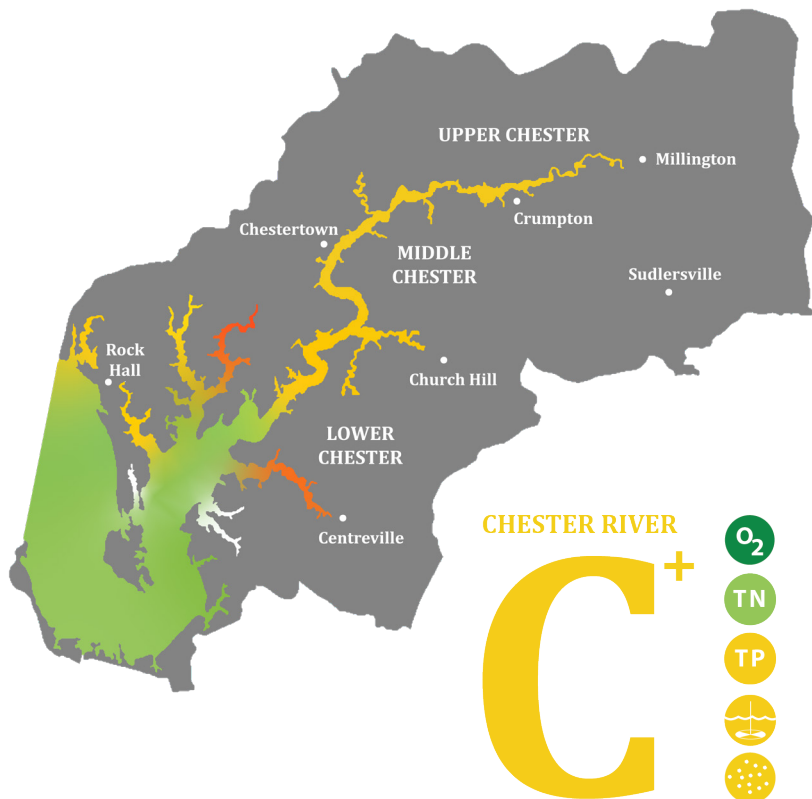


CHESTER RIVER REPORT CARD

2023

BAY HEALTH SCALE



The Eastern Shore experienced drought conditions in the spring and early summer, which vastly improved water clarity and nutrient scores in those seasons. They also increased salinity levels—measuring more than twice the nine-year average at many stations. This may have impacted submerged aquatic grass beds (SAV), especially in the upper Chester, where native species are intolerant of increased salinity levels. In July through September, increased rainfall led to more stormwater runoff—negatively impacting clarity and oxygen scores.

Our 2023 data shows that phosphorus, clarity, and chlorophyll *a* (Chl *a*) continue to be the Chester River’s largest threats, with an overall score of 46%, 41%, and 48% for these parameters, respectively. It is common for phosphorus and clarity scores to correlate, as phosphorus moves into a waterbody when bonded to sediments. Chl *a* concentrations—especially upstream in low salinity areas—increase from excess phosphorus in our waterways. Levels in excess of 40 ug/l can be indicators for algal blooms. This year, our data indicated elevated algal activity in Southeast Creek, the Corsica River, and the east fork of Langford Creek. While the majority of these blooms occurred in late summer, the Corsica experienced high Chl *a* levels of concern as early as late April.

- DISSOLVED OXYGEN
- TOTAL NITROGEN
- TOTAL PHOSPHORUS
- WATER CLARITY
- CHLOROPHYLL A

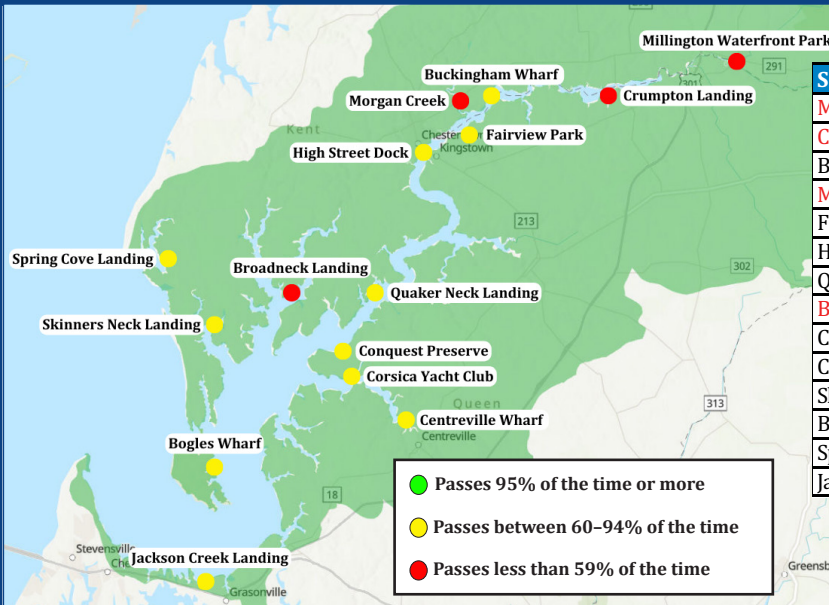
ShoreRivers uses Mid-Atlantic Tributary Assessment Coalition scientific protocols to collect and evaluate water quality data. A numeric **Water Quality Index** is calculated using established thresholds for water quality parameters, then converted to a letter grade.

