HARBOR HEARTBEAT

The Baltimore Harbor Restoration Report Card

MAY 2019

BALTIMORE, MARYLAND

HARBOR HEARTBEAT

The Baltimore Harbor Restoration Report Card

ABOUT THIS REPORT

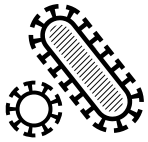
Harbor Heartbeat is an annual restoration report card for Baltimore's streams and Harbor. The report is produced by the Waterfront Partnership of Baltimore as part of the Healthy Harbor Initiative and tracks annual progress being made toward a swimmable Baltimore Harbor. It doesn't matter if you live in Baltimore City or Baltimore County, we can all do something to protect our waterways.

Each year, Harbor Heartbeat takes the pulse of water quality in the Baltimore Harbor by tracking seven indicators of progress. Sometimes the indicators go up and sometimes they go down, but each is critical to the health of our communities, streams, Harbor and Bay. Contributors to this report include city and county governments, environmental nonprofits and businesses.

Photo Credit: Casey Merbler

Andree Cochran and **Kelly Ferguson** are engineers in the Baltimore City Department of Public Works. They manage programs that inspect sewer lines for grease, rags and other debris so that the pipes can be cleaned before sewer overflows or basement backups can occur.

7 INDICATORS OF HARBOR HEALTH



Fecal Bacteria

Page 3: Fecal Bacteria levels answer one very basic question: is this water safe for swimming or any other human contact? Bacteria measurements help us determine the risk of getting sick if someone comes into contact with the water. Some common sources of bacteria are sewage overflows, broken sewer pipes and pet waste.

Sewer Repairs

Page 6: Baltimore City and County share a sewer system, but some sewer pipes are over 80 years old. When old pipes break or get clogged it can cause sewage to discharge into our streams and Harbor. Some common causes of sewer discharges are people putting grease down their drains, flushing wet wipes and other non-flushable items and too much rainwater getting into the sanitary sewer system.

Pollution Tracking

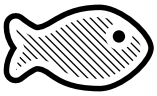
Page 7: When sewage or other pollutants get into our streams and Harbor, it's important to find the source. Government and nonprofits have tools and technology to help them find and eliminate sources of pollution.

Restoration Projects

Page 10: When fields and forests are replaced with pavement and structures, the ground loses its ability to slow down and filter rainwater. Restoring natural land cover with rain gardens, trees and native plants means that the ground can slow down and filter rainwater once again.

Litter & Debris

Page 12: Trash in our streams and Harbor is harmful to birds, fish and crabs who might mistake it for food. Dirty streets and alleys make our communities unsightly. Some common sources of litter are trashcans and recycling bins without lids, illegal dumping and trash bags being ripped open by animals.



Ecosystem Health

Page 14: Scientists at Blue Water Baltimore monitor eight different water quality indicators at 49 sites throughout Baltimore's streams and Harbor to determine how healthy they are for fish and other aquatic life.

Boots on the Ground

This year's report highlights some of the amazing individuals who have been rolling up their sleeves and getting to work on projects and programs that help clean up our waterways.

The Jones Falls floods at Meadow Mill, May 2018.

Photo credit: Kalani Gordon Priest/Baltimore Sun

Fecal Bacteria

IMPROVED BACTERIA SCORES HOLD STEADY DESPITE RECORD RAINFALL

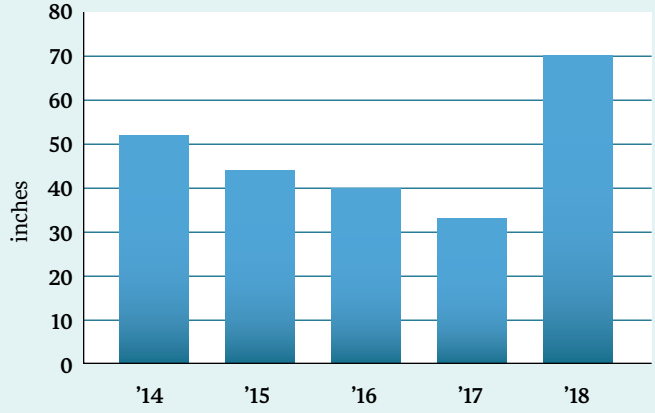
In 2018 the volume of sewer overflows in Baltimore made headlines, as the region endured its wettest year on record. Baltimore received a total of 71 inches of rain (29 inches more than average). When all of that rain seeped into city and county sanitary sewer pipes, the system could not handle the additional flow causing it to discharge into streams and the Harbor. The Maryland Department of the Environment estimates 260 million gallons of rainwater mixed with sewage spilled into city and county waterways in 2018, compared to 20 million gallons in 2017.

Fortunately, data collected by water quality experts did not indicate a spike in bacteria levels in 2018. Scientists at Blue Water Baltimore monitor levels of fecal bacteria at 49 sites throughout the city and county (see pages 4 and 5). In 2017 fecal bacteria scores had improved dramatically across the Harbor and streams in the Jones Falls and Gwynns Falls watersheds. Despite the high volume of sewer overflows in 2018, bacteria scores for the streams have remained relatively high for the second year in a row.

The Baltimore Harbor also scored well for fecal bacteria for a second year, but this result should be interpreted with caution. Frequent bad weather prevented the Blue Water Baltimore team from sampling during the wettest days. Therefore, the fecal bacteria data only represent conditions during dry weather rather than the entire swimming season. Experts are not certain why bacteria scores remained steady given the overflows, but some think the large quantity of rain may have significantly diluted the stormwater and sewage.

The State of Maryland does not recommend swimming in any body of water during or within 48 hours of a rain event, so from a water recreation perspective, the dry weather data is still encouraging. Also encouraging is the fact that the number of dry weather sewer overflows caused by clogs in the system (from fats, oils, grease and rags) saw no increase in the city and decreased by a third in the county compared to 2017.

