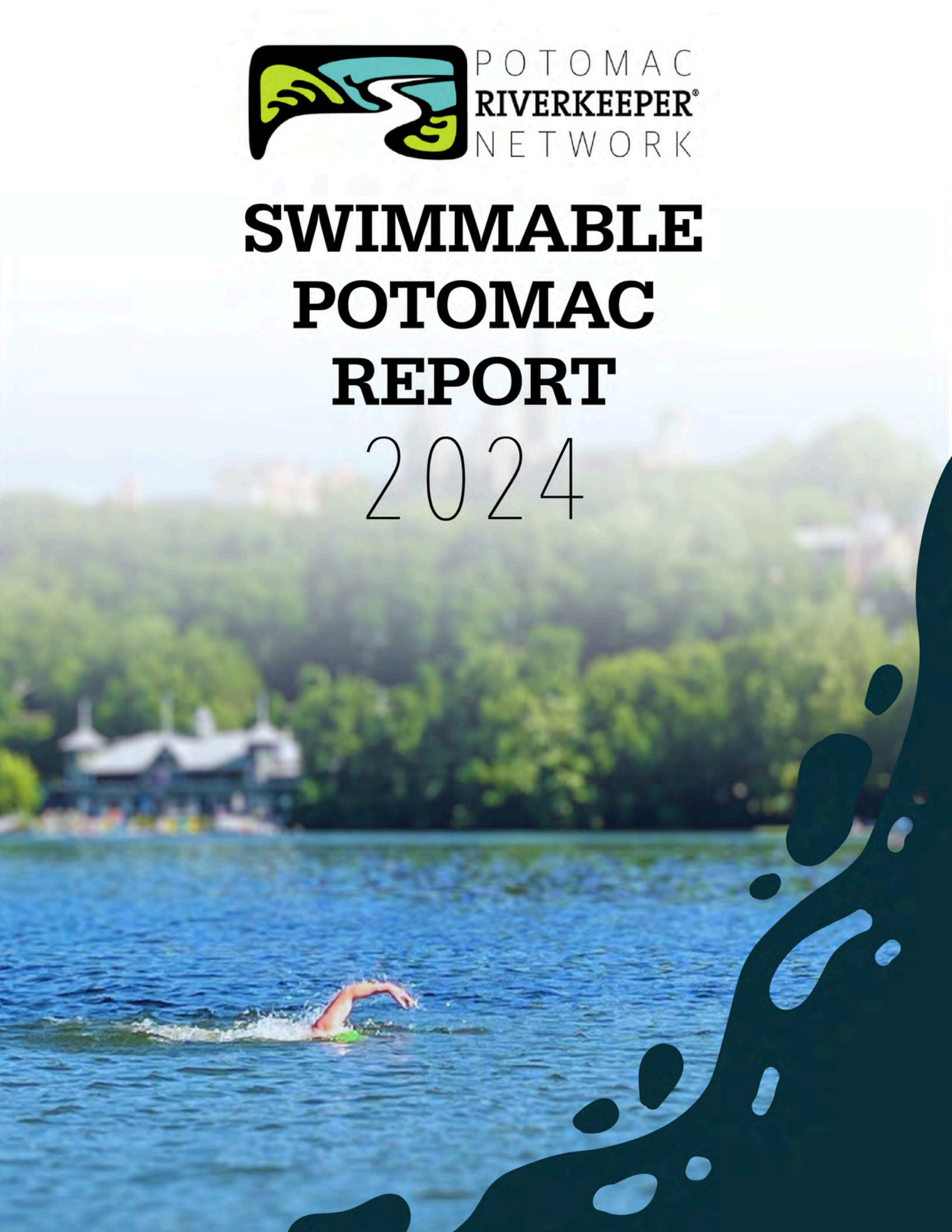
POTOMAC RIVERKEEPER® NETWORK

SWIMMABLE POTOMAC REPORT

2024



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Executive Summary

A Swimmable Potomac – Lets Reclaim a National Treasure

Globally, almost every major city was founded on a river – Beijing, Cairo, Paris, Rome, London, Chicago, New York City – and Washington, DC.

The Potomac, though, despite its beauty and the wildlife it supports, has historically been disparaged and condemned because of its polluted state. In 1971, the District of Columbia banned swimming in the river, just six years after President Lyndon Johnson called the Potomac "a national disgrace" full of "decaying sewage and rotten algae." Fortunately, those days are behind us. From May to October every year for the past five years, we have conducted weekly collection and testing of water samples from the river, with the goal of showing when and where contact with the water is safe. Our data show that contact with the water is safe for human contact on average across those sites more than 70% of the time across a five year average.

Dean Naujoks, the Potomac Riverkeeper, spends innumerable hours each week patrolling the river, and in 2019, he launched PRKN's Community Scientist Water Quality Monitoring Program. With nine initial locations and a cadre of volunteer scientists rigorously trained in the requirements of sample collection, Dean was able to establish a Tier III water testing laboratory aboard the Sea Dog, a Chesapeake deadrise boat donated to PRKN by retired Admiral Paul Reason and moored at National Harbor. The program has grown to the point that now there are 30 sampling locations along the Potomac.

Tier III labs are rigorous; their data is viewed as reliable by regulatory bodies throughout the region. With five years of data showing that human contact with the river was safe most of the time, we went to officials at the District's Department of Energy and the Environment (DOEE) to ask them to work with us to lift the ban on swimming in DC.