Annie Richards, Chester Riverkeeper
arichards@shorerivers.org
443.385.0511 ext 282



	DISSOLVED OXYGEN	TOTAL NITROGEN	TOTAL PHOSPHORUS	WATER CLARITY	CHLOROPHYLL A	WATER QUALITY INDEX	2023 GRADE
Chester	90%	65%	46%	41%	48%	58%	C+
Corsica	69.6%	37.8%	13.6%	30.2%	16.3%	33%	D
Grays Inn	75%	64%	47%	36%	34%	51%	C
Langford	50%	57%	25%	36%	31%	40%	C-
Southeast Creek	100%	55%	27%	25%	44%	50%	C
Swan Creek	92%	60%	51%	34%	52%	58%	C+

BACTERIA MONITORING ON THE CHESTER | 2023



Site	Pass Rate	Average Failing CFU*
Millington Waterfront Park	40%	300
Crumpton Landing	40%	220
Buckingham Wharf	60%	157
Morgan Creek	7%	250
Fairview Park	80%	201
High Street Dock	80%	228
Quaker Neck Landing	87%	345
Broad Neck Landing	40%	200
Conquest Preserve	93%	285
Corsica Yacht Club	87%	186
Skinners Neck Landing	74%	165
Bogles Wharf	80%	323
Spring Cove Landing	62%	104
Jackson Creek Landing	93%	199

CFU = Colony Forming Units
Pass/Fail Threshold = 104 CFU

*Indicates the average of all failing scores this season

Each season our volunteer SwimTesters, as a part of the Swimmable ShoreRivers program, test for bacteria pollution at shoreline sites along our rivers, including popular public access locations, marinas, yacht clubs, and town piers. These tests are conducted weekly from Memorial Day through Labor Day. The program follows the Environmental Protection Agency’s standard protocols for collecting and analyzing samples and uses a pass/fail system to determine the level of risk that bacteria levels pose for water contact activities.

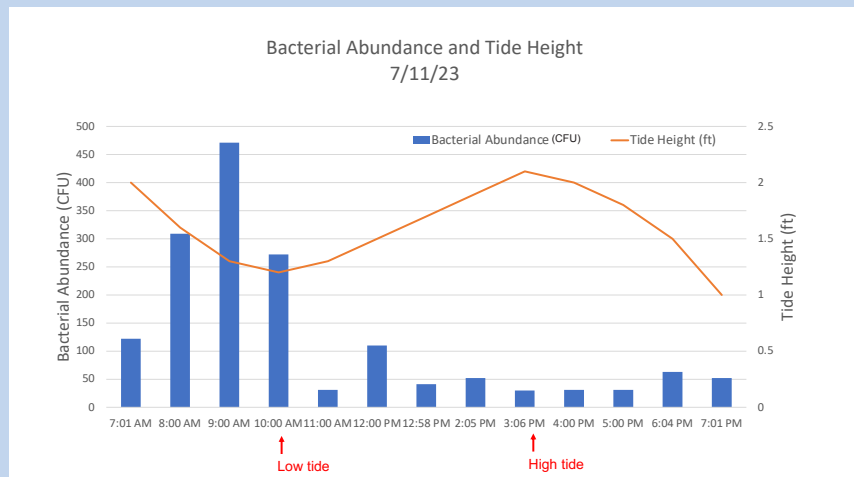
This year’s bacteria results were varied across the region, with the majority of test sites (10 of 14) passing 60–93% of the time. Millington Waterfront Park, Crumpton Landing, and Broadneck Landing had a 40% pass rate, while Morgan Creek Landing’s pass rate hit an all-time low of 7%. **Surrounding land use and water temperature vary at each location, and both rain events and tidal stages are usually connected to spikes in bacteria levels at any site.**

While pass rates were mixed in the 2023 monitoring season, an important improvement to note is that the 2023 average failing CFU levels decreased. These averages indicate how significantly a site fails to meet water quality standards, with anything higher than 104 CFU being considered a failing score. **This season, our average CFUs ranged between 104–345, which is dramatically lower than ranges from any previous year of testing. We hope to see this trend continue in 2024.**

