REPORT OF THE SECRETARY OF NATURAL RESOURCES

FY 2021 CHESAPEAKE BAY AND VIRGINIA WATERS CLEAN-UP PLAN

TO THE GOVERNOR AND THE CHAIRMEN OF THE SENATE AGRICULTURE, CONSERVATION AND NATURAL RESOURCES COMMITTEE; THE HOUSE AGRICULTURE, CHESAPEAKE AND NATURAL RESOURCES COMMITTEE; THE SENATE COMMITTEE ON FINANCE; AND THE HOUSE COMMITTEE ON APPROPRIATIONS

COMMONWEALTH OF VIRGINIA
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Contents

Executive Summary

This report was developed to comply with consolidated water quality reporting requirements set forth in § 62.1-44.118 of the *Code of Virginia*. This section requires the Secretary of Natural Resources to submit a progress report on implementing the impaired waters clean-up plan as described in § 62.1-44.117 of the *Code of Virginia*. This consolidated report also includes the *"Annual Report on the Water Quality Improvement Fund"* by the Department of Conservation and Recreation (DCR) and Department of Environmental Quality (DEQ) pursuant to § 10.1-2134 of the *Code of Virginia* and incorporates the reports on "*Cooperative Nonpoint Source Pollution Programs"* required in subsection D of § 10.1-2127 and the *"Watershed Planning and Permitting Report"* required in subsection B of § 10.1-1193 of the *Code of Virginia*. The report also encompasses DCR's report of *"Annual Funding Needs for Effective Implementation of Agricultural Best Management Practices"* pursuant to subsection C of § 10.1-2128.1 of the *Code of Virginia*. The 2021 report includes the "*Water Quality Improvement Fund Requests Estimate Report"* required by § 10.1-2134.1 of the *Code of Virginia* and the "*Stormwater Local Assistance Fund Requests Estimates Report*" required by § 62.1-44.15:29.2 of the *Code of Virginia*. This consolidated report also includes the "*2014 Chesapeake Bay Watershed Agreement Progress Report: State of the Chesapeake Bay Program Report to the Chesapeake Bay Executive Council*," August 2021 as required in § 2.2-220.1. This consolidated report also addresses Item 361.A. in the 2018 Special Session I Budget for FY 2021 and FY 2022 in Chapter 2.

Water Quality Improvement Fund and Cooperative Nonpoint Source Pollution Programs

For FY 2021 (the period July 1, 2020 – June 30, 2021), DCR initially allocated $35.0 million in agricultural cost-share and $5.85 million in technical assistance funds to Soil and Water Conservation Districts. An additional $5.6 million in agricultural cost-share and $547,000 in technical assistance funds were allocated to Districts in December 2020. Finally, $500,000 in Conservation Reserve Enhancement Program (CREP) cost-share funds were available for disbursement to Districts as state match for new projects. Practices installed on farms during FY 2021 will result in estimated edge of field nitrogen reductions of approximately 10.9 million pounds, phosphorus reductions of approximately 4.0 million pounds, and sediment reductions of approximately 770,000 tons.

Under the Water Quality Improvement Fund (WQIF) Point Source Program, since 2006, 69 point source WQIF grant agreements obligating $798.7 million have been signed. The construction project grants range from 35% to 90% cost-share, for design and installation of nutrient reduction technology at Chesapeake Bay watershed point source discharges. The WQIF point source grants provide critical support for compliance with the nutrient discharge control regulations and achieving Chesapeake Bay nitrogen and phosphorus waste load allocations. Sixty-six of the projects have been completed and are operational. A summary of active construction grant projects is accessible via the DEQ WQIF webpage. For calendar year 2020, facilities registered under the Chesapeake Bay Watershed Nutrient Discharge General Permit reported discharged loads that, in aggregate, were significantly below the total Waste Load Allocations currently in effect for all Chesapeake Bay tributary basins. Tables of discharged and delivered loads for each individual facility and basin totals are available online from DEQ.

With nonpoint source funding made available through the WQIF, along with matching funds, DEQ has worked with local government and state agency partners to implement a wide range of actions to reduce nonpoint source pollution that contributes to water quality problems.

Although there has been no additional WQIF Nonpoint Source Program funding since 2016, implementation activities continue under a Request for Assistance (RFA) made available to local government (cities, towns, counties, Soil and Water Conservation Districts, and Planning District Commissions) and state agency applicants. DEQ continues to manage projects awarded through the $3.4 million RFA. These nonpoint source (NPS) pollution implementation projects are at various stages of completion.

Within the Chesapeake Bay Watershed, projects that maximize reduction of nitrogen, phosphorous or sediment were a funding priority. Projects with the highest pollution reduction relative to dollars requested were given priority. These projects implement pollution control actions that will have a significant and lasting impact on local and state water quality. After nearly four years of implementation, many projects are nearing completion. One project has been terminated and several projects have been completed. Overall, pollution reductions are expected to be in line with original reduction estimates.

Funding Needs for Effective Implementation of Agricultural Best Management Practices

The funding projections for the effective implementation of best management plans was determined using a revised formula for FY 2020 and future years. These projections for the Chesapeake Bay were developed based on a detailed analysis of practices identified in the Chesapeake Bay Phase III Watershed Implementation Plan (WIP). This included a review of progress made in implementing the WIP through 2019 and assumes the practices included in the WIP are implemented.

A revised estimate of $2.6 billion may be required from state and federal funds as well as farmer financial contributions to meet water quality goals. Approximately 40% of this total ($1.1 billion) could be needed from State sources, the vast majority of which is direct funding of the Virginia Agricultural Cost-Share (VACS) Program and support for Soil and Water Conservation Districts that implement the VACS program.

Actual FY 2021 allocations from state sources for implementation of agricultural best management practices (BMPs) had the following breakdown:

FY 2021 (Program Name – amount):

VACS Cost-Share program funding - $40.6 million

District Technical Assistance - $6.4 million

District Financial Assistance - $7.1 million

FY 2021 support figures exclude engineering support via DCR staff, IT support, and training assistance (*e.g.*, Conservation Planning Certification). These have been itemized separately.

Projected funding needs from state sources for implementation of agricultural BMPs through the FY 2020-2030 biennium are estimated in the 2021 Ag Needs Assessment Table on page 22. A comprehensive review of the VACS Program that began in 2019 has led to improved program efficiency, increased flexibility in agricultural practice standards and specifications, and other significant programmatic revisions. Additional efforts are focused on methods to improve tracking of voluntarily installed practices.

Chesapeake Bay and Virginia Waters Clean-Up Plan Report

During FY 2021, many strategies were implemented to reduce pollutants entering the Chesapeake Bay tributaries and Southern Rivers basins. Significant progress was made in reducing point source pollutant discharges from sewage treatment plants, installing agricultural BMPs with a continuing focus on livestock exclusion practices, the reissuance of administratively continued Phase 1 Municipal Separate Storm Sewer System (MS4) permits, and implementing revised Stormwater Management Regulations. Virginia agencies are wrapping up the 2020-2021 WIP milestones period and drafting the 2022-2023 WIP milestones. DEQ's five year 2019 Virginia Nonpoint Source Pollution Management Plan (drafted April 2019), was fully approved in March 2020, and the first annual report for this plan was submitted to EPA in February 2021.

In FY 2021, DEQ developed 10 Total Maximum Daily Load (TMDL) equations for small watersheds and completed two Implementation Plans covering 19 waterbody impairments. The NPS program has shifted its reporting window due to the limited availability of information; in FY 2020, a total of 223 small TMDL Implementation Watersheds saw BMP activity resulting in a total of 4,129 BMPs installed using a total of $22,921,761 of Federal and State funds as well as landowner contributions.

Chapter 1 - Annual Report on Water Quality Improvement Fund Grants

The purpose of the Virginia Water Quality Improvement Act of 1997 (the "Act") is "to restore and improve the quality of state waters and to protect them from impairment and destruction for the benefit of current and future citizens of the Commonwealth" (§ 10.1-2118 of the *Code of Virginia*). The Act created the Water Quality Improvement Fund (WQIF); its purpose is "to provide Water Quality Improvement Grants to local governments, soil and water conservation districts, state agencies, institutions of higher education and individuals for point and nonpoint source pollution prevention, reduction and control programs" (§ 10.1-2128.B. of the *Code of Virginia*). In 2008, the General Assembly created a sub-fund of the WQIF called the Virginia Natural Resources Commitment Fund (VNRCF) (§ 10.1-2128.1 of the *Code of Virginia*) that is to be used for agricultural BMPs and associated technical assistance.

During the 2013 General Assembly session, legislation was passed (Chapters 756 and 793 of the 2013 Acts of Assembly) which designated, effective July 1, 2013, the Virginia Department of Environmental Quality (DEQ) as the lead agency for nonpoint source programs in the Commonwealth in addition to its responsibility for point source programs. As such, DEQ has the responsibility to provide technical and financial assistance to local governments, institutions of higher education, and individuals for point and nonpoint source pollution prevention, reduction, and control programs. The Department of Conservation and Recreation (DCR) plays a role, providing technical and financial assistance to Soil and Water Conservation Districts, institutions of higher education, and individuals for nonpoint source pollution controls. Because of the nature of nonpoint source pollution controls, DEQ sought the assistance and support of other state agencies, such as the Department of Forestry and the Department of Mines, Minerals and Energy (since renamed the Department of Energy), to provide the necessary expertise and resources to implement the nonpoint source elements of the Act. DCR and DEQ continue to work cooperatively on nonpoint source water quality initiatives.

This report section fulfills a legislative requirement under § 10.1– 2134 of the Act for DEQ and DCR to report on the WQIF. Specifically, the mandate is for an annual report to be submitted to the Governor and the General Assembly specifying the amounts and recipients of grants made from the WQIF and pollution reduction achievements from these grants. Information on WQIF grants awarded is provided in this report, along with available data on pollutant reductions achieved and estimated pollutant reductions to be achieved from recently funded grant projects.

WQIF & VNRCF Nonpoint Source Programs

The WQIF and its sub-funds have served as the principal funding source for nonpoint source pollution control projects in Virginia. The goal of the nonpoint source grant component of the WQIF is to improve water quality throughout the Commonwealth and in the Chesapeake Bay by reducing nonpoint source pollution. Nonpoint source pollution is a significant cause of degradation of state waters. Within the Chesapeake Bay watershed, the immediate priority is to implement the Bay Total Maximum Daily Load (TMDL) Watershed Implementation Plans (WIP) developed by the Commonwealth and evaluated by the U.S. Environmental Protection Agency (EPA). The Chesapeake Bay Watershed Agreement, signed in 2014, renewed the commitments made in the 2010 TMDL to, "By 2025, have all practices and controls

installed to achieve the Bay's dissolved oxygen, water clarity/submerged aquatic vegetation and chlorophyll a standards as articulated in the Chesapeake Bay TMDL document.

For watersheds outside of the Chesapeake Bay watershed, the goal is to achieve measurable improvements in water quality, which can include nutrient and sediment reductions, as well as reduction of other pollutants including bacterial contamination. Other uses of grant funds may include providing protection or restoration of other priority waters such as those containing critical habitat, serving as water supplies, or that target acid mine drainage or other nonpoint source pollution problems.

DCR distributes the nonpoint WQIF and VNRCF funds pursuant to § 10.1-2132 of the *Code of Virginia.* This includes managing the allocation of funding to the Agricultural Cost-Share Program and the federally funded Conservation Reserve Enhancement Program (CREP). These funding sources also provided cost-share funds to Virginia Agricultural Cost-Share (VACS) program participants to fund 100% of the cost of implementing qualifying livestock stream exclusion BMPs. DEQ is responsible for soliciting applications for Water Quality Initiative grants and Cooperative Nonpoint Source Pollution Program Projects with local governments and managing the distribution of those nonpoint WQIF grants.

Agricultural Best Management Practices Cost-Share Program

Agricultural best management practices (BMPs) that are most effective in reducing excess nutrients and sediment from agricultural lands are implemented through the VACS program managed by DCR under the Virginia Soil and Water Conservation Board's (VSWCB) allocation policy and guidance. BMPs installed through the program must be implemented in accordance with the Virginia Agricultural BMP Manual. Virginia's 47 Soil and Water Conservation Districts (SWCDs or Districts) administer the local implementation of the VACS program with funding from DCR to cover the cost-share expenditures, the technical assistance to administer the program, and essential funding for district operations. State financial support for FY 2021 was $46 million.

Conservation Reserve Enhancement Program

WQIF and VNRCF funds support Virginia's commitment for participation in the U.S. Department of Agriculture's (USDA) Conservation Reserve Enhancement Program (CREP). Under the USDA-administered CREP program, which is implemented through the SWCDs, eligible landowners may receive cost-share incentives for eligible BMPs for restoration of riparian buffers and wetlands, as well as rental payments (up to 15 years) for removing environmentally sensitive land from agricultural production and planting grasses or trees that will improve water quality and waterfowl and wildlife habitat. Virginia doubled its cost-share contributions for the restoration of forested riparian buffers adjacent to both pastureland and cropland from July 1, 2015 – February 28, 2017. This enabled USDA Farm Service Agency to receive an additional $1 million with which to establish the Chesapeake Bay Incentive Payment for CREP participants within Virginia's portion of the Chesapeake Bay watershed. Due to limited CREP appropriations, DCR returned to a 25% state match of eligible cost for CREP contracts approved after March 1, 2017. However, additional funding for the state match has been appropriated during the biennium and the state match for CREP was increased to 35% effective as of July 1, 2019.

Water Quality Initiatives

In FY 2014, DEQ became the lead nonpoint source (NPS) agency in the Commonwealth. DEQ and DCR work collaboratively to fund water quality initiatives to manage other NPS pollution priority needs. These projects focus on priority, cost effective, and innovative initiatives that further advance Virginia's NPS programs and provide for measurable water quality improvements. These include initiatives with other state agencies, Soil and Water Conservation Districts, Planning District Commissions, local governments, educational institutions, and individuals on nonpoint source pollution reduction, education, research, and other NPS reduction activities such as acid mine land reclamation and nutrient management.

Nonpoint Source Pollution Program Projects with Local Governments

When funding is available, DEQ works cooperatively with local governments and agency partners to provide Water Quality Improvement Fund (WQIF) matching funds to reduce nonpoint source runoff that causes or contributes to local water quality problems. One project remains active from a 2016 Request for Assistance (RFA) made available for local governments (cities, towns, counties, Soil and Water Conservation Districts, and Planning District Commissions) and state agency applicants. The remaining project will be completed this year.

All completed projects met pollution reduction goals. These projects have achieved significant nitrogen, phosphorus, sediment and bacteria pollution reduction. Pollution reductions from these projects have had a significant and lasting beneficial impact on local and state water quality.

2021 WQIF & VNRCF Nonpoint Source Program Funds

Agricultural Cost-Share Allocations

DCR's emphasis for agricultural BMP implementation focuses on efficient nutrient and sediment reduction and includes priority practices such as cover crops, conservation tillage, nutrient management, livestock exclusion from streams, the establishment of vegetative riparian buffers, and animal waste facilities. Historical, annual cost-share totals are summarized below.

Annual state cost-share allocations are based upon the Agricultural Nonpoint Source Assessment and Virginia Soil and Water Conservation Board policy. Hydrologic units with the highest potential to contribute agricultural NPS pollution to surface and ground waters receive the highest amounts of cost-share funds. SWCDs then rank cost-share applications and fund those applications that will provide the greatest amount of local water quality benefit.

Table 1: Historical Cost Data for Agricultural BMPs Completed by Fiscal Year

Program Year	Actual BMP Cost	Total Cost-Share Paid	State Cost-Share Paid	Non-State Cost-Share Paid	Other Funding Amount	Farmer Cost Before Tax Credit	Tax Credit Amount Issued
1998	$6,576,958.87	$4,085,435.66	$3,147,431.74	$938,003.92	$326,658.37	$2,164,864.84	$416,228.26
1999	$5,912,593.56	$4,437,793.05	$4,026,364.92	$411,428.13	$213,063.44	$1,261,737.07	$350,507.40
2000	$13,661,495.61	$8,304,576.76	$8,243,830.83	$60,745.93	$906,150.61	$4,450,768.24	$825,714.15
2001	$15,919,568.08	$7,899,817.01	$6,526,498.00	$1,373,319.01	$2,572,224.08	$5,447,526.99	$810,499.22
2002	$23,091,963.14	$8,341,729.11	$6,578,518.07	$1,763,211.04	$6,506,805.74	$8,243,428.29	$889,771.88
2003	$13,732,546.23	$3,197,822.34	$2,364,969.91	$832,852.43	$4,936,562.95	$5,598,160.94	$985,532.19
2004	$10,016,920.07	$2,771,069.24	$2,391,617.08	$379,452.16	$3,333,439.92	$3,912,410.91	$535,905.53
2005	$11,204,651.14	$4,307,458.65	$3,681,507.66	$625,950.99	$2,207,948.41	$4,689,244.08	$603,939.92
2006	$19,319,573.82	$9,608,506.54	$8,866,687.43	$741,819.11	$2,837,266.06	$6,873,801.22	$856,540.66
2007	$24,533,967.91	$15,236,795.29	$14,198,592.16	$1,038,203.13	$3,524,256.32	$5,772,916.30	$935,415.38
2008	$24,452,862.62	$13,907,309.86	$12,867,038.10	$1,040,271.76	$3,154,319.66	$7,391,233.10	$1,060,397.79
2009	$31,350,056.35	$16,068,967.68	$15,211,981.85	$856,985.83	$5,893,277.13	$9,387,811.54	$1,327,632.62
2010	$36,830,652.05	$23,303,023.96	$22,338,647.13	$964,376.83	$4,448,722.71	$9,078,905.38	$1,433,947.46
2011	$17,775,578.95	$10,723,665.36	$10,275,734.34	$447,931.02	$1,933,530.72	$5,118,382.87	$974,444.39
2012	$32,201,441.80	$21,515,125.78	$21,304,282.41	$210,843.37	$2,834,009.50	$7,852,306.52	$1,387,328.32
2013	$36,822,386.74	$27,981,522.17	$27,678,172.36	$303,349.81	$3,990,091.06	$4,850,773.51	$1,072,903.48
2014	$39,720,443.49	$30,695,494.96	$28,676,566.52	$2,018,928.44	$3,975,330.01	$5,049,618.52	$971,193.35
2015*	$76,474,191.62	$64,291,193.29	$60,493,692.61	$3,797,500.68	$5,498,501.15	$6,684,497.18	$1,049,329.26
2016	$17,063,545.42	$10,277,328.02	$9,911,445.76	$365,882.26	$1,081,809.23	$5,704,408.17	$885,890.75
2017	$27,651,159.07	$18,269,937.08	$17,679,614.12	$590,322.96	$2,585,045.91	$6,796,176.08	$847,279.04
2018	$30,481,086.41	$16,960,678.17	$14,449,557.48	$2,511,120.69	$4,260,207.54	$9,260,200.70	$1,711,166.20
2019	$25,674,835.40	$17,482,770.12	$16,506,493.52	$976,276.60	$1,973,249.51	$6,218,815.77	$961,867.09
2020	$48,644,175.88	$39,762,256.58	$38,691,978.40	$1,070,278.18	$2,211,481.63	$6,670,437.67	$690,950.66
2021**	$29,410,248.69	$24,133,745.97	$23,990,706.77	$143,039.20	$393,301.08	$4,883,201.64	$145,565.52
State Totals	**$618,522,902.92**	**$403,564,022.65**	**$380,101,929.17**	**$23,462,093.48**	**$71,597,252.74**	**$143,361,627.53**	**$21,729,950.52**

*2015 figures will be adjusted each year as SL-6(T) BMPs that were obligated under the 100% SL-6 funding program are completed. Significant funding from FYs 2016 through 2021 was transferred to FYs 2013, 2014 and 2015 to cover 100% SL-6s.

**2021 figures do not include approved BMPs carried forward into FY 2022 that are awaiting completion.

Conservation Reserve Enhancement Program

The Virginia CREP program is divided into two regions. The Chesapeake Bay CREP targets Virginia's entire Chesapeake Bay watershed and is aiming to restore 22,000 acres of riparian buffers and filter strips and 3,000 acres of wetlands. The Southern Rivers CREP aims to restore 13,500 acres of riparian buffers and filter strips and 1,500 acres of wetland restoration. A summary of Virginia CREP cost-share assistance to farmers during the period from July 2000 to June 2021 is provided in the following table (Table 2).