Our advocacy is leading to success: DOEE has publicly supported the goal of removing the swim ban — though it won't be immediate, as officials want to conduct their own testing on a more frequent basis than our resources permit.

Moreover, thanks to leadership by Rep. Eleanor Holmes Norton, Congress has passed legislation to require - and has approved initial funding for - the Army Corps of Engineers to identify safe swimming locations in Washington, DC.

And after many years of advocacy by the Potomac Riverkeeper and other local allies, DC Water has started building tunnels along the Potomac to capture and treat the stormwater and sewage mix that currently overwhelms D.C.'s sewage treatment system during periods of heavy rain, triggering untold overflows of raw sewage into the Potomac River and Rock Creek. We have already seen the tremendous progress that such tunnels have made in the Anacostia River's water quality.

Potomac Riverkeeper Network has a unique approach among local environmental groups. Many of them advocate, and many organize at the grassroots level to clean up the rivers and banks. We do both those things. But we also use the most current scientific methods to investigate and assess water quality to demand that those responsible for maintaining water quality standards do the hard work to make the right decisions and to implement them. And when advocacy alone is insufficient, we bring enforcement actions to hold polluters accountable.

Our dedication to enforcement is a key feature of our campaign. One example: Alexandria has for decades allowed coal tar residue from a long-shuttered industrial site, owned by the city, to seep into the Potomac near Founders Park. We urged city officials to remediate the pollution, but after several years of them dragging their feet, we told them, "Fix it or we sue". And sue we did. As a result, Alexandria finally agreed to a real solution which will clean up the source of the coal tar residue and the river will be better for it. Those from the community who use the park for recreational access will have even more opportunities in the future, thanks to this development.

We support swimming in the Potomac where and when water quality allows. The District of Columbia Aquatics Club and Wave One are two notable examples of local organizations devoted to open water swimming, and we stand with them – we do the necessary preliminary water testing to assure safety, provide volunteers to paddle watercraft for the safety of the swimmers, and join in the fun ourselves.

Paradoxically, other watersports that often involve full immersion in the river, like paddle boarding and whitewater kayaking, are permitted under the statute.

The current state of the law also represents a preference for those with means. Our Nation's River is accessible to only those residents with the income and time to own watercraft – others who want to enjoy the water can reach no farther than its edge. From 1918-1925, up to 20,000 people per day swam in the Tidal Basin, and there were bath houses and diving platforms to support them. Early efforts to create a beach for people of color resulted in its closure by a bigoted Congress – and pollution did the rest.

Swimming in the Potomac is no longer prohibited due to racial bias, but the reluctance of some politicians, regulators and residents to consider the river as it is now, and not as it was decades ago, is still restricting all DC residents from being able to swim from its shores. We want safe swimming beaches and designated swimming locations so that DC's population can fully enjoy their iconic waterway.

Everyone has a right to clean water. DC should protect the public's right to swim in the Potomac River.

Why We Care

Why do we monitor water quality?

We are committed to making the Potomac swimmable again - and this requires a two-pronged strategy. First,we need to improve the cleanliness of the water, which we have been working on for over twenty years — though some days there is too much bacteria in the water to allow for safe swimming. Second, we work with authorities in the District of Columbia to lift the ban on swimming and to create public swimming beaches.

Thanks to amazing volunteers who run our Water Quality Monitoring Program, we sample weekly to test for bacteria, water and air temperatures, turbidity, and pH. See “Field Methods”, p. 15 for explanations of the specifics and more details - all of which affect the safety of contact with the water. We are pleased that this year’s overall pass rate was 70%. That’s a decrease from 2021’s 76%, but we attribute that to two factors: One, we’re sampling at more sites, including several where water quality is more problematic because of their proximity to sewage outflows. And two, climate change has brought an increase in frequency and intensity of intense rain events, which result in more sewage overflows, more stormwater pollution, and an increase in water temperature which promotes the growth of bacteria.

A Quick Summary By The Numbers

The pass rate for all sites in our last 2022 Report was 76% overall and was a three year average covering 2019-2021. This year's, for data from 2019 - 2023, we had a 71% pass rate for all sites; however, nine new sites, chiefly from the Rock Creek vicinity, contributed heavily to the lower rate; without their inclusion, the overall average rate would have been 80% for 2022. Another climate change feature is the measurable increase in rain events: for 2019-2021, 50% of sampling was within 48 hours of sampling; for 2022, rain events had jumped to 60% 48 hours prior to sampling.

We share our weekly results publicly on SwimGuide.org and the Chesapeake Monitoring Cooperative's website - that way, the public can see in nearly real time where and when contact is safe. In addition, colleagues in the Chesapeake Bay can use our data to help restore the Bay.

We make the annual results available to decision makers throughout our region. They are able to rely on the results because of the rigorous Tier III requirements and protocols we follow in the collection and testing process. And we urge the regulators to take action where it is required to stop the pollution that still makes swimming unsafe at times. It is our goal to have safe swimming almost every day of the year.

This advocacy extends particularly to the District of Columbia, the only local jurisdiction with a decades-old, and now unnecessary, ban on swimming. We continue to have productive - if slow-moving - conversations with DC's Department of Energy and Environment about lifting the swim ban. They share our goal but insist that more frequent testing - which they cannot afford - is necessary. Thus, we ask all DC residents to contact the Mayor and City Council to allocate the funds required for this project.