BALTIMORE CITY ANNUAL TOTAL RAINFALL



Source: Weather.gov

Photo Credit: Vasiliki Photography

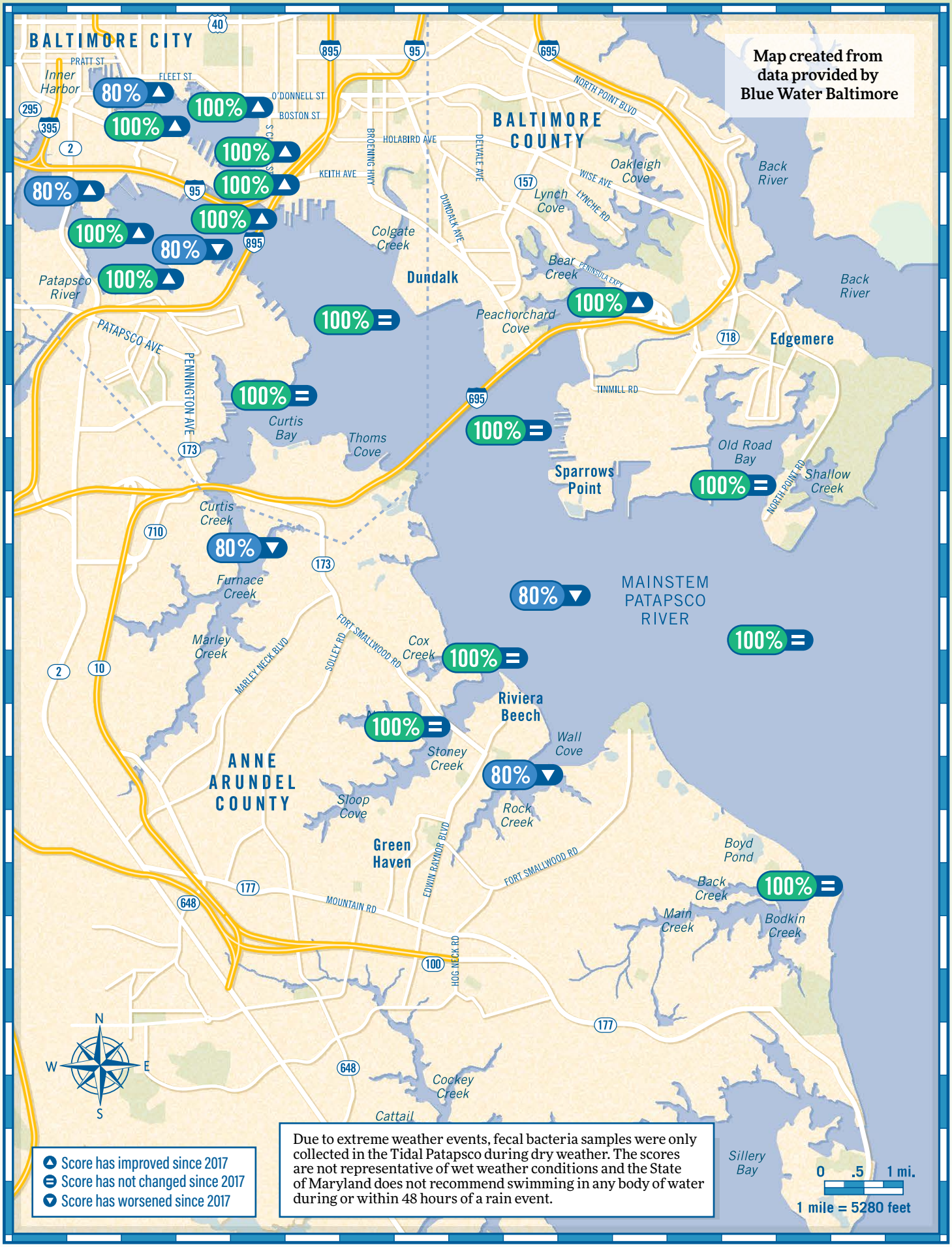
Percentage of Samples That Met the Fecal Bacteria Standard for Swimming

Baltimore Streams: May - September 2018

To see the data behind the scores visit *BaltimoreWaterWatch.org*

Percentage of Samples That Met the Fecal Bacteria Standard for Swimming

Tidal Patapsco: May - September 2018



To see the data behind the scores visit *BaltimoreWaterWatch.org*

Scores calculated by Waterfront Partnership of Baltimore based on data provided by Blue Water Baltimore.