Table 2: CREP Summary FY 2001-2021 by Drainage by Fiscal Year

Drainage	Fiscal Year	Total Cost Share Payment	Area Buffer Restored (acres)	Miles Stream Bank Protected
Chesapeake Bay	2001	$321,247.50	1325.90	50.76
Chesapeake Bay	2002	$1,460,044.46	5032.10	258.24
Chesapeake Bay	2003	$602,270.38	1716.10	164.05
Chesapeake Bay	2004	$331,743.07	1965.40	101.30
Chesapeake Bay	2005	$219,240.64	1130.50	77.93
Chesapeake Bay	2006	$237,156.47	1609.94	84.79
Chesapeake Bay	2007	$227,018.64	545.20	49.43
Chesapeake Bay	2008	$351,833.72	1468.04	94.66
Chesapeake Bay	2009	$467,225.79	1411.70	97.53
Chesapeake Bay	2010	$645,947.21	1580.80	81.54
Chesapeake Bay	2011	$444,625.29	575.50	50.67
Chesapeake Bay	2012	$477,040.35	442.00	51.81
Chesapeake Bay	2013	$129,214.22	159.00	11.65
Chesapeake Bay	2014	$115,096.92	176.90	6.94
Chesapeake Bay	2015	$115,683.77	99.40	12.62
Chesapeake Bay	2016	$425,530.86	200.58	23.33
Chesapeake Bay	2017	$437,166.55	131.84	21.65
Chesapeake Bay	2018	$124,649.53	71.53	14.88
Chesapeake Bay	2019	$35,274.75	13.16	2.92
Chesapeake Bay	2021*	$4,919.20	5.59	0.00
Chesapeake Bay Totals:		**$7,172,929.32**	**19,661.18**	**1,256.70**
Southern Rivers	2001	$275,966.34	606.80	41.98
Southern Rivers	2002	$1,011,454.63	2638.90	184.75
Southern Rivers	2003	$381,269.67	1964.40	102.79
Southern Rivers	2004	$391,879.34	1666.00	124.33
Southern Rivers	2005	$346,378.31	2207.90	145.18
Southern Rivers	2006	$226,432.45	1519.36	121.50
Southern Rivers	2007	$197,151.05	541.50	154.44
Southern Rivers	2008	$267,733.17	845.30	203.61
Southern Rivers	2009	$250,768.21	1787.96	98.33
Southern Rivers	2010	$388,281.49	481.00	42.73
Southern Rivers	2011	$343,089.67	295.70	28.56

Southern Rivers	2012	$405,606.84	535.10	33.90
Southern Rivers	2013	$271,355.39	516.18	23.69
Southern Rivers	2014	$244,332.22	151.80	28.69
Southern Rivers	2015	$314,990.14	228.10	28.78
Southern Rivers	2016	$670,504.24	225.90	30.29
Southern Rivers	2017	$624,115.05	247.81	31.41
Southern Rivers	2018	$247,877.41	87.58	19.60
Southern Rivers	2019	$100,550.01	64.84	5.95
Southern Rivers**	2020*	$50,494.01	14.67	0.78
Southern Rivers	2021*	$163,960.73	36.76	8.70
Southern Rivers Totals:		**$7,174,190.37**	**16,663.56**	**1,459.99**
Statewide Totals:		**$14,347,119.69**	**36,324.74**	**2,716.69**

*Note: Prior years' figures are adjusted each year as CREP practices that were previously obligated are completed.

**Due to the delay in restarting the CREP Program 2020 signups were significantly lower than previous years including no signups in the Chesapeake Bay drainage.

Strategic Water Quality Initiatives

Resource Management Plans

The Commonwealth's Resource Management Plan (RMP) Program provides a voluntary way to promote the use of BMPs that improve water quality and agricultural operations. RMPs are designed to encourage producers to implement a high level of BMPs to reduce pollution and to increase the producer's profitability, in many instances. By participating in the Program and fully implementing an RMP, the producer is considered to be in compliance with any new state nutrient, sediment and water quality standards for a period of nine years. As of July 31, 2021, 157 RMPs have been certified as fully implemented. The certified RMPs within the Chesapeake Bay watershed include nearly 35,000 acres. Nearly 70,000 additional acres within the Chesapeake Bay watershed are included in an RMP that is currently being implemented (i.e. not yet certified). There are more than 2,200 acres outside of the Chesapeake Bay watershed that are certified and approximately 7,000 acres are included in an RMP that is currently being implemented.

In July 2020, DCR began a direct pay initiative for RMP developers. Similar to the nutrient management direct pay initiative, direct pay does not require RMP developers to respond to a Request for Applications (RFA) but instead provides payment for RMP development on a first-come, first-served basis until available funding has been obligated. To date, 2,365 acres of RMPs have been developed through direct pay; $23,647 in payments have been made to RMP developers. Additional plans continue to be developed and certified using federal grant funds with an emphasis on certifying existing plans.

Livestock Stream Exclusion in Virginia

Through a sign up that ended June 30, 2015, DCR offered 100% grants for the SL-6 (Stream Exclusion with Grazing Land Management) practice to cost-share applicants. An SL-6 required the installation of a permanent fence, alternative watering systems, other features, and a minimum 35-foot vegetated buffer along streams. All participant applications received as part of this initiative have now been funded. As of

June 2019, partially due to a supplemental appropriation by the Virginia General Assembly of $5.2 million, a total of $93.1 million has been provided by the Commonwealth for this initiative. Nearly $50 million of this total has been provided to producers within Virginia's Chesapeake Bay watershed. Pollution reduction towards year 2025 WIP goals will result from approximately 5.5 million linear feet of stream bank protected and nearly 64,000 animal units in the Chesapeake Bay watershed that will be excluded (statewide, the impact would be almost 9.28 million linear feet of stream bank protected and over 112,000 animal units excluded) once all of the 100% reimbursed SL-6 practices have been installed. Only a few of the over 2,300 SL-6 practices funded by this initiative are not yet completed.

Starting in FY 2020, the VACS stream exclusion options were widely expanded, giving farmers a variety of cost-share options including continued funding for up to 100% of the practice cost based upon buffer width and contract lifespan (i.e. 5 to 15 years). Wide width buffers greater than or equal to 35 feet also receive a per acre buffer payment to incentivize the most invaluable practices. The wide variety of options and buffer payment should significantly increase farmer sign-ups when money is available. In FY 2021, a portable stream fencing practice will be eligible for state cost share for the first time.

Whole Farm Approach Pilot Project

DCR, with approval from the Virginia Soil and Water Conservation Board, developed a Whole Farm Approach (WFA) pilot project that began in 2019. This pilot allows a farmer to submit a single cost share application for a bundle of agricultural BMPs, including their choice of nutrient management, precision nutrient management, and cover crop practices; this significantly simplifies the process for the producer. This pilot has increased producer participation and provides information on all the BMPs implemented or installed on the agricultural operation, not just information on the BMPs funded by WFA. It has been successfully implemented in Essex, King and Queen, and King William counties and is now available in the Chesapeake Bay watershed portion of the Eastern Shore to farmers who have, or are willing to obtain, a Resource Management Plan (RMP). Of those participating in the Eastern Shore project it is anticipated that nearly 900 acres of existing RMPs will be certified and new RMPs will be written on more than 4,100 acres on the Eastern Shore.

Increased Tax Credit

Actions taken during the 2021 Special Session I (HB 1763 and SB 1162) both increased the tax credit amount a producer is eligible to claim for implementation or installing a BMP and created an enhanced tax credit for the implementation of agricultural BMPs that are part of an approved Resource Management Plan (RMP). The credit allows for 50% tax credit (up to a $50,000 cap) per entity for agricultural BMPs implemented on acreage included in a SWCD-approved RMP. For BMPs not included in an RMP, the producer is eligible to claim 25% (up to $25,000) of the total out-of-pocket expense of the implementation and installation of the BMP. The Virginia Department of Taxation administers an annual cap on these credits of $2 million (for all participants). This additional financial incentive may encourage more producers to implement RMPs on their operations.

Virginia Conservation Assistance Program

During the 2019 General Assembly Session, $1 million in state funds was provided to the Virginia Conservation Assistance Program (VCAP), which was established to assist the Commonwealth in meeting its reduction targets for urban and residential areas as established in the Chesapeake Bay TMDL, including localities with Municipal Separate Storm Sewer Systems (MS4). During the 2020 General Assembly Session, $500,000 was provided and an additional $1 million was provided during the 2021 Special Session I as well. VCAP provides cost-share and technical assistance to address natural resource and stormwater concerns by assisting in the voluntary installation of certain BMPs on land for which there is no other cost-share program assistance available. VCAP is also intended to retrofit existing infrastructure.

The Virginia Association of Soil and Water Conservation Districts administers VCAP. Virginia's Soil and Water Conservation Districts (Districts), with qualified, trained, and experienced staff, implement the voluntary stormwater BMPs and cost-share program for public, private, and non-profit landowners. Since March 2016, $4,316,596 has been allocated through VCAP and $336,000 has been provided for technical assistance from a total of $6,600,438 in grant funding. Projects have been completed across a wide variety of properties, with the support of partner agencies, educators, and contractors. Most practices are eligible for 75% cost share and some practices provide a flat incentive payment up to the cost of installation.

WQIF Point Source Program

Since 1998, 69 point source WQIF grant agreements obligating $798.7 million have been signed. The construction project grants range from 35% to 90% cost-share, for design and installation of nutrient reduction technology at Bay watershed point source discharges. The WQIF point source grants provide critical support for compliance with the nutrient discharge control regulations and achieving Chesapeake Bay nitrogen and phosphorus waste load allocations. Sixty-six of the projects have been completed and are operational.

Since its formation in 1998, the WQIF Point Source Program has received a total of $1.0595 billion in appropriations, bond proceeds, monetary assessments and accrued interest. Part of that total was in the General Assembly’s most recent WQIF point source commitment in FY 2020; authorization was given for up to $100 million in bonds to be issued to support point source nutrient reduction projects in the Chesapeake Bay watershed. Approximately $95.3 million of the $1.0595 billion total funding was used for 24 grants prior to the adoption of nutrient discharge control regulations in late 2005. A total of $4.01 million was awarded for 39 technical assistance grants, including Basis of Design Reports, Interim Optimization Plans, and startup support for the Nutrient Credit Exchange Association; all have been completed. In 2011, $3 million was set aside for the James River Chlorophyll Study, which has been completed with revised water quality criteria and assessment methods adopted by the State Water Control Board on June 27, 2019. EPA subsequently approved the new criteria and they became effective on January 6, 2020. A relatively small balance of WQIF funds remained after the James River Study ended and are targeted for the Virginia Institute of Marine Sciences for continued operation of the water quality model developed for the James River. The model is currently being used, with updated climate change factors, to test point source nutrient reduction scenarios and chlorophyll criteria attainment. An additional $250,000 was awarded in 2013 through a Technical Assistance grant to Chesapeake Environmental

Communications to expand the James River Modeling framework by incorporating water quality data collected from 2011 to 2013.

The balance of the WQIF grants have been awarded for the design and installation of nutrient reduction technology needed to meet the total nitrogen and total phosphorus waste load allocations assigned to the significant dischargers in the Chesapeake Bay watershed under the EPA–adopted Chesapeake Bay TMDL. As of June 30, 2021, the grant amount owed under existing, signed WQIF agreements was $8,614,011. It is projected that reimbursement requests for ongoing projects will be covered with available funding.

It should be noted that all grantees are obligated to complete their projects regardless of the amount of grant funds received. The Commonwealth commits to fully funding all projects, subject to the availability of funds.

Legislation enacted following the 2019 General Assembly session added the design and installation of certain wastewater conveyance infrastructure as an eligible project type for WQIF point source funding provided certain conditions established in the *Code of Virginia* are satisfied. DEQ drafted guidance for evaluating and implementing those projects with stakeholder input and provided the guidance for a 30-day public review period. No comments were received and the guidance became effective on August 15, 2021.

WQIF & Virginia Natural Resources Commitment Fund Nutrient Reductions

Estimated Nutrient Reductions from Nonpoint Source WQIF-Funded Projects

During FY 2021, WQIF and VNRCF funding supported agricultural BMPs that are expected to reduce edge of field nutrient and sediment losses by approximately 10.9 million pounds of nitrogen, 4.0 million pounds of phosphorus, and 770,000 tons of sediment (Table 3). CREP implementation is included in the above reductions. A table of nutrient and sediment reductions resulting from the implementation of agricultural BMPs is provided below.

Table 3: Historic Edge of Field Nutrient/Sediment Reductions Resulting from Agricultural BMP Implementation by Fiscal Year - State Funding Only

Fiscal Year	Total N Reduction (lbs./year)***	Total P Reduction (lbs./year)***	Total Soil Loss Reduction (tons/year)
1998	1,354,363.05	297,672.69	250,763.40
1999	765,068.08	144,671.63	145,329.12
2000	2,311,310.44	449,146.30	430,344.62
2001	1,507,850.97	377,639.65	240,639.43
2002	1,650,827.23	363,688.41	282,922.84
2003	1,156,889.80	269,886.84	185,871.04
2004	532,847.28	107,035.77	98,090.74
2005	1,189,873.36	268,783.48	200,792.54
2006	1,998,416.01	436,765.32	354,761.76
2007	4,696,217.54	1,507,301.39	475,458.12
2008	6,102,885.63	1,654,395.74	833,953.66

2009	4,491,208.64	1,181,760.91	609,756.72
2010	6,705,604.41	2,033,814.38	756,961.95
2011	5,991,018.43	1,778,493.12	835,843.71
2012	9,558,935.57	2,904,184.63	1,300,011.03
2013	10,250,752.75	3,084,918.50	1,384,853.19
2014	7,647,439.40	2,612,812.01	718,091.95
2015*	9,486,949.88	3,348,574.61	764,510.33
2016	7,545,792.75	2,928,824.17	439,399.38
2017	10,952,241.30	3,752,927.86	933,180.77
2018	9,620,709.70	3,180,064.17	899,033.39
2019	10,537,146.46	3,692,491.34	853,229.23
2020	14,411,350.61	5,205,497.89	1,107,782.61
2021**	10,908,675.75	3,997,985.21	770,537.66

*2015 figures will be adjusted each year as SL-6(T) BMPs that were obligated under the 100% SL-6 funding program are completed

**2021 figures do not include approved BMPs carried forward into FY 2022 that are awaiting completion

***Total N and P Reduction numbers now include estimates for Nutrient Management BMPs

Estimated Nutrient Reductions from Point Source WQIF-Funded Projects

To date, 66 of the 69 construction projects with signed grant agreements for the installation of nutrient reduction technology have initiated operation. With these projects coming on-line, annual nutrient loads discharged from wastewater plants in the Chesapeake Bay watershed have declined dramatically. From 2009 to 2020, annual nitrogen discharges were reduced by about 9,866,941 pounds; phosphorus annual loads were reduced by almost 798,445 pounds, exceeding the milestone commitments set in Virginia's WIP for both nutrients. Because of these ongoing nutrient control upgrades and facilities operating below their design capacity, point source loads continue to be below the allocations called for in the WIP and TMDL.

Chapter 2 – Water Quality Improvement Fund Requests Estimates Report

The Water Quality Improvement Fund (WQIF) is a special permanent, nonreverting fund established to provide Water Quality Improvement Grants in accordance with the provisions of the Virginia Water Quality Improvement Act of 1997. In accordance with § 10.1-2134.1 of the *Code of Virginia* the Department of Environmental Quality (DEQ), in consultation with stakeholders, including representatives of the Virginia Association of Municipal Wastewater Agencies (VAMWA), local governments, and conservation organizations, is required to annually determine an estimate of the amount of Water Quality Improvement grant funding expected to be requested by local governments for projects that are related to point source pollution and are eligible for grant funding. For the fiscal years (FY) 2022 to 2026, an estimate of $449 million may be required from state funds as well as locality financial contributions to meet water quality goals. Approximately 60% of this total ($279 million) could be needed from the WQIF.

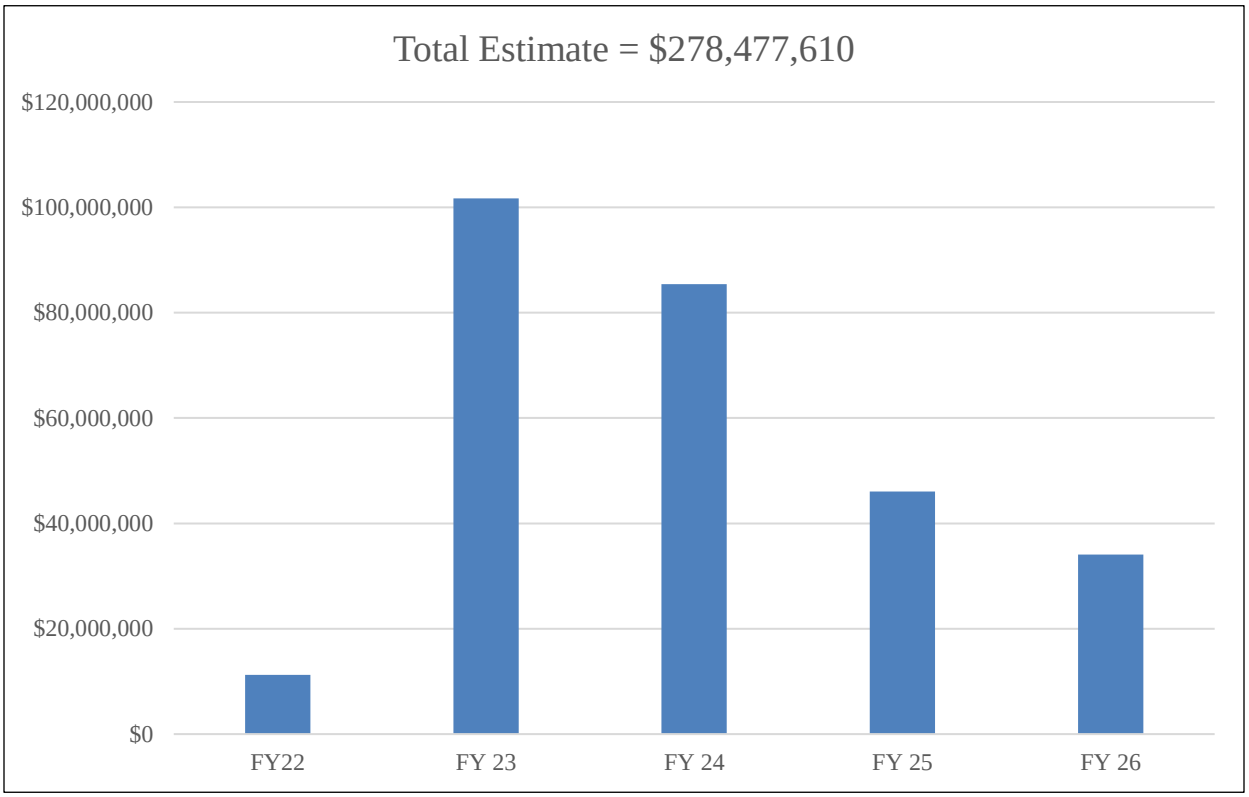


Figure 1: WQIF Needs Survey Results (FY 2022 – FY 2026)

The methodology for estimating the amount of WQIF grant funding expected to be requested by local governments was established by DEQ in consultation with wastewater stakeholders from VAMWA. An electronic survey was created in consultation with stakeholders and distributed to significant dischargers in the Chesapeake Bay watershed. The survey requested general information, programmatic information and total project cost with no time horizon. General information included facility name and contact information. Programmatic information was requested on future WQIF funding needs over a five year

time horizon (FY 2022 to FY 2026). This timeframe was selected because it generally aligns with the time horizons of typical Capital Improvement Plans (CIP). Total estimated project costs were also requested with no specified time horizon. This amount is assumed to include costs needed for the entire project beyond FY 2026.

A total of 19 survey responses from seven prospective grantees were received identifying a programmatic funding need over the five-year time horizon and total project costs. Programmatic funding need amounts were then multiplied by the estimated eligible grant percentage for each survey respondent to determine the WQIF eligible funding need. The grant percentage from the previous WQIF grant for each locality was utilized for the calculation. Total estimated project costs were also multiplied by the estimated eligible grant percentage for each locality to determine the total WQIF eligible funding need.

The eligible project costs for those anticipating to request WQIF funds total $448,539,600 through FY 2026. Based on the estimated eligible grant percentage for each respondent, the amount of programmatic WQIF point source funding needed through FY 2026 is $278,477,610. The following is a breakdown of WQIF point source funding need by fiscal year:

FY 2022 – $11,225,100
FY 2023 – $101,703,100
FY 2024 – $85,450,035
FY 2025 – $46,036,875
FY 2026 – $34,062,500

These amounts include estimated WQIF funding needed for facilities to complete projects necessary to meet permit limits under the Enhanced Nutrient Removal Certainty (ENRC) Program established in § 62.1-44.19:14 of the *Code of Virginia* (2021 Special Session I Va. Acts Chs. 363 and 364). WQIF funding needs identified for ENRC Program projects total $250,480,000 through FY 2026. Additionally, needs were included for upgrades that could potentially be required at publicly owned treatment works discharging in the Tidal Fresh or the Above the Fall Line portions of the James River if phosphorus waste load allocations are reduced. These funding needs identified in the survey total $4,141,235 over the 5 year survey period.

Table 1: 2021 WQIF Needs Survey Results

WQIF Grants	2022	2023-2024 Biennium		2025-2026 Biennium		Total Need (FY22 - FY26)
	FY22	FY23	FY24	FY25	FY26	
Applicant	$11,225,100	$101,703,100	$85,450,035	$46,036,875	$34,062,500	$278,477,610
TOTALS	**$11,225,100**	**$187,153,135**		**$80,099,375**		**$278,477,610**

The total estimated project costs identified by survey respondents both within and beyond the FY 2022 to FY 2026 time horizon is $2,235,448,000. Of that total, the amount of WQIF eligible project costs is estimated to be $619,789,600. Based on the estimated eligible grant percentage for each survey

respondent, the amount of WQIF point source funding needed with no specified time horizon totals $381,040,110. The portion of WQIF point source funding needed for ENRC Program projects with no specified time horizon totals $352,480,000.

Table 2: 2021 WQIF Needs Survey Results - Total Project Costs (no time horizon)

Est Total Project Costs	WQIF Eligible Project Costs	Est Eligible Grant Amount
$2,235,448,000	$619,789,600	$381,040,110

In order to improve upon the data collection methods, DEQ, with stakeholder participation, intends to re-evaluate the methodology utilized to determine the estimate of WQIF point source grant requests prior to conducting the needs assessment next year. Based on feedback received during stakeholder engagement conducted this year, the survey format will remain consistent, with updated questions relating overall need to new regulatory possibilities.

