

EXECUTIVE SUMMARY

Virginia's 2016 Water Quality Assessment Integrated Report (IR) is submitted in compliance with the water quality reporting requirements under Sections 305(b), 303(d), 106, 314 and 319 of the Federal Clean Water Act and the Virginia Water Quality Monitoring, Information and Restoration Act (Section 62.1-44.19:5 C of the Code of Virginia). The 2016 IR provides the results of Virginia's water quality assessments during the time period January 1, 2009 through December 31, 2014, and describes the extensive efforts to monitor, assess, and improve water quality in the waters of the Commonwealth. The information in this report is intended to educate the public about Virginia's water quality conditions and as a tool in planning and management of waters in the Commonwealth.

Overview of Assessment Results

A primary objective of the IR is to determine whether the Commonwealth's waters support their applicable designated uses as mandated by Section 305(b) of the Clean Water Act. There are six designated uses that may be applied to surface waters: aquatic life, fish consumption, shellfishing, recreation, public water supply, and wildlife. Virginia's water quality standards define the water quality needed to support each of these uses by establishing the numeric criteria that physical and chemical data are assessed against. If a waterbody contains more of a pollutant than is allowed by the water quality standards, it will not support one or more of its designated uses. Such waters are considered to have "impaired" quality. An "impairment" refers to an individual parameter or characteristic that exceeds a water quality standard. A water fails to support a designated use when it has one or more impairments.

Between January 2009 and December 2014 DEQ staff visited 4,205 stations located in Virginia's lakes/reservoirs, rivers, and estuaries. At these stations, DEQ collected 120,309 measurements of temperature, 96,240 measurements of pH, and 118,910 measurements of dissolved oxygen. A subset of these water samples were also analyzed for nutrients, suspended solids, bacteria, metals, pesticides, herbicides, and toxic organic compounds. Over 600 different parameters were analyzed. In addition to this large dataset, data collected by over 100 citizen monitoring groups and governmental partners were used by DEQ to assess the status of Virginia's waters. Chapter 3 provides more information about these monitoring programs.

Table A provides a summary of the statewide assessment results for the 2016 IR reporting period. Statewide, 7,116 stream miles, 20,318 acres of lakes/reservoirs, and 315 square miles of estuarine waters meet all designated uses for which they were assessed¹. This represents measurable progress since the 2014 IR, as indicated in Table A below. The improvements in assessment status are attributed to new data collected to support impairment delists and newly assessed waters that previously had insufficient data to complete an assessment. The total impaired river miles reported in the 2016 IR is 15,282, which represents a slight decrease from the 2014 IR reported mileage of 15,679. While the Commonwealth added 871 newly impaired river miles in the 2016 IR, this was largely offset by new impairment delists. The acres of lakes reported as impaired in the 2016 IR is 93,523, which is a decrease from the 2014 IR reported

¹ The majority of these waters fall within assessment Category 2; fully supporting some Uses but insufficient data to assess all Uses.

value of 94,754. Similarly, the square miles of estuarine waters reported as impaired in the 2016 IR is 2,132, which is a slight decrease from the 2014 IR reported value of 2,136. The decreases in impaired acres of lakes and square miles of estuarine waters is largely attributed to impairment delists.

Table A. Overview of assessment results. Improvements since the 2014 IR, shown as percent change, are in green font.

	Rivers (mi)	Lakes (acres)	Estuaries (sq mi)
Impaired (% total) <i>Percent change from 2014</i>	15,282 (15%) <i>-2.5%</i>	93,523 (80%) <i>-1.3%</i>	2,132 (75%) <i>-0.2%</i>
Non-Impaired (% total) <i>Percent change from 2014</i>	7,116 (7%) <i>10.4%</i>	20,318 (17%) <i>4.4%</i>	315 (11%) <i>1.6%</i>
Not Assessed (% total) <i>Percent change from 2014</i>	78,576 (78%) <i>-0.3%</i>	3,373 (3%) <i>13.6%²</i>	400 (14%) <i>2.5%</i>
TOTAL	100,974	117,215	2,848