Photo Credit: Baltimore City DPW

Sewer Repairs

MAKING HEADWAY ON THE HEADWORKS PROJECT

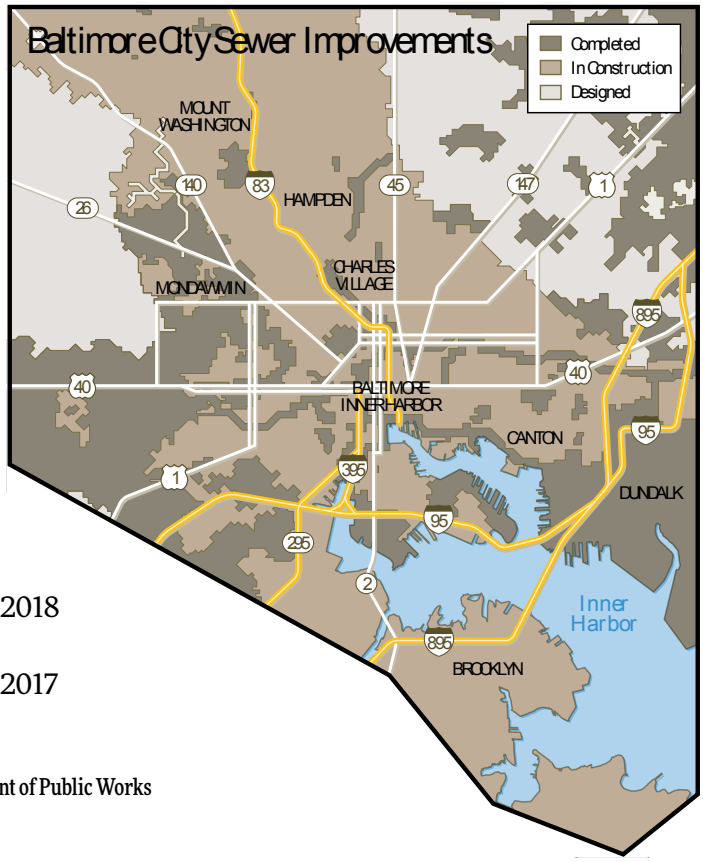
Every commuter knows the golden eggs visible from Interstate 695, just east of the city. They are anaerobic digesters, part of the Back River wastewater treatment plant that treats sewage from the city and the county. The plant may be in the county, but it has a big impact on water quality in the city too. That's because a 12-foot diameter pipe carrying sewage from the city to the plant is misaligned, causing a daily ten-mile sewage back up beneath the streets of East Baltimore. That means less room in the pipe which, in 2018, resulted in over 700 reported city sewer overflows.

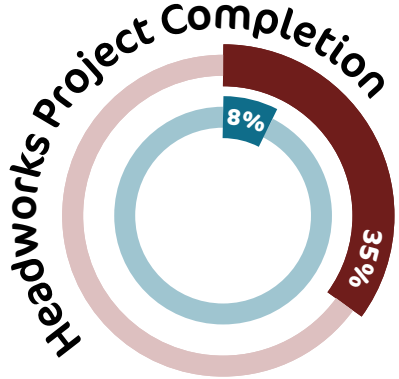
To fix this problem, state and city officials broke ground on a $430 million improvement project in 2017. That project, known as the Headworks Project, is now 35% complete and on schedule to be finished in 2020. Engineers at the Baltimore City Department of Public Works estimate that this one repair will reduce annual sewer overflow volume by 83%.

The massive project is now a 45-acre construction zone with 41,500 cubic yards of concrete, a new pumping station and tanks that will increase the plant's capacity from 469 million gallons of sewage per day to 600. The project is part of a legal consent decree between the Maryland Department of the Environment and the U.S. Environmental Protection Agency requiring the city to spend $1.6 billion on sewer repairs by 2030.

Construction of the Headworks Project at the Back River Waste Water Treatment Plant

Photo credit: Baltimore City Department of Public Works





Completion as of 2018

Completion as of 2017

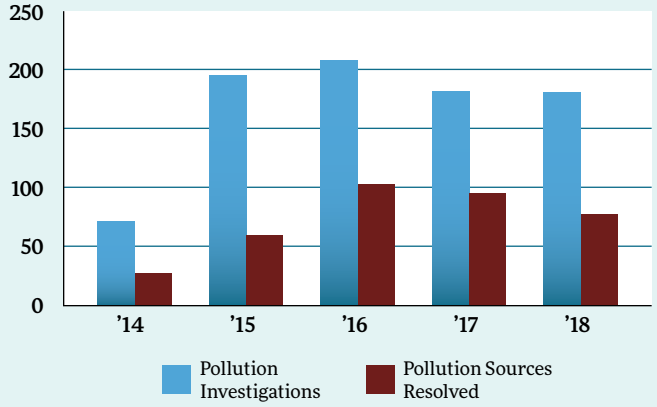
Source: Baltimore City Department of Public Works

Pollution Tracking

Photo Credit: Casey Merbler

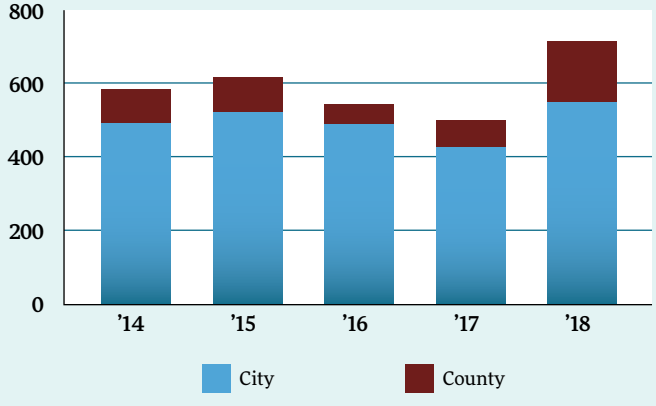
Matthew Cherigo is a Pollution Control Analyst for the Baltimore City Department of Public Works. He works in the fields and streams of Baltimore checking to see where sewage might be leaking into the stormwater pipes so that the city can make repairs. In 2018, Pollution Control Analysts conducted 180 pollution source investigations resulting in 79 repairs.

BALTIMORE CITY POLLUTION SOURCE INVESTIGATIONS



Source: Baltimore City Department of Public Works

BALTIMORE CITY & COUNTY NUMBER OF REPORTED SEWER OVERFLOWS



Source: Maryland Department of the Environment

Boots on the Ground

Photo Credit: Casey Merbler

Alex Smith, Director of Operations for the Baltimore Tree Trust, is doing his part to help Baltimore double its tree canopy. Trees help to filter pollution, increase home values and reduce urban heat island effect. Alex also manages the Urban Roots Apprenticeship program, which helps connect Baltimore residents with green jobs in the city.

Photo Credit: Maribeth Teller

Robert Teller volunteers as a member of the Greater Patapsco Community Association in Baltimore County. He organizes litter cleanups and enthusiastically promotes water quality awareness. He also formed a Small Watershed Community Committee that plans to monitor water quality in the Patapsco River.