Chapter 3 – Stormwater Local Assistance Fund (SLAF) Requests Estimates Report

The purpose of the Stormwater Local Assistance Fund (SLAF) is to provide matching grants to local governments for the planning, design, and implementation of stormwater best management practices (BMPs). In accordance with § 62.1-44.15:29.2 of the *Code of Virginia* the Department of Environmental Quality (DEQ), in consultation with stakeholders, including representatives of the Virginia Municipal Stormwater Association (VAMSA), local governments, and conservation organizations, is required to annually determine an estimate of the amount of stormwater local assistance matching grants expected to be requested by local governments for projects that are related to planning, designing, and implementing stormwater BMPs that are eligible for funding from the SLAF. For fiscal years (FY) 2022 to 2026, it is estimated that $189 million could be requested from the SLAF program. Because the SLAF is a matching grant program, this total represents up to 50% of the total funds expended on stormwater best management practices, with the other portion being made up by financial contributions from localities.

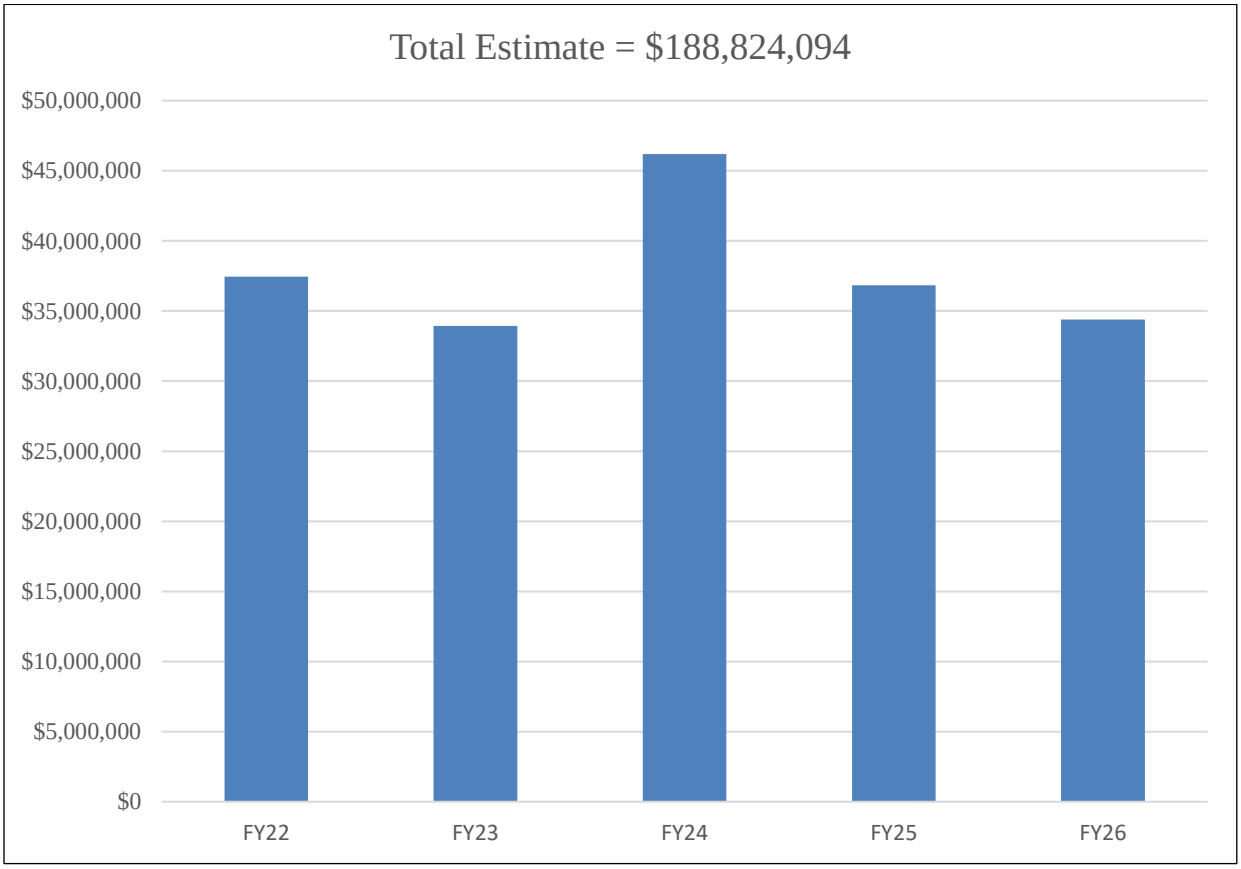


Figure 1: 2021 SLAF Needs Survey Results (FY 2022 – FY 2026)

The methodology for estimating the amount of stormwater local assistance matching grants expected to be requested by local governments was established by DEQ in consultation with stormwater stakeholders, including VAMSA, Virginia Municipal League (VML), Virginia Association of Counties (VACO), Chesapeake Bay Foundation (CBF), Northern Virginia Regional Commission (NVRC), Hampton Roads

Planning District Commission (HRPDC) and the James River Association (JRA). An electronic survey was created in consultation with these stakeholders and distributed to localities. The survey requested general, programmatic and project specific information from localities. General information included the locality name and contact information. Programmatic information was requested on future SLAF funding needs over a five year time horizon (FY 2022 to FY 2026). This timeframe was selected because it generally aligns with the time horizons of typical local Capital Improvement Plans (CIP) and Municipal Separate Storm Sewer System (MS4) Permit TMDL Action Plans. Project specific information supporting the FY 2022 SLAF funding need was requested based on the assumption that planning or design information would be available for projects that are likely to be the subject of an FY 2022 SLAF grant application.

A total of 27 responses to the survey were received with varying levels of completeness. Duplicate responses and responses containing no numerical data or all zeros were removed from the data. A total of 19 localities identified a programmatic funding need over the five-year time horizon. Responses from 15 of those localities identified project specific funding needs for FY 2022. Of the survey respondents that identified a programmatic need, all are regulated as MS4s.

The total amount of SLAF funding needed through FY 2026 to fund all needs identified in the survey is $188,824,094. The following is a breakdown of funding need by fiscal year:

FY 2022 – $37,445,257
FY 2023 – $33,945,245
FY 2024 – $46,193,667
FY 2025 – $36,842,425
FY 2026 – $34,397,500

Table 1: 2021 SLAF Needs Survey Results

Applicant	FY 2022	2023-2024 Biennium		2025-2026 Biennium		Total Need
	FY22*	FY23	FY24	FY25	FY26	
Regulated	$37,445,257	$33,945,245	$46,193,667	$36,842,425	$34,397,500	$188,824,094
Unregulated	$0	$0	$0	$0	$0	$0
FY Totals	$37,445,257	$33,945,245	$46,193,667	$36,842,425	$34,397,500	$188,824,094
TOTALS	**$37,445,257**	**$80,138,912**		**$71,239,925**		**$188,824,094**

* Need amount for FY22 was taken from FY22 programmatic data.

For the FY 2022 funding need, four localities either did not provide project specific data or provided programmatic and project specific data that were inconsistent. The total funding need of regulated localities for FY 2022, when calculated based on the FY 2022 input in the project specific section, is $37,296,147. Using programmatic data, the total FY 2022 need is $37,445,257. Because the programmatic data for regulated localities represents the most complete data set, this figure was used to determine the anticipated total need for FY 2022 of $37,445,257.

In order to improve upon the data collection methods, DEQ, with stakeholder participation, intends to re-evaluate the methodology utilized to determine the estimate of SLAF grant requests prior to conducting the needs assessment next year. Based on feedback received during stakeholder engagement conducted this year, the survey format will remain consistent in order to allow for multi-year comparisons.

Chapter 4 - Annual Funding Needs for Effective Implementation of Agricultural Best Management Practices

In accordance with subsection C of § 10.1-2128.1 of the Water Quality Improvement Act, the Department of Conservation and Recreation (DCR), in consultation with a stakeholder advisory group (SAG), including representatives of the agricultural community, the conservation community, and the Soil and Water Conservation Districts, determines the funding needs for effective Soil and Water Conservation District technical assistance and implementation of agricultural best management practices (BMPs). Pursuant to § 2.2-1504 of the *Code of Virginia*, DCR must provide to the Governor the annual funding amount needed for each year of the ensuing biennial period. For tFiscal Years (FY) 2020– 2030 a revised estimate of $2.64 billion may be required from state and federal funds as well as farmer financial contributions to meet water quality goals (Figure 1 and Table 1). Approximately 40% of this total (nearly $1.1 billion) could be needed from State sources, the vast majority of which is direct funding of the Virginia Agricultural Cost-Share (VACS) Program and support for Soil and Water Conservation Districts (SWCDs or Districts) that implement the VACS program.

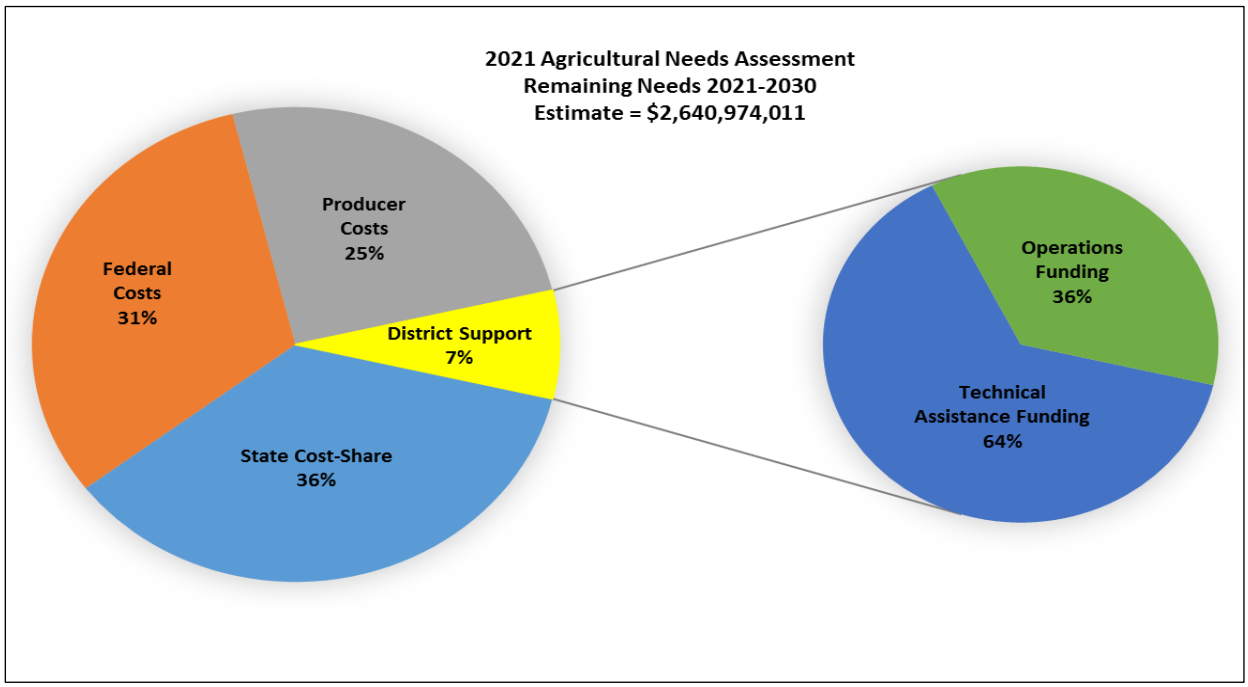


Figure 1: 2021 Agricultural Needs Assessment Summary[1]

Virginia's Phase 3 Chesapeake Bay Total Maximum Daily Load Watershed Implementation Plan (WIP III) was finalized on August 23, 2019. It includes projections through 2025 for bBMPs. The methodology

[1]The pie chart reflects progress made against the WIP commitment from FY2019.

for the Agricultural Needs Assessment was revised in 2019 to accurately reflect the commitments made by Virginia in WIP III. Although Virginia made excellent progress towards the 2025 nutrient reduction goals as of the 2017 midpoint assessment, a significant increase in agricultural BMP implementation is needed, most notably for nutrient management on cropland, cover crops, animal waste storage, poultry litter transport, conservation planning, including Resource Management Plans, both grass and forested riparian buffers, and additional livestock stream exclusion. Using BMP cost data from Virginia and where BMP data was lacking in Virginia, from the Chesapeake Bay Program, the following table shows the revised funding needs for agricultural BMP implementation. These funding needs are based on Commonwealth-specific estimated costs and Commonwealth-specific BMP standards and specifications.

For the Southern Rivers areas, the needs assessment is based on the Chesapeake Bay annual cost estimates and a revised split of 70% to the Chesapeake Bay watershed and 30% to lands outside of the Chesapeake Bay watershed (the Southern Rivers watershed). Recognizing that implementation in the Southern Rivers is not affected by the 2025 deadline associated with the Chesapeake Bay TMDL, the comparison showed that using the revised 70/30 split as an approximation of the long term Southern Rivers implementation needs is sufficient. As additional TMDL implementation plans are developed in the Southern Rivers area, this analysis will be reevaluated.

The total annual implementation costs are then divided between the various funding sources: Federal (35% [assumed]), State (40%) and Agricultural Producer (25%). The cost of resource management plan development, using contractors, is currently estimated to average $150,000 per year in the Chesapeake Bay watershed and $50,000 per year in the Southern Rivers; however, this is expected to increase closer to 2025. This has been excluded from the revised agricultural needs assessment.

FY 2021 CHESAPEAKE BAY AND VIRGINIA WATERS CLEAN-UP PLAN

Table 1: 2021 Agricultural Needs Assessment – Biennial Needs Summary with All Data

2021 Agricultural Needs Assessment - Biennial Needs Summary with All Data

Estimated Costs		2021-2022 Biennium		2023-2024 Biennium		2025 Target Year					
2019-2025	**FY19 Funding***	**FY20 Funding***	**FY 21 Funding***	**FY22 Funding****	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
CHESAPEAKE BAY STATE COST SHARE	**$14,384,534**	**$39,486,279**	**$26,466,959**	**$55,462,408**	**$85,474,977**	**$90,833,673**	**$96,192,369**	**$84,777,337**	**$84,777,337**	**$54,814,704**	**$54,814,704**	**$54,814,704**
CHESAPEAKE BAY TECHNICAL ASSISTANCE	**$2,141,348**	**$6,367,656**	**$3,883,068**	**$6,922,500**	**$11,111,747**	**$11,808,377**	**$12,505,008**	**$11,021,054**	**$11,021,054**	**$7,125,912**	**$7,125,912**	**$7,125,912**
CHESAPEAKE BAY PRODUCER PORTION				$40,705,491	$44,054,676	$47,403,861	$50,753,046	$52,985,836	$52,985,836	$34,259,190	$34,259,190	$34,259,190
CHESAPEAKE BAY FEDERAL PORTION	**$15,960,273**	**$15,401,409**	**$52,799,496**	**$53,362,527**	**$58,051,386**	**$62,740,286**	**$67,429,104**	$74,180,170	$74,180,170	$47,962,866	$47,962,866	$47,962,866
OCB STATE COST SHARE	**$9,613,603**	**$17,608,120**	**$12,697,099**	**$22,449,087**	**$37,072,304**	**$39,368,888**	**$41,664,672**	**$36,333,144**	**$36,333,144**	**$23,492,016**	**$23,492,016**	**$23,492,016**
OCB TECHNICAL ASSISTANCE	**$1,431,125**	**$2,890,794**	**$1,966,931**	**$2,827,500**	**$4,819,400**	**$5,117,955**	**$5,416,407**	**$4,723,309**	**$4,723,309**	**$3,053,962**	**$3,053,962**	**$3,053,962**
OCB PRODUCER PORTION				$17,445,210	$44,054,676	$47,403,861	$50,753,046	$22,708,215	$14,682,510	$14,682,510	$14,682,510	$14,682,510
OCB FEDERAL PORTION	**$18,964,850**	**$19,008,462**	**$21,921,475**	**$17,795,647**	**$21,814,669**	**$23,824,180**	**$25,833,691**	$31,791,501	$31,791,501	$20,555,514	$20,555,514	$20,555,514
SWCD OPERATIONS FUNDING	$7,191,091	$7,191,091	$7,191,091	$7,191,091	$7,191,091	$7,191,091	$7,191,091	$7,191,091	$7,191,091	$7,191,091	$7,191,091	$7,191,091
	State cost share excludes CREP, poulty litter transport, and Resource Management Plans		** Difference between proposed FY22 state cost share funding compared to FY22 need has been included as an average increase in need for FY23 - FY25 * Actual federal funding in FFY19 & 20 has been updated and adjusted the federal need for FY21 - 25. * Actual federal FFY21 funding through September 2021, will also cause adjustments to FY22 - FY25.									
TOTALS	$69,686,824	$107,953,811	$126,926,119	**$224,161,461**	**$313,644,925**	**$335,692,172**	**$357,738,433**	**$325,711,657**	**$317,685,951**	**$213,137,765**	**$213,137,765**	**$2,640,974,011**
												FY21 - FY30
Cost of BMPs Needing Single Implementation	**$1,001,597,677**		**$735,467,346**		**TOTAL OCB BMP COST**							
2019 - 2030 In ChesBay				**Lump Sum**	**2019 - 2030 using 70/30 split**							
***Annual BMP Portion at 100% implemented**	**$89,311,600**	**FY26…30**						Revised state cost share and technical assistance needs and federal				
*Annual BMPs averaged approx. 17% of WIP FY18 - 20								funding need will be adjusted annually based on actual budgets				
*Annual BMPs increase FY21 - 26 to 30%, 45%, 60%, 75%, 90%, 100%			**per year cost**									
Stream Exclusion BMPs	**$ 524,346,077**	**FY21 - 27**	**$74,906,582**									
Animal Waste	**$ 346,727,680**	**FY21 - 30**	**$34,672,768**									
Cost of Other Non-Annual BMPs	**$126,463,570**	**FY21 - 30**	**$12,646,357**									
****Animal Mortality Composters**	**$ 4,060,350**	**FY21 - 30**	**$406,035**									
STATE TECHNICAL ASSISTANCE 13% OF STATE SHARE ONLY												
AG BMP FUNDING NEEDED TO MEET WIP III	**FY21**	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28 - FY30**				
CHESAPEAKE BAY 1X BMP COST	**$122,631,742**	**$122,631,742**	**$122,631,742**	**$122,631,742**	**$122,631,742**	**$122,631,742**	**$122,631,742**	**$47,725,160**				
CHESAPEAKE BAY ANNUAL BMP COST	**$26,793,480**	**$40,190,220**	**$53,586,960**	**$66,983,700**	**$80,380,440**	**$89,311,600**	**$89,311,600**	**$89,311,600**				
CHESAPEAKE BAY STATE SHARE 40%	$59,770,089	$65,128,785	$70,487,481	$75,846,177	$81,204,873	$84,777,337	$84,777,337	$54,814,704	Cost share needs based on WIP			
CHESAPEAKE BAY PRODUCER PORTION 25%	$37,356,306	$40,705,491	$44,054,676	$47,403,861	$50,753,046	$52,985,836	$52,985,836	$34,259,190	calculated in 2019			
CHESAPEAKE BAY FEDERAL PORTION 35%	$52,298,828	$56,987,687	$61,676,546	$66,365,405	$71,054,264	$74,180,170	$74,180,170	$47,962,866				
TOTAL OCB BMP COST	**$64,039,381**	**$69,780,841**	**$75,522,301**	**$81,263,761**	**$87,005,221**	**$90,832,861**	**$90,832,861**	**$58,730,040**				
OCB STATE SHARE 40%	$25,615,752	$27,912,336	$30,208,920	$32,505,504	$34,802,088	$36,333,144	$36,333,144	$23,492,016	Cost share needs based on 30%/70%			
OCB PRODUCER PORTION 25%	$16,009,845	$17,445,210	$18,880,575	$20,315,940	$21,751,305	$22,708,215	$22,708,215	$14,682,510	WIP need calculated in 2019			
OCB FEDERAL PORTION 35%	$22,413,783	$24,423,294	$26,432,805	$28,442,316	$30,451,827	$31,791,501	$31,791,501	$20,555,514				
*Annual BMPs include cover crops, nutrient management, poultry litter transport												
** Animal mortality composters at 15 per year averaging $27069 each												

DCR now has two Professional Engineers (PE) and two Engineering Specialist to assist SWCDs and farmers. A second Engineering Specialist was hired in FY 2020. The total cost is now part of the DCR budget and therefore has been excluded from the revised agricultural needs assessment.

A study committee established in 2012 and continued in 2013 supported the concept that a base "technical assistance funding" amount should be added to the administrative and operational funding support provided by the General Assembly and the total amount should be considered base funding. This base funding would include administrative and operational support including Directors' travel, resource management plan support, environmental education support, dam maintenance, and a baseline amount for technical assistance staff.

In 2017, a stakeholder advisory group was established pursuant to the Appropriation Act. The stakeholder group was charged with evaluating methods to stabilize the fluctuations in funding for agricultural best management practices. One of the recommendations of the stakeholder group was that the VACS program be maintained at a minimum $35 million baseline funding level. If the VACS Program received $35 million in funding, Districts would need a minimum of $4.55 million in technical assistance funding to provide adequate technical assistance to agricultural producers.

During the 2020 General Assembly, a base technical assistance amount of $4.55 million was provided to Districts as part of the Districts' reoccurring base budget. This budget action recognized consistent funding is necessary for Districts to adequately provide technical assistance to their agricultural producers.

Chapter 5 - Chesapeake Bay and Virginia Waters Clean-up Plan Report

This chapter is submitted to fulfill the progress reporting requirements of §§ 62.1-44.117 and 62.1-44.118 of the *Code of Virginia* which calls on the Secretary of Natural and Historic Resources to plan for the cleanup of the Chesapeake Bay and Virginia's waters designated as impaired by the U.S. Environmental Protection Agency (EPA). This chapter also incorporates the reports on "*Cooperative Nonpoint Source Pollution Programs"* required in subsection D of § 10.1-2127 and the *"Watershed Planning and Permitting Report"* required in subsection B of § 10.1-1193 of the *Code of Virginia*.