BACTERIA MONITORING STUDY SUPPORTS TIPS FOR SAFE SWIMMING

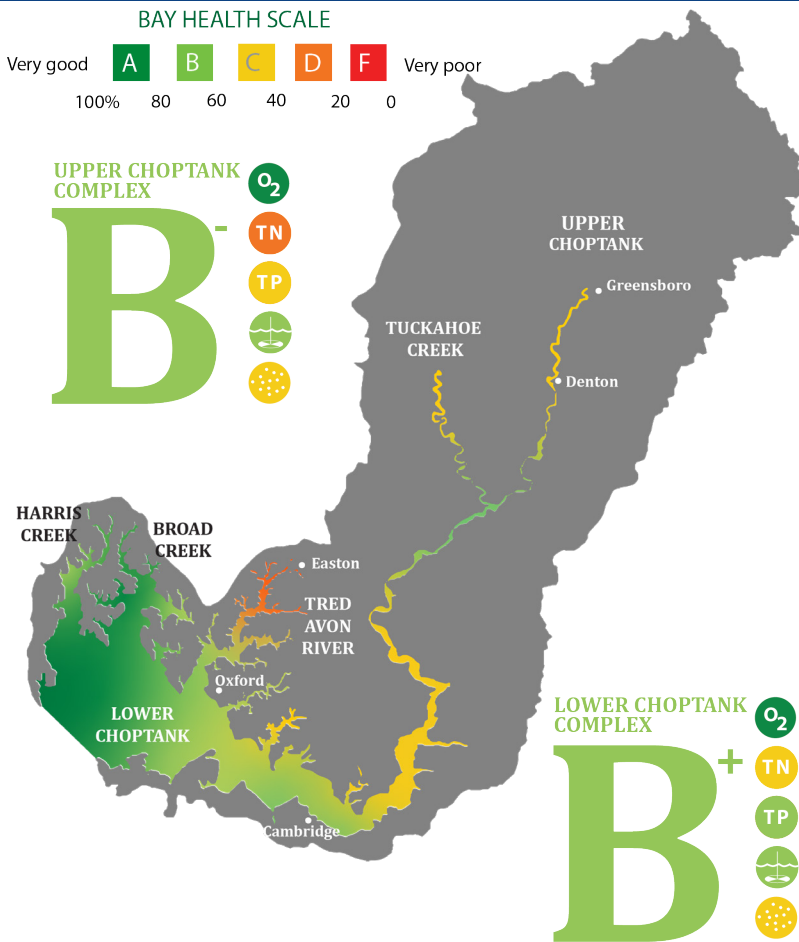
Thanks to funding from the Chesapeake Bay Trust, Morgan Buchanan, ShoreRivers’ Education Programs Coordinator, conducted a continuous bacteria monitoring study at Morgan Creek Landing on the Chester River to better understand the relationship between tidal cycles and bacteria pollution in our waterways.

Results support our understanding that outgoing tides bring the highest bacteria levels of each tidal cycle. This can be seen in the figure to the right, showing results for the tidal cycle sampled on July 11, 2023, which saw no rain in the 24 hours prior to sampling. The highest bacteria level that day occurred one hour prior to low tide and with a reading of 471 CFU, whereas the average bacteria level that day was 124 CFU.



CHOPTANK RIVER REPORT CARD

2023



The highlight in water quality conditions in 2023 was, without a doubt, the increased salinity levels that soared 3–6 parts per thousand (ppt) above the 10-year average. It was a great case study to learn about the water quality benefits and costs in a year when we experienced less than normal precipitation resulting in higher than average salinity. Benefits include reduced nutrient inputs over land, greater oyster reproduction, healthier underwater grass beds, and smaller low-oxygenated areas (dead zones); costs include increased oyster diseases, poor reproduction of anadromous fish like striped bass, and increased sea nettles.

Looking at the full suite of parameters we monitor, we saw improvements in 2023 in dissolved oxygen, water clarity, chlorophyll *a*, and the lower Choptank River's total phosphorus. The biggest threat to the Choptank continues to be total nitrogen and, except for in Island and Tuckahoe creeks, we saw nitrogen levels greatly degrade. The majority of nitrogen enters our rivers from groundwater, and during drier years, groundwater inputs to rivers and creeks are less diluted and more impactful on water quality.

The fact that water quality in the rivers tend to improve in dry years means that improvements can continue during normal conditions if we can better capture and control runoff.

- DISSOLVED OXYGEN
- TOTAL NITROGEN
- TOTAL PHOSPHORUS
- WATER CLARITY
- CHLOROPHYLL A

ShoreRivers uses Mid-Atlantic Tributary Assessment Coalition scientific protocols to collect and evaluate water quality data. A numeric **Water Quality Index** is calculated using established thresholds for water quality parameters, then converted to a letter grade.