Prior to the development of the 2014 IR, DEQ adopted the 1:24,000 scale resolution of the National Hydrography Dataset (NHD) in its water quality assessments. The conversion of Virginia’s older 1:100K to the higher resolution 1:24K NHD resulted in a significant increase in mapped stream mileage, and, consequently, a higher percentage of waters considered “not assessed” due to the inclusion of previously unmapped waterways—mostly small unnamed tributaries³. These waters are counted as “unassessed” until they are monitored and properly characterized by DEQ staff. However, DEQ’s freshwater probabilistic monitoring program, described in chapter 4.4, includes coverage of small unnamed tributaries as part of the randomly generated station locations. While much of the data generated by probabilistic monitoring is not formally assessed, the data is used to answer questions about statewide and regional water quality conditions, and to identify problem areas for follow-up monitoring.

The assessment status of the Commonwealth’s designated uses is summarized in Chapter 4.2. Many of the Commonwealth’s waters contain data indicating a “supporting” status for one or more designated uses. The aquatic life, wildlife, public water supply, and shellfishing designated uses are reported as “supporting” most frequently. The recreation use is impaired in the most number of waters; 49% of assessed rivers/streams (10,926 miles), 1% of assessed

² Includes waterbodies that have been previously assessed but do not have data in the current assessment window. Some of these waters will be reviewed during the 2018 assessment period.

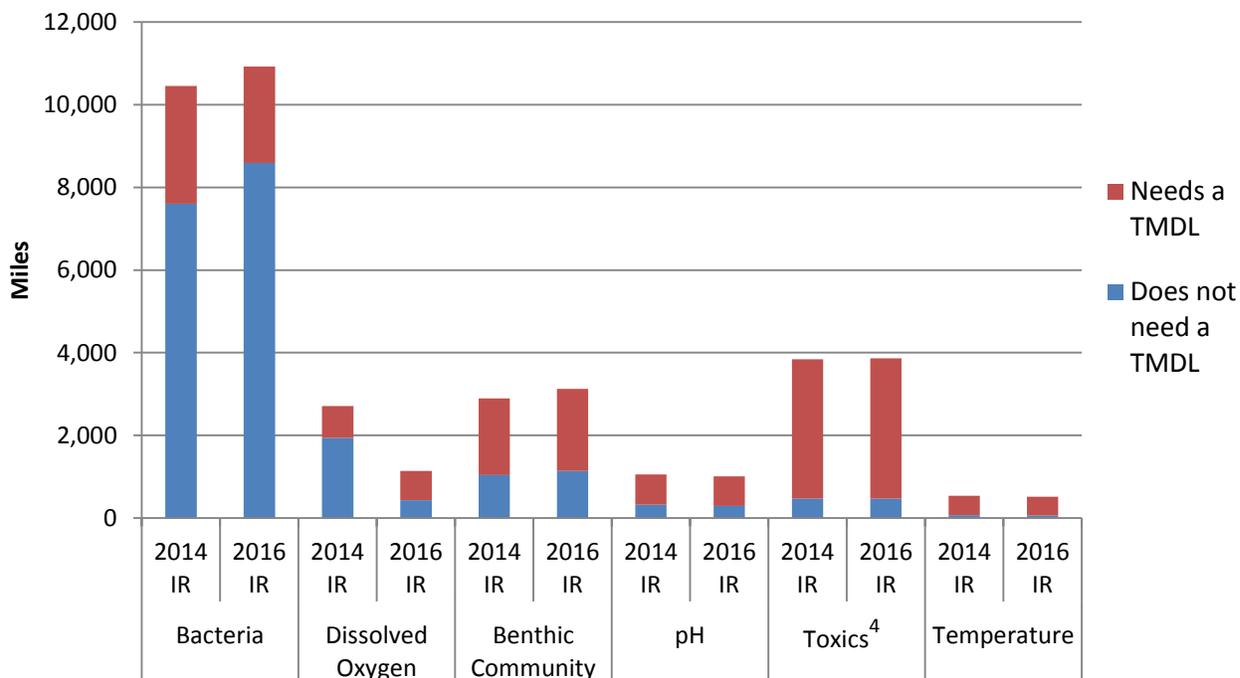
³ DEQ does not anticipate significant changes to the resolution of its surface water mapping in the foreseeable future; though it is likely statewide stream mileage will decrease slightly as intermittent, ephemeral streams are better distinguished from perennial waters.