Thanks also to our advocacy, our friend on Capitol Hill, Rep. Eleanor Holmes Norton, was instrumental in getting a bill passed into law that directs the US Army Corps of Engineers to study the feasibility of swimming beaches in the District. To date, the Corps has yet to start this study. And so we also call on all residents to voice their support and insist that the Corps act - and act now.

We can have safe swimming in the Potomac River. We can make it happen - with your help.

About Potomac Riverkeeper Network

The Potomac River is the second largest tributary of the Chesapeake Bay, with a watershed encompassing more than 14,000 square miles. Connecting 4 different states and the District of Columbia, the Potomac River and its tributaries are as diverse as the 6 million people who call the watershed home. From the scenic fresh water trout streams of the Shenandoah and thundering white water of Great Falls, all the way down to the tidal brackish waters where the river connects to the Chesapeake Bay, this incredible natural resource deserves our protection and reverence.

For over two decades, the Potomac Riverkeeper Network (PRKN) has been steadfast in its mission to stop pollution and restore clean water in the Potomac and Shenandoah Rivers and their tributaries. Our commitment is unwavering, and our track record speaks volumes. Since our founding in 2000, we've emerged as a formidable force in the watershed, employing a comprehensive approach that combines community engagement, assessment, advocacy, and enforcement to protect these vital waterways.

When the Potomac Riverkeeper was founded, the need for a dedicated advocacy group to safeguard clean water became evident. The watershed demanded grassroots advocacy and legal action. Since 2003, the addition of Riverkeepers for the Shenandoah River in 2005 and the Upper Potomac in 2009 marked significant growth. In 2014, the organization expanded to become the Potomac Riverkeeper Network, reflecting our broader reach and influence. Our three PRKN Riverkeepers are not just experts; they are champions of the watershed. Their in-depth knowledge and strong local connections have been instrumental in holding polluters accountable. By enforcing the federal Clean Water Act and state and local clean water laws, we've secured multiple legal victories protecting and restoring clean water throughout the watershed, and establishing our organizations presence as the voice of our rivers.

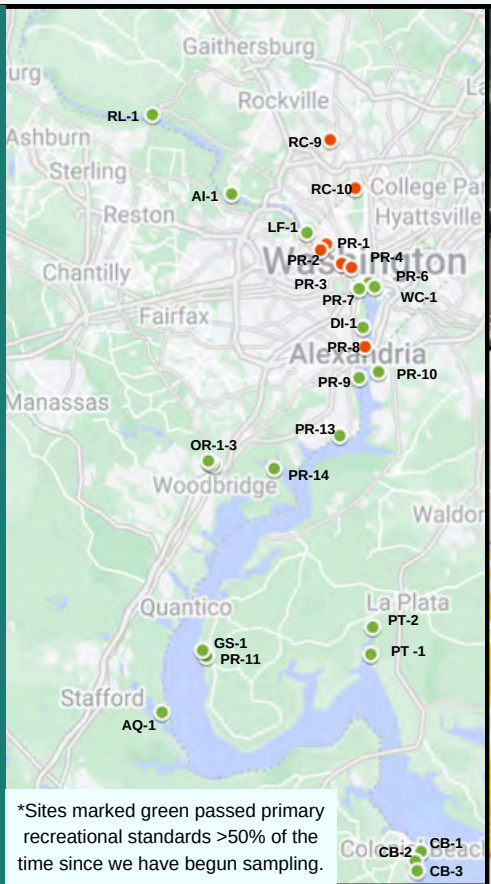
Community Science Water Quality Monitoring Program

Through the generous support of our many sponsors and the hard work of over 80 dedicated volunteers, our Water Quality Monitoring program is now in its fifth sampling year. Started in 2019, our program provides up-to-date weekly water quality data during the recreational season to residents and visitors alike, with a primary focus on reporting bacterial levels in the river. With thousands of people interacting with and recreating on the Potomac and its tributaries each year, it is essential for the public to have current information about the water quality that may directly affect their well-being and health.

Every Wednesday morning from May-September, our volunteers collect water samples at our sites along the DC, Maryland & Virginia waterfront and transport them to our state certified floating laboratory, Sea Dog - a 42-foot Chesapeake Deadrise berthed at National Harbor in Oxon Hill, MD. Our vessel was generously donated to the organization in 2019 by retired Navy Admiral J. Paul Reason and his wife, Dianne. Sea Dog is outfitted with an onboard laboratory that uses the IDEXX Colilert system, which allows us to directly and quickly analyze our own samples. We monitor turbidity, pH and e.coli levels at all of our sites, along with noting water temperature, air temperature, rainfall, tides, and other observational indicators of water health. This information is then uploaded and made publicly available every Friday during our sampling season through the Chesapeake Monitoring Collective, the SwimGuide app, and PRKN's social media - just in time for weekend recreation!