Pamela Kendall, a resident of Baltimore's Milton-Montford neighborhood, pulled together her neighbors to participate in a Green Stoop Challenge event and plant native species that provide habitat and filter rain water. Artist **Derek Pulse** helped complete the transformation with a series of beautiful murals.

Photo Credit: Adam Lindquist

Rocky Brown, President of the Bocek-Madison Eastend Community Association and a Friends of Library Square Green Steward, routinely hosts cleanups for neighborhood parks and rain gardens with help from dozens of youth who affectionately call him "Mr. Bocek." Together they have enrolled three blocks in the Green Stoop Challenge and were recently awarded a BMORE Beautiful grant to purchase a riding lawnmower for park maintenance.

Photo Credit: Leanna Wetmore

Photo Credit: Casey Merbler

Tiffany Kim manages the Great Baltimore Oyster Partnership for the Healthy Harbor Initiative. The program is a collaboration with the Chesapeake Bay Foundation and funded in part by the Critical Area Management Program. It engages hundreds of volunteers to grow over 200,000 spat (baby oysters) in the Baltimore Harbor each year.

Restoration Projects

Green Stoop Challenge: In Spring 2019, Waterfront Partnership launched the Green Stoop Challenge, a new program calling on city residents to clean and plant the green spaces near their stoops with native plants and flowers. The native species provide habitat for pollinators, beautify the community and filter polluted runoff that would otherwise end up in the Harbor.

Project partners will be helping residents in five East Baltimore neighborhoods plant 450 tree wells with over 6,000 native plants and new trees provided by the Baltimore Tree Trust. The project is funded by a grant from the National Fish and Wildlife Foundation.

Every tree counts, so count every tree: The city of Baltimore has inventoried every tree on city streets and in city parks and put this information into a new online mapping database. The data collection process, managed by TreeBaltimore, took two years and shows the total quantity, spatial distribution and composition of all trees in city-managed spaces.

Data was collected for 122,011 trees, 5,168 stumps and 39,976 vacant sites where trees can be planted. The data also revealed 21,697 sites where a tree well could be added for future planting.

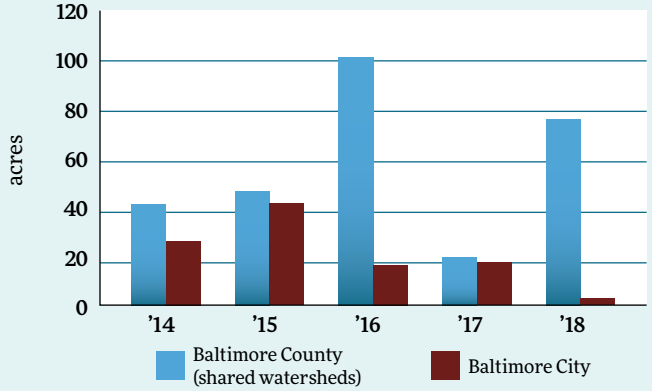
The Baltimore Tree Inventory map allows users to search, view and download tree data and will be updated on a regular basis. It is available to the public and can be accessed by computer or mobile device by visiting TreeBaltimore.org

Oysters reproducing in the Patapsco: In December 2018, a survey of the Fort Carroll oyster reef found new oyster spat (baby oysters) living on the reef. The man-made reef, located near the Francis Scott Key Bridge in the Patapsco River, has been seeded with juvenile oysters by the Great Baltimore Oyster Partnership since 2014. The restoration effort is a joint venture by the Healthy Harbor Initiative, the Chesapeake Bay Foundation, the Maryland Port Administration and Maryland Environmental Services.

The survey looked at 900 oysters from the reef and found two spat. While that may not sound like a lot, it's important because scientists were initially unsure if oysters would reproduce at all due to the amount of fresh water that flows into the Patapsco River from Baltimore and the surrounding counties. The new theory is that denser, saltier water from a nearby shipping channel may be having a positive impact on oyster reproduction on the reef.

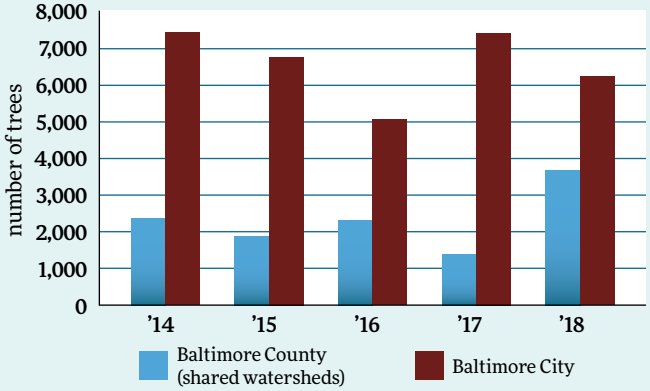
The Great Baltimore Oyster Partnership plans to plant a total of 5 million oysters by 2020. To get involved, visit HealthyHarbor.org

ACRES OF LAND IMPROVED BY RESTORATION PROJECTS



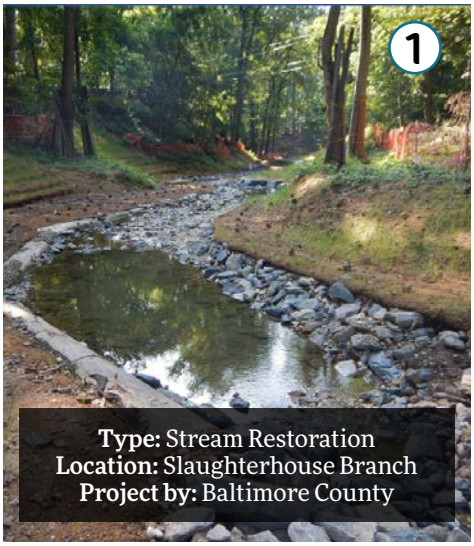
Source: Baltimore City, Baltimore County, Blue Water Baltimore, Civic Works, Parks & People Foundation

