

## EXECUTIVE SUMMARY

The primary objective of Virginia's water quality assessment program 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 violates a water quality standard. A water fails to support a designated use when it has one or more impairments.

Modifications to assessment procedures since the 2012 Integrated Report (IR) are detailed in the Part II of the [Final 2014 Water Quality Assessment Guidance Manual](#). The most notable changes are the addition of two new assessment categories. Category 4D, applicable only to segments impaired for dissolved oxygen and covered by the Chesapeake Bay TMDL, applies to waters where part(s) of a dissolved oxygen standard previously failed and currently meet, but other pertinent criteria have not been assessed due to insufficient information. Category 5R describes waters with an EPA-approved restoration plan that addresses specific impairment(s) and is expected to result in use attainment once implemented.

Since the last report, DEQ staff have updated the agency's Geographic Information System (GIS) layers to conform to the 1:24K USGS National Hydrography Dataset. The more accurate mapping has resulted in a 92% increase in the state's total stream mileage relative to estimates reported previously. This means there are also more unassessed stream miles. DEQ and its monitoring partners will continue incorporating these waters into future assessments.

This report provides the results of Virginia's water quality assessments during the time period January 1, 2007 through December 31, 2012, and satisfies the water quality reporting requirements of the Commonwealth of Virginia 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). In addition to educating the public about Virginia's water quality conditions, the information provided in this report is intended to be used as a tool in planning and management of waters in the Commonwealth.

### *Overview of Results*

Between January 2007 and December 2012 DEQ staff visited 4,328 stations located in Virginia's lakes/reservoirs, rivers, and estuaries. At these stations, DEQ collected 173,757 measurements of temperature, 149,247 measurements of pH, and 168,635 measurements of dissolved oxygen. 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.

The assessment status of the Commonwealth's designated uses, broken down by sub-watersheds, are summarized in Figure A and Table A. Sub-watersheds categorized as "Not Supporting" include waters that do not meet water quality standards, whether they have a TMDL assigned to them or not. Statewide, 6,450 stream miles, 19,458 acres of lakes/reservoirs, and 310 square miles of estuarine waters meet all assessed designated uses. The recreation use is impaired in the most number of sub-watersheds. Forty-seven percent of assessed rivers/streams (10,458 miles), 1% of assessed lake acres (1,118 acres)

Final 2014

and 3.7% of assessed estuarine waters (91 square miles) are impaired for this use. As shown in Figure B, elevated levels of the bacteria *Escherichia coli* (*E. coli*) is the most significant impairment for this use, mainly affecting rivers. Agricultural practices, urban runoff, leaking sanitary and storm sewers, and domesticated animals are major sources of *E. coli*. The aquatic life use is also not supported in a large number of sub-watersheds. Twenty-nine percent of assessed rivers/streams (6,479 miles), 43% of assessed lake acres (48,555 acres) and 86% of assessed estuarine waters (2,114 square miles) are impaired for this use. Low dissolved oxygen concentration (hypoxia) is the most important impairment of the aquatic life use. Nutrient enrichment, also known as eutrophication, causes 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 water does not support the aquatic life use. Detailed assessment results at state-wide and basin-wide scales are found in Chapters 4.2 and 4.3, respectively.

Waters of the Chesapeake Bay comprise most of the estuarine waters presented in this report. The aquatic life use in Bay waters is subdivided into special sub-uses. One such sub-use is the shallow-water submerged aquatic vegetation use. As the name suggests, this use supports conditions favorable to the growth and survival of submerged aquatic vegetation (SAV). SAV provides critical nursery habitat for blue crabs and fishes and prevents shoreline erosion. Reduced water clarity due to suspended sediments is the major cause of impairment for the shallow-water SAV use. Currently, 46% of the state's total SAV acreage goal has been met. Chapter 4.6 provides the assessment results specific to the Chesapeake Bay and its tributaries.

New impairments were identified in the 2014 assessment (904 waterbody-pollutant combinations) (see Table B). The increase can be partially attributed to dissolved oxygen impairments observed in the embayments of the Potomac River between the 2012 and 2014 reporting periods. There has also been a small decrease in the number of toxic impairments since the last assessment, the result of improving ammonia concentrations observed in Seacorrie Swamp (see below for more information about delisted impairments).

Appendix 1 provides the list of impaired waters, which can be visualized using DEQ's mapper application found here: <http://www.deq.virginia.gov/ConnectWithDEQ/VEGIS.aspx>.

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. Secondly, if assessment methodology for a particular standard has been modified, a water may now meet the standard. Thirdly, 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 typically the reason for recovery is unknown. A rationale for each delist candidate is submitted for EPA's approval before it is removed from the 303(d) list. For the 2014 assessment, DEQ has delisted 337 causes, tracked by waterbody size (see Figure C). The most common delisted impairment is bacteria. See Appendix 3 for the list of waters with delisted impairments.