LOWER POTOMAC SITE LIST

RL -1 - Riley's Locke
AI - 1 - Old Anglers Inn
LF -1 Little Falls Take Out
RC - 9 - Rock Creek - Josephs Branch
RC - 10 - Rock Creek - Boundary Bridge
PR - 1 - Battery Kemble Creek
PR - 2 - Fletchers Boat House
PR - 3 - Fletchers Boat House
PR - 4 - Washington Canoe Club
PR - 5 - Thompson Boat Center
PR - 6 - Tidal Basin
WC - 1 - Washington Channel
PR - 7 - Columbia Island Marina
DI - 1 - Daingerfield Island Marina
PR - 8 - Oronoco Bay
PR - 9 - Belle Haven Marina
PR - 10 - National Harbor
PR - 13 - Little Hunting Creek
PR - 14 - Pohick Bay
OR - 1 - Occoquan Boat Ramp
OR - 2 - Occoquan Kayak Launch
OR - 3 - Occoquan Mill
PR - 11 - Mallows Bay Dock
GS - 1 - Mallows Bay - Gradys Spit
AQ - 1 - Aquia Creek
PT - 1 - Port Tobacco - Chapel Point
PT - 2 - Port Tobacco Shirley Boulevard
CB - 1 - Colonial Beach - Town Pier
CB - 2 - Colonial Beach - Yacht Center
CB - 3 - Colonial Beach - Monroe Bay Campground



*Sites marked green passed primary recreational standards >50% of the time since we have begun sampling.

Since the launch of our Community Science Water Quality Monitoring Program in 2019, our program has undergone significant expansion and has become an incredibly valuable public resource, notifying the public of when and where it is safe to recreate on the river. We now monitor 30 sites along the river and have over 100 trained volunteers involved in the program. The results of our bacterial monitoring, which we release to the public via The Swim Guide - a free smartphone app & website, allows us to accurately inform the public when and where the river is clean enough to participate in direct-contact recreation. According to our five years worth of data, the sites we monitor are usually safe for recreation, passing public-health based water quality standards 71 percent of the time.

Over the past 5 years, DMV residents have checked our data on SwimGuide more than 100,000 times. The sheer number of folks who are checking our water quality data reflects just how many people are already recreating along the Potomac and need accurate notification of the water quality to protect their health. While the public use of the SwimGuide app is a good start, we hope that Maryland, DC, & Virginia will enhance our efforts with improved public notification about water quality. Other cities throughout the United States already have public notification programs. For example, in 2012, New York passed the Sewage Pollution Right to Know Act, making public reporting about unsafe water conditions nearly as routine as severe weather warnings. The law requires public wastewater treatment plants to provide a notification of any raw or partially-treated sewage release within two hours of the release to the Department of Environmental Conservation and within four hours of the release to the public. The technology to inform the public of when it is safe to recreate on the Nation's river is already available. Now is the time for lawmakers in Maryland, DC & Virginia to step up to the plate and work to protect the public's health and right to clean water by requiring better notification of water quality.

In addition to better public notification, our data proves it is also time for lawmakers to remove the outdated swim ban that was put into effect in DC waters in 1971, when the river was plagued with sewage and toxic chemicals. The passing of the Clean Water Act has successfully led to improved water quality, and now many of our DC monitoring sites at public access points are clean enough to swim. We are calling on Mayor Bowser to commit to lifting this DC ban and for DC and the surrounding jurisdictions to allow recreational access along the Potomac River for all.

Our Findings

Bacteria: Bacteria was measured using the Most Probable Number Method (MPN) from 100mL samples, which enumerates the presence of fecal coliform bacteria in our samples. The purpose is to estimate the population density of microorganisms in our test samples. Our sites passed our bacteria standards 71% of the time, with twenty-two of our sites passing more than 50% of the time, and ten of our sites passing more than 90% of the time - indicating safe overall bacteria levels in our sampling region. These sites were Tidal Basin, all Mallows Bay sites, all Occonquan sites, and all Colonial Beach Sites. Our data did identify several bacterial pollution hotspots, Rock Creek - Joseph's Branch, Rock Creek - Boundary Bridge, and Battery Kemble Creek, which only passed our standards 36%, 10%, and 48% of the time respectively.

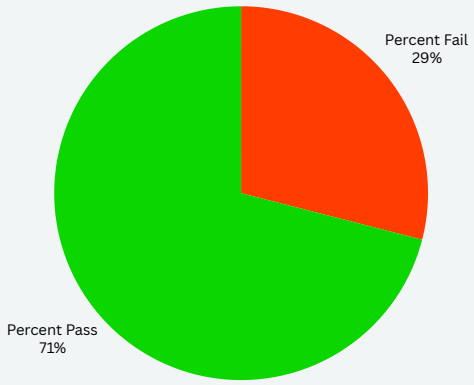


Fig. 1. Pass/Fail percentage for all sites from 2019-2023.