lake acres (1,248 acres) and 3.8% of assessed estuarine waters (92 square miles) are impaired for this use. Elevated levels of the indicator bacteria *Escherichia coli* (*E. coli*) are the most significant cause for this use impairment, mainly affecting rivers. Agricultural practices, urban runoff, leaking sanitary and storm sewers, failing septic systems, wildlife and domesticated animals are contributors of *E. coli*. The aquatic life use is also not supported in many rivers; 23% of assessed rivers/streams (5,159 miles), 13.6% of assessed lake acres (15,439 acres) and 86% of assessed estuarine waters (2,110 square miles) are impaired for this use. Low dissolved oxygen concentration (hypoxia) is the most prevalent cause of aquatic life use impairment. Nutrient enrichment, also known as eutrophication, can cause hypoxia by contributing to the formation of oxygen-depleting algae blooms. Low dissolved oxygen is a common impairment of lakes and estuarine waters, including the Chesapeake Bay. Evidence of a degraded biological (benthic) community is another strong indicator that a waterbody does not support the aquatic life use. Finally, the fish consumption designated use is also reported as not supported in many waters of the Commonwealth; 16% of assessed rivers/streams (3,590 miles), 75% of assessed lake acres (85,755 acres) and 84% of assessed estuarine waters (2,049 square miles) are impaired for this use. PCBs and/or Mercury in fish tissue are the most prevalent cause of the fish consumption use impairment.

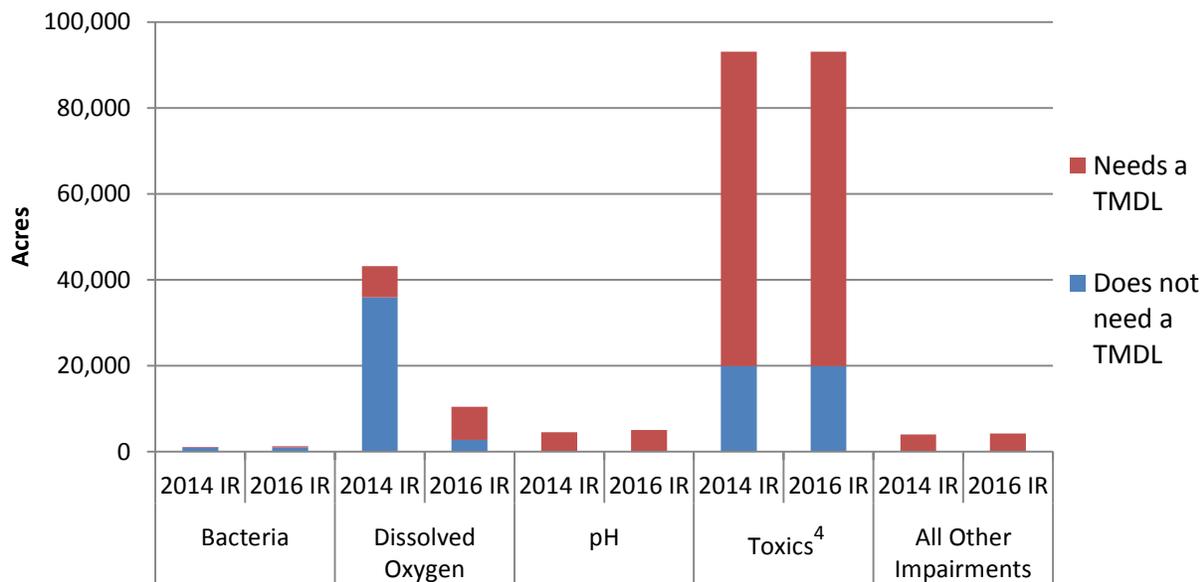
The impairment status of Virginia's rivers, lakes, and estuaries is illustrated in Figure A below. The blue portion of each graph characterizes the size of the waterbody that is impaired but does not need a Total Maximum Daily Load (TMDL) plan because a TMDL is already complete (assessment Category 4A), another form of pollution control plan is in place (assessment Category 4B), the water quality condition is considered natural (assessment Category 4C), or for some other reason the water does not require a TMDL. The red portion of the graph represents the size of the waterbody that is impaired and still requires TMDL development (assessment Category 5). As evident in the figures below, the Commonwealth has made significant progress on completing TMDL plans for many impairments, including bacteria, benthics, and dissolved oxygen, while other impairments, such as toxics in fish tissue, still require a TMDL. DEQ currently has TMDL projects underway to address toxics in fish tissue in the New River and lower James River basins, and is initiating a TMDL study to address toxics in fish tissue in the upper James River. Chapter 7.2 provides more information on the prioritization process for TMDL development through 2022.