TREES PLANTED

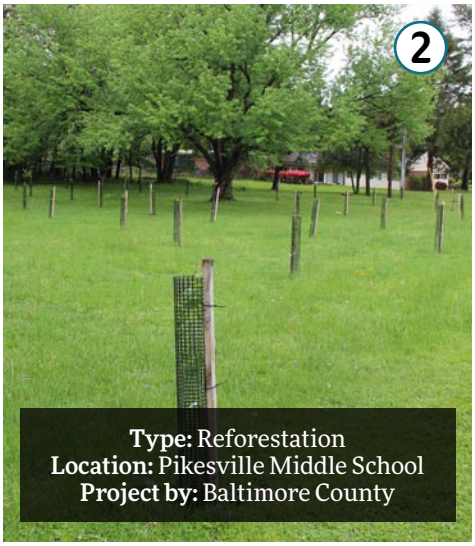


Source: Baltimore City, Baltimore County, Blue Water Baltimore, Civic Works, Parks & People Foundation, Baltimore Tree Trust, TreeBaltimore

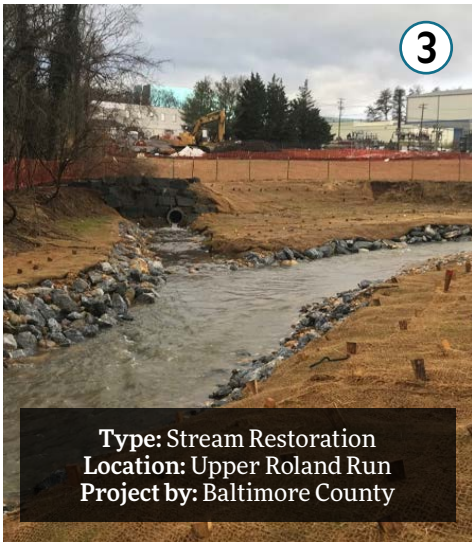
2018 BALTIMORE RESTORATION PROJECT HIGHLIGHTS



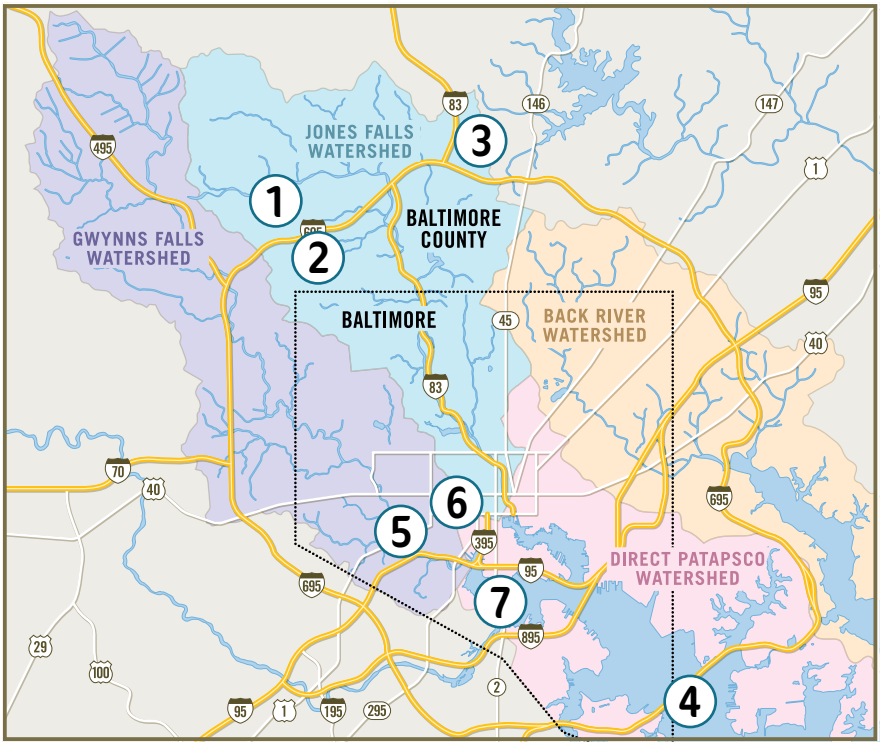
Type: Stream Restoration
Location: Slaughterhouse Branch
Project by: Baltimore County

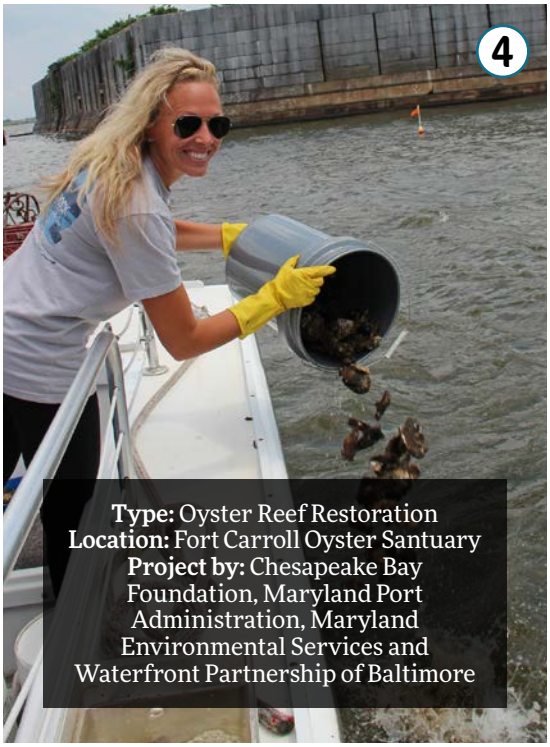


Type: Reforestation
Location: Pikesville Middle School
Project by: Baltimore County

