VIRGINIA'S 2024 305(b)/303(d) Water Quality Assessment Integrated Report

Submitted in accordance with Sections 303(d) and 305(b) of the Clean Water Act, and the Virginia Water Quality Monitoring, Information, and Restoration Act

February 2025

EXECUTIVE SUMMARY

The 2024 Integrated Report (IR) provides the results of Virginia's water quality assessments for monitoring data collected in the six-year period between Jan. 1, 2017, through Dec. 31, 2022. It describes the extensive efforts to monitor, assess, and improve water quality in Virginia.

Virginia's IR is prepared every two years. The 2024 IR includes:

- A summary of water quality monitoring and assessment results in Virginia.
- Information on the new Virginia Data Explorer which provides an efficient way to review and incorporate volunteer and non-Agency monitoring data.
- An overview of probabilistic monitoring programs in Virginia.
- An updated Chesapeake Bay Assessment.
- A 20-year trend analysis of 15 water quality parameters.

Monitoring Water Quality in Virginia

DEQ's Water Quality Monitoring Program consists of an integrated network of subprograms. Comprehensive geographic coverage of Virginia surface waters is accomplished primarily by the Ambient Watershed Monitoring Network, DEQ's Chesapeake Bay Monitoring Program, and by two Probabilistic Monitoring Networks that encompass all free-flowing and estuarine waters. These are complemented by the agency's Trend Monitoring Network, Lakes Monitoring Program, Biological Monitoring Program, Targeted Fish Tissue and Sediment Monitoring Program, and a Volunteer Monitoring Program.

Between January 2017 and December 2023, DEQ staff collected multiple samples at 3,421 water quality monitoring stations. Over 100,000 observations of temperature, dissolved oxygen, pH, and salinity were used to make aquatic life use support determinations. Approximately 55,000 bacteria samples were used to make recreation use support determinations in freshwater and estuarine environments. Thousands of ammonia, nitrate and chloride samples were assessed to determine support of the wildlife and/or the public water supply uses. The assessment of fish consumption and shellfishing designated uses are largely made using advisory information issued by the Virginia Department of Health.

Volunteer and Non-Agency Monitoring Data

New for the 2024 IR cycle, the Virginia Data Explorer, developed in collaboration with the Chesapeake Monitoring Cooperative and the Virginia Institute of Marine Science, is an online data management tool that is now the primary method for submitting water quality data collected by outside monitoring groups to DEQ for use in the IR.

Nearly 100 volunteer and other non-agency monitoring organizations submitted data for the 2024 IR. DEQ accepts water quality data to be reviewed and evaluated for assessment purposes on a continual basis. However, to be used for the 2024 IR, data had to have been submitted by March 6, 2023. DEQ held an evening webinar for outside monitoring groups to provide an overview of the VDE on February 7, 2023. Data solicitation notices will be issued for subsequent

IR cycles at the beginning of the assessment process, which typically falls early in odd-numbered years.

Statewide Assessment Results

A primary objective of the IR is to determine whether Virginia's waters support the six designated uses mandated by Virginia's Water Quality Standards: fish consumption, shellfishing, recreation, public water supply, wildlife, and aquatic life-- which includes several Chesapeake Bay specific designated uses. A diverse water monitoring dataset, collected by DEQ and others, is reviewed and evaluated through the IR process. If data show that a waterbody segment exceeds the pollutant level allowed by water quality criteria or does not meet a specified threshold, it will not support one or more of its designated uses. Such waters are considered "impaired" and placed on the List of Impaired Waters (Appendix 1a). New for the 2024 IR is the first assessment of benthic chlorophyll-a data to make recreation use attainment determinations in portions of the Mainstem, North Fork, and South Fork of the Shenandoah River.

*A **waterbody segment** or **assessment unit** is a geographically defined portion of an estuary, river, stream, or reservoir that is assigned designated uses. Where data is sufficient, water quality monitoring data collected within or proximal to the defined waterbody area is evaluated against established numeric or narrative water quality thresholds, or criteria, to determine if the uses are met.*

Assessment results by waterbody type.

	Rivers (Miles)	Lakes (Acres)	Estuaries (Miles^2)
Non-Impaired	3,516 (4%)	13,338 (11%)	306 (11%)
Impaired	16,312 (16%)	102,091 (87%)	2,143 (75%)
Not Assessed	81,148 (80%)	2,440 (2%)	393 (14%)
Total	100,975	117,869	2,842

The overall summary of assessment results between the 2022 and 2024 IR cycles are relatively unchanged. The table below presents a statewide summary comparison between assessment cycles. Note that lakes had an increase of approximately 500 acres of water classified as non-impaired this cycle, representing roughly a 1% change. Additionally, as presented in second table below, bacteria, toxins in fish tissue, and low dissolved oxygen remain the leading causes of impairment in Virginia waters.