Matt Pluta, Choptank Riverkeeper

mpluta@shorerivers.org

443.385.0511 ext 203



SHORERIVERS

	DISSOLVED OXYGEN	TOTAL NITROGEN	TOTAL PHOSPHORUS	WATER CLARITY	CHLOROPHYLL A	WATER QUALITY INDEX	2023 GRADE
Lower Choptank River Mainstem	96%	50%	77%	67%	57%	69%	B
Harris Creek	100%	58%	82%	84%	72%	79%	B+
Broad Creek	100%	52%	89%	83%	71%	79%	B+
Irish Creek	100%	52%	86%	82%	69%	78%	B+
Tred Avon River	76%	45%	75%	60%	55%	62%	B-
Island Creek	100%	35%	75%	65%	53%	66%	B
La Trappe Creek	80%	28%	58%	43%	37%	49%	C
B+ Bolingbroke Creek	100%	45%	63%	45%	43%	55%	C+
B- Tuckahoe Creek	100%	52%	27%	60%	66%	61%	B-
Upper Choptank River Mainstem	98%	31%	51%	67%	51%	60%	B-

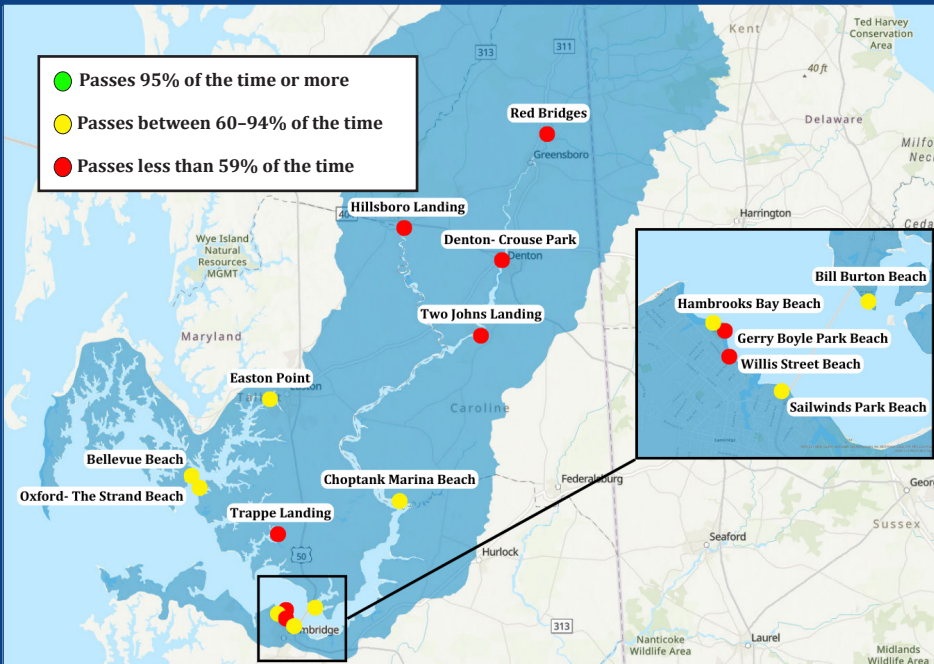
BACTERIA MONITORING ON THE CHOPTANK | 2023

Each season our volunteer SwimTesters, as a part of the Swimmable ShoreRivers program, test for bacteria pollution at shoreline sites along our rivers, including popular public access locations, marinas, yacht clubs, and town piers. These tests are conducted weekly from Memorial Day through Labor Day. The program follows the Environmental Protection Agency's standard protocols for collecting and analyzing samples and uses a pass/fail system to determine the level of risk that bacteria levels pose for water contact activities.

Bacteria monitoring data for the Choptank showed that 67% of the sites passed more often in 2023 than they did in 2022.

However, half of the sites still passed less than 60% of the time, while the rest passed between 60-94% of the time. We also brought on two new sites: Easton Point and Two Johns Landing. Easton Point is surrounded by predominantly urban landuse, so it was a pleasant surprise to see an 86% pass rate, however, this site had the highest average failing results, meaning that even though it doesn't fail often, when it does, it fails because of a lot of bacteria in the water.

Thank you to our sponsors and volunteers for making our bacteria testing program possible!



Site	Pass Rate	Average Failing CFU*
Red Bridges	29%	247
Hillsboro Landing	36%	537
Denton, Crouse Park	46%	321
Two Johns Landing	29%	215
Choptank Marina Beach	71%	319
Bill Burton Beach	92%	134
Sailwinds Park Beach**	64%	381
Willis St. Beach	14%	660
Gerry Boyle Park Beach	36%	293
Hambrooks Bay Beach	79%	223
Trappe Landing	43%	459
Easton Point	86%	1277
The Strand, Oxford	93%	383
Bellevue Beach	86%	122