WATER QUALITY MONITORING SITES FROM LOWEST TO HIGHEST LEVELS OF E.COI BY AVERAGE MPN FROM 2019-2023

CB 2 - Colonial Beach - Boathouse Marina - 33.7 MPN
PR 11 - Mallows Bay Dock - 34.1 MPN
CB 1 - Colonial Beach - Town Pier - 32.6 MPN
PR 14 - Pohick Bay - 37.3 MPN
AC 1 - Aqua Creek - 39.3 MPN
PR 10 - National Harbor - 51.5 MPN
OR 2 - Occoquan Kayak Launch - 52.5 MPN
CB 3 - Colonial Bach - Monroe Bay Campground - 61.2 MPN
OR 3 - Occoquan Mill - 65.5 MPN
OR 1 - Occoquan Boat Launch - 90.3 MPN
AI 1 - Old Anglers Inn - 90.5 MPN
GS 1 - Grady's Spit - 102.1 MPN
PR 6 - Tidal Basin - 102.1 MPN
LF 1 - Little Falls Takeout - 113.7 MPN
PR 13 - Little Hunting Creek - 114.3 MPN
PT 1 - Port Tobacco - Chapel Point - 151.9 MPN
WC 1 - Washington Channel - 166.4
DI 1 - Daingerfield Island Marina - 185.0 MPN
PR 9 - Belle Haven Marina - 247.1 MPN
PR 2 - Fletchers Cove - 279.9 MPN
PR 7 - Columbia Island Marina - 285.6 MPN
PR 8 - Oronoco Bay - 394.2 MPN
PR 4 - Washington Canoe Club - 478.3 MPN
PR 5 - Thompsons Boat Center - 509.6 MPN
PT 2 - Port Tobacco - Shirley Boulevard - 539.2 MPN
PR 3 - Foundry Branch - 573.4 MPN
PR 1 - Battery Kemble Creek - 655.1 MPN
RC 9 - Joseph's Branch - 851.1 MPN
RC 10 - Boundary Bridge - 890.2 MPN

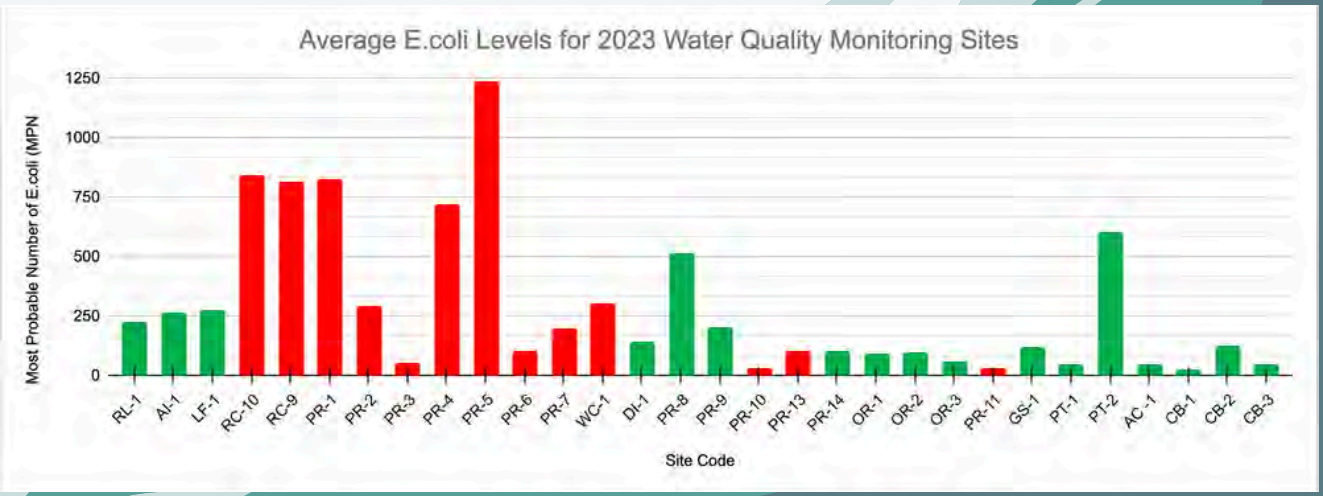
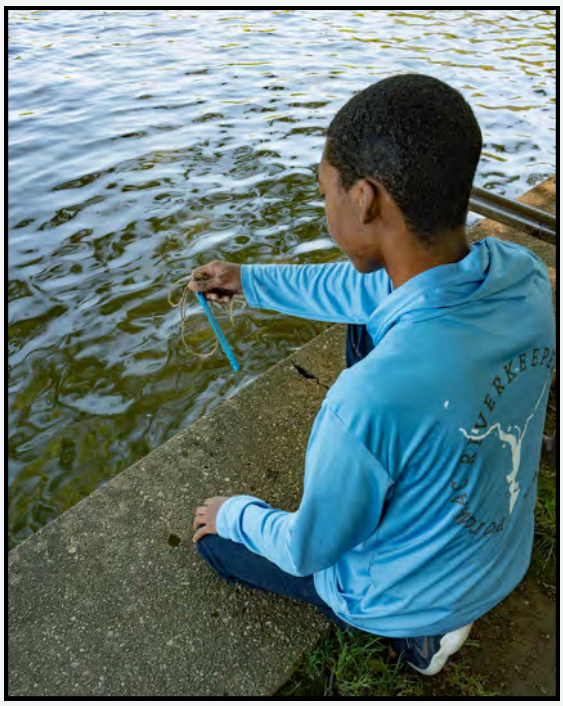


Fig. 2. Average E.coli levels by site for 2023 monitoring season.

Water Temperature: Water temperature is imperative for the wellbeing and proliferation of living organisms. Water temperature can also impact bacteria levels, with higher temperatures allowing for pathogenic bacteria colonies to thrive. Water temperature also impacts the observed levels of dissolved oxygen, with cold water holding more oxygen, which maintains healthy populations of some aquatic life, such as trout. Our water temperature samples were recorded in degrees celsius, and show a normal distribution throughout our sampling seasons, averaging 24.5°C.