Figure A. Summary of impaired waters as reported in the 2014 and 2016 Integrated Reports. Differences between reporting periods reflect both proposed delistings and new impairment listings.

a. Stream miles

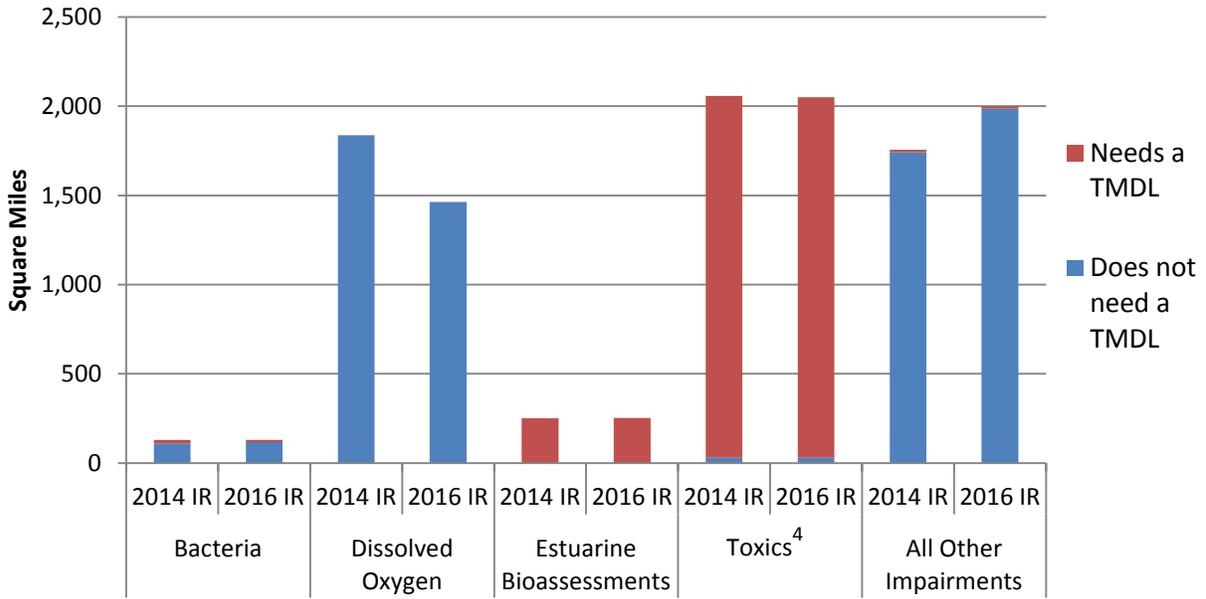


b. Acres of lakes



⁴ The overwhelming majority of toxics impairments in rivers, lakes and estuaries are due to exceedences of thresholds for PCBs and Mercury in fish tissue.