CFU = Colony Forming Units

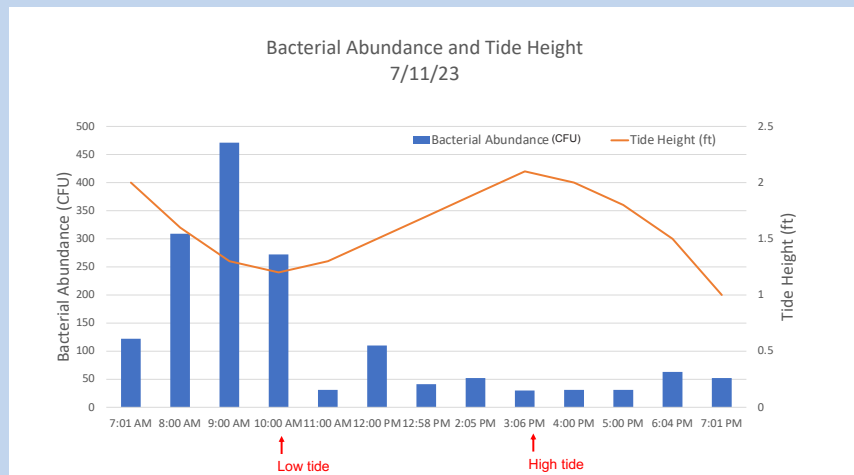
*Indicates the average of all failing scores this season

**Readings above 104 CFU are considered failing, except at Sailwinds Park Beach, which uses a more rigorous testing method and a geometric mean of 35 CFU to be considered failing.

BACTERIA MONITORING STUDY SUPPORTS TIPS FOR SAFE SWIMMING

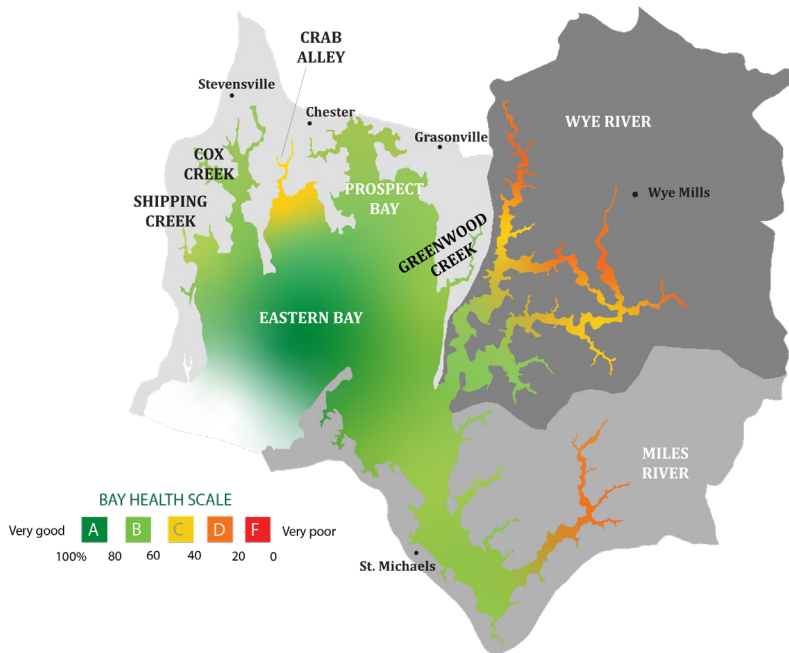
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Results support our understanding that outgoing tides bring the highest bacteria levels of each tidal cycle. This can be seen in the figure to the right, showing results for the tidal cycle sampled on July 11, 2023, which saw no rain in the 24 hours prior to sampling. The highest bacteria level that day occurred one hour prior to low tide and with a reading of 471 CFU, whereas the average bacteria level that day was 124 CFU.



MILES, WYE, & EASTERN BAY REPORT CARD

2023



- DISSOLVED OXYGEN
- TOTAL NITROGEN
- TOTAL PHOSPHORUS
- WATER CLARITY
- CHLOROPHYLL A

ShoreRivers uses Mid-Atlantic Tributary Assessment Coalition scientific protocols to collect and evaluate water quality data. A numeric **Water Quality Index** is calculated using established thresholds for water quality parameters, then converted to a letter grade.

In 2023, likely due to less precipitation across the watershed, especially in the spring, **water quality across the Miles, Wye, and Eastern and Prospect bays improved marginally.** All sampling areas had heightened salinity levels, with increases above the 10-year average of 4-6 parts per thousand (ppt), depending on the sampling site. The benefits of reduced rainfall include reduced nutrient inputs, greater oyster reproduction, healthier underwater grass beds, and smaller low-oxygenated areas (dead zones), while the costs include increased oyster diseases, poor reproduction of anadromous fish like striped bass, and increased prevalence of sea nettles.

Although some improvements were noted in dissolved oxygen and clarity near the mouths of our rivers and in Eastern and Prospect bays, the upper tributaries did not see the increased clarity notable in the downstream sampling locations. Nitrogen and phosphorus levels showed a marked improvement, but remain a significant concern throughout the system, especially as sites were sampled further upstream.