Comparison of the 2022 and 2024 IR assessment results.

	Rivers (Miles)		Lakes (Acres)		Estuaries (Miles^2)	
	2022	**2024**	**2022**	**2024**	**2022**	**2024**
Non-Impaired	4%	4%	10%	11%	11%	11%
Impaired	16%	16%	86%	87%	75%	75%

Leading causes of impairments by water body type.

	River (Miles)	Lakes (Acres)	Estuaries (Miles^2)
Bacteria	12,213	4,293	174
Toxics in Fish Tissue	3,724	88,765	2,058
Dissolved Oxygen	706	47,366	1,375

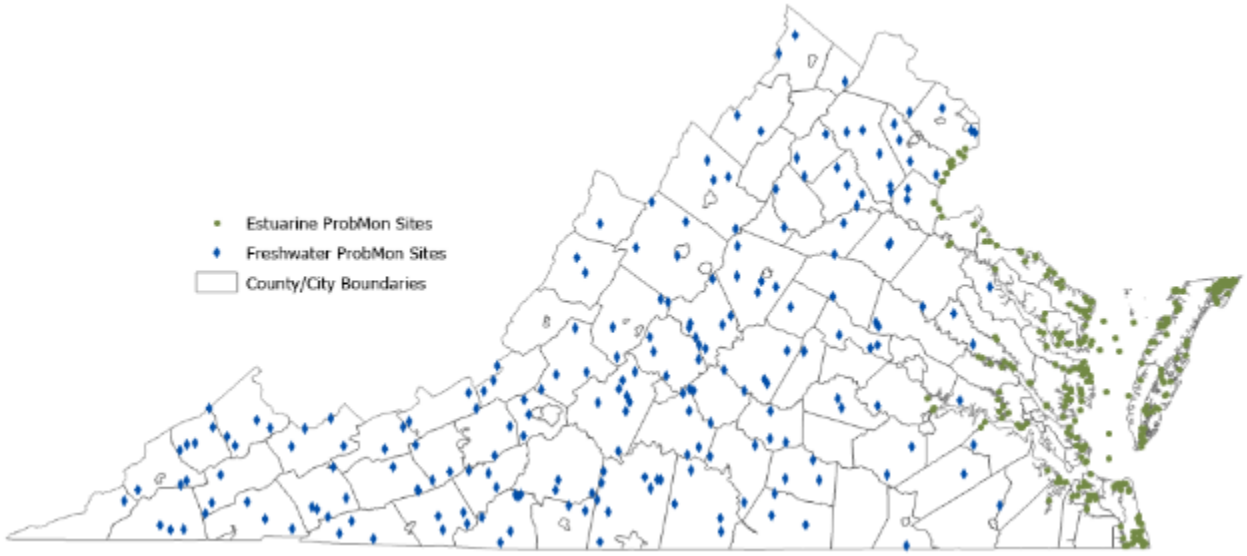
After a waterbody is classified as impaired, state statute directs DEQ to develop and implement a plan to achieve fully supporting status for the water by addressing the pollutant or pollutants causing the impairment. DEQ may initiate a watershed study, such as a Total Maximum Daily Load (TMDL). TMDLs are implemented in applicable discharge permits and by addressing nonpoint pollutant sources. In Virginia, an Implementation Plan (IP), also known as a clean-up plan, is often used to guide implementation of nonpoint source controls. Waters are removed from the impaired list by providing new data or information to the U.S. Environmental Protection Agency (EPA) that shows attainment of all applicable water quality criteria for the waterbody segment. In the 2024 IR, DEQ proposes fully or partially delisting 735 water segments from the Impaired Waters List. Of these, 38 are considered full delists, where all assessed uses for the given segment are attaining, and 697 are considered partial delists, where one or more parameters meet criteria, but others remain a cause of impairment. To date, the agency has completed 1,044 watershed studies and nearly 100 clean-up plans across the state.