Turbidity: Turbidity is meant to measure how far light can penetrate into a body of water. Our samples demonstrated an overall normal distribution, with our samples averaging 14 NTU over the course of the last 5 years. We did have several notable spikes in our turbidity levels, with peaks hitting 32 NTU in 2019, and 22 NTU in 2022. One sample received in 2020 remains an outlier. On September 9th 2020, Foundry Branch turbidity was registered at 1250 NTU's. Whether this spike was due to a pollution incident or collection error is unclear - no other data from this site on this day indicated pollution.



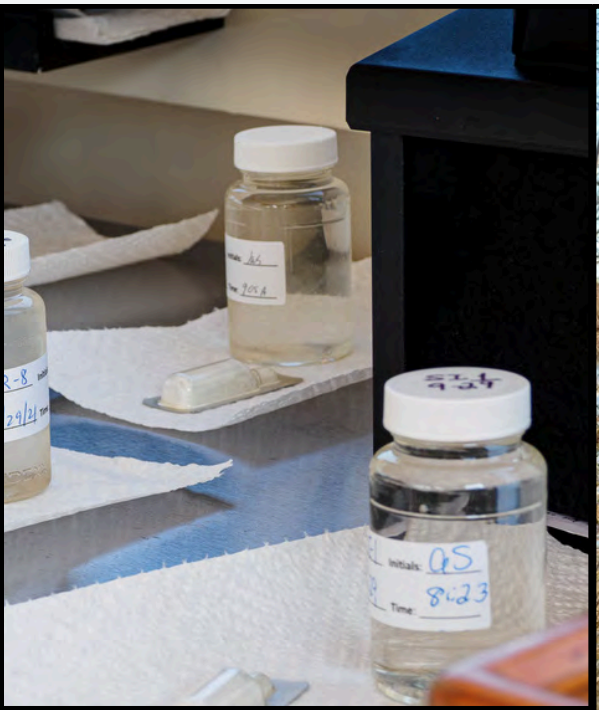
Air Temperature: Air temperature was recorded in degrees celsius and shows a normal trend throughout our sampling seasons. Our data showed an average high temperature of 20°C.

pH: pH is meant to measure the acidity of the sampled water. It is measured on a scale of 0-14 with 7 being neutral. pH is an important indicator of water quality, because it determines the solubility and biological availability of chemical constituents like nutrients and heavy metals. Pollution can directly impact a water's pH, and as a result impact river/stream health. Our sampling over the past three years has shown a consistently neutral pH of 7, with the average pH of our sites not exceeding a level of 8 pH or dropping below 6 pH.

Discussion:

Water Quality indicators provide a basis for understanding and enumerating the health of bodies of water. The Potomac Riverkeeper Network has chosen to target frequently used public access points as our monitoring sites in order to understand the health implications of recreating in these waters. Overall, our water quality monitoring results paint a picture of a healthy Potomac River. While there are still certain sites that require our attention and efforts to improve bacteria pollution - such as Rock Creek - we are seeing that the Potomac is safe for primary contact recreation the majority of the time.

Many of the sites that frequently fail to meet the public health based E.coli standards are impacted by combined or sanitary sewer overflows. Combined sewers overflow when it rains, dumping raw sewage into the Potomac and Rock Creek. These raw sewage discharges have an immediate adverse impact on the safety of swimming in the waterways into which they flow. Often it takes 24-48 hours for the sewage to dissipate. The location of these raw sewage discharges is known and signs mark their discharges points. Sanitary sewer overflows occur when pipes break, leak or back up and discharge through manholes. Sanitary sewer overflows are not planned in advance. They are also illegal under the federal Clean Water Act.

