs and winters and more intense droughts during summer and fall. Warmer water stresses our native fish species, causes algal blooms, and reduces the amount of oxygen that water can hold. Fortunately, many solutions for water pollution and climate change overlap. Planting native plants and trees for stormwater management will also clean and cool the air. Restoring wetlands will filter water and provide a buffer from sea level rise and flooding. And burning fewer fossil fuels will mean fewer algae blooms and clearer water in the Chesapeake Bay.

9. Transform gray to green

Many of our marine ecosystem problems stem from the same underlying issue: too many hard, paved surfaces. Instead of filtering through soil, rain hits pavement and rushes toward storm drains, carrying pollutants. The only real, lasting solution is to replace concrete with green spaces (tree wells, rain gardens, native plantings, green roofs) and other systems designed to retain and filter rain water. This would not only result in cleaner water but also improve air quality, cool streams and neighborhoods, create habitat, and raise property values.

10. Use Road Salts Efficiently

High conductivity in streams is a common problem caused in large part by the excessive use of road salt, which – in addition to devastating freshwater ecosystems – can also kill terrestrial plants, corrode infrastructure, and contaminate drinking water. While safety is paramount, there are proven strategies to reduce the use of salt and ensure roads remain free of ice.



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