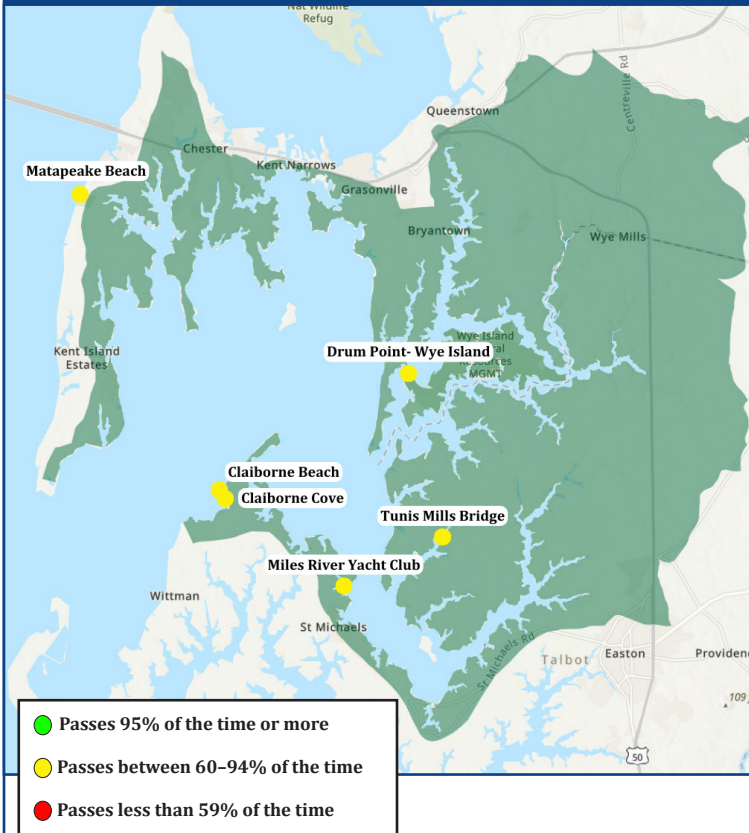
Ben Ford, Miles-Wye Riverkeeper
bford@shorerivers.org
 443.385.0511 ext 213



SHORERIVERS

	DISSOLVED OXYGEN	TOTAL NITROGEN	TOTAL PHOSPHORUS	WATER CLARITY	CHLOROPHYLL A	WATER QUALITY INDEX	2023 GRADE	
B	Eastern Bay	90%	87%	87%	71%	80%	83%	A-
	Shipping Creek	100%	78%	75%	31%	54%	68%	B
	Cox Creek	100%	84%	72%	38%	60%	71%	B
	Crab Alley	83%	64%	64%	34%	54%	60%	B-
	Prospect Bay	100%	78%	74%	48%	71%	74%	B
	Greenwood Creek	100%	73%	65%	35%	51%	65%	B-
C-	Wye Narrows	50%	49%	31%	29%	28%	37%	D+
	Wye River	58%	58%	41%	38%	44%	48%	C
	Wye East	84%	45%	28%	26%	23%	41%	C-
C+	Miles River	81%	63%	51%	40%	38%	55%	C+

BACTERIA MONITORING ON THE MILES, WYE, & EASTERN BAY | 2023



- Passes 95% of the time or more
- Passes between 60-94% of the time
- Passes less than 59% of the time

Site	Pass Rate	Average Failing CFU*
Drum Point Beach	86%	466
Broad Cove Claiborne	86%	288
Claiborne Beach	79%	350
Tunis Mills Bridge	64%	159
Miles River Yacht Club	93%	121
Matapeake Beach	86%	133

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This year, the pass rate increased across all sites, and the average failing CFU (a measure of indicator bacteria) decreased. These averages indicate how significantly a site fails to meet water quality standards, with anything higher than 104 CFU being considered a failing score. While this is a positive step, it’s likely a product of the reduced precipitation during the testing season rather than an ongoing trend.

The tide, recent rainfall, water temperature, and distance from bacteria sources (like wastewater treatment plants and failing or out-of-date septic systems) all play a major role in bacteria counts.

Thank you to our sponsors and volunteers for making our program possible!