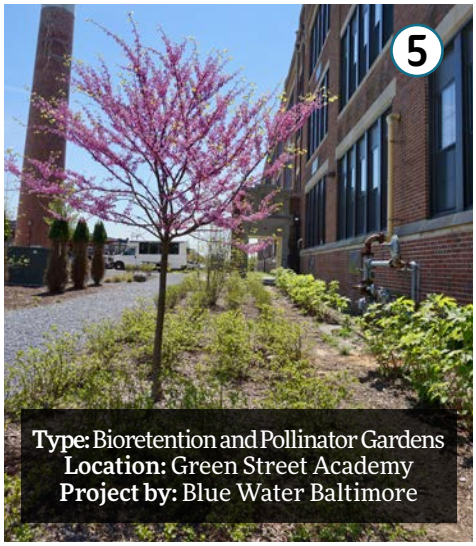


Type: Stream Restoration
Location: Upper Roland Run
Project by: Baltimore County

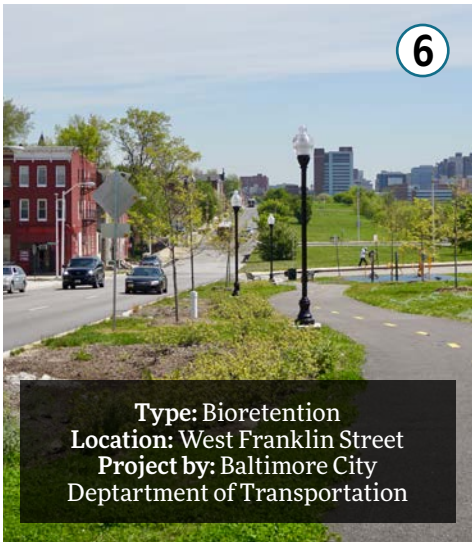




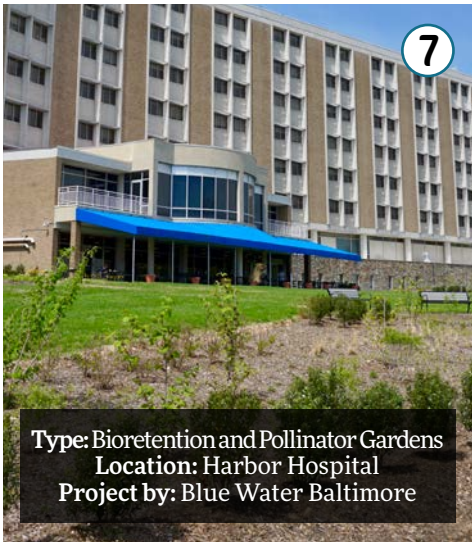
Type: Oyster Reef Restoration
Location: Fort Carroll Oyster Santuary
Project by: Chesapeake Bay Foundation, Maryland Port Administration, Maryland Environmental Services and Waterfront Partnership of Baltimore



Type: Bioretention and Pollinator Gardens
Location: Green Street Academy
Project by: Blue Water Baltimore



Type: Bioretention
Location: West Franklin Street
Project by: Baltimore City Deptartment of Transportation



Type: Bioretention and Pollinator Gardens
Location: Harbor Hospital
Project by: Blue Water Baltimore

Litter & Debris

Photo Credit: Max Franz

Maryland State Delegate Brooke Lierman was the primary sponsor of a bill to ban expanded polystyrene foam food containers across the state.

Photo Credit: Casey Merbler

Cy Appleby-Kellett is part of the team at Clearwater Mills, the company that invented Baltimore's famous Mr. Trash Wheel. In 2018, Cy helped the Mr. Trash Wheel family remove 363 tons of trash and debris from the Baltimore Harbor.

Volunteers with Volunteering Untapped count 2,400 foam containers found in a single trash wheel dumpster.

Photo credit: Adam Lindquist

Captain Trash Wheel, Baltimore's third trash wheel, was installed by the Maryland Port Administration at the Masonville Cove Environmental Education Center in June, 2018.

Photo credit: Casey Merbler

A SEA CHANGE FOR FOAM CONTAINERS

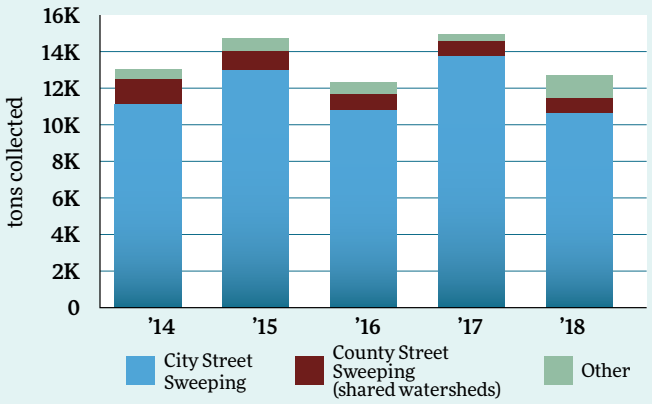
The tide is turning on single-use plastics as 2019 shapes up to be a year of milestones in Baltimore's fight for a cleaner environment. The city's ban on polystyrene containers – better known as Styrofoam – passed during the 2018 legislative session and goes into effect in October. Spurred by this and similar successes in other districts, Delegate Brooke Lierman from Baltimore City and Senator Cheryl Kagan of Montgomery County led support for a bill to ban disposable polystyrene containers and cups statewide.