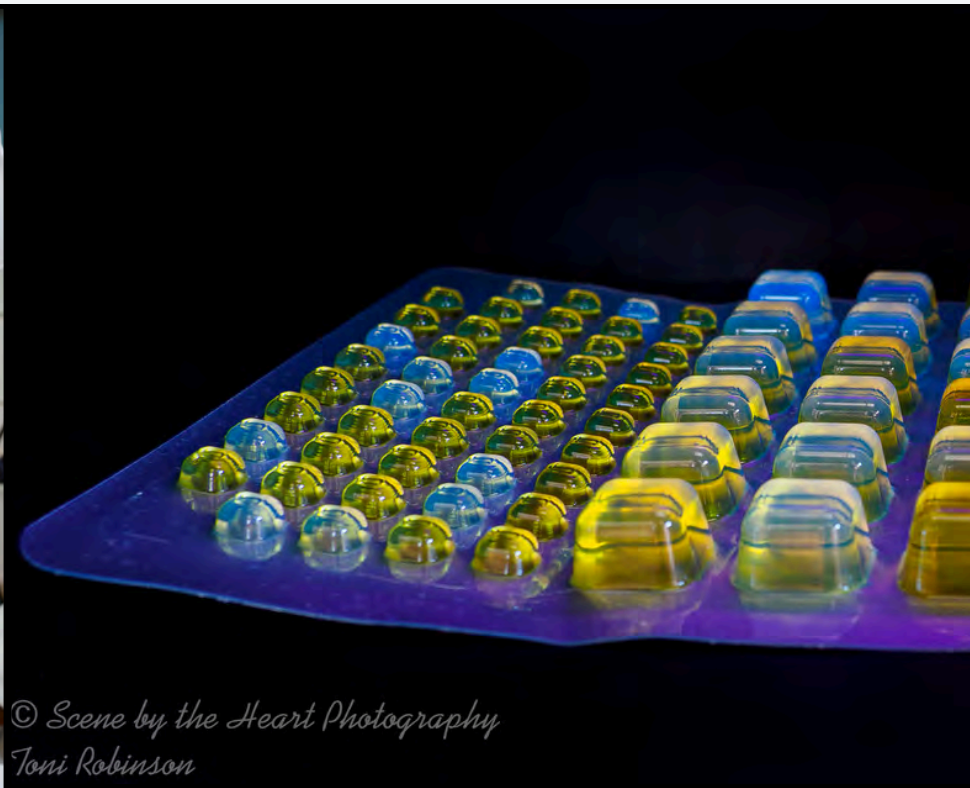


Methodology

Volunteer Recruitment and Training: The Community Science Water Quality Monitoring program was established for the purpose of collecting the data. Volunteers are continually recruited from the District of Columbia, Maryland and Virginia. They are reached through newsletters, press releases, outreach activities including river paddles, members meetings, river clean-ups, and our project data which is shared weekly with the community. The training regimen for this program was developed by the Potomac Riverkeeper with assistance from the Anacostia Riverkeeper, the D.C. Department of Energy and the Environment, the Alliance for the Chesapeake Bay, Friends of the Shenandoah, National Institutes of Health, the Virginia Department of Environmental Quality and other watershed partners. Volunteers are trained through a combination of virtual and onsite training. A Water Quality Monitoring Field and Laboratory Standard Operating Procedures are in place to ensure all water samples collected and analyzed by the PRKN Sea Dog Laboratory are done so following the methods determined by the laboratory equipment manufacturers and Virginia DEQ approved WQM Community Science Program Quality Assurance Project Plan (QAPP). This is imperative for quality control of sample collection, analysis, and documentation. A manual is provided to all volunteers as an in-field reference for sampling and project information & an online volunteer resource folder houses all permits, data sheets, and manuals for volunteer reference.

Field Methods: Volunteers collected water quality samples from sites along the Potomac River and its tributaries every week on Wednesday mornings from May to September. At each site, volunteers measured pH, air temperature, water temperature and collected water samples for fecal indicator bacteria (E. coli and total coliform) and turbidity. Volunteers also recorded physical information about the site (i.e., flow conditions, weather, tide) on their field sheet. Sample duplicates were collected from 10% of the sites each week to ensure quality assurance and check volunteer sampling techniques. All physically collected water samples were recorded on a Chain-of-Custody (CoC) form to ensure sample fidelity and provide quality assurance for all samples coming to the Potomac Riverkeeper, Sea Dog lab. To develop a clearer picture of on-water recreation in DMV waters, a Recreational Use Survey (RUS) was developed for volunteers to complete while at a monitoring site. While monitoring, volunteers make observations on the type of recreation activity witnessed and the number of participants engaged in that activity. Activities included on the survey are activities such as boating, swimming, fishing, etc. All sampling methods are established in the project QAPP which has been based on approved US Environmental Protection Agency (USEPA) water quality sampling methods for tidal and non-tidal waters. The QAPP as well as the field and lab methods have undergone further review by the Virginia Department of Environmental Quality and the PRKN M/V Sea Dog has been accredited as a Tier III lab.

Bacteria and turbidity are the only physical water samples collected on site. Bacteria samples are collected using a sterilized and sealed 100mL IDEXX sample bottle with sodium thiosulfate preservative inside and stored on ice to be analyzed within 6-hours. Turbidity samples are collected in standard 100mL polyurethane sample bottles and analyzed aboard the Sea Dog water quality lab along with bacteria. In the field, alkalinity (pH) is analyzed using Hydrion 0-14 pH litmus paper with a colorimetric scale. Finally, air temperature and water temperature are both collected using annually NIST certified armored glass thermometers.



Why are we looking for...

Bacteria: Samples are collected using a sterilized 100mL IDEXX sample bottle with sodium thiosulfate inside and stored on ice to be prepared for incubation within 6 hours of collection. Bacteria samples are collected, allowed to incubate for 24 hours, and analyzed using the IDEXX Colilert method for freshwater samples and IDEXX Enterolert for brackish water samples. Two nutrient indicators, ONPG and MUG, are the major sources of carbon in Colilert and can be metabolized by the coliform enzyme B-glucuronidase and B- galactosidase. Samples are sealed in a sampling tray, then placed in an incubator at 35 °C for 24 hrs. After 24 hrs samples are read.

When coliform bacteria metabolize the nutrient indicator, ONPG, the sample turns yellow. When E.coli metabolizes the nutrient indicator MUG, the sample fluoresces under a UV light at 365nm. Colilert can simultaneously detect these bacteria at 1 colony forming unit (CFU) /100mL within 24 hours even with as many as two million types of bacteria present. Results are published in "Most Probable Number of Colony Forming Units" or MPN/100mL.
Fecal coliform bacteria, such as E.Coli, are found in the feces of humans and other warm-blooded animals. These bacteria can enter rivers through direct discharge from mammals and birds, from agricultural and storm runoff carrying wastes from birds and mammals. Fecal coliforms naturally occur in the digestive tract and aid in the digestion of food. By themselves they are not pathogenic. Pathogenic organisms include bacteria, viruses, and parasites that cause diseases and illnesses. Pathogenic organisms are found along with fecal coliform. If fecal coliform counts are high in the river, there is a greater chance that pathogenic organisms are also present. A person swimming in such waters has a greater chance of getting sick from swallowing disease causing organisms or from pathogens entering the body through cuts in the skin, the nose, mouth, or the ears. Typhoid fever, hepatitis, gastroenteritis, dysentery, and ear infections can be contracted in waters with high fecal coliform levels. E. Coli is an indicator bacteria, often suggesting the presence of other fecal coliform bacteria as well.