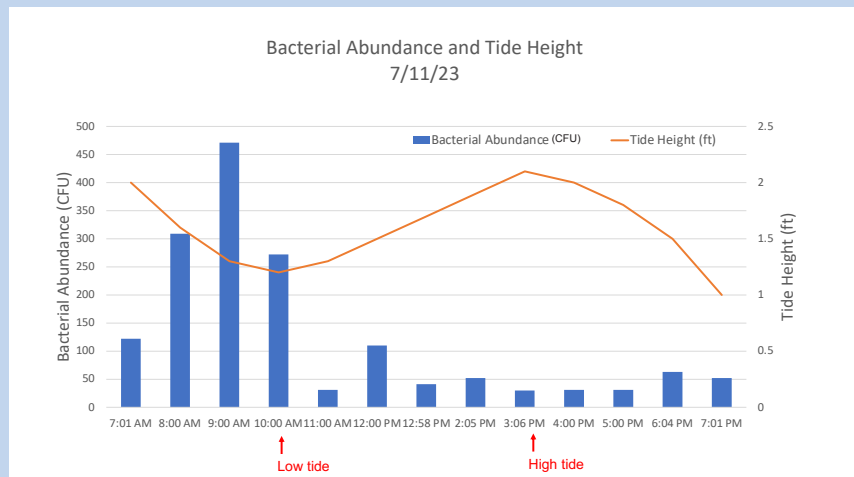
CFU = Colony Forming Units
Pass/Fail Threshold = 104 CFU

*Indicates the average of all failing scores this season

BACTERIA MONITORING STUDY SUPPORTS TIPS FOR SAFE SWIMMING

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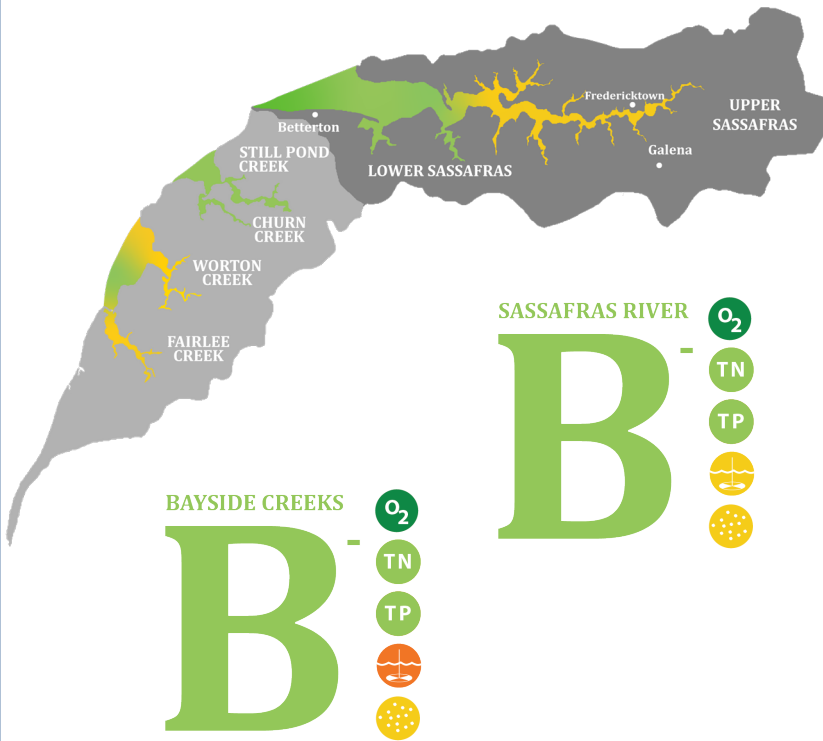
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SASSAFRAS RIVER & BAYSIDE CREEKS REPORT CARD

2023

BAY HEALTH SCALE








One of the major water quality themes for 2023 was the increased salinity we experienced throughout much of the year. Since the SassafRAS is primarily considered a tidal fresh river, salinity levels that were 3-5 times higher than normal had significant impacts on both water quality and ecosystem health. Less rainfall did reduce the amount of nutrient surface runoff, but the 2023 water quality scores for the SassafRAS River and Bayside Creeks show that excess phosphorus, low water clarity, and high levels of chlorophyll *a* continue to be detrimental to the health of these waterways.

The overall Water Quality Index shows that the Upper SassafRAS only meets acceptable water quality standards 54% of the time, the Lower SassafRAS only meets these standards 71% of the time, and the Bayside Creeks only meet these standards 62% of the time.