Figure A. Attainment status of designated uses based on the number of 6<sup>th</sup> Order sub-watersheds assessed for those uses. Virginia has a total of [1,247 sub-watersheds](#). Note: A sub-watershed can contain both waters that support and do not support the same designated use.

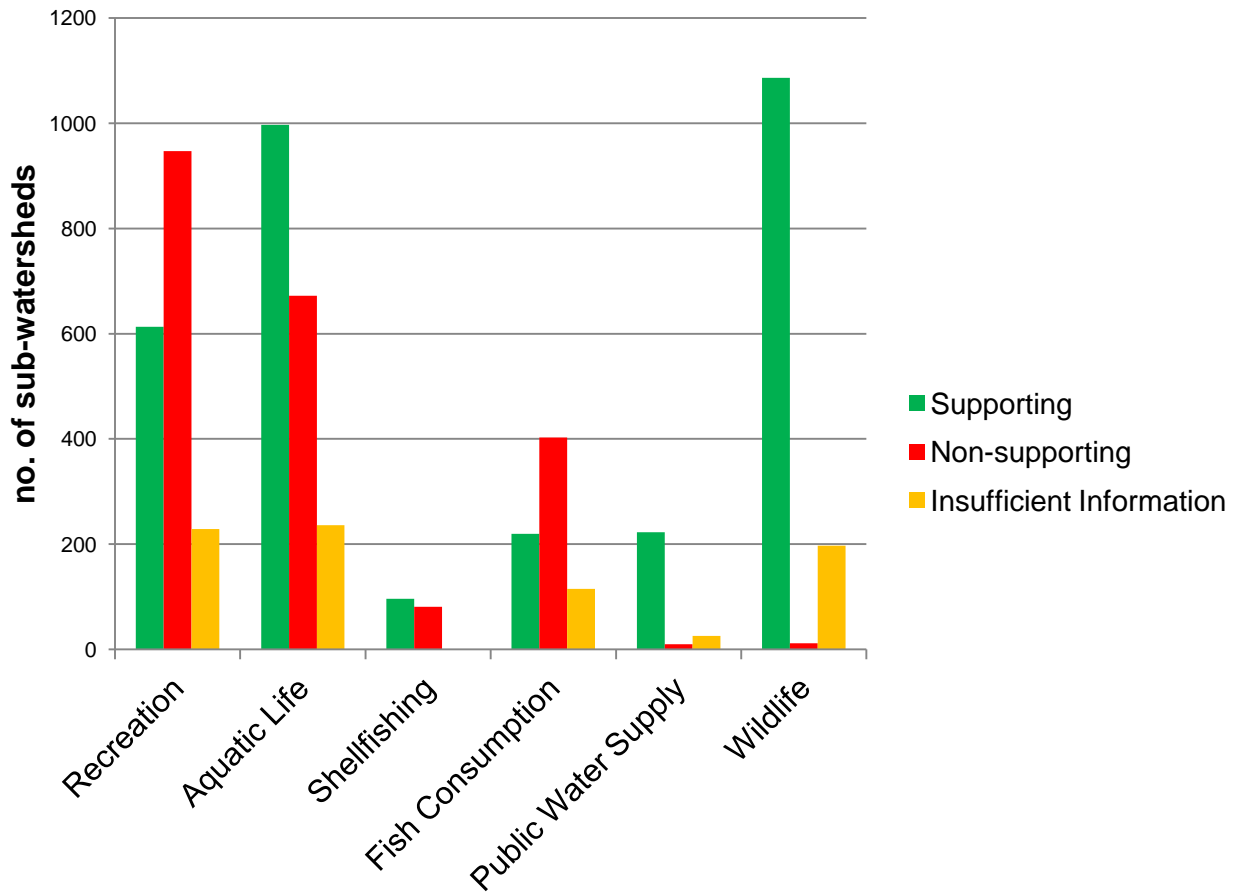
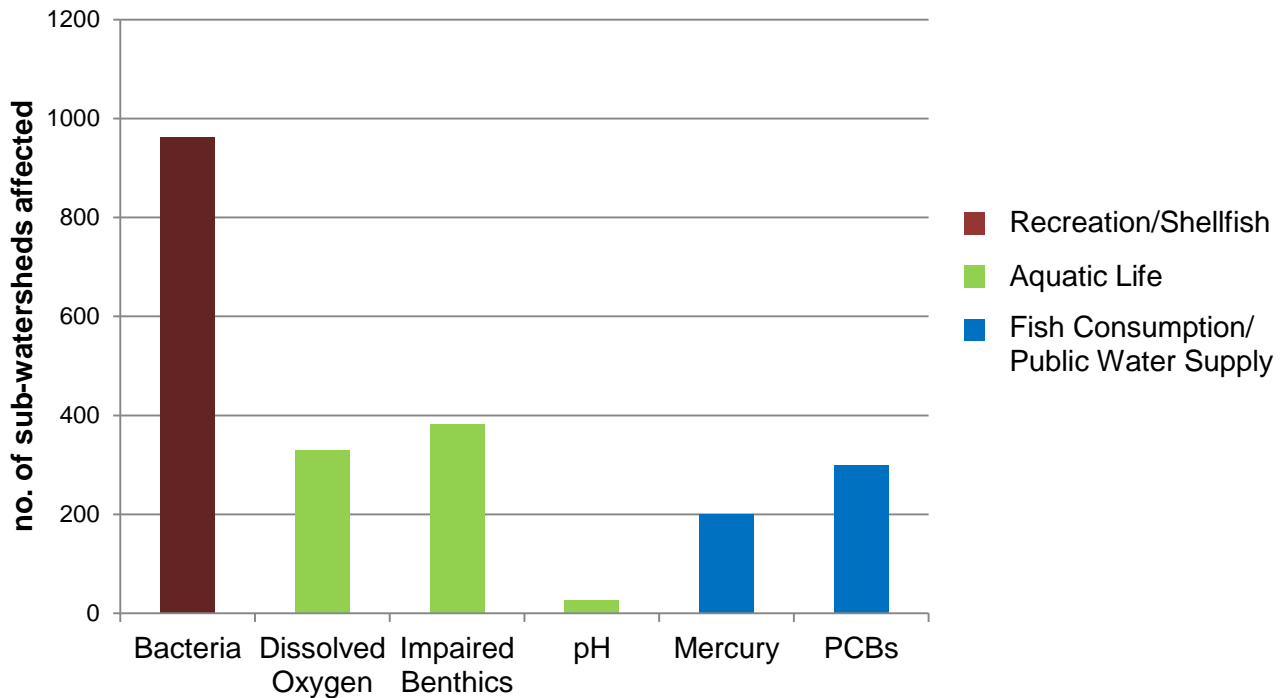