Upgrades to wastewater treatment facilities in the Chesapeake Bay watershed

2021 Progress Report

Nutrient load reductions from the point source sector have been the most reliable reductions achieved under the Chesapeake Bay Total Maximum Daily Load (TMDL). Significant dischargers are regulated under the Chesapeake Bay Watershed Nutrient Discharge General Permit. The general permit includes wasteload allocations (WLAs) and schedules of compliance when necessary to phase in the necessary treatment facility upgrades. The general permit also allows point sources to trade nutrient credits so that facility upgrades can be phased in over a number of years while still meeting TMDL nutrient reduction goals. The permit was first issued on January 1, 2007 and reissued as of January 1, 2012 and January 1, 2017. Upgrades implemented to date have reduced the annual point source nutrient load delivered to the Chesapeake Bay and tidal rivers by approximately 10 million pounds of nitrogen (50% reduction) and 647,000 pounds of phosphorus (47% reduction) compared to the 2009 loads.

The current Chesapeake Bay Watershed General Permit includes additional nutrient reductions for significant dischargers in the James River basin (nitrogen and phosphorus) as required by the Chesapeake Bay TMDL. Point source nutrient loads are dominated by the James River facilities that accounted for 76% of the statewide point source nitrogen loads and 81% of the statewide point source phosphorus loads in 2020.

Appendix X of the TMDL identified two phases of additional Total Nitrogen and Total Phosphorous reductions necessary in the James River Basin to meet the dissolved oxygen (DO) criteria. These reductions have been implemented in the last two phases of the Watershed General Permit and are currently incorporated in 9VAC25-820-80. The only remaining WLA reduction from Appendix X of the TMDL yet to be implemented in the Watershed General Permit is an additional one million pounds of Total Nitrogen from the aggregate HRSD James River WLA. In accordance with Part I.C. of the Watershed General Permit, this reduction in WLA is effective January 1, 2022. It should be noted that through a combination of facility upgrades, over performance and flows remaining below design capacity, the Virginia point sources have met the DO-based WLAs in aggregate since 2012.

Appendix X to the TMDL also included a staged implementation strategy to give the Commonwealth time to identify what additional point source reductions would be necessary to meet water quality criteria for chlorophyll-a in the tidal portions of the James River Basin. DEQ took the opportunity provided by the staged implementation schedule to further evaluate and refine the existing chlorophyll-a criteria.

On September 20, 2018, the State Water Control Board gave approval for DEQ to go to public hearing and comment on amendments to the Water Quality Standards Regulation (9VAC25-260-310 (bb)), addressing the numeric chlorophyll-*a* criteria applicable to the tidal James River. The proposed amendments were the outcome of a seven-year-long effort to update the regulation with best available science, evaluating the protectiveness of the current criteria and determining if revisions were appropriate, as well as modifying the methods used to assess criteria attainment. The new criteria and assessment method take into consideration the recommendations of a scientific advisory panel (SAP) and a regulatory advisory panel (RAP). The final chlorophyll criteria amendments were presented to the State Water Control Board for adoption at its June 27, 2019 meeting with additional text included, in response to comments received, to describe additional lines of evidence that would be examined to render an appropriate assessment determination for the aquatic life use if "back-to-back" seasonal mean exceedances were to occur. EPA subsequently approved the new James River numeric chlorophyll criteria and they became effective on January 6, 2020.

In addition, during the James River chlorophyll study an enhanced water quality model was developed to simulate chlorophyll concentrations in response to varying levels of point source nutrient reduction. Through the spring and into the early summer of 2020, the model was updated with adjusted climate change factors and a set of point source nutrient reduction scenarios were re-run to test chlorophyll criteria attainment. Results indicated that water quality conditions protective of the revised chlorophyll criteria can be attained with the point sources controlling total phosphorus to near state-of-the-art treatment levels. Numerous scenarios evaluating various levels of phosphorus reductions in the tidal fresh and free flowing portions of the James River were evaluated by DEQ with input from a RAP. In December 2020, the State Water Control Board authorized DEQ to publish a notice of public comment and hold a public hearing on Scenario “3-B(i)” which reduces phosphorus WLAs for six publicly owned treatment works (POTWs) and one industry discharging to the tidal freshwater estuary in order to meet the newly adopted chlorophyll-a water quality criteria. A public hearing and public comment period for the proposal are scheduled for the fall of 2021.

The Water Quality Management Planning (WQMP) Regulation (9VAC25-720) amendments authorized for public notice in December 2020 also included implementation of floating WLAs for 36 significant municipal wastewater treatment plants. The floating WLAs were proposed to meet the commitment to achieve additional nutrient reductions from the wastewater sector included in Initiative #52 of Virginia’s Chesapeake Bay TMDL Phase III Watershed Implementation Plan (WIP). The floating WLA approach was subsequently superseded by HB 2129 and SB 1354, which were enacted following Special Session 1 of the 2021 General Assembly (2021 Special Session I Va. Acts Chs. 363 and 364). HB 2129 and SB 1354 eliminated the floating WLA concept and established the Enhanced Nutrient Removal Certainty (ENRC) Program. The ENRC program includes established schedules for nutrient upgrades and/or consolidation projects at 13 POTWs and reduced WLAs at 7 Hampton Roads Sanitary District (HRSD) treatment plants in the James River and York River Basins. The State Water Control Board approved amendments to the WQMP Regulation (9VAC25-720) to incorporate the reduced WLAs in June 2021. DEQ staff are in the process of modifying individual Virginia Pollutant Discharge Elimination System (VPDES) permits to include the upgrade schedules and treatment requirements included in the ENRC Program.

TMDL development and implementation for waters impacted by toxic contamination

2021 Progress Report

Bluestone River: The Virginia portion of the Bluestone River watershed has impairments for PCBs in fish tissue and violations of the total PCB water quality criterion in water. To address these impairments, Virginia and West Virginia remain in discussions with EPA to explore the feasibility of developing an interstate PCB TMDL. High PCB concentrations detected in the water column during an earlier multistate collaborative TMDL source investigation study triggered an EPA study and a cleanup effort. For example, a former Superfund site known as Lin Electric was remediated for extremely high levels of PCBs in sediment/sludge. The EPA Superfund program performed additional remedial activities within the Beaver Pond Creek tributary near Bluefield, West Virginia. More recently, Virginia performed a PCB source identification component of a TMDL study that included instream monitoring during base flow and high flow conditions. The results provided compelling evidence that the PCBs may be originating from West Virginia. Based on the potential interstate nature of this project, the TMDL scheduled has been delayed.

Elizabeth/tidal James Rivers: A PCB fish consumption advisory extends from the fall-line in Richmond, Virginia to the mouth of the James River, and includes the Elizabeth River and its tributaries. A PCB TMDL currently under development and scheduled for completion in 2022 will establish reductions needed to attain the fish consumption use within these impaired waters. A PCB source investigation study is almost complete and will tabulate prospective PCB sources from each category, or conveyance, from which allocations and reductions will be assigned. Example categories consist of point sources such as industrial and municipal outfalls, regulated stormwater from urbanized areas as well as known PCB contaminated sites. Contaminated sediment and contributions from atmospheric deposition are also considered for this study. In order to synthesize all the information as well as link available PCB sources to the contaminated fish, a PCB fate and transport model is under development by the Virginia Institute of Marine Science (VIMS).

James (non-tidal)/Jackson/Maury Rivers: The non-tidal James River basin is located in central Virginia. Five river segments were listed for PCB fish consumption advisories beginning in 2004 with the most recent occurring in 2008. Initial TMDL studies to delineate the geographic distribution and possible sources of the PCB contamination were initiated in 2017 and continued through 2019. The purpose of this intensive monitoring effort is to identify sources of PCBs throughout the impaired watershed in addition to informing fate and transport of PCBs to assist with the TMDL model development. TMDL development has begun and is planned for completion in 2022.

Levisa Fork: A PCB TMDL was completed in April 2010 for the Levisa Fork watershed, which is part of the Tennessee/Big Sandy River basin. Since TMDL monitoring had not revealed a viable source(s) of the contaminant, this particular TMDL was submitted to EPA as a phased TMDL. The Virginia Department of Mines, Minerals and Energy (since renamed the Department of Energy) developed an EPA-approved monitoring plan to evaluate PCBs, total suspended solids (TSS) and total dissolved solids (TDS). Funding

to support monitoring was limited and PCB monitoring was de-prioritized to concentrate efforts on monitoring of TSS and TDS for completion of the phased TMDL. Existing monitoring results for instream concentrations suggest focusing future PCB monitoring on Dismal Creek and Slate Creek will aid in TMDL implementation. More recently, certain Virginia Pollutant Discharge Elimination System (VPDES) permitted facilities have been identified as possible contributors of PCB loads for which pollutant minimization plans (PMP) were developed and implemented.

Lewis Creek: Lewis Creek is located in the Potomac-Shenandoah River Basin in western Virginia. The impaired segment of Lewis Creek was first listed for fish consumption advisories in 2004. Initial TMDL studies to delineate the geographic distribution and possible sources of the contamination were performed during 2017 into 2019. The purpose of the monitoring is to identify sources of PCBs throughout the TMDL watershed in addition to informing fate and transport of PCBs to assist with TMDL model development. While underway, TMDL development is planned for completion in 2021.

Mountain Run: The Mountain Run PCB impairment extends from the Route 15/29 bridge crossing near Culpeper approximately 19 miles to the confluence with the Rappahannock River. This waterbody was listed in 2004 although PCB contamination was originally identified during studies performed back in the 1970s. PCB monitoring was initiated in 2013 as part of the source investigation study for TMDL development. Additional rounds of monitoring also occurred during 2014, 2015, and 2018 with the results pointing toward the identification of prospective source areas in the Culpeper area. A PCB TMDL is scheduled to be developed and completed in early 2022.

New River: The New River, beginning at the I-77 Bridge and extending to the West Virginia line, has been the focus of an extensive PCB source investigation study due to fish consumption use impairments. The study was initiated in 2010 and included several iterations of ambient river PCB monitoring within the impairment. Large tributaries such as Peak Creek have also been investigated. In addition, PCB monitoring of permitted VPDES facilities has occurred along with the identification of other prospective sources such as contaminated sites, atmospheric deposition and contaminated sediment. The TMDL that was developed to restore the fish consumption use was completed during the summer of 2018. As allowed by available funding, DEQ intends to develop an Implementation Plan to assist in identifying and reducing PCB loadings from TMDL non-point source categories with an emphasis on the "Uncategorized" category.

North Fork Holston River: This mercury TMDL was completed in 2011. A fish consumption advisory for mercury extends approximately 81 miles from Saltville, Virginia to the Tennessee state line. While most of the mercury in the river originated from the Olin plant site, this contaminant has been distributed throughout the floodplain downstream. The TMDL identified that most of the current mercury loadings come from the watershed and floodplain with lesser amounts from the former plant site. In order to meet the TMDL loadings, mercury reductions will be needed from all contributors. Beginning in 2018, EPA performed additional instream mercury monitoring under the Superfund Program as a step in assessing on-going mercury loadings from the Olin plant site to the river. In 2021, EPA has continued its oversight of additional and on-going remediation of the former Olin site.

Potomac River: A multi-jurisdictional PCB TMDL was completed in 2007. TMDL implementation activities have been on going within the Virginia embayments. The VPDES municipal wastewater

treatment facilities that discharge to the embayments have been monitored for the presence of PCBs. Pollutant minimization plans (PMPs) are incorporated into those permits where reductions are needed to meet the assigned TMDL allocations.

Roanoke (Staunton) River: A PCB TMDL was completed in early 2010 for the Roanoke River that included drainage areas from the headwaters and extended downstream all the way to the Dan River (Kerr Reservoir). The Roanoke TMDL source investigation study identified two noteworthy PCB sources in the downstream (Staunton River) portion of the river. One facility successfully eliminated 10 percent of the on-going PCB load to the river by identifying, treating, and eliminating the source. TMDL implementation continues at the other significant source and after identifying the on-site sources, is in the process of performing site modifications that should greatly reduce the on-going load. A PCB monitoring requirement is also applicable for an extensive list of VPDES permits throughout the watershed. A growing list of pollutant minimization plans (PMPs) to address identified contamination have been submitted to DEQ from known, active point sources. PMP implementation will continue until appreciable PCB reductions identified by the TMDL are met.

South and Shenandoah Rivers: This mercury TMDL was completed in 2010. The South River has a fish consumption advisory that extends about 150 miles from Waynesboro to the West Virginia state line via the South River, the South Fork Shenandoah River, and the mainstem Shenandoah River. The primary source of mercury deposited in the river and floodplain was from releases that occurred during the 21 years that DuPont used mercury in the production of rayon at the facility (1929-1950) in Waynesboro. Atmospheric deposition was not identified as a significant mercury source. Fish tissue data from a reference site upstream of the former DuPont plant site shows safe mercury levels, while fish tissue samples below the plant contain elevated amounts of mercury. Unfortunately, mercury levels in fish tissue from this portion of the river have not shown a decline since the mercury was discovered in the river in 1976. Remediation and restoration efforts to reduce or eliminate mercury contamination continue through DEQ's TMDL and Resource Conservation and Recovery Act (RCRA) and Natural Resource Damage Assessment (NRDA) regulatory programs, and a significant non-regulatory science-based initiative through the South River Science Team has been in place since 2000. As part of a $50 million settlement approved by a federal court in August 2017, DuPont has agreed to mitigate the environmental harm, including water quality, caused by the mercury contamination. Corrective actions on the DuPont site have included soil removal, capping, sewer abandonment, cleaning and lining. COVID restrictions caused delays in corrective action activities that were scheduled to be completed in 2020. Since the easing of COVID restrictions on-site, storm sewer cleaning has resumed and will be completed by the end of the summer of 2021. On-going off-site activities have included bank stabilizations and soil removal and capping. Remediation has been completed in the first two miles of river with the completion of removals and bank stabilization of 4,000 feet of riverbank. Modeling has predicted this work will reduce mercury loading from the riverbanks in this part of the river by 90%. Monitoring is occurring to assess the effectiveness of this work on reducing mercury concentrations in the river and biota and investigations are occurring to evaluate downstream riverbanks. NRDA activities to date have included land protection, habitat restoration, bank stabilizations, stream exclusion and animal waste control projects, mussel restoration and improving and creating new access for recreational fishing.

Dan River Coal Ash Spill and State Response

On February 2, 2014, about 39,000 tons of coal ash and 25 million gallons of ash storage pond water were released into the Dan River from the Duke Energy facility in Eden, North Carolina. Coal ash is the residue generated from burning coal, and is typically stored at power plants or placed in landfills. Coal ash has a large variety of ingredients – mostly silicon oxide, iron oxide and aluminum oxide, with trace amounts of arsenic, selenium, mercury, boron, thallium, cadmium, chlorides, bromine, magnesium, chromium, copper, nickel, and other metals.

EPA, DEQ, U.S. Fish and Wildlife Service (USFWS), North Carolina Department of Environmental Quality, and Duke Energy conducted emergency response monitoring to detect any acute affects to aquatic life over the next 10-12 months. Analytical results for water samples taken by DEQ staff at four river and two reservoir stations located in Virginia's portion of the Dan River showed no violations of water quality standards for the protection of aquatic life. Sediment taken from the same locations showed some relatively elevated levels of trace metals, but not above any freshwater ecological screening levels that DEQ uses to indicate potential concerns. In addition to the emergency response environmental monitoring, to protect human health the Virginia Department of Health was involved in finished drinking water testing with the localities that draw their water from the Dan River (Danville, South Boston and Clarksville). All finished water met state and federal drinking water standards throughout the emergency.

Following the release, the ash was distributed by river flow over the entire length of the Dan River and into Kerr Reservoir, a distance of about 70 miles. Longer-term environmental monitoring, aimed at detecting any trends in sediment or water column concentrations of trace metals associated with the ash, was done from 2015 – 2017. This trend monitoring plan was composed of several elements (Figure 1):

- Monthly water column and sediment sampling at four river stations and two Kerr Reservoir stations.
- Fish tissue collection at eight sites, once at each location annually, during the period September - October.
- "Boatable Probabilistic" monitoring (habitat, macroinvertebrates, fish community structure, and expanded chemical testing) at two stations; sampling done annually in late summer.

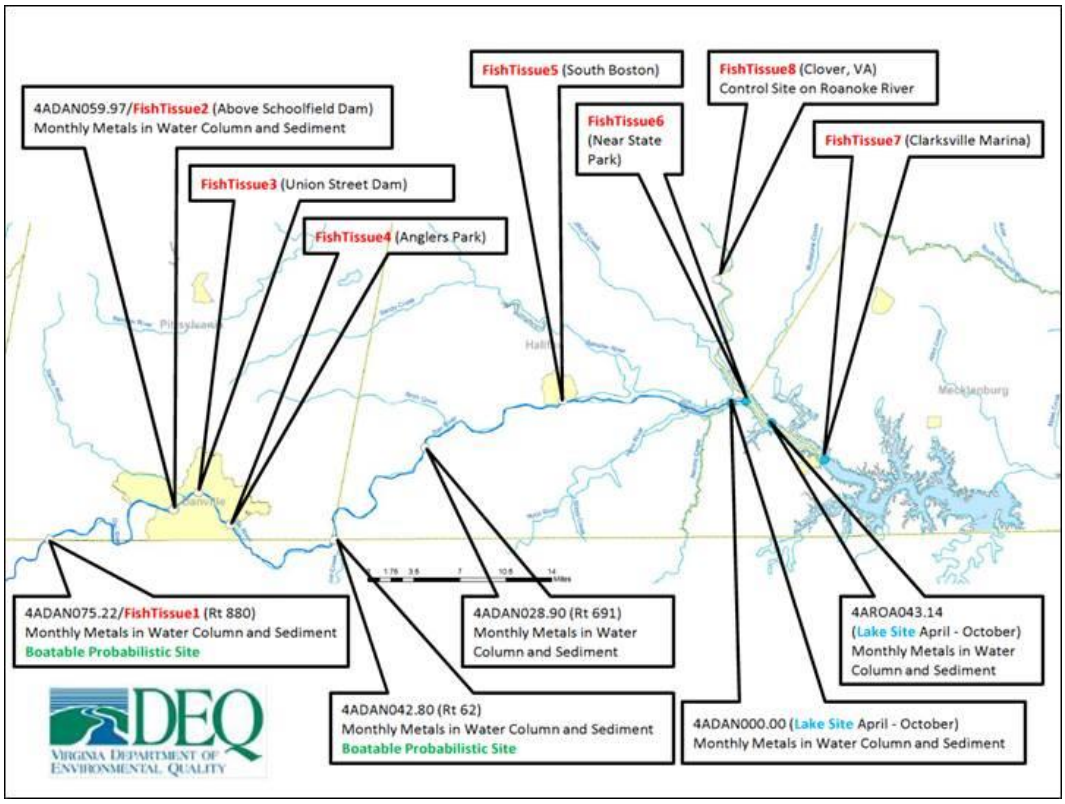


Figure 1: Map of Dan River Monitoring Program Sites

Because the accumulated results indicate that impacts were minimal and trends were essentially in a positive direction (*i.e.*, decreasing concentrations) the Dan River monitoring program has been scaled back to a few "sentinel" sites periodically sampled for sediment and water column metals levels. Fish tissue collection continues at a slightly expanded scope, with the addition of five more stations located within the larger Roanoke and Yadkin River basins, under a five-year grant (through 2022) from the National Fish and Wildlife Foundation (using a portion of the penalty settlement funds paid by Duke Energy to the federal government).

Following is a summary of the results from the 2014-2020 monitoring program:

- Sediment monitoring occurred from 2014 to 2017 only. Sediment metals levels remained low, below thresholds of potential concern, and the ash continued to be mixed and covered by native sediment to non-detectable levels in the biologically active layer throughout the river.
- Water column dissolved metals monitoring occurred from 2014 to 2017 only. Water column dissolved metals levels remained below water quality standards for both aquatic life and human health protection.
- Fish tissue collection and analysis has been completed for all samples taken (835 total) from 2014 through 2020. Lab results indicate that uptake by fish does not appear to be a concern for metals associated with the coal ash. There were no major differences or significant variations across the five years of monitoring, with the exception of chromium in the 2017 results. There was notable uptick in the number of samples in which chromium was detected above the Method Detection Limit (MDL) of 0.01 parts per million (ppm), but only one concentration in 160 samples was

above the Practical Quantification Limit (PQL) of 0.50 ppm. Even with this result for chromium in 2017, the reported concentrations of all the metal analytes were below DEQ's screening values for levels of concern. However, for fish taken in the region of the river where there is an existing consumption advisory due to legacy mercury contamination not associated with the Duke Energy release, the need for the advisory was confirmed.

- The uptick in chromium concentration observed during the 2017 monitoring season was not present in 2018, 2019, or 2020.

Regarding State-level compliance actions, at its June 25, 2015 meeting, the State Water Control Board approved an enforcement Consent Order negotiated with Duke Energy that included a $2.5 million settlement. Under the Order, Duke Energy has agreed to undertake $2.25 million in environmental projects that benefit Virginia localities affected by the spill. The remaining $250,000 will be placed in a fund DEQ uses to respond to environmental emergencies.