Temperature: Many of the physical, biological, and chemical characteristics of a river are directly affected by temperature making it a significant factor in water quality. Temperature influences the amount of oxygen that can be dissolved in water (gasses are more easily dissolved in cool water). Therefore, the rate of photosynthesis by algae, larger aquatic plants, and submerged aquatic vegetation will be impacted by temperature. In addition, temperature affects the metabolic rates of aquatic organisms, and their sensitivity to toxic wastes, parasites, and diseases. People can affect water temperature by thermal pollution from industry, as well as from stormwater running off warmed urban surfaces, such as streets, sidewalks, and parking lots. Deforestation removes trees that help shade the river. Soil erosion along a riverbank due to construction, removal of vegetation, poor farming practices increases turbidity and cloudy water absorbs the sun's rays, causing the temperature of the river to rise. In addition, we expect to see increases in air and water temperature in the near future due to the impacts of climate change. Air and water temperature was recorded in degrees Celsius at each site.

pH: The pH test measures the acidity or alkalinity of water based on a scale that ranges from 0 – 14. A pH of 7 is considered neutral, neither acidic or basic. A pH value less than 7 is considered acidic. A pH greater than 7 is considered basic. In the U.S, the pH of freshwater is usually between 6.5 and 8.5. Increased amounts of automobile and coal-fired power plant emissions are converted to nitric and sulfuric acid in the atmosphere. These acids can combine with moisture in the atmosphere and fall to earth as acid rain. Many organisms are adapted to life in the water at a specific pH. Aquatic insects and juvenile fish are extremely sensitive to pH values below 5. pH is analyzed using Hydrion 0-14 pH litmus paper with a colorimetric scale.

Turbidity: Turbidity is a measure of the relative clarity of the water. The greater the turbidity, the murkier the water. The turbidity measurement increases as a result of suspended solids in the water that reduce the transmission of light. Suspended solids may be clay, silt, plankton, industrial wastes, and sewage. High turbidity may be caused by soil erosion, waste discharge, urban runoff, abundant bottom feeders that stir up the bottom sediments, or algal growth. The presence of suspended solids may cause color changes in the water. Water becomes warmer as suspended particles absorb heat from the sunlight. Photosynthesis decreases with less light able to penetrate the water. Suspended solids can clog the gills of fish, decrease resistance to disease, prevent egg and larval development. Material that settles between rocks in slow moving stretches of the river make these microhabitats unsuitable for aquatic insects. Suspended solids can also serve as vectors for bacteria.

Turbidity samples are collected using standard 100mL polyurethane sample bottles and analyzed in the Sea Dog lab. Turbidity samples are assessed using a LaMotte 2020i turbidimeter which uses light attenuation passing through a sample compared to lab standards to determine the turbidity of a sample in nephelometric turbidity units (NTUs). Standards for 0 NTU, 1 NTU, 10 NTU, and 100 NTU are run before each week's samples to assure accurate readings.

Conclusions

Our data shows that the Potomac River is much cleaner than it was when the swim ban was put into effect, and that bacteria levels are in fact low enough for safe recreation the majority of the time. It is time to lift this outdated law, and give the public access to this invaluable resource. Access to clean water is a right for all, and it is time for DC to embrace that sentiment and allow the public to enjoy swimming in the river when it is safe.

While the conversations around lifting the swim ban are promising, and we are encouraged by both DOEE's support of our goal and by Rep. Eleanor Holmes Nortons efforts to get congress to approve initial funding for the Army Corps of Engineers to conduct a feasibility study on safe swimming locations in DC, we still have a lot of work ahead of us. Potomac Riverkeeper Network will continue to monitor the health of the river, notify the public on when and where it is safe to recreate via SwimGuide, and keep pressure on our elected officials to ensure that the Potomac is being protected from pollution and is accessible to all.

What You Can Do

Help to lift the swim ban in DC – contact the Mayor, the DC Council, and the US Army Corps of Engineers and tell them that the ban is not necessary and that it is unfair to DC residents without watercraft – they want but have no access to DC waters!

Tell them that DOEE needs more money to conduct more frequent water quality monitoring to assure river users that the water is safe for primary contact.

Tell the US Army Corps of Engineers to conduct the feasibility study, required by law, to identify recreational swimming beaches in the District

Sponsors

We want to give a special thank you to our Community Science Water Quality Monitoring Program sponsors, partners, and supporters, without whom our program and this report could not be possible. We also want to thank our Volunteer Lab Manager Lisa Wu, who continues to dedicate hours of her time to our Water Quality Monitoring Program, and without whom this report would not be possible.

The support we receive from the following groups allows us to produce scientifically defensible data sets at our Tier-III certified lab in order to establish public safe swim advisories in a timely manner, assess the effectiveness of capital investments to reduce bacteria loading into the Potomac and its tributaries, recommend listing or delisting waters as impaired, trace pollution sources, identify and support local stormwater infrastructure investment needs, collect baseline information to prioritize monitoring needs and establish baseline conditions, and contribute to local land use decisions.

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