c. Square miles of estuarine waters

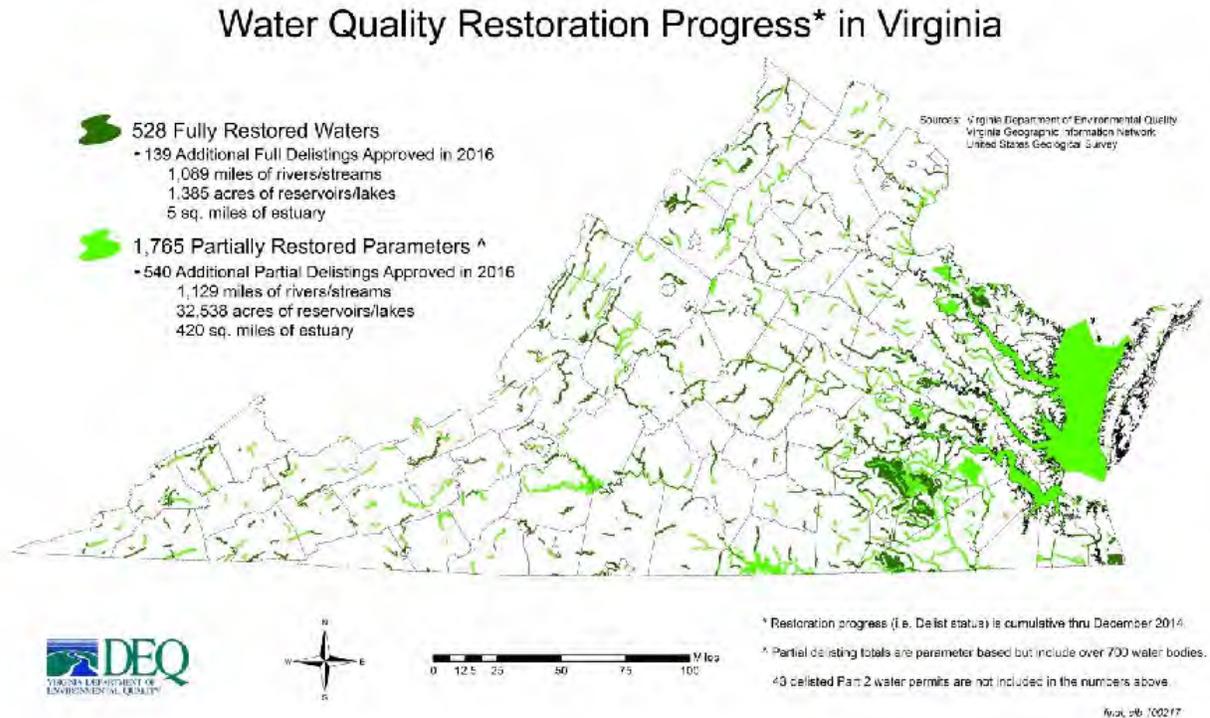


Appendix 1 provides the list of impaired waters, which can be visualized using DEQ’s mapping application found here: <http://www.deq.virginia.gov/ConnectWithDEQ/VEGIS.aspx>. Detailed assessment results at state-wide and basin-wide scales are found in Chapters 4.2 and 4.3, respectively. Chapter 4.6 provides the assessment results specific to the Chesapeake Bay and its tributaries.