The monitoring data was used in a basinwide Natural Resources Damage Assessment and Restoration (NRDAR) process led by the Dan River Natural Resource Trustee Council, a group composed of state and federal natural resources trustees. The Council finalized an early-restoration plan and solicited public input on specific projects that Duke Energy could undertake for environmental improvement and enhancement in the Dan River basin. An April 2019 draft Damage Assessment and Restoration Plan Report was released for public review. This report provides information on quantifying the injuries to natural resources and resource services (*e.g.*, human recreation) resulting from the ash release, as well as a summary of restoration alternatives that have either been completed or are under way, including:

- Mayo River Park Expansion and Land Protection – land along the Mayo River corridor conserved and transferred to the State Park Systems in North Carolina (404 acres) and Virginia (214 acres).
- Pigg River Power Dam Removal – defunct dam has been removed, reopening 75 miles of river to protect federal, state and local trust resources, including the Roanoke Logperch (a threatened/endangered species), the Trout Heritage Waterway, and a historic dam powerhouse. The dam removal was the last obstacle to complete Franklin County's Pigg River Blueway. Environmental monitoring is ongoing to assess the effect dam removal has on the watershed.
- Abreu-Grogan Park Improvements – completed; added a bathroom, deck, handicap access pier, bank stabilization and other enhancements to expand river-centered opportunities for public recreation and wildlife viewing.
- Public Boat Ramp (location to be determined, planning in progress) – improve recreational access to the Dan River for motor boats, canoes and kayaks.

The proposed NRDAR Consent Decree was lodged with the federal court on July 19, 2019. The Trustees held two information sessions regarding the Restoration Plan on August 6, 2019 and August 7, 2019 in Danville, Virginia and Eden, North Carolina. The sessions provided an overview of the proposal and projects and held in conjunction with the public comment period for the proposals. Approximately 15-25 citizens attended each event with one media outlet at each session. On September 21, 2020, the Trustees filed a Motion to Enter the Consent Decree with the court for final approval.

Regulation and Management of Coal Ash Impoundments in Virginia

In response to the Eden, North Carolina coal ash release into the Dan River, DEQ conducted a review of coal ash impoundment operations along Virginia's waterways. The EPA had previously concluded a review of the structural integrity of Virginia's coal ash impoundments in 2013. None of the units were found to have an unsatisfactory rating.

There are currently 17 active coal ash impoundments located at nine facilities. The map below identifies the locations and owner/operators of these units. DEQ shares regulatory oversight with the Virginia Department of Conservation and Recreation (DCR), with DCR having statutory authority over the permitting, operation, maintenance and decommissioning of impoundment berms under its Dam Safety Program.

Coal Ash Impoundments in Virginia

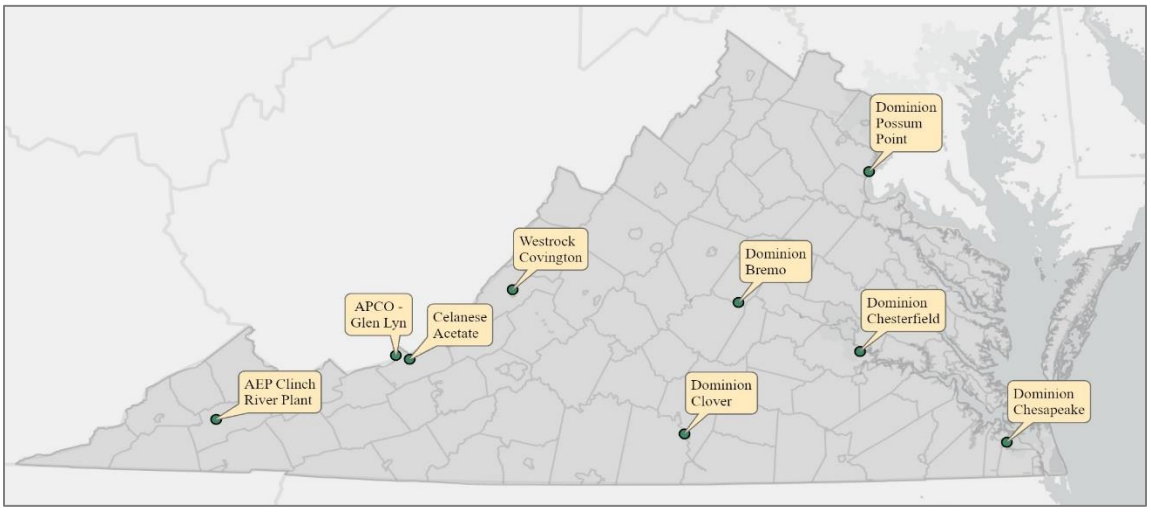


Figure 2: Map of Coal Ash Impoundments in Virginia

EPA's final rule on the Disposal of Coal Combustion Residuals from Electric Utilities became effective on April 17, 2015. The federal requirements were adopted into Virginia's Solid Waste Management Regulations effective January 27, 2016. The state and federal rules require closure or retrofit of existing wet ash handling impoundments at six electric generating utilities in Virginia (AEP's Clinch River Plant and Dominion's Clover, Bremo, Possum Point, Chesterfield and Chesapeake Plants) (Figure 2). VPDES permits have been issued for the drawdown and dewatering of the AEP Clinch River, Dominion Bremo, Dominion Chesterfield and Dominion Possum Point facilities. The VPDES permits include monitoring requirements; limitations for whole effluent toxicity and metals associated with coal combustion residuals; and other necessary conditions. Wastewater treatment systems have been installed and dewatering has commenced at the Bremo, Possum Point and AEP Clinch River facilities. The wastewater treatment system for the Chesterfield facility is still under construction. A VPDES permit application is pending for the Chesapeake facility.

Closure of the ash impoundments will also include DEQ oversight through waste permitting requirements including plan reviews, groundwater and surface water monitoring, post-closure care requirements, and other necessary conditions. Additionally, the General Assembly has passed legislation regarding the closure of coal ash units (including impoundments) in the Chesapeake Bay Watershed. HB 2786 and SB 1355 (2019 Va. Acts Chs. 650 and 651) effective July 1, 2019, require that coal ash impoundments at power stations in the Chesapeake Bay Watershed (Bremo, Chesterfield, Chesapeake, and Possum Point) must be closed by removal and the coal ash either recycled or disposed of in a modern, lined landfill. Additionally, the legislation requires that a minimum of 6.8 million cubic yards must be recycled from at least two of the four sites. The legislation also includes additional requirements related to transportation, public water connection, and continued efforts to recycle. The General Assembly passed additional legislation regarding the closure of coal ash units (including impoundments) located in Giles and Russell Counties. House Bill 443 (2020 Va. Acts Ch. 563) effective July 1, 2020 requires that coal ash units at power stations in the named counties (Clinch and Glen Lyn) must be closed by removal and the coal ash either recycled or disposed of in a modern, lined landfill, unless all units completed closure prior to January 1, 2019. The legislation also includes additional requirements related to transportation, public water connection, and continued efforts to recycle. Solid waste staff are in contact with facilities impacted by these legislative actions and working to issue permits covering these required actions. Other ash impoundments have either received solid waste permits related to closure (Celanese Acetate) or are in the process of evaluating final closure.

No Discharge Zone (NDZ) designations

2021 Progress Report

Federal Law prohibits the discharge of untreated sewage from vessels within all navigable waters. A "No Discharge Zone" (NDZ) is an area in which both treated and untreated sewage discharges from vessels are prohibited. In 2021, EPA provided an affirmative determination for the establishment of an NDZ for Sarah Creek and Perrin River in Gloucester County, Virginia. This was presented to the SWCB in April 2021 and the NDZs were finalized in Virginia regulations in June 2021. Implementation efforts in the form of signage and outreach are underway.

DEQ is currently investigating options for additional NDZs in the Chesapeake Bay mainstem and its tidal tributaries as a part of the strategy in Virginia's Phase III Chesapeake Bay Watershed Implementation Plan (WIP), which provides that "[t]he Commonwealth, in consultation with stakeholders, will consider options available under the Clean Water Act to apply to the Administrator of the E[nvironmental] P[rotection] A[gency] for a No Discharge Zone (NDZ) for all or portions of the Chesapeake Bay mainstem and its tributaries." This investigation includes the collection data of various forms and performing targeted stakeholder outreach to gain an understanding of the spectrum of perspectives, concerns, challenges, and areas of support surrounding options that may exist for increasing the number of NDZs in Virginia and, in particular, in all or portions of the Chesapeake Bay mainstem and its tidal tributaries.

On-site septic systems

2021 Progress Report

The Virginia Department of Health (VDH) Office of Environmental Health Services, including 35 local health districts, implements and oversees the state onsite wastewater program to protect public health and ground water quality. Across the state, there are approximately 1.1 million onsite sewage systems including approximately 32,000 alternative onsite sewage systems (AOSS). Roughly 550,000 of the total onsite sewage systems in Virginia are located in the Chesapeake Bay Watershed.

VDH has been involved with a variety of legislative initiatives aimed at decreasing pollution from onsite sewage systems across the Commonwealth. HB 2322 (2019 Va. Acts Ch. 429) passed in the General Assembly and was signed by Governor Northam. The bill directed VDH to develop a plan for the oversight and enforcement by VDH of requirements related to the inspection and pump-out of onsite sewage treatment systems in the Northern Neck, Middle Peninsula and Eastern Shore regions of Virginia. VDH worked with stakeholders in the identified areas to develop a plan to transfer the oversight and enforcement of pump-out requirements from localities to VDH. A final report was submitted to the General Assembly in August 2021; the report can be found on Virginia's Legislative Information System website. The report recommends that VDH implement a phased and targeted approach to the transition of oversight. This would begin with an effort to enhance VDH's onsite sewage system database to include all properties within the impacted area served by an onsite sewage system. Once a complete database is available, VDH proposes to send notices to all impacted property owners regarding pump out requirements and implement additional educational approaches to increase septic tank pump outs. VDH would then assess compliance rates in advance of any further enforcement actions. The report notes that this strategy will require legislative action to transition oversight authority to VDH, as well as additional funding to support database development and staffing resource needs.

A critical piece of legislation, SB 1396 (2021 Special Session I Va. Acts Ch. 382), was passed by the 2021 General Assembly. This legislation has four primary components: (i) establishes the Commonwealth's policy prioritizing universal access to wastewater treatment that protects public health and the environment and supports local economic growth and stability; (ii) establishes in the Code of Virginia the Wastewater Infrastructure Working Group, (iii) provides VDH with authority to include in the Sewage Handling and Disposal Regulations (12VAC5-610) consideration for the impacts of climate change; and (iv) provides VDH authority to use the onsite sewage system indemnification fund for grants and loans to repair failing onsite sewage systems.

The action to establish a Commonwealth policy to prioritize access to fully protective wastewater treatment is a significant milestone in reducing the impacts of onsite sewage systems on the Chesapeake Bay watershed. Affected agencies will seek to improve public education regarding adequate treatment as part of this policy. Agencies will also collaborate and coordinate grant opportunities to seek projects that provide a combination of public health, environmental, and positive economic impacts. The legislation also established a preference for community-based and regional projects, as opposed to the historic practice of wastewater infrastructure needs on a site-by-site basis.

In 2019, the Secretaries of Natural and Historic Resources, Health and Human Resources, and Commerce and Trade worked together to form a Wastewater Infrastructure Work Group (Work Group) consisting of representatives of DEQ, VDH, Virginia Department of Housing and Community Development, and Virginia Resources Authority. This legislation codifies that Work Group, and ensures it will remain in place until 2030. The legislation also includes additional partners to sit at the table to assist the Work Group in assessing wastewater infrastructure needs in the Commonwealth. An associated budget amendment to the legislation also provides for additional funding to Center for Coastal Resource Management at the College of William & Mary Virginia Institute of Marine Science to expand the Virginia Wastewater Data Viewer tool to include all portions of the Chesapeake Bay Watershed west of I-95. The tool uses septic repair permitting data to create a map identifying areas with high rates of septic system failure. The tool also allows VDH staff working in localities throughout the Commonwealth to geographically identify communities with wastewater infrastructure needs.

Climate change is already having an impact on wastewater infrastructure throughout the Commonwealth, especially onsite sewage systems located on some waterfront parcels in rural Coastal Virginia. Currently, the Sewage Handling and Disposal Regulations only require that current conditions be assessed when permitting an onsite sewage system. While systems permitted today may meet minimum standards and setbacks from surface waters, they could have negative impacts in the near future as sea level and ground water levels rise. VDH will work with a broad group of stakeholders to develop considerations for the impacts of climate change to minimize future impacts of onsite sewage systems on Virginia's waterways.

The expansion of the onsite sewage indemnification fund provided in SB 1396 provides VDH with an ongoing financial resource to assist low-income households in repairing their onsite sewage system. When an owner applies for an onsite sewage system construction permit with VDH, $10 of each application fees is collected and placed in the onsite sewage indemnification fund. The fund was created to provide relief to system owners that experienced a premature system failure because of VDH error. However, with the implementation of a quality assurance program for VDH designs and a shift to private sector designs, the fund has seen a significant reduction in the number claims. This legislation allows VDH to use the fund to provide grants and loans to households at or below 200% of the federal poverty guidelines to assist in repairing failed onsite sewage systems.

In 2018, VDH was awarded $300,000 from the Virginia Environmental Endowment (VEE), with an additional $200,000 from the Smithfield Foundation, the philanthropic arm of Smithfield Foods, Inc., for a total of $500,000, to assist in the repair of failing onsite sewage systems. These funds are targeted to repair failing septic systems and remediate illicit sewage discharges (straight pipes) from homes in portions of James City County, Isle of Wight County, and Surry County within the James River Watershed. VDH has reimbursed three property owners thus far in 2021 for installation of nitrogen reducing repair systems, and has obligated almost $400,000 in total funding to date. The COVID-19 pandemic and related impacts to supply chains has created a delay in the installation of systems currently obligated funding under the program.

In August 2021, the General Assembly also approved $11.5 million in funding from the American Rescue Act Plan for improvements to well and septic systems for homeowners at or below 200% of the federal poverty guidelines. VDH will receive $5,750,000 in each of the next two years for these improvements. Funding at this scale will have tremendous positive impacts on public health and the environment

throughout the Commonwealth and in helping Virginia meet its goal of prioritizing universal access to wastewater treatment that protects public health and the environment and supports local economic growth and stability.

VDH has made several improvements to the process in which it reports septic BMPs to the DEQ warehouse. First, VDH has identified more nitrogen-reducing treatments by updating its list of treatment systems approved for NSF 245 50% nitrogen reduction and also improving the R script that identifies these systems in the VDH dataset. Second, the BMP reporting now includes records that were previously dropped due to being unable to match them to a precise location. The DEQ warehouse does not require a precise location and records can be included even if they are only matched to a county level. Finally, VDH has modified the data uploaded to match the templates used by the DEQ warehouse and used a new unique identifier from the VDH database that is always unique.

The online O&M portal for uploading maintenance reports has also undergone several changes. In October 2020, VDH held a meeting with a small group of stakeholders to understand their needs for the online O&M portal and make updates based on their feedback. VDH has also worked to develop an interface to upload maintenance reports from Carmody and Online RME, which are databases used by septic system operators and other professionals.

VDH is in the process of filling gaps in its inventory of septic systems using real estate data that includes septic information. This data is collected from local county governments and compared with the existing inventory of septic systems to identify any new septic systems and confirm the accuracy of records found in both datasets. As of July 2021, VDH has collected and analyzed real estate data from 65 counties in the Chesapeake Bay Watershed and identified over 850,000 new potential septic system locations not in the septic inventory. The real estate data consists only of the location of a septic system without any information on the system itself, but with more funding VDH can collect this information with fieldwork, surveys, and other techniques and confirm the validity of the real estate data. Additional funding would also allow VDH to upload these real estate records into the existing septic system database maintained by VDH. Collecting these datasets is still ongoing, but there are some limitations, as not all county governments collect septic information when performing their real estate assessments. In addition, not all land parcels have data in the real estate datasets, leaving some addresses with unknown septic/sewer information remaining.

In order to address missing information in the real estate data, VDH developed a predictive model that estimates if a given property would have a septic system. The model was created using sewer line map layers and spatial analysis in ArcGIS to assign each land parcel as having septic or sewer based on its proximity to the sewer line. This analysis was developed in a trial run in Henrico County due to the availability of sewer line shape files and real estate data that included septic and sewer information for each property. The results of the predictive model were compared to the real estate data and VDH's inventory of septic systems to get a measure of accuracy, meaning that the model and the real estate were both septic at a given location. The model had an accuracy of 94.2%, with some potential sources of error due to outdated records in the real estate data or properties near sewer lines that continue to use septic systems. This model can be used to identify any properties that may have septic systems that are missing data in the real estate dataset.

VDH worked with the internal communications office and the advertising agency Vance to create a social media campaign in order to inform homeowners in and around the Chesapeake Bay Watershed about the importance of septic system maintenance and motivate them to take action. The VDH Septic Smart digital campaign ran for six weeks across three channels on the Google platform: Google search, YouTube pre-roll video, and Google display. These ads were targeted at individuals living in 75 counties in Virginia that are in the Chesapeake Bay Watershed. The campaign resulted in 851,432 impressions or views and 41,460 engagements in the form of clicks on the advertisement. This engagement or click-through rate was higher than industry averages, and the YouTube pre-roll ads had the highest level of engagement of the three channels. These high levels of engagement demonstrate that VDH's messaging resonated with its audiences and should result in greater awareness about septic system maintenance.

As part of the Source Water Protection Program, The Office of Drinking Water at VDH has undergone several projects related to surface water protection. VDH received a grant that provided for the construction of source water protection area educational signs constructed near Rivanna Water Authority reservoirs. VDH also worked with DEQ on the development of a Road Salt Management Plan for Northern Virginia. There are also several ongoing projects aimed at protection of groundwater sources, such as funding well abandonment and fencing and security cameras around public water supply wells.

DEQ grant funding for repairing/replacing failing on-site septic systems and straight-pipes

2020 Progress Report[2]

DEQ continues to work with organizations and localities across Virginia to fund projects that correct failing septic systems or straight-pipes. A majority of these projects are part of larger watershed restoration and implementation efforts in TMDL implementation areas. During FY 2020, DEQ provided $1,518,229from State and Federal funding and landowner contributions to address failing or failed septic systems (Table 1). Please note that the information covered here does not include septic activity associated with the Chesapeake Bay Preservation Act.

[2] Due to the availability of BMP data at the time of this reporting deadline, the NPS program is not able to provide a FY 2021 programmatic report. The FY 2020 report included the first two quarters of FY 2020 data (7/1/2019 - 12/31/2019) due to the same deadline issue. The program data included in this report is for the full FY 2020 activity (7/1/2019-6/30/2020).

Table 1: Residential Septic Program – Grant Funded BMPs (7/1/2019 – 6/30/2020)

Name of BMP	BMP Practice Code	Number of BMPs Installed	Pounds of Nitrogen Reduced	CFU* of Bacteria Reduced	Total Amount of Cost-share Provided	Landowner Contributions or Other Match	Total Cost of Practice
RB-1	Septic Tank Pumpout	429	672	1.20+E12	$46,824	$35,349	$82,173
RB-2/2P	Connection to Public Sewer/Connection with Pump	3	92	1.49+E11	$25,477	$21,627	$47,104
RB-3	Septic Tank System Repair	32	739	1.19+E12	$64,051	$66,960	$131,011
RB-3R	Conventional Onsite Sewage Systems Full Inspection and Non-permitted Repair	52	1,202	1.91+E12	$42,379	$34,439	$76,818
RB-4	Septic Tank System Replacement	63	1,456	2.35+E12	$253,240	$237,337	$490,577
RB-4P	Septic Tank System Installation/Replacement with Pump	21	485	7.83+E11	$140,136	$154,579	$294,715
RB-5	Installation of Alternative Waste Treatment System	18	416	6.71+E11	$225,604	$170,227	$395,831
Total		**429**	**5,063**	**8.28E+12**	**$797,709**	**$720,520**	**$1,518,229**

*CFU = colony forming units

The grant funds were utilized in seven different river basins throughout Virginia. Generally, Soil and Water Conservation Districts facilitate septic repair and replacements along with overall TMDL implementation; however, in a few cases, not-for-profits, planning district commissions and localities assisted with the projects (Tables 2 and 3).

Table 2: Residential Septic BMPS for Waters Outside the Chesapeake Bay Watershed (7/1/2019 – 6/30/2020)

River Basin	# of BMPs	Federal 319(h) and State WQIF NPS Funds	Total Cost of Practice	Bacteria Reductions CFU	Nitrogen Reduction Lbs./Year
Big Sandy	0	$0	$0	0.00E+00	N/A
New River	0	$0	$0	0.00E+00	N/A
Roanoke-Dan	7	$18,592	$24,733	2.29E+11	141
Tennessee-Clinch	0	$0	$0	0.00E+00	N/A
Tennessee-Holston	48	$45,673	$61,151	4.65E+11	277
Upper Roanoke	24		$63,915	3.91E+11	237
Total	79		$149,799	8.28E+12	655

Table 3: Residential Septic BMPs for Waters Inside the Chesapeake Bay Watershed (7/1/2019 – 6/30/2020)

River Basin	# of BMPs	Federal 319(h) and State WQIF NPS Funds	Total Cost of Practice	Bacteria Reductions CFU	Nitrogen Reduction Lbs./Year
James-Appomattox	31	$76,631	$115,274	6.72E+11	412
James-Rivanna	14	$32,534	$62,336	3.28E+11	202
Middle James	80	$172,776	$310,045	1.24E+12	752
Potomac-Shenandoah	87	$134,488	$284,475	1.45E+12	881
Rappahannock	109	$204,071	$436,551	2.88E+12	1,775
Upper James	1	$2,500	$9,500	1.08E+10	23
York	28	$75,847	$150,249	5.92E+11	363
Total	350	$698.846	$1,368,430	7.20E+12	4,408

Adoption of cost-effective agricultural best management practices

2021 Progress Report

Agricultural Cost-Share Programs

DCR administers funds for conservation programs that Soil and Water Conservation Districts deliver to the agricultural community. Some of these programs include the Virginia Agricultural Best Management Practices Cost-Share, Agricultural BMP Tax Credit, and Conservation Reserve Enhancement Programs. Details on cost-share allocations to Soil and Water Conservation Districts are summarized in Chapter 4 of this report.