Table A. Overview of assessment results.

	Rivers (mi)	Lakes (acres)	Estuaries (sq mi)
<b>TOTAL</b>	100,927	117,179	2,836
<b>Impaired (% total)</b>	15,677 (16%)	94,764 (81%)	2,136 (75%)
<b>New Impaired (% total)</b>	528 (0.5%)	361 (0.3%)	4 (0.1%)
<b>Non-Impaired (% total)</b>	6,450 (6%)	19,458 (17%)	310 (11%)
<b>Not Assessed (% total)</b>	78,800 (78%)	2,967 (3%)	390 (14%)

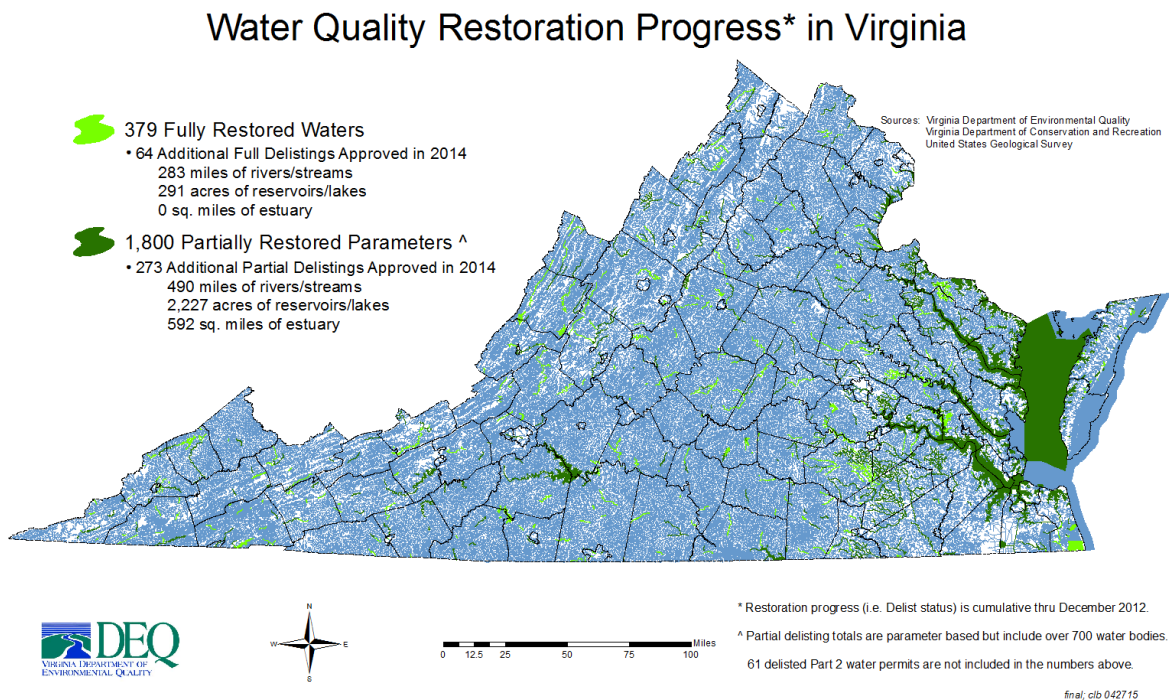
**Figure B. Common causes of designated use non-attainment.**