Thanks to the multi-year efforts of the Baltimore Sustainability Commission, Trash Free Maryland, the League of Conservation Voters, the Sierra Club, the Waterfront Partnership and Baltimore Beyond Plastic, the bill passed the General Assembly with supermajorities in both the House of Delegates and the Senate. Members of the youth-led Baltimore Beyond Plastic met with state representatives and testified in Annapolis. Waterfront Partnership supported the bill with information collected by the Mr. Trash Wheel family, who have collectively prevented over one million foam containers from polluting the Baltimore Harbor and Atlantic Ocean.

This spring over one hundred trash wheel fans volunteered to dive into a trash wheel dumpster and find out what kind of garbage is making its way into the Harbor. Volunteers counted an estimated 2,400 polystyrene containers, 2,800 containers made of other plastics, 1,500 plastic bottles, and 14,000 food wrappers, among other trash. In June 2018, the Maryland Port Administration installed Baltimore's third Trash Wheel, known as Captain Trash Wheel, and Waterfront Partnership is currently raising funds to build a fourth device at the mouth of the Gwynns Falls in the Middle Branch of the Baltimore Harbor.

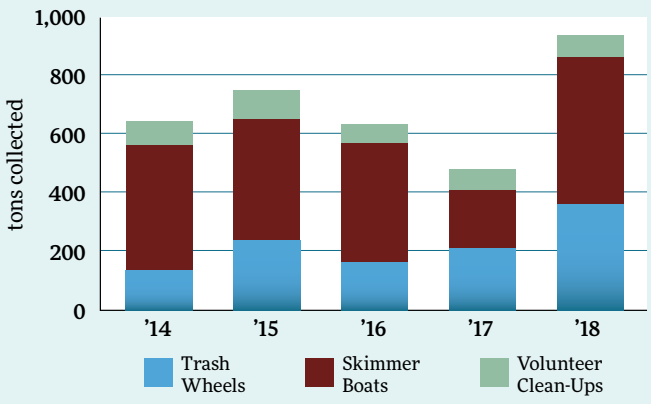
Of course, the best scenario would be a world in which trash interceptors aren't needed because society has greatly reduced its reliance on single-use plastics like straws, plastic bags and, of course, foam containers.

BALTIMORE CITY AND COUNTY TOTAL LITTER AND DEBRIS COLLECTION

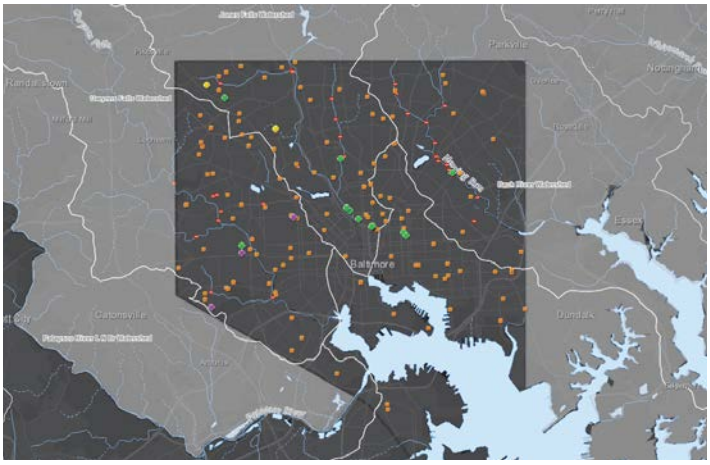


Source: Baltimore City, Baltimore County, Waterfront Partnership, Blue Water Baltimore, Parks & People Foundation, National Aquarium, South Baltimore Partnership

BALTIMORE CITY AND COUNTY TOTAL LITTER AND DEBRIS COLLECTION (OTHER THAN STREET SWEEPING)



Source: Baltimore City, Waterfront Partnership, Blue Water Baltimore, Parks & People Foundation, National Aquarium, South Baltimore Partnership



BALTIMORE'S INTERACTIVE SEWAGE OVERFLOW MAP

With the Baltimore City Department of Public Works' new interactive map, information on sanitary sewer overflows is now posted as soon as it is known. There is no waiting for press releases or social media updates to obtain this important public health information.

The online map provides information on just-confirmed sewer overflows and continues to display information for up to four months. The website uses near real-time data to let the public know about sewer overflows in Baltimore City and is available on the DPW website: publicworks.baltimorecity.gov.

Ecosystem Health

Blue Water Baltimore is home to the Baltimore Harbor Waterkeeper whose team of scientists collect rigorous water quality data in Baltimore's streams and Harbor throughout the year. Experts at Blue Water Baltimore analyze the data to produce the annual scores displayed here. More detailed information about the scores can be found online at BaltimoreWaterWatch.org.

WHAT DO THE WATER QUALITY INDICATORS MEAN?

Chlorophyll α tells us if there is too much algae in the water. Some algae blooms are toxic to fish and harmful to human health. Too much algae can ultimately lead to low dissolved oxygen, which can harm organisms living in Baltimore's waters.

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

Dissolved Oxygen is important for all organisms that live in the water. Fish, shellfish and other life need oxygen to breathe and thrive.

Megan Brosh is a pollution detective for Baltimore County where she loves the challenge of tracking pollution to its source and following up until it's fixed.

Total Nitrogen and **Total Phosphorus** are nutrients that tell us how much stormwater pollution is coming from the land. These nutrients feed naturally-occurring phytoplankton, which can lead to algae blooms. Some common sources of nutrient pollution are fertilizers, sewage, urban stormwater runoff and burning of fossil fuels.

Turbidity and **Water Clarity** are important for fish and plants in the water. The water must be clear enough for fish to see and find their prey, and underwater plants need light to grow. Too much sediment in the water from poor construction practices and stormwater runoff can degrade water clarity.

Top 5 water quality facts in 2018

1. **The Baltimore region experienced the wettest year on record.** 2018 had over 71 inches of rain (29 inches more than average) and Blue Water Baltimore's data show this had complex impacts on water quality.