Through funding provided by the General Assembly, Virginia developed and is working to expand a computerized BMP tracking program to record the implementation and financial data associated with all implemented BMPs. Both the VDACS implemented Agricultural Stewardship Act (ASA) and DEQ's Total Maximum Daily Load (TMDL) programs utilize modules of the BMP tracking program to administer these programs. During the last fiscal year, DCR continued to upgrade this application. This Conservation Data Suite has integrated modules that now have the added capacity to interface with those state agencies that protect cultural and historic resources as well as threatened and endangered species.

Agricultural Stewardship Act Program

The Agricultural Stewardship Act (ASA) Program is a complaint-based program by which the Commissioner of Agriculture and Consumer Services receives information alleging water pollution from agricultural activities. The Commissioner receives complaints alleging that a specific agricultural activity is causing or will cause water pollution. If a complaint meets the criteria for investigation, the Commissioner (through the ASA program staff) contacts the appropriate Soil and Water Conservation District (SWCD or district) about investigating the alleged water pollution problem. If the district declines, the ASA program staff conducts the investigation on behalf of the Commissioner. In most cases, a joint investigation involving local district staff and ASA program staff is performed.

The purpose of the investigation is to determine whether the agricultural activity is causing or will cause water pollution. If no causal link is found, the Commissioner decides that the complaint is unfounded. If the Commissioner determines that the activity is the cause of pollution, the farmer is given up to 60 days to develop an agricultural stewardship plan to correct the identified water pollution problems. The local district typically reviews the plan, and the Commissioner will approve the plan when it is determined that it meets the necessary requirements to solve the water pollution problem.

The ASA provides the farmer up to six months from the date of the Commissioner's determination that a complaint is founded to start implementing the agricultural stewardship plan and up to 18 months from that date to complete plan implementation. The timing allows the farmer to take advantage of suitable weather conditions for outside work or required construction. If a farmer fails to submit a plan for approval or implement a plan within the given timeline, the Commissioner takes enforcement action.

The ASA program received numerous inquiries regarding possible agricultural pollution during the program year of April 1, 2019, through March 31, 2020. Forty-eight of these cases became official complaints. The official complaints fell into 12 categories according to the following types of agricultural activity: beef (17); equine (8); land conversion (7); cropland (4); dairy (4); swine (2); beef and dairy (1); beef and cropland (1); beef, cropland, and dairy (1); sod (1); goats and sheep (1); and other (1). There were also eight different categories of complaints received based on the type of pollution: sediment (16); nutrients and sediment (9); bacteria, nutrients, and sediment (8); nutrients (6); bacteria and nutrients (5); bacteria, nutrients, sediment, and toxins (2); bacteria and sediment (1); and bacteria (1).

During the program year, 15 (31 percent) of the 48 official complaints were determined to be founded and required agricultural stewardship plans to address water pollution problems. In each founded case, there was sufficient evidence to support the allegations that the agricultural activities were causing or would cause water pollution. Eighteen (38 percent) of the complaints received during the program year were determined to be unfounded because there was either insufficient evidence or no evidence of water pollution. In some instances, farmers involved in the unfounded complaints voluntarily incorporated best management practices into their operations to prevent more complaints or to prevent potential problems from becoming founded complaints. Fifteen (31 percent) of the complaints received during the program year were dismissed for various reasons. Many of the complaints that were dismissed were situations where a water quality concern existed but was remedied prior to the official investigation. Others were cases in which the ASA program had no jurisdiction in the matter or were dismissed because insufficient information was provided by the complainant. In general, farmers involved in the complaint and correction process were cooperative in meeting the deadlines set up by the ASA and it was not necessary to assess any civil penalties. Under the ASA, the Commissioner issues a corrective order when an owner or operator fails to submit or complete implementation of the agricultural stewardship plan based on the findings of a conference held to receive the facts on a case. There were no corrective orders issued during the 2019 - 2020 program year for failure to submit a stewardship plan, implement an approved stewardship plan, or maintain the measures included in an approved stewardship plan.

Department of Forestry Implementation of Silvicultural Regulation and Strategic Water Quality and Watershed Protection Initiatives

2021 Progress Report

The mission of the Virginia Department of Forestry (VDOF) is protecting and managing healthy, sustainable resources for all Virginians. Managing the state forests and working with private forest owners and communities to assure that the forests of the Commonwealth are major contributors to water quality and healthy watersheds aligns with the Department's core mission, with its current strategic plan, and with its Forest Action Plan. Forests provide superior watershed benefits over nearly every other land use. Silvicultural water quality enforcement, fire suppression, riparian buffers, conserving forested headwaters, providing for adequate water supplies to downstream communities, land conservation, restoring Longleaf and Shortleaf pine and American chestnut, wildlife habitat management, prescribed fire, urban and community forestry, and conservation education are key VDOF programs.

Silvicultural Water Quality Law Enforcement Actions

In July 1993, the General Assembly of Virginia – with the support of the forest industry – enacted the Virginia Silvicultural Water Quality Law, § 10-1-1181.1 through § 10.1-1181.7 of the *Code of Virginia*. The law authorizes the State Forester to assess civil penalties to owners and operators who fail to protect water quality in their forestry operations. Virginia is the only state in the southeastern United States that grants enforcement authority under such a law to a state's forestry agency. In FY 2021, the VDOF was involved in 108 water quality actions initiated under the Silvicultural Law. Of these actions, two resulted in a Special Order being issued and no Emergency Special Orders were issued during the period for violations of the law. In addition, there were 15 failure to notify violations by timber harvesting contractors during the fiscal year.

Forestry Best Management Practices (BMPs) for Water Quality

VDOF has been a leader in the conservation of forested watersheds since the early 1970s when it published its first set of Forestry Best Management Practices for Water Quality. The fifth and current edition of those guidelines came out in 2011. A statewide audit system has been in place since 1993 to track trends in BMP implementation and effectiveness. The entire BMP Implementation Monitoring effort has also been automated to be compatible with VDOF's IFRIS (Integrated Forest Resource Information System) enterprise database system. The information compiled serves as the basis for VDOF reporting under Virginia's WIP. In calendar year 2020, 95.5 percent of the timber harvest acres in Virginia conducted within the boundaries of the Chesapeake Bay Watershed were under BMPs and 95 percent of the timber harvest acres statewide were under BMPs. The audit also showed that only one (0.04%) of the sites visited had any sign of active sedimentation present after the closeout of the harvesting operation. The BMP goal for WIP III is to achieve a 95 percent implementation rate by 2025.

Harvest Inspection Program

The Department's harvest inspection program began in the mid-1980s, and provides VDOF an opportunity to educate forestland owners and operators about BMPs and water quality protection

techniques. In FY 2021, VDOF field personnel conducted 16,667 inspections on 3,742 timber harvest sites across Virginia on 176,213 acres (Figure 3).

The backbone for the Department's water quality effort is the harvest inspection program, which began in the mid-1980s. This program provides VDOF one-on-one contact with harvest operators and a welcomed opportunity to educate them on BMPs and the latest water quality protection techniques.

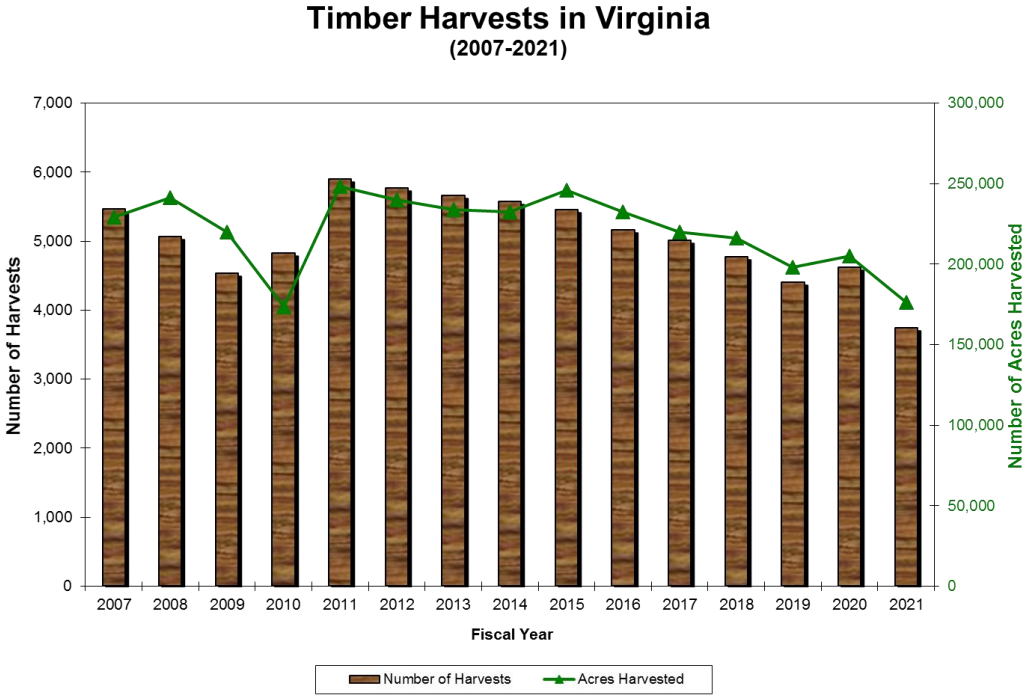


Figure 3: Number of harvests inspected and total number of acres harvested: 2007 through 2021

Cost-Share Assistance

VDOF offers cost-share assistance to timber harvest operators through a program funded by the Commonwealth's Water Quality Improvement Fund (WQIF). This program shares the cost of the installation of forestry BMPs on timber harvest sites by harvest contractors. Fifty-four stream protection projects were funded using FY 2019 funds that are using portable bridges to provide stream crossing protection across the site during and after harvesting.

VDOF also offers tree-planting grants using the Virginia Trees for Clean Water (VTCW) Program promoted through an RFP process. The spring 2021 cycle has allocated $179,525.35 to 30 projects in 30 different HUC12 watersheds utilizing some funds from the Commonwealth's WQIF. The majority of the projects funded are in more urbanized parts of the state including the Richmond Metro Area, Hampton Roads, and Northern Virginia. Technical assistance and application review was provided by VDOF ISA Certified Arborist staff and community engagement is required as part of the review process. Projects funded include establishing riparian forest buffers, school and park plantings, regreening efforts to combat urban heat islands and stormwater retrofits that incorporate the use of trees. Another RFP for the VTCW Program was distributed in August 2021 and applications are due in early September to allocate

the FY21 WQIF money received in June 2021. To date, VDOF has assisted in completing 247 projects resulting in more than 63,000 trees being planted in Virginia communities. These tree-planting activities are being tracked using VDOF's "My Trees Count" application.

James River Buffer Program

The James River Buffer Program was established in December 2018 and is funded through the Virginia Environmental Endowment's James River Water Quality Improvement Program. The Commonwealth specifically targeted the James River to meet Virginia's 2025 WIP III goals. To meet these goals, riparian forest buffers need to be installed in the James River basin in the coming years. The James River Buffer Program will help meet goals through forest buffer establishment along streams and associated land and through BMPs to mitigate concentrated flow bypassing those buffers. The Buffer Program is designed to work in tandem with existing programs and seeks to target currently unengaged landowners that have not participated or who do not qualify for existing programs. The Buffer Program provides essential BMPs and more flexibility and to meet the targets set by the Phase III WIP.

Two partners, the VDOF and the James River Association, carry out the James River Buffer Program within the Middle James River Watershed. In spring of 2021, a new partner, the Chesapeake Bay Foundation, joined as a partner to serve landowners in the Upper James River Watershed.

In FY 2021, the VDOF has carried out eighteen buffer projects, adding 16.4 acres of riparian buffers within the Middle James River Watershed. The below table shows the associated pollutants and sediment reductions linked to these established buffer acres.

Table 3: Riparian buffer accomplishments by the Virginia Department of Forestry's James River Buffer Program for FY 2021)

Total Buffer Acres	Approx. no. of trees planted	lbs. of N	lbs. of P	lbs. of TSS
66.4	28,801	4,372.488	143.5928	214,366.6

Environmental Impact Reviews

In its role as a reviewing agency for DEQ's and the Virginia Department of Transportation's (VDOT) environmental impact review processes, VDOF evaluates proposed projects to identify the forest resources that may be impacted; provide assessments; and provide recommendations and comments pertaining to forest health, conservation, management and mitigation needs aimed at conserving Virginia's forest resources in keeping with state executive policy and/or as part of the federal consistency determination/certification process. These reviews have resulted in the modification of project footprints to avoid forest loss and to commitments by project sponsors to follow VDOF Forestry BMPs for Water Quality in numerous cases. DEQ has also included special forestland mitigation guidance to project sponsors that was developed by VDOF in its environmental impact review instructions.

VDOF has also been partnering with the Commonwealth's other natural resource agencies to look beyond the direct footprints of proposed long, linear infrastructure projects to measure the indirect impacts of forest fragmentation. VDOF was instrumental in creating the Virginia Forest Conservation Partnership (VFCP). This partnership was forged to better leverage agency and organization missions; forest conservation and forest mitigation initiatives, and available conservation financing. The group most recently provided analysis to state executive offices on the potential impact on Virginia's forest resources of the construction of multiple proposed projects to assist in refining potential mitigation options. VDOF also collaborated with VDOT in identifying potential projects on public lands in the Shenandoah/ Potomac River watershed where VDOT could undertake conservation projects to offset the TMDL impact of proposed road project construction. In the first quarter of 2021, the VDOF also coordinated a series of five meetings to discuss with partner organizations and agencies a desire to create a path for renewable energy projects (solar) that would minimize the impacts on land use and the Commonwealth's natural resources. The group was comprised of Fellows from the Virginia Natural Resources Leadership Institute and was a cross representation of people from non-profits, non-governmental organizations and state agencies. The group, titled, the "Policy Action Work Group" or PAWG had a shared goal to ensure the balanced and equitable development of solar energy to meet Virginia's clean energy goals while incorporating environmental justice, protecting Virginia's natural resources, addressing land ownership concerns, and supporting local economic benefits. The University of Virginia's Institute for Engagement and Negotiation facilitated these meetings and activities. The final report is not yet completed.

Logger Education

VDOF was involved in eight Logger education programs in FY 2021 educating 372 timber harvesting professionals through the Virginia SHARP Logger Program in cooperation with Virginia Tech and the Sustainable Forestry Initiative (SFI®) State Implementation Committee. Training opportunities were greatly curtailed due to the COVID-19 pandemic but some virtual training opportunities allowed VDOF to offer some in person as well as virtual update classes. This program has enabled VDOF to assist in training 10,689 harvesting professionals in 355 programs relating to water quality protection since its inception. Figure 4 exhibits historical levels of participation in VDOF logger education programs since 2005.

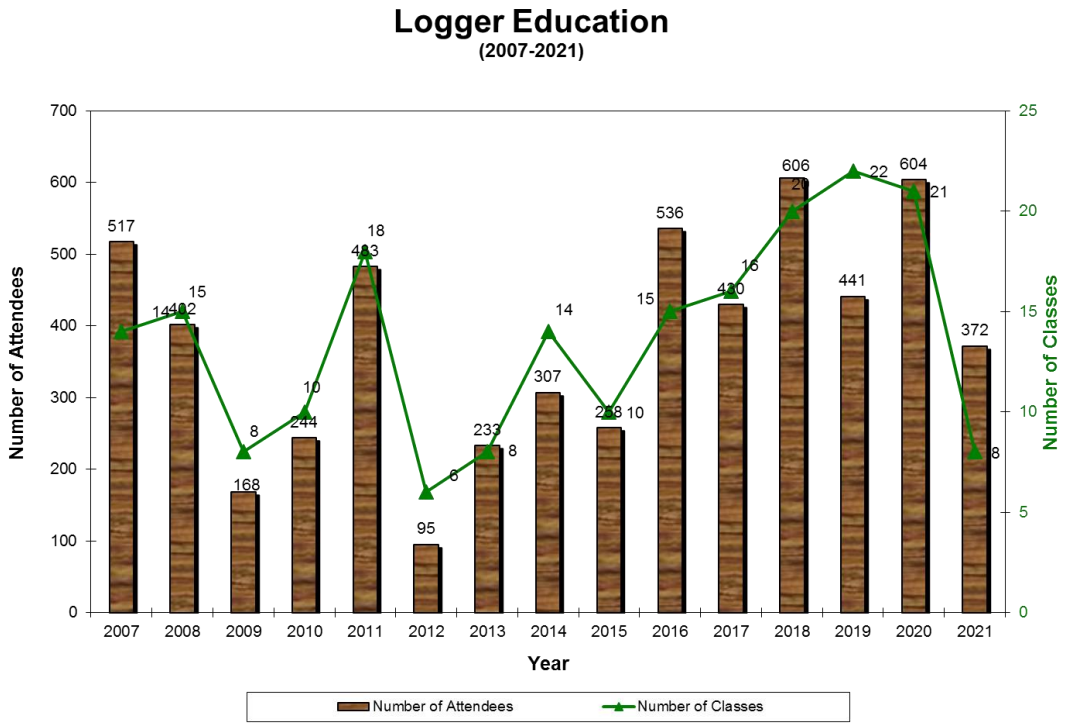


Figure 4: VDOF logger education 2007 – 2021

Riparian Forest Buffers Technical Assistance

Riparian forest buffers (RFB) provide particular and critical protection for Virginia's waters. They provide shade that cools water, capture sediment, store and utilize nutrients, mitigate floodwaters, and provide essential food and habitat for both aquatic and terrestrial life. Riparian forest buffers serve as one of the most effective and cost-effective water quality improvement practices. Because of this, state and federal agencies, landowners, and contractors work together to establish and expand buffers for multiple values. VDOF has technical assistance responsibility for planning, coordination, and certification of riparian forest buffer establishment in federal, state, and privately funded programs. VDOF foresters meet with landowners, assess sites, develop site-specific recommendations, and coordinate with contractors and owners to establish buffers through tree planting or natural means. In FY 2021, VDOF recorded riparian forest buffer establishment on 156 sites acres in the Chesapeake Bay watershed. Protecting water quality in Virginia through the creation and protection of riparian forest buffers is very important, not only to the VDOF, but also to other state and federal conservation agencies, including DCR, the USDA Farm Service Agency (FSA) and the Natural Resources Conservation Service (NRCS). While these agencies can provide funding to landowners for creating riparian forest buffers, the VDOF provides the technical forestry expertise in the planning and creation of riparian forest buffers.

Riparian Forest Buffer Tax Credits

For Tax Year 2020, VDOF issued Riparian Forest Buffer tax credits on 87 applications covering 1,350 acres of retained forested buffers. The tax benefit to forest landowners was $594,697.01 on timber valued at $2,611,261.00.

Flexible Riparian Buffer Program

DOF is specifically tasked under § 10.1-1105 of the *Code of Virginia* with the "...prevention of erosion and sedimentation, and maintenance of buffers for water quality." The implementation of forested, vegetated riparian buffers is therefore a priority. Efforts in Virginia to retain forest land and promote riparian forest buffers must rely on an array of alternatives that assist and encourage landowners to retain their forests rather than convert them to other uses and to restore forest cover where it has been lost. A number of landowner assistance programs have been in place that have resulted in positive improvements in riparian forest buffer (RFB) establishment. However, these have not reached, or are not suitable for every owner and the Commonwealth is not reaching all potential RFB candidate landowners.

Using its strength as a state-wide agency with professional field personnel, the VDOF has begun working with and through partners to identify areas of high potential where trees can provide a solution to nutrient, sediment, and physical stream challenges. The initiative will target currently unengaged landowners that have not participated, or who do not qualify for existing programs. Partners, like Soil and Water Conservation Districts (SWCDs or districts), other agencies and non-profit organization have often already identified some of these areas of need. VDOF would provide technical assistance and leverage funding to implement the buffer practices.

The effort is funded by two grants: one from the Virginia Environmental Endowment (VEE) and the other from the National Fish and Wildlife Foundation (NFWF) through the Chesapeake Bay Foundation. The VEE program is focused on the middle portion of the James River and the second is focused on the Shenandoah/Potomac watershed. The goal in each will be to deliver tangible, measurable and meaningful results, at substantial cost savings, on lands that have been difficult to reach through existing programs (gaps) and that will help meet the WIP III goals associated with the James River and the Shenandoah/Potomac watersheds. VDOF has long and extensive experience in tree planting and has found that costs to establish trees can typically be much less than has been customary with forest buffer establishment programs. Planning for and effecting the establishment of naturally regenerated forests cost even less. With these flexible programs, VDOF will serve in the role of the general contractor, which will help control costs even more. A project goal is that sites selected should not compete with existing federal or state buffer programs.

Easement Program

VDOF administers a conservation easement program to assure a sustainable forest resource. Because larger blocks of forest potentially provide the greatest range of functions and values, VDOF easements focus on keeping the forest land base intact, unfragmented, keeping the forest in larger, more manageable and functional acreages. VDOF holds 195 conservation easements in 60 counties and the City of Suffolk that permanently protect over 88,000 acres of vital forestland. Of these, 118 easements consisting of 32,079 acres lie within the Chesapeake Bay watershed.