Probabilistic Monitoring Programs

Virginia's freshwater and estuarine probabilistic monitoring programs provide an important complement to DEQ's ambient monitoring station network. Probabilistic data from randomly selected stations provide an unbiased regional or statewide characterization of water resources with a known degree of statistical confidence. The freshwater probabilistic study design includes smaller-order streams in addition to large-order waters and is one of the few programs that gathers data from smaller streams. Probabilistic data has many applications, some include:

- Enabling broad regional assessments of overall ambient conditions.
- Establishing baseline water quality conditions.
- Answering questions about statewide and regional water quality conditions. For example, "what are the primary water quality problems in VA?", "how widespread are these problems?", and "what pollutants cause the greatest environmental stress to VA's waters?"
- Meeting requirements under section 305(b) of the CWA to make water quality condition estimates and "submit…a report which shall include a description of water quality of all navigable water…"

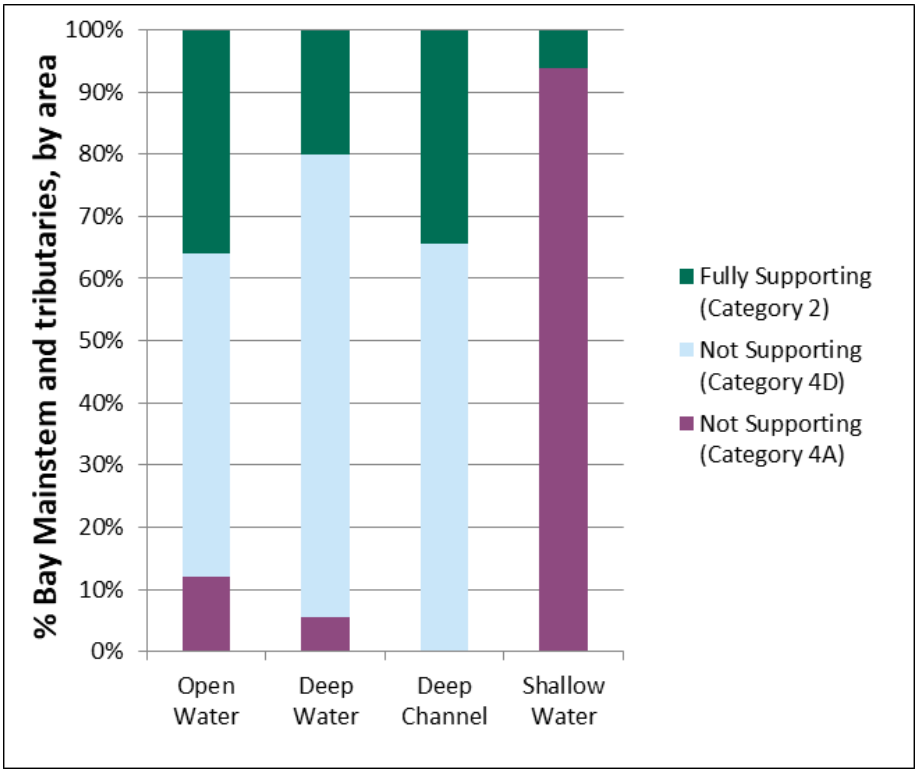
The figure below shows monitoring stations that were visited during 2017-2022 as part of the probabilistic study design.



Freshwater and Estuarine Probabilistic monitoring stations evaluated in the 2024 Integrated Report.

Chesapeake Bay Assessment Results

For the 2024 IR, DEQ and its partners have performed the assessment of monitoring data collected in Virginia's Chesapeake Bay waters. Updated for the 2024 cycle is the assessment of dissolved oxygen (DO), which aligns with processes used in past IRs, but now includes rounding to significant digits consistent with the Virginia Administrative Code and DEQ's Assessment Guidance. The figure below provides a summary of the areas of the Bay and how the Bay specific criteria assessment results are reported by category. Category 4D applies to waters that meet the DO criteria which were assessed in the 2024 IR, but which are required to meet all applicable DO criteria before they can be assessed as fully supporting (i.e., Category 2). Note that there are 11 DO criteria for Chesapeake Bay waters, depending on the designated use(s), of which three are currently assessed. Additionally, only segments that have fully met their respective SAV acreage goals are assessed as fully supporting. Most Bay segments have partially met their SAV goals and contribute to the total SAV acreage goal but are still assessed as not supporting. Category 4A applies to waters that are impaired or threatened for one or more designated uses. Both Category 4A and 4D waters are covered by the EPA Chesapeake Bay TMDL.



Chesapeake Bay Criteria Assessment Results.