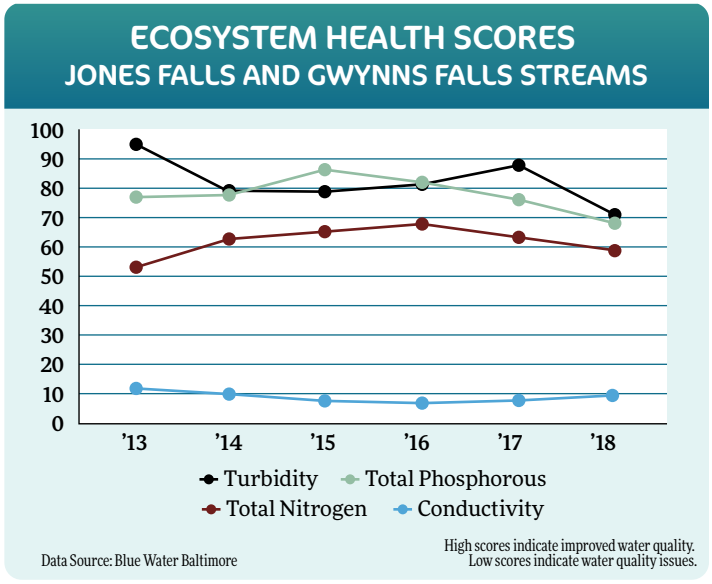
2. **Conductivity scores are still very poor.** This means we need to continue to address over application of road salt, polluted stormwater runoff and uncontrolled sewage overflows. The fact that we continue to have high conductivity levels in our streams even in dry weather indicates that our groundwater may be contaminated, which could take decades to fully restore.

3. **2018 stream scores are similar to 2017.** While overall scores are slightly lower across the board, this is likely due to increased rain causing worse turbidity and phosphorus scores. However, bacteria scores are particularly encouraging because we now have two years of data showing improvement (see pages 4 and 5). We look forward to 2019 to see if this is an actual trend.

4. **Chlorophyll α levels improved dramatically in the Harbor.** Chlorophyll α levels were lower at every sampling station in 2018 meaning there was less algae in the water. Dissolved oxygen levels were also quite good in the Inner Harbor compared to previous years. This is probably due to increased rainfall flushing algae blooms out of the Harbor.

5. **Turbidity scores were significantly worse in the Gwynns Falls.** This is most likely due to increased rainfall and is a concern because other pollutants can cling to sediment - specifically microplastics, pesticides, and toxicants like PCBs - and carry them into the Harbor and Chesapeake Bay. This decline in turbidity scores was not observed in the Jones Falls, but that could be due to the timing of Blue Water Baltimore's sampling.

Photo Credit: Vasiliki Photography



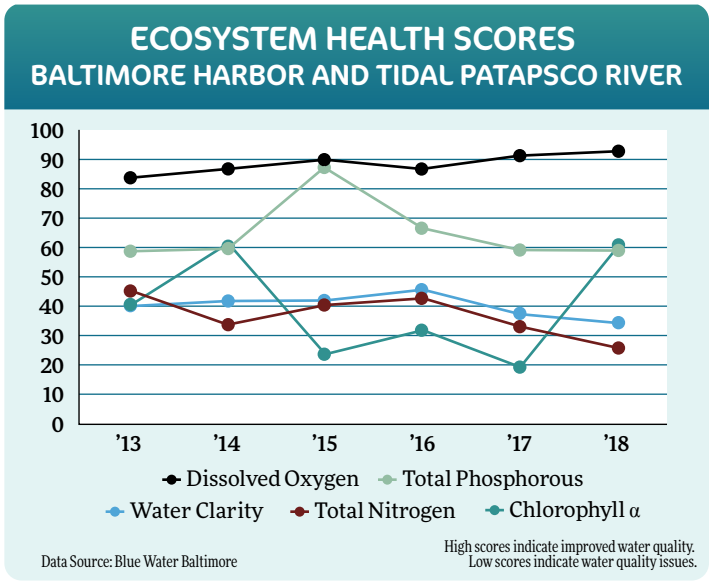


Photo Credit: Leanna Wetmore

Richelle Stills (in pink, left) is a Friends of Library Square Greening Steward and has led a Green Stoop Challenge on her block in Patterson Park with help from a team of students funded by BMORE Beautiful.

In 2018, over 5,500 people volunteered for projects that helped to restore Baltimore's waterways. Were you one of them?

HEALTHY HARBOR

A WATERFRONT PARTNERSHIP INITIATIVE

This report was made possible with input from the following partners:

WATERFRONT PARTNERSHIP OF BALTIMORE

BLUE WATER BALTIMORE

BALTIMORE HARBOR WATERKEEPER
A PROGRAM OF BLUE WATER BALTIMORE

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DIRECTOR

CLEAN GREEN
BALTIMORE COUNTY

PARKS & PEOPLE FOUNDATION

NATIONAL AQUARIUM

Civic Works

CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

TreeBaltimore

Interfaith Partners for the CHESAPEAKE

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Constellation
An Exelon Company

RAUCH FOUNDATION

CBTRUST
Chesapeake Bay Trust

T.RowePrice
INVEST WITH CONFIDENCE

MOM's Organic Market

LEGG MASON
GLOBAL ASSET MANAGEMENT

Clayton Baker Trust

ABELL FOUNDATION

Invest in Baltimore
BCF
BALTIMORE COMMUNITY FOUNDATION

THE CAMPBELL FOUNDATION

Critical Area Commission
Chesapeake and Atlantic Coastal Bays

Morgan Stanley

BGE
An Exelon Company

RK&K

Baltimore Office of Sustainability
People · Planet · Prosperity

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