In FY 2021, VDOF permanently protected 2,554 acres of open space and more than 13 miles of water courses through 3 conservation easements. Two of the easements, comprising 1,936 acres and protecting approximately 6.7 miles of water courses, were within the Chesapeake Bay watershed.

Forest Management Planning

The VDOF has a strong role in forest management planning for Virginia landowners. Forest management plans are a foundational element in meeting the needs of landowners and meeting the broader resource objectives of the Commonwealth. Because forests are long-term by nature, proper planning and implementation of plans will help meet a variety of goals, including water quality. Specifically, VDOF professional foresters prepare multi-resource forest management plans that address forests, timber, wildlife habitat, water quality, soils, and recreation. One of the flagship programs for these plans is the Forest Stewardship Program, a cooperative effort with the U. S. Forest Service, Cooperative Forestry section. It is delivered by VDOF to non-industrial private landowners, who own the majority of Virginia's forests. Private consulting foresters prepare similar, equivalent plans, like the American Tree Farm Program certification, or plans assisted by USDA, Natural Resources Conservation Service. All of these multi-resource management plans address forests and water quality as a required element. Additionally, VDOF and private foresters prepare forest stand-level practice plans for more direct landowner needs for specific forest management projects, and land use plans that meet county and state requirements for the use-value taxation program. VDOF field staff also prepare pre-harvest plans to assist loggers in planning and strategies for specific areas to be harvested. These all aid in comprehensive resource and watershed management. In FY 2021 VDOF recorded over 1,900 plans exceeding 93,000 acres in the Chesapeake Bay Watershed.

Forest management plans lead to implementation of forest management practices. These practices are the very essence of forestry and natural resource management in Virginia. They are action-based, designed to meet landowner and resource needs and include harvesting, tree planting, preparing sites, improving forests, controlling erosion and sedimentation, establishing new forests, controlling invasive species, and helping to heal streams and watersheds. VDOF field staff provide technical assistance and administer financial assistance programs in implementing some of these practices. In FY 2021, VDOF recorded over 1,200 forest management projects on approximately 37,000 acres in the Chesapeake Bay Watershed. More specifically, VDOF reported tree planting on over 500 sites on nearly 20,000 acres in the Chesapeake Bay Watershed. Of this, over 400 acres were established on previously non-forested open land.

VDOF manages 26 State Forests that cover 71,972 acres. These operational, working forests are managed for multiple uses including demonstration, research, watershed protection, timber, wildlife, and recreation. They have recently been certified by Sustainable Forestry Initiative (SFI) and the American Tree Farm System standards, which includes rigorous water quality and Best Management Practice Standards. Additionally, VDOF operates two tree seedling nurseries, offering over 40 species of trees and shrubs that meet Virginia's for needs reforestation, afforestation, water quality, wildlife, and aesthetics. Each year, the nurseries produce approximately 30 million seedlings.

Urban Tree Canopy Program

The Virginia Urban Tree Canopy program assists communities by providing both cost-share funding and technical assistance to plant and maintain more trees on both public and private land. These trees provide green stormwater infrastructure benefits, thereby improving water quality across Virginia and specifically, in the Chesapeake Bay. The USFS Urban and Community Forestry Program (U&CF) also

financially supports and provides technical assistance for Urban Tree Canopy (UTC) analyses, tree inventories and urban forest management plans to give communities better data and encourage better management of existing canopy. With the newly added Tree Planting – Canopy BMPs for the WIP III, a tracking platform for both communities and private citizens has been developed to make it easier to report these plantings using ESRI® software. This tracking application, known as "My Trees Count" is serving a valuable function of tracking planting projects on multiple scales from individual trees to partner group multi-acre projects. Funding is used to educate communities on how to use the platform for tracking and reporting. The U&CF Program is also supporting citizen-science based urban heat island studies across the state. A study was completed in Norfolk in 2020 with Old Dominion University and VDOF collaborated with the Virginia Foundation of Independent Colleges and Science Museum of Virginia to complete urban heat island studies in 10 communities in 2021 with the support of 11 colleges and universities. Data will be available later this year and will be used to prioritize locations for tree planting funding to help combat these heat islands.

Healthy Watershed Forest/TMDL Project

Since 2015, VDOF has partnered with other Chesapeake Bay jurisdictions and internally within Virginia with the Rappahannock River Basin Commission and other partners in leading a landscape-scale, Chesapeake Bay wide initiative called the Healthy Watershed Forest/TMDL project. In Phase I of the project, Virginia successfully quantified that the value of retaining more forestland to meet Chesapeake Bay TMDL requirements could offset TMDL management investments and, thereby, save up to $125 million in the pilot study area alone. In Phase II, Virginia partnered with Pennsylvania which peer reviewed and validated Virginia's Phase I quantification methodology by applying it to a Pennsylvania watershed study area. In Virginia, the project team engaged in more than 60 discussion and discovery sessions in the field over a year-long period to determine what is needed from the perspective of local leaders and landowners to prioritize forestland retention as a land-use planning option to meet Chesapeake Bay Watershed goals. The findings of Phases I and II of the project contributed significantly to the December 2017 decision of the Chesapeake Bay Program management committee to credit forestland retention as a BMP in the 6.0 version of the TMDL model. In addition, the Virginia General Assembly in its 2018 session legislated some of the changes recommended by the localities in Phase II aimed at prioritizing forestland retention to meet water quality objectives.

Phase III of the project began in the spring of 2018 and will continue for up to two years. Funding is provided by the Chesapeake Bay Program through the Chesapeake Bay Trust and the U.S. Endowment for Forests and Communities. Phase III has three tasks: (1) work with three primary Virginia counties (Fauquier, Orange and Essex) to revise policies and ordinances to incentivize retention of forest and agricultural lands; (2) create a working financial model to incentivize private sector investment ($50 million+) in land conservation on a landscape scale and on a long-term sustainable basis: and (3) coordinate with other Chesapeake Bay Program workgroups to integrate findings with those of other initiatives to institutionalize results across all Bay jurisdictions.

Carbon values have been selected as a water quality proxy to provide income streams and incentives for landowners and rural localities. Carbon offers the potential for aggregating interested landowner holdings so they can be offered at scale and with the market convenience required to attract large-scale private capital investments. Further, the project is focusing on Virginia's Economic Development Authorities

(EDAs) as an aggregating mechanism. Adapting the EDA structure to carbon as a proxy for water quality enables a role for counties, combined by choice, into a regional (watershed basin) entity to exercise the authorities granted within the EDA. The General Assembly passed legislation signed by the Governor following the 2019 legislative session to enable EDA's to serve such an aggregating role.

The findings and recommendations of the Healthy Watersheds/Forest project have been incorporated into Virginia's WIP III strategies. Outcomes in 2021 are the creation and inclusion of the legal framework in order to complete the aggregation of landowners within the EDA as well as the addition of Fauquier County to the process. Additional changes to the *Code of Virginia* were identified and deemed necessary to remove barriers to implementation of the program. In the General Assembly 2021 session, SB 1343 was introduced and passed. The bill, titled "the Virginia Freedom of Information Act; proprietary records and trade secrets; carbon sequestration agreements" excludes from the mandatory disclosure provisions of the Virginia Freedom of Information Act proprietary information, voluntarily provided by a private business under a promise of confidentiality from a public body, used by the public body for a carbon sequestration agreement. The bill requires the private business to specify the records for which protection is sought before submitting them to the public body and to state the reasons why protection is necessary. This bill took effect July 1, 2021.

Assessments of Forestland Change

VDOF is compiling and incorporating assessments of forestland change from other agencies, states, universities and conservation groups to better inform urban forestry policies, including state forest resources assessments, wildlife action plans and eco-regional assessments.

Implementation of Nutrient Management Planning

2021 Progress Report

Currently, over 417,453 active nutrient management planned acres in the Commonwealth were developed by DCR staff (Table 4).

Table 4: DCR Nutrient Management Planning

	Crop Acres	Hay Acres	Pasture Acres	Specialty Acres	Total Acres
Chesapeake Bay Watershed	153,529	58,157	42,775	1,048	255,509
Outside the Chesapeake Bay Watershed	103,492	31,122	26,988	342	161,944
Totals	**257,021**	**89,279**	**69,763**	**1,390**	**417,453**

As required by § 10.1-104.5 of the *Code of Virginia*, all golf courses have obtained and are implementing nutrient management plans. DCR continues to work with the golf courses to ensure the nutrient management plans are updated and revised as required by law.

Total urban areas with nutrient management now exceed 33,688.5 acres. Because of reporting/data collection limitations, the total urban acres with nutrient management is not reflective of the actual amount of urban acres with nutrient management. The actual acreage is much higher. Section 3.2-3602.1 of the *Code of Virginia* applies to the application of regulated products (fertilizer) to nonagricultural property. It calls for training requirements, establishment of proper nutrient management practices (according to Virginia's Nutrient Management Standards and Criteria), and reporting requirements for contract-applicators who apply fertilizer to more than 100 acres as well as for employees, representatives, or agents of state agencies, localities, or other governmental entities who apply fertilizer to nonagricultural lands. The total acreage reported to VDACS is not currently reflected in the total urban acres with nutrient management. DCR estimates the additional acreage is roughly 115,000 acres. The VDACS acreage combined with the acreage reported through DCR nutrient-management-planner-annual-activity reports for required nutrient management plans on golf courses, localities with DEQ municipal separate storm sewer system (MS4s) permits, and state-owned land, covers the majority of fertilization of nonagricultural land in the state that is managed by professionals.

During the 2019, 2020 and 2021 General Assembly Sessions, funding was provided for nonpoint source reduction projects including the poultry litter transport incentive program. Utilizing the additional funding provided, DCR has expanded the transport program to include Accomack County while still maintaining programs in Page and Rockingham counties. An agreement with the Virginia Poultry Federation allows DCR to leverage the state funding provided. As a strategy in WIP III, poultry litter transported from these three key counties needs to increase from 5,000 – 6,000 tons annually to approximately 89,000 tons annually by year 2025. For FY 2021, 3,122 tons of litter were transported out of Accomack County, totaling $62,451.60 in payments. Out of Rockingham County 14,698 tons of litter were transported, totaling $210,959.03 in payments. FY 2021 contracts totaled just over 30,000 tons of litter that will be moved, however to date there has been no participation in Page County.

In order to continue progress toward meeting goals for the Chesapeake Bay TMDL, DCR has dedicated two certified nutrient management staff to work exclusively with small dairies and other small farms to develop nutrient management plans. There are 376 dairies in Virginia, a reduction from more than 500 in recent years. Forty-four of these permitted operations have current nutrient management plans. DCR staff develops nutrient management plans for the majority of the animal operations in the Commonwealth. All nutrient management plans involving the use of biosolids must be approved by DCR as well as many of the nutrient management plans that utilize manure as a fertilizer.

DCR has developed a new module, the Nutrient Management Planning (NMP) Module, which is completely integrated with the existing Conservation Application Suite. This new module collects data in a more systematic and thorough manner and allows for more accurate reporting and data collection on nutrient management. The NMP Module is being used by all DCR nutrient management planners; DCR is currently examining ways to expand the Module's use by private sector planners.

From 2019 - 2021, funding, via both federal grants and the state, provided $1.2 million for the development of nutrient management plans. Utilizing some of these funds, DCR established a direct pay initiative for nutrient management planners in 2019. This initiative pays nutrient management planners for the development, revision, and implementation of nutrient management plans, particularly in counties within the Chesapeake Bay watershed with fewer plans on cropland; this emphasis on ensuring that nutrient management plans are implemented on cropland will assist the Commonwealth in reaching its water quality goals. Payments are made to the planners on a first-come, first-served basis until available funding has been obligated. This is a far simpler process for planners to receive payment than responding to a Request for Applications (RFA). To date, approximately 94,631 acres of nutrient management plans have been developed through this initiative.

Implementation of and compliance with erosion and sediment control programs

2021 Progress Report

From July 2020 through June 2021, the continued focus of DEQ central and regional office staff has been assisting local governments with the implementation of their local stormwater management programs, which includes addressing erosion and sediment control in a manner that is consistent with the Erosion and Sediment Control Law and attendant regulations. DEQ central office staff performed five local government erosion and sediment control program audits during the reporting period. DEQ regional office staff continued to visit small and large construction activities to perform site inspections for compliance with the 2019 Construction General Permit, which includes addressing erosion and sediment control in a manner that is consistent with the Erosion and Sediment Control Law and attendant regulations.

Implementation of stormwater management program

2021 Progress Report

During the reporting period, no local governments requested or received approval to manage local stormwater management programs. Ninety-four local governments continued to implement their previously approved local stormwater management programs with the assistance of DEQ central and regional office staff. In addition, DEQ central office staff and local governments continued to process coverage under the Construction General Permit using the Stormwater Construction General Permit System. This online system enables local stormwater management programs to continue to coordinate their efforts with DEQ's issuance, modification, transfer, and termination of Construction General Permit coverage. From July 2020 through June 2021, new (*i.e.*, first-time) coverage under the 2019 Construction General Permit was approved for 332 land-disturbing activities where DEQ is the local Virginia Stormwater Management Program (VSMP) authority and new coverage under the 2019 Construction General Permit was approved for 1,358 land-disturbing activities statewide. DEQ regional office staff continued to visit small and large construction activities to perform site inspections for compliance with the 2019 Construction General Permit. On July 1, 2019, the 2019 Construction General Permit became effective replacing the 2014 Construction General Permit. The 2019 Construction General Permit expires on June 30, 2024.

Authorization of Stormwater Local Assistance Fund Project Funding List

In order to reduce nonpoint source pollution from stormwater runoff, the Virginia General Assembly included Item 360 in Chapter 806 of the 2013 Acts of Assembly (the Commonwealth's 2013 Budget Bill) which created and set forth specific parameters for the administration of the Stormwater Local Assistance Fund (SLAF). The purpose of the Fund is to provide matching grants to local governments for the planning, design, and implementation of stormwater BMPs that address cost efficiency and commitments related to reducing pollutant loads to the state's surface waters. In accordance with that legislation, the State Water Control Board approved Guidelines for the implementation of the SLAF program. The Guidelines call for an annual solicitation of applications, an application review and ranking process, and the authorization of a Project Funding List (PFL) by the DEQ Director.

The General Assembly provided $35 million in bond funds for SLAF in FY 2014 and $20 million more in FY 2015. In the first cycle of SLAF funding, DEQ funded 71 projects in 31 localities totaling $22,937,158. In the second cycle of SLAF funding, DEQ authorized funding for 64 projects in 25 localities totaling $21,488,776. The remaining funds were carried over to be combined with the additional $5 million in appropriations provided by the General Assembly in FY 2016. In the third cycle of SLAF funding, DEQ authorized funding for 17 projects in 17 localities, totaling $8,486,209. The General Assembly made $20 million in bond funds available for the FY 2017 solicitation. DEQ authorized 41 projects from 26 localities totaling $19,855,948. For the FY 2019 solicitation, the General Assembly made $20 million in bond funds available that resulted in 15 localities with 24 projects being authorized. In FY 2020, DEQ authorized $18,000,000 in funding for 22 projects and 1 nutrient credit purchase from 15 localities utilizing $10,000,000 in bond authorization from the General Assembly and $8,000,000 in carryover funds.

As of June 30, 2021, the six funding cycles of SLAF grants have resulted in 37 localities that signed grant agreements to implement 146 projects, totaling $68,414,690 in cost-share. Additionally, 39 projects authorized for funding from the solicitations (19 from the first cycle, ten from the second, one from the third cycle, six from the fourth cycle, two from the fifth cycle and one from the sixth cycle) have been withdrawn by the localities.

Virginia Clean Water Revolving Loan Fund

For FY 2021 (the period July 1, 2020 – June 30, 2021), the Virginia Clean Water Revolving Loan Fund (VCWRLF) allocated roughly $206 million in loan funds to 27 localities for wastewater and stormwater infrastructure projects, sanitary sewer evaluation surveys, and one living shoreline. The VCWRLF was created in 1987 and DEQ, on behalf of the State Water Control Board, manages the VCWRLF. The VCWRLF provides financial assistance in the form of low-interest loans to local governments for needed improvements at publicly owned wastewater treatment facilities and collection systems. In 1999, 2001, 2003, 2010 and 2016, the State Water Control Board expanded the scope of VCWRLF activity and DEQ implemented additional programs to provide low interest loans related to agricultural and other non-point source water quality issues.

From 1988 to 2020, under the VCWRLF Program, DEQ has authorized over 692 projects, providing over $4 billion in subsidized loan funds for projects in the Chesapeake Bay Watershed and Southern Rivers. Eligible costs include the planning and design to upgrade, rehabilitate, and/or expand wastewater treatment plants; the remediation of brownfields; purchase of land for the purpose of conservation; installation of living shorelines; and construction of stormwater BMPs and agricultural BMPs.

Local government implementation and compliance with requirements of the Chesapeake Bay Preservation Act

2021 Progress Report

Chesapeake Bay Preservation Act (CBPA) compliance reviews continue to be conducted for the Tidewater localities subject to the CBPA. DEQ Local Government Assistance Program staff have been working to ensure that a periodic (every five years) compliance review is completed for all local programs in the 84 CBPA localities. With 80 localities now through the compliance review process, and being found fully compliant or working to resolve conditions under a Corrective Action Agreement, four localities remain scheduled to undergo a compliance review in the near future. If a DEQ review reveals conditions that must be addressed by a locality in order for its program to come into compliance with the CBPA and the locality does not meet the conditions by an established deadline, a warning letter is issued with a short deadline to comply. The review is passed on to DEQ's Enforcement Division if the locality does not comply with the conditions after the established deadline.

During these compliance reviews, staff assess whether or not the locality is implementing soil and water quality conservation assessments for all active agricultural lands, the status of the water quality provisions of the local comprehensive plans, how well local governments are ensuring that impervious cover is minimized, indigenous vegetation is maintained and land disturbance is minimized on approved development projects and septic tank pump out requirements are met. As part of the compliance review

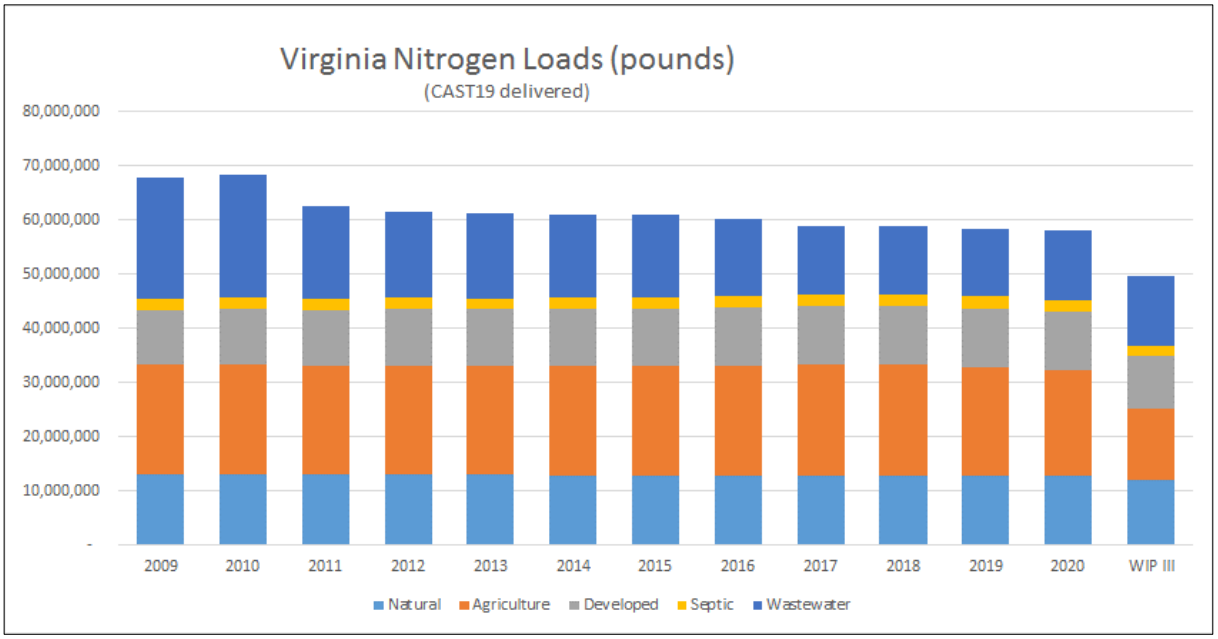
process, localities are required to submit annual reports on their continued implementation of the CBPA. Based on the 2019 annual report cycle (January 1, 2020 – December 31, 2021), 118 soil and water quality conservation assessments on agricultural land were conducted and 15,989 septic systems were pumped out.

Chesapeake Bay Total Maximum Daily Load Implementation

2021 Progress Report

The following graphs show the modeled annual nitrogen, phosphorus and sediment loads reaching the Chesapeake Bay from Virginia based on the Phase 6 Chesapeake Bay Watershed model (Figures 5-7). Each of the bars represents the estimated annual loads reaching the Chesapeake Bay from Virginia for 2009-2020. The last bar on the right shows the model estimated annual loads that would result from full implementation of the BMPs identified in Virginia's Phase III WIP in 2025. Each of the colors stacked in the bars represents the annual loads from the various sectors (natural, agriculture, developed, septic and wastewater).

