



Swimmable ShoreRivers Bacteria Monitoring Program Background:

As Riverkeepers, we are frequently asked by the public, “Is it safe to swim in the water?” To better understand the answer to this question, and to provide our communities with the information they need to decide if it’s safe to swim in our rivers, ShoreRivers and our partners developed a seasonal bacteria monitoring program to test bacteria levels at beaches, shorelines, and creeks throughout Maryland’s Eastern Shore. When it rains, the runoff from our roads, fields, and homes washes bacteria into the river. This specific type of bacteria – enterococci, is commonly found in human and animal waste and is mostly comes from sewage, agricultural and urban stormwater runoff, direct input by animals via defecation, bather skin or pathogen shedding, marine vessel waste, and polluted groundwater, soils, sediments, and sands. Enterococci has been identified by the Environmental Protection Agency (EPA) and the state of Maryland as an indicator for how bacteria effects human health and at what levels water contact by swimmers should be avoided. According to the Center for Disease Control (CDC), 35 states reported 140 untreated recreational water-associated outbreaks last year, resulting in at least 4,958 cases of disease and two deaths. The most common symptom of swimming in water with high levels of enterococci bacteria is gastrointestinal illnesses, urinary tract infections, and other infections in some circumstances.

ShoreRivers follows EPA protocol for testing and thresholds, recommending that swimmers avoid water contact when enterococci levels are higher than 104 MPN (Most Probable Number) for a single sample, or the geometric mean of 35 MPN when multiple samples are collected from a single site.

Our rivers are filled with multiple places for swimmers to access the water, and whether it be from a sandy beach, a local yacht club, or right off the bow of their boat, we have identified sampling locations that represent the water quality where the majority of people are coming in contact with the water. As a result, we have over 25 monitoring sites throughout the Chester, Choptank, Miles, Wye, and Sassafras Rivers. To assist with the cost of sampling these sites, which is about \$40/sample, many communities and community partners donate or sponsor individual sites.

Throughout the 2019 testing season, which occurred between Memorial Day and Labor Day, we received a tremendous amount of support, concern, and questions from the general public. Collectively in just one month, our social media postings that include the bacteria monitoring results reached an average of 9,734 people per Riverkeeper, of which ShoreRivers staffs four. For comparison, a programmatic or informative post outside of bacteria testing season has an average reach of about 250 people. While this interest and level of engagement is high, there are gaps between providing the data and the general public understanding how they can impact that data. ShoreRivers is in need of outreach

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and awareness tools that will continue to educate this audience and encourage action. Our goal is not only to educate people about these sources of bacteria and the human health impacts, but to also discourage fear and encourage stewardship. Our main objective is to have citizens make the connection between what we are doing on land and how it is affecting their ability to swim in our waterways.

1. Abstract/Section 1: Methodology for site-selection

1. What is ShoreRivers' methodology for site-selection for sampling/monitoring unregulated beaches? Or if/when regulated beaches are also sampled, what is the methodology for their selection? What other sites are sampled, how are they selected?

ShoreRivers selects these monitoring sites based on popular water contact locations, such as yacht clubs, swimming holes, and boat launch sites, as well as areas that are not being monitored by a county health department or other group. Communities can also sponsor a site in their community, where they provide the funding and we collect and analyze the samples. We also monitor popular beaches in the area. Certain counties are less transparent with their data or do not have the resources available to monitor popular locations in their jurisdictions, so a few of our sites are located at these locations to assist the county with this effort, as well as encourage them to assume control of monitoring these sites once we can demonstrate the tremendous community support of and need for this program.

2. Are site selections different for sampling for real-time versus long-term monitoring? Do methodologies differ?

2020 is only our second full year of operating this program and monitoring sites across our entire range, so all sites are focused on real-time monitoring for now. In the future site locations may change based on funding, community support, and local or state partners taking over certain sites.

2. Abstract/Section 2: What is ShoreRivers' methodology for implementation?

1. What is the methodology for site selection to implement? What types of projects are selected and why, how are they located?

Implementation is based on multiple factors including funding and need. We have applied for funding for this program from several local and regional funders, including the Chesapeake Bay Trust, Cornell-Douglass Foundation, and others. This funding has allowed us to develop the program methodologies, outreach messaging, and community engagement tools. Grant funding has also helped offset



supply costs including incubators, tray sealers, sample bottles, and test trays, which now allows us to conduct all testing in-house. We had previously partnered with Washington College in Chestertown to use their lab equipment for processing samples from the Sassafras and Chester rivers, and a private lab in Kent Island for processing samples from the Choptank, Miles, and Wye rivers. We also rely on community funding for specific sites. Community members or local groups can sponsor a site in their community or multiple sites in their region, which allows us to collect and process the sample and share the results with them if there is a specific area they are interested in. Implementation is also based on community needs. ShoreRivers monitors popular swimming location within the watershed, ensuring that the general public is safe and aware of both swimming conditions and swimming best practices.

3. Abstract/Section 3: Shoreline surveys

1. Does ShoreRivers perform shoreline surveys; desktop or in-field or both?

We are in the process of expanding and improving our shoreline surveys. Right now it is limited to mainly desktop work, with some in the field work to ground truth our results. We use satellite imagery, land use analysis, GIS tools, discharge permits, and more to help with source tracking. Our in-field surveys so far have been conducted by water, and we have also used two of the drones that we own to help survey the general area, when permissible.

2. Does ShoreRivers have a methodology for cruising sites in the field?

We are in the process of developing this methodology and expanding this part of the program.

4. Abstract/Section 4: Data sharing

1. What is ShoreRivers methodology for posting real-time data?

One of the biggest success stories of this program has been the community interest and engagement we generate with this sampling and posting the results in real time. As mentioned previously, our bacteria posts on social media tend to have significantly higher engagement than most of our other posts, and reach thousands of people both in and out of the Bay watershed. Samples are usually collected on Wednesdays or Thursdays and then results are posted on our social media accounts 24 hours later when the samples are ready to be read. We also post results at the same time to the SwimGuide platform, available both as a website and an app for smartphones. Samples are collected every week or every other week, depending on the site, and before major holiday weekends (Memorial Day,



Independence Day, Labor Day), when engagement with local waterways are at high levels, so that community members can be making safe and informed decisions with real-time data. Along with posting the results for each site on these two platforms we also include general information about open water swimming to educate and inform community members about the inherent risks of swimming in our rivers. This general advice includes not swimming in the river within 48 hours after a significant rain event, always washing off after swimming in the river, avoiding swimming if you have cuts or are immune compromised, and using common sense to avoid water that looks or smells funny. We also include general advice and recommendations for actions that community members can take to reduce levels of bacteria in local waterways. Protecting the public, informing them about what is going on in local waterways, and empowering them with actions they can take to improve the health of local waterways are three of the most important goals of this monitoring program.

2. Does ShoreRivers have a methodology for inventorying long-term monitoring data?

We inventory long-term data for all of our sample locations in internal spreadsheets. We are exploring other options for storing and analyzing this data as we continue to grow this program and collect more data. SwimGuide also inventories long-term data so that community members are able to go back and look at specific dates over the past two years, as well as see the historical averages of each site.