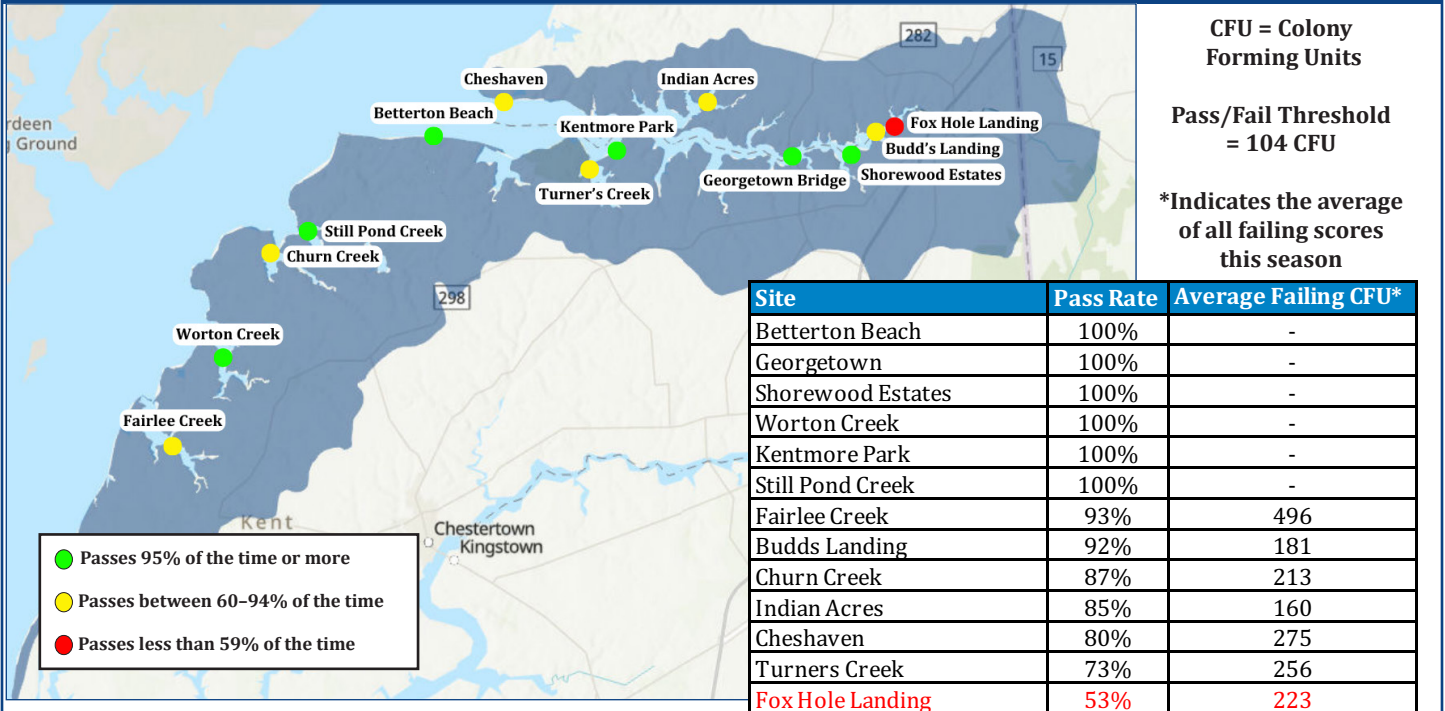
Zack Kelleher, SassafRAS Riverkeeper
 zkelleher@shorerivers.org  
 443.385.0511 ext. 281



-  **DISSOLVED OXYGEN** ShoreRivers uses Mid-Atlantic Tributary Assessment Coalition scientific protocols to collect and evaluate water quality data. A numeric **Water Quality Index** is calculated using established thresholds for water quality parameters, then converted to a letter grade.
-  **TOTAL NITROGEN**
-  **TOTAL PHOSPHORUS**
-  **WATER CLARITY**
-  **CHLOROPHYLL A**

	DISSOLVED OXYGEN	TOTAL NITROGEN	TOTAL PHOSPHORUS	WATER CLARITY	CHLOROPHYLL A	WATER QUALITY INDEX	2023 GRADE
SassafRAS River	95%	64%	63%	42%	43%	61%	B-
Churn Creek	100%	68%	78%	50%	35%	66%	B
Fairlee Creek	100%	68%	65%	33%	20%	57%	C+
Still Pond Creek	100%	63%	70%	40%	65%	68%	B
Worton Creek	83%	65%	53%	33%	55%	58%	C+

BACTERIA MONITORING ON THE SASSAFRAS & BAYSIDE CREEKS | 2023



Each season our volunteer SwimTesters, as a part of the Swimmable ShoreRivers program, test for bacteria pollution at shoreline sites along our rivers, including popular public access locations, marinas, yacht clubs, and town piers. These tests are conducted weekly from Memorial Day through Labor Day. The program follows the Environmental Protection Agency’s standard protocols for collecting and analyzing samples and uses a pass/fail system to determine the level of risk that bacteria levels pose for water contact activities. **In 2023, Sassafras sites passed 87% of the time, and Bayside Creeks sites passed 95% of the time.**

The Fox Hole Landing, Budds Landing, Shorewood Estates, Kentmore Park, and Cheshaven sites are all paid for by residents of those neighborhoods. We are especially thankful for all of the strong community support for this program. In the table above, the “average failing CFU” value indicates when a site fails to meet water quality standards, how significantly (on average) it falls. **The average failing CFU in 2023 was 258, compared to 486 in 2022. Tidal flow, temperature, and rainfall vary at each site and can cause bacteria levels to spike at various rates, contributing to failing results.**

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