**Table B. Number of cumulative impairment listings (waterbody-pollutant combinations) reported in the 2012 and 2014 Integrated Reports. Differences between reporting periods reflect both proposed delistings and new impairments.**

Impairment Cause	2012 IR	2014 IR
Bacteria	2,249	2,412
Dissolved Oxygen	1,191	1,110
Benthic Community	693	732
pH	232	207
Toxics	1,273	1,271
All Other Impairments	957	1,092
<b>TOTAL</b>	<b>6,595</b>	<b>6,824</b>

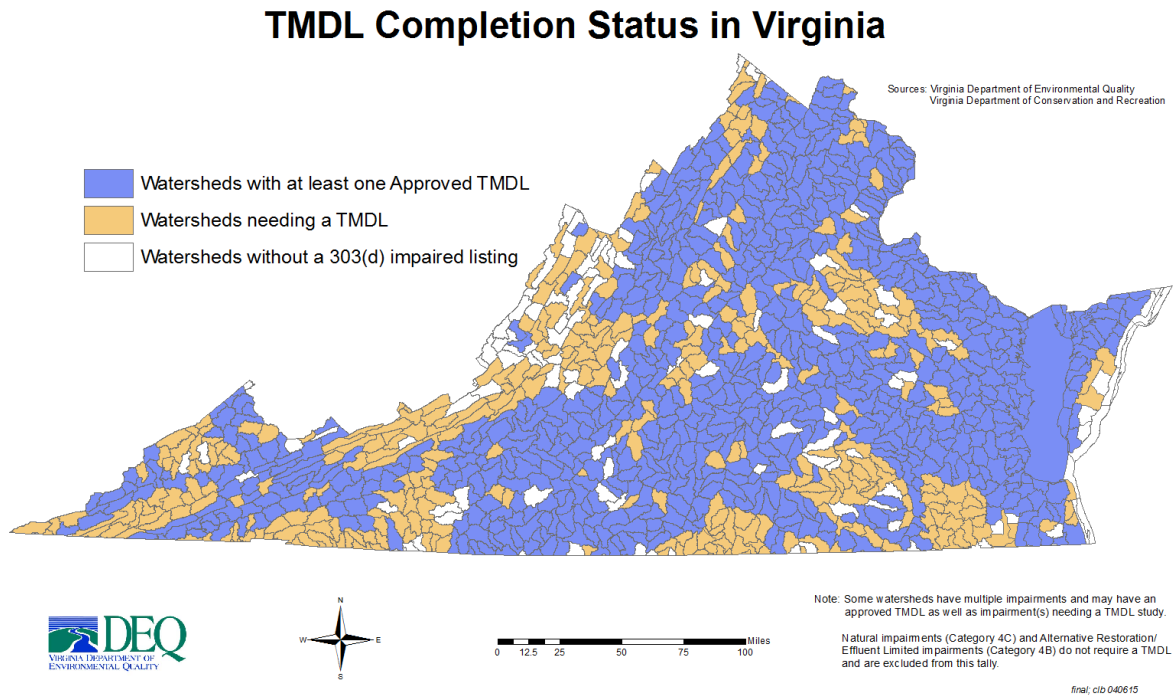
**Figure C. Distribution of waters with causes that have been removed from the 303(d) List of Impaired Waters. (Full delists are waters in which all known impairments have been removed from the list).**



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 or scheduled 959 TMDLs. Most have been focused on eliminating bacteria impairments. Figure D shows the sub-watersheds where TMDLs have been developed or completed. Chapter 7.1 provides more information regarding DEQ’s TMDL program.

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, 7.5, and 7.7 discuss programs focused on the protection of groundwater, coastal waters, and wetlands.

Figure D. Sub-watersheds containing TMDLs



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 provides the latest probabilistic survey results of Virginia’s waters.