Dissolved Oxygen: The 2024 dissolved oxygen assessment shows attainment of the assessed Open Water criteria is achieved in the lower Rappahannock River, the James River, as well as in the mainstem Bay (to include Mobjack Bay and Pocomoke Sound). These improvements do not result in waterbody segments being removed from the Impaired Waters List as not all applicable DO criteria are currently assessed, and all criteria must be met before removing waters from the impaired list. The upper Pamunkey River and Elizabeth River are two segments where the assessed Open Water criteria were meeting last cycle and are not this cycle. Attainment of the assessed Deep Water criteria is achieved in the mainstem Bay. However, in the Rappahannock, York and Southern Branch of the Elizabeth River segments the Deep Water criteria are not achieved. The Deep Channel Chesapeake Bay specific designated use is attaining in all Virginia waters where it is assessed this cycle.

Submerged Aquatic Vegetation: Increases to SAV and water clarity acreage goals in the water quality standards regulation were made in several estuarine portions of the Rappahannock River and the James River since the 2022 IR cycle. This resulted in an increase of approximately 4,680 acres, or 6% percent, for these SAV coverage goals. Approximately 48% of the total statewide SAV acre goal was attained during the 2024 IR cycle. The acreage goal increases incorporated into the regulations are partially reflected in the change from previous assessment cycles where it was reported that nearly 60% of the total statewide SAV goal was being attained.

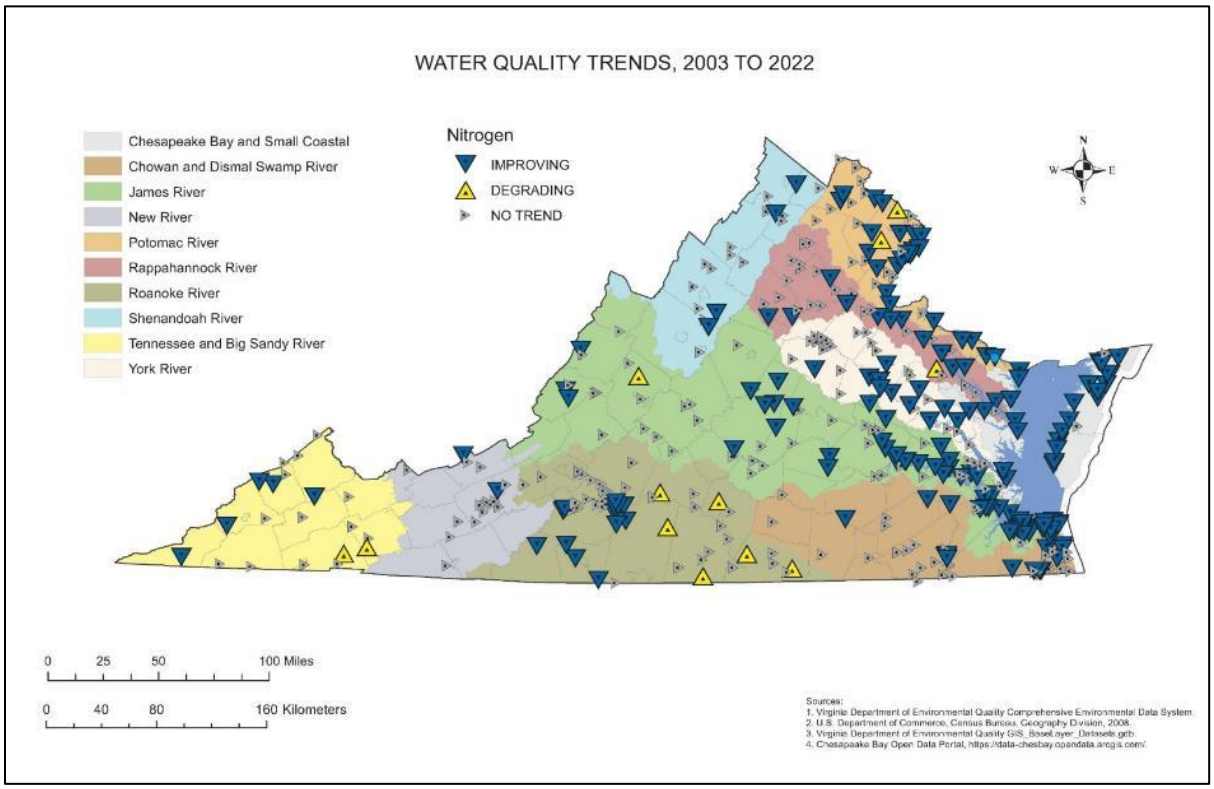
James River Chlorophyll-a**:** The lower portion of the James River Tidal Fresh segment failed to meet both the seasonal mean and short-duration chlorophyll criteria in both the Spring and

Summer months. The upper portion of the James River Tidal Fresh segment failed to meet the chlorophyll criteria during the summer months.