Water Quality Improvements and Total Maximum Daily Loads

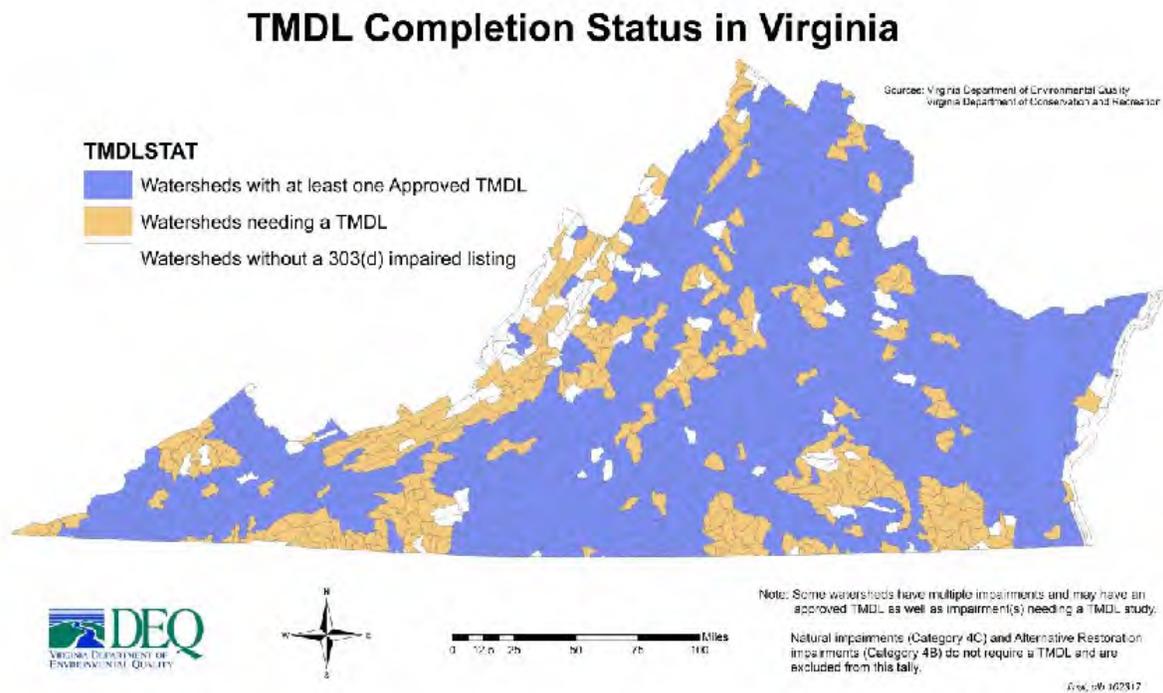
Water quality assessment also identifies those waters that were previously listed as impaired but now currently meet standards. Impairment causes of impaired waters are “delisted” from the 303(d) List of Impaired Waters after justification is provided to EPA, the proposed removal is announced to the public, and the removal is approved by EPA. An impairment can be delisted for a number of reasons. First, if a water quality standard is officially changed through rule-making, waters that previously failed that standard may now meet it. Second, if the assessment methodology for a particular standard has been modified, a water may now meet the standard. Third, a cause can be delisted if new data indicate that water quality standards are currently being attained. This can be the result of successful pollution control efforts, but sometimes the reason for recovery is unknown. For the 2016 assessment, DEQ has delisted 681 causes, tracked by waterbody size (see Figure B). The most common delisted impairment is dissolved oxygen. The decline in dissolved oxygen impairments since the 2014 IR can be partially attributed to improvements in DO concentration observed in lakes and in the tidal waters of the Chesapeake Bay during the 2012-2014 time period. See Appendix 3 for the list of waters with delisted impairments.

Figure B. Distribution of waters with causes that have been removed from the 303(d) List of Impaired Waters. (Full delists are waters in which all known impairments have been removed from the list).



Water quality assessment serves as the first step in the development of Total Maximum Daily Loads (TMDLs). TMDLs can be viewed as a “pollution diet” for a particular water, prescribing the maximum level (or “load”) of a pollutant that the water can handle before it violates water quality standards. To date, DEQ has completed 917 TMDLs. Most have been focused on eliminating bacteria impairments. Figure C shows the sub-watersheds where TMDLs have been developed or completed. Chapter 7.1 provides more information regarding DEQ’s TMDL program.

Figure C. Sub-watersheds containing TMDLs



Other Water Quality Information

Most of the information in this report pertains to the condition of surface waters (freshwater rivers, lakes/reservoirs, and estuaries). But surface water is only one component of Virginia's water resources. DEQ is charged with characterizing, protecting, and improving all waters. Chapters 6, 7.6, and 7.8 discuss programs focused on the protection of groundwater, coastal waters, and wetlands.

EPA defines threatened waters as those waters that are predicted to exceed water quality standards during the next 305(b) reporting cycle and therefore, considered needing a TMDL. DEQ believes impairment should be confirmed by current monitoring data, using rigorous assessment methodology, before scheduling TMDL development. However, DEQ does identify "at-risk" waters using probabilistic monitoring in freshwater, free-flowing wadeable streams (ProbMon). Chapter 4.4 and Chapter 4.5 provide the latest probabilistic survey results of Virginia's waters.

Modifications to assessment procedures since the 2014 Integrated Report (IR) are detailed in Part II of the [Final 2016 Water Quality Assessment Guidance Manual](#). The most notable change pertains to how waterbodies are prioritized for TMDL development. Chapter 7.2 discusses this new prioritization scheme.