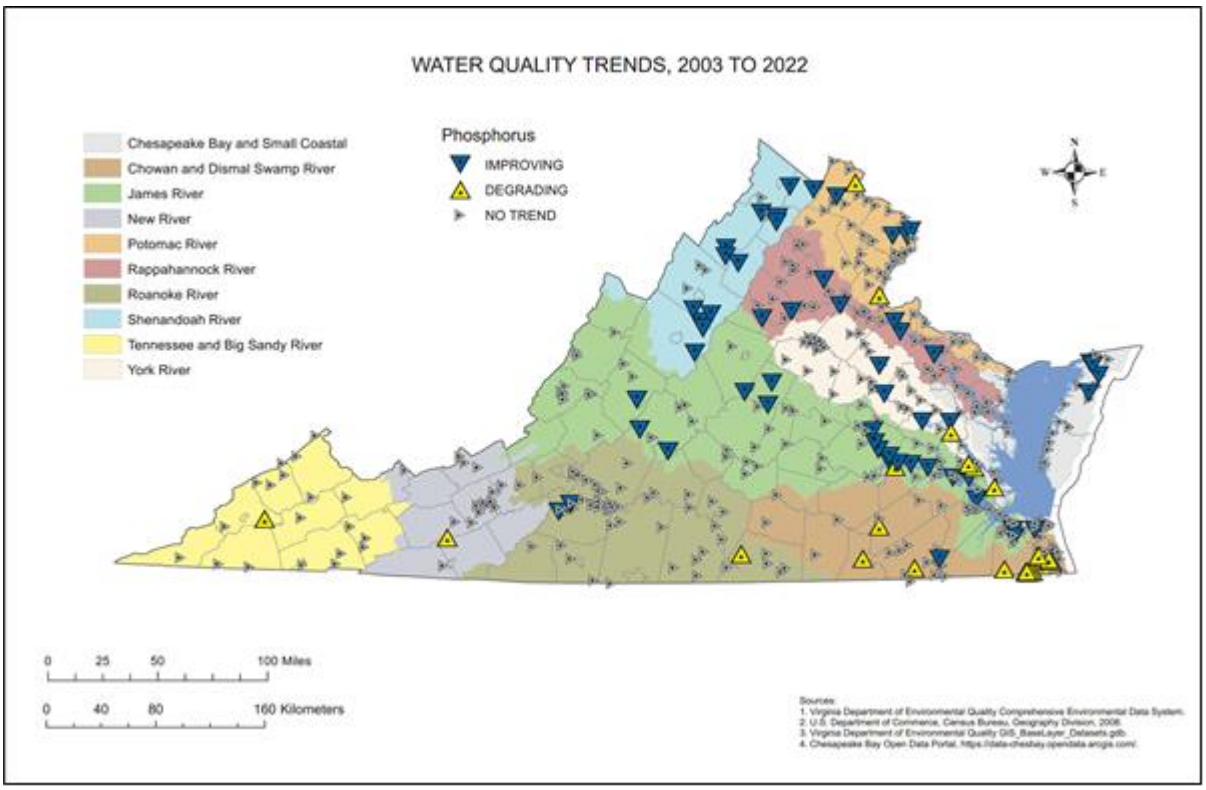
Estuarine Bioassessments: The most recent estuarine benthic assessment results show full attainment in the lower Chesapeake Bay mainstem. It is anticipated that progress in Bay aquatic life use attainment will continue to improve as implementation activities under the Chesapeake Bay Total Maximum Daily Load (TMDL) and Virginia's Watershed Implementation Plans continue.

Trends

DEQ operates a fixed-station network of over 400 stations across the Commonwealth where data has been collected since the late 1960s. Using this rich dataset, changes in water quality are quantified to show an improving or degrading trend. Section 4.7 of the 2024 IR includes a trend analysis performed over the 20-year period from 2003-2022. In most cases, the 15 chemical and physical water quality characteristics evaluated for this analysis provide a relatively complete description of overall water quality. It should be noted that the goal of trend analysis is to detect changes in concentrations or values of key water quality parameters and not to determine whether the measured values are particularly high or low. The two maps below show trends in Nitrogen and Phosphorous concentrations across the state. The major river basins are shown by color with monitoring stations represented as either an improving trend (blue downward triangle), degrading trend (yellow triangle) or no significant trend (small gray triangle).



Statewide total nitrogen trends.



Statewide total phosphorus trends.