Figure 5: Virginia's Annual Nitrogen Progress Loads for 2009-2020 with WIP III Planned 2025 Loads



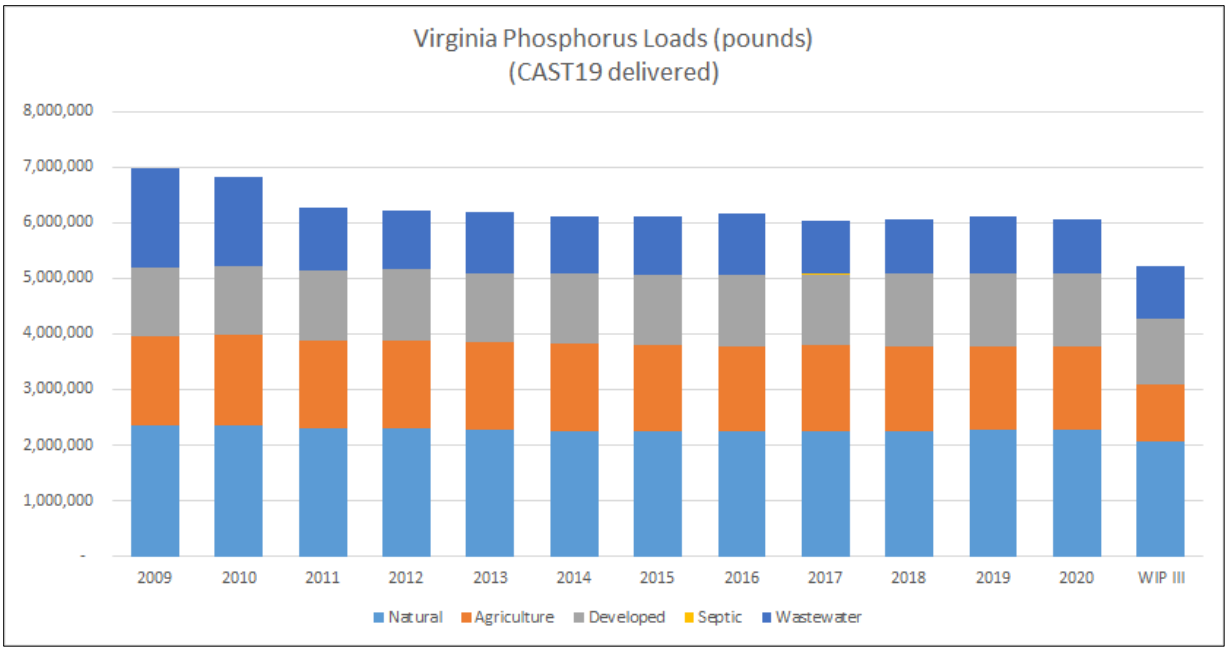


Figure 6: Virginia's Annual Phosphorus Progress Loads for 2009-2019 with WIP III Planned 2025 Loads

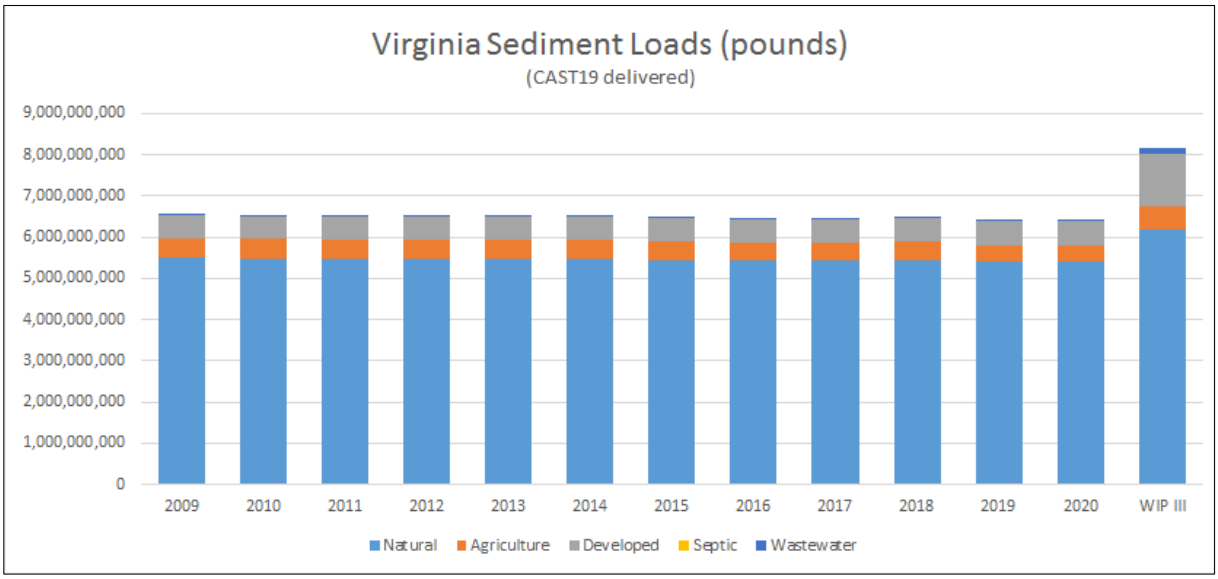


Figure 7: Virginia's Annual Sediment Progress Loads for 2009 – 2019 with WIP III Planned 2025 Loads

For additional information on the Chesapeake Bay TMDL, associated implementation efforts and progress, please visit the DEQ Chesapeake Bay Programs webpage and the Chesapeake Bay Program's ChesapeakeStat website.

Development of TMDL reports, implementation plans, and implementation projects

Development of Total Maximum Daily Load Reports

2021 Progress Report

As of June 2021, 10 new TMDL equations, each representing a watershed area draining to impaired surface waters, have been EPA approved. The figure below shows the number of TMDL equations by pollutant set across Virginia since the inception of the TMDL program (Figure 8).

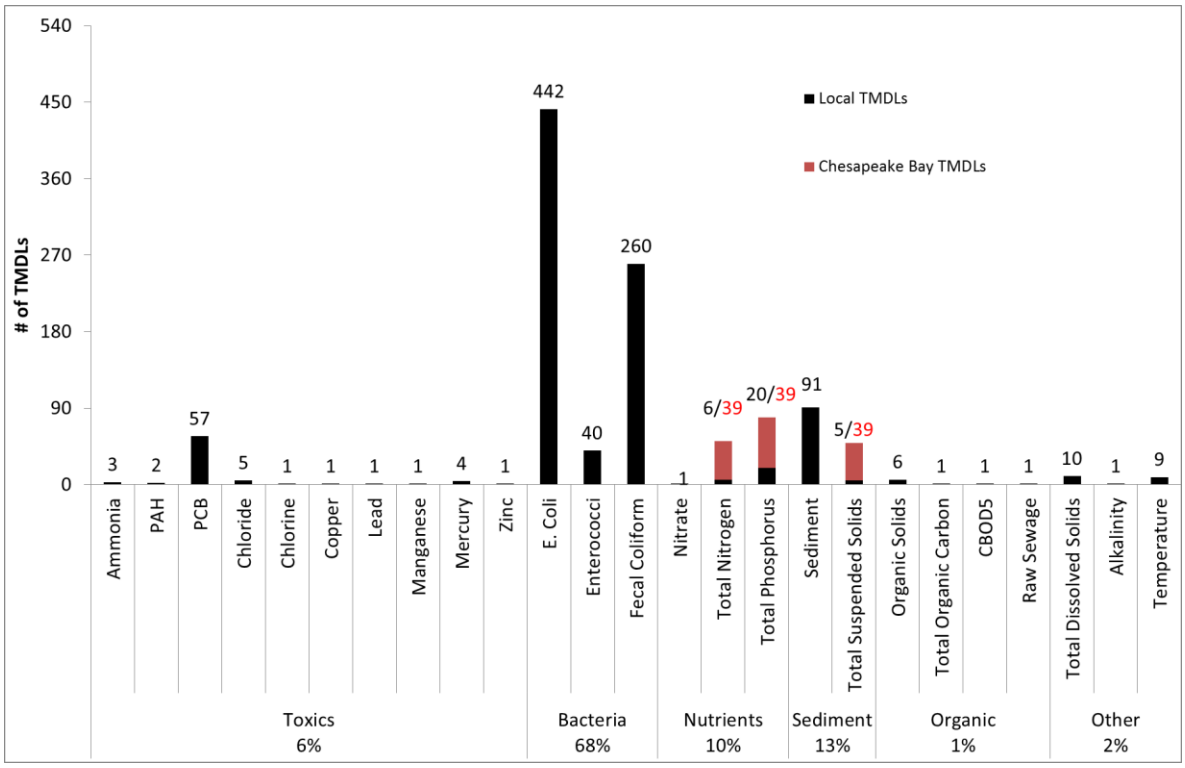


Figure 8: TMDL Equations by Pollutant[3]

Based on the 2020 Integrated Report, Virginia estimates that 8,383 miles of rivers, 77,054 acres of lake, and 2,055 square miles of estuary will require TMDL development in the coming years. To maintain a robust pace of TMDL development with level funding, Virginia has developed several strategies including: a) developing TMDLs using a watershed approach to address multiple impairments in

[3] The graph includes TMDL equations reported previously and newly adopted equations. In some instances, previously established TMDLs were superseded by revised TMDLs. Supersession can be one equation replacing another or one equation replacing many equations.

watersheds with similar characteristics; b) developing TMDLs in-house; c) identifying non-TMDL solutions, such as plans that outline BMP implementation strategies in predominantly nonpoint source (NPS) polluted watersheds; and d) developing TMDLs that are more easily implemented. Virginia continues to explore tools and options for restoring and protecting water quality, both for environmental benefit and efficient program management.

Starting in the winter of 2014, states, including Virginia, began prioritizing watersheds for TMDL or TMDL alternative development for the approaching six-year window (2016-2022). Watersheds are prioritized for TMDL development based on types of impairment, public interest, available monitoring, regional input, and available funding. DEQ embarked on data analysis to identify highest priority watersheds, particularly those that appear to be valued for the impaired designated use. All of the prioritized watersheds for TMDL or TMDL alternative development during 2016-2022 were assembled into a list and public noticed for public comment on July 27, 2015. Only one comment was received and addressed by DEQ. It did not result in any changes to the priorities list that was then finalized following the close of the 30-day public comment period and submitted to EPA. After a few months of implementing the priorities list, EPA announced that states could revise their priorities lists and include TMDL revisions in the list. Accordingly, in the winter of 2016 DEQ revised the list of prioritized impaired waters and public noticed it for public comment on April 4, 2016. The comment period closed on May 4, 2016 with no comments received. In 2018, EPA gave states the opportunity to adjust their priorities lists to adapt to changes in program resources. This revised list was public noticed for public comment on April 2, 2018. The comment period ended on May 4, 2018 with no comments received. Following the close of the public comment period, the list of priorities was finalized and submitted to EPA. Most recently, EPA granted a final opportunity to adjust state priorities. In May 2019, DEQ revised (and EPA approved) its priorities to promote all benthic impairments that were previously internal priorities, not committed to EPA, to be formal priorities that are committed to EPA. The bacteria priorities that were previously formal priorities were then moved to be internal priorities. This revision was necessary to reflect changes in program resources. The remaining 2016-2022 TMDL program priorities can be found in Appendix 1 of the 2020 Integrated Report.

Most recently, DEQ initiated the planning process to prepare for the next cycle of priorities. At the beginning of this process, DEQ solicited input from the public in September 2020 to help identify water quality impairments of interest to the public. These priorities are still draft and will be finalized with the issuance of the 2022 Integrated Report.

Development of Implementation Plans

2021 Progress Report

Virginia law (1997 Water Quality Monitoring, Information, and Restoration Act, §§ 62.1- 44.19:4 through 19:8 of the *Code of Virginia*, or WQMIRA) requires the development and implementation of a plan (including a TMDL when appropriate) to achieve fully supporting status for impaired water. The development of an Implementation Plan (IP) is Virginia's mechanism for addressing nonpoint pollutant sources in impaired watersheds. The IP report includes: water quality goals, control measure goals, a schedule of corrective actions, monitoring strategy and associated costs and benefits of implementation. DEQ, along with other agency and non-agency partners, continues to develop and implement IPs

throughout Virginia. In FY 2021, DEQ and partners completed 2 IPs covering 19 impairments. In addition, 4 IPs covering 41 impairments were under development at the end of the fiscal year.

The graph below summarizes implementation planning progress since the program inception. Since 2001, Virginia has completed 97 IPs, addressing 607 impairments (Figure 9).

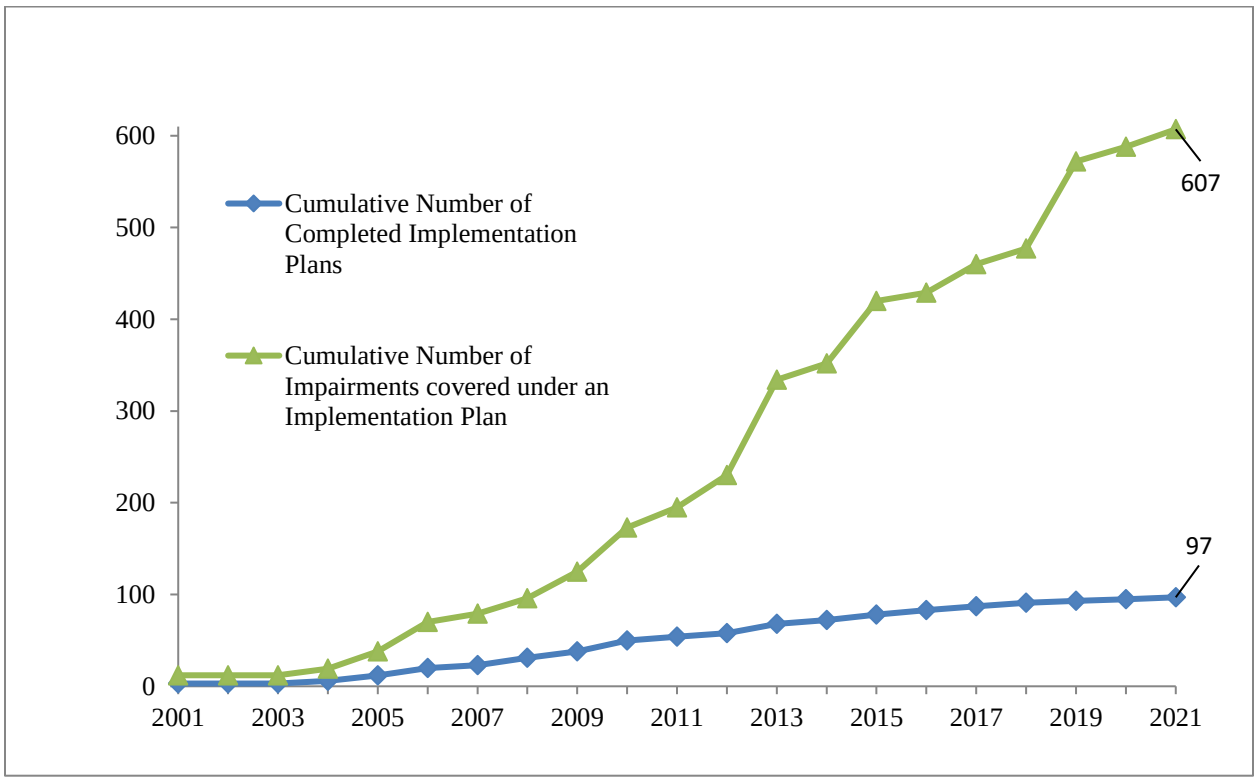


Figure 9: Cumulative Summary of Implementation Plan Development (July 2001 – June 2021)

As funding limitations have continued over the years, it has become increasingly important to evolve the implementation planning program. DEQ is continuing to evaluate the prioritization methods of developing implementation plans, as well as how these plans are written. More efforts are being placed on producing joint TMDL-IP reports, exploring TMDL alternatives, evaluating larger watershed areas, pursuing more watershed-based plans and simplifying modeling efforts. These efforts have allowed the implementation planning program to seek new opportunities, including performing more development work in-house. Sediment/benthic impairments were prioritized in FY 2021 in the development of IPs following suit to FY 2021 TMDL priorities. Bacteria impairments continue to be the most common pollutant to Virgina waterbodies and addressed through many already approved IPs developed since 2001.

A list of all completed IPs through June 2021 is provided in the table below (Table 5). More information on IPs (under development or approved) can be found on DEQ's Implementation Planning webpage.

Table 5: Completed Implementation Plans (January 2001 – June 2021)

Watershed (# of impairments / # of impaired segments)	Location (county or city)	Impairment	Lead	Fiscal year Completed
Middle Fork Holston (3/3)	Washington	Bc	DCR	2001
North River (Muddy, Lower Dry, Pleasant, and Mill Creek) (5/4)	Rockingham	Bc, Be (Nitrate)	DCR	2001
Upper Blackwater River (4/4)	Franklin	Bc	DCR	2001
Catoctin Creek (4/4)	Loudoun	Bc	DCR	2004
Holmans Creek (2/2)	Shenandoah	Bc, Be (sed)	DCR	2004
Four Mile Run (1/1)	Arlington, Alexandria	Bc	DEQ	2004
Willis River (1/1)	Cumberland, Buckingham	Bc	DCR	2005
Chowan Study Area (9/9)	Multiple Counties	Bc	DEQ	2005
Moores Creek (1/1)	Charlottesville, Albemarle	Bc	DEQ	2005
Guest River (5/5)	Wise, Scott, Dickenson	Be (sed)	DEQ	2005
Lower Blackwater, Maggoddee and Gills Creek (3/3)	Franklin	Bc	DCR	2005
Lynnhaven (shellfish) (2/2)	VA Beach	Bc	DEQ	2005
Cooks Creek and Blacks Run (6/2)	Rockingham, Harrisonburg	Bc, Be (sed & P)	DCR	2006
Thumb, Deep, Carter and Great Runs (4/4)	Fauquier, Stafford	Bc	DCR	2006
Big Otter (8/8)	Bedford, Campbell	Bc	DCR	2006
Mill and Dodd Creeks (2/2)	Floyd, Montgomery	Bc	DCR	2006
Little and Beaver Creek (3/2)	Bristol, Washington	Bc, Be (sed)	DCR	2006
Stroubles Creek (1/1)	Montgomery	Be (sed)	DEQ	2006
Back Creek (2/1)	Pulaski	Bc, Be (sed)	DEQ	2006
Abrams and Opequon Creek (8/5)	Frederick, Winchester	Bc, Be (sed)	DEQ	2006
Knox and PawPaw Creek (4/2)	Buchanan	Bc, Be (sed)	DEQ	2007
Hawksbill and Mill Creek (2/2)	Page	Bc	DCR	2007
Looney Creek (1/1)	Botetourt	Bc	DCR	2007
Upper Clinch River (1/1)	Tazewell	Be (sed)	DCR	2008
Occahannock Creek (shellfish) (1/1)	Accomack	Bc	DCR	2008
Falling River (1/1)	Campbell, Appomattox	Bc	DCR	2008
Dumps Creek (2/1)	Russell	TSS, TDS	DEQ	2008
Bluestone River (2/1)	Tazewell, Bluefield	Bc, Be (sed)	DCR	2008
Smith Creek (2/1)	Rockingham, Shenandoah	Bc, Be (sed)	DEQ	2008
Appomattox River – Spring Creek, Briery Creek, Bush River, Little Sandy River and Saylers Creek (5/5)	Prince Edward, Amelia	Bc	DCR	2008
Appomattox River – Flat, Nibbs, Deep and West Creeks (4/4)	Amelia, Nottoway	Bc	DCR	2008
Straight Creek, Stone Creek and Tributaries (3/3)	Lee	Bc, Be (sed)	DEQ	2009
Long Glade Run, Mossy Creek and Naked Creek (5/3)	Augusta, Rockingham	Bc, Be (sed)	DCR	2009
Back Bay Watershed (1/1)	City of Virginia Beach	Bc	DEQ	2009
North Landing Watershed (4/4)	City of Virginia Beach	Bc	DEQ	2009
Pigg River and Old Womans Creek (8/8)	Franklin, Pittsylvania	Bc	DEQ	2009
Cub, Turnip, Buffalo and UT Buffalo Creeks (4/4)	Appomattox, Charlotte	Bc	DCR	2009
Hazel River Watershed (4/4)	Culpeper, Madison, Rappahannock	Bc	DCR	2009
Greenvale Creek, Paynes Creek and Beach Creek (shellfish)(3/2)	Lancaster	Bc	DCR	2010
Ash Camp and Twitty's Creek (2/2)	Charlotte	Be (sed)	DCR	2010

Watershed (# of impairments / # of impaired segments)	Location (county or city)	Impairment	Lead	Fiscal year Completed
Upper & Lower Middle River, Moffett Creek & Polecat (7/5)	Augusta	Bc, Be (sed)	DCR	2010
Mill and Powhatan Creek (2/2)	James City County	Bc	DEQ	2010
Lewis Creek (1/1)	Russell	Be (sed)	DCR	2010
Browns, Craig and Marsh Runs (3/3)	Fauquier	Bc	DCR	2010
Little Dark Run and Robinson River (3/3)	Culpeper & Madison	Bc	DCR	2010
Rock Island, Austin, Frisby, Troublesome Creeks, North and Slate Rivers (6/6)	Buckingham	Bc	DCR	2010
Hays, Moffatts, Otts and Walker Creeks (4/4)	Augusta & Rockbridge	Bc	DCR	2010
Christians Creek and South River (6/3)	Augusta & Waynesboro	Bc, Be (sed)	DCR	2010
South James River, Ivy, Tomahawk, Burton, Judith, Fishing, Blackwater and Beaver Creeks (8/8)	Campbell, Bedford, Amherst, Lynchburg	Bc	DEQ	2010
Nansemond River, Shingle Creek (3/3)	Suffolk	Bc	DEQ	2010
Cherrystone Inlet, Kings Creek (shellfish) (1/1)	Northampton	Bc	DCR	2011
Roanoke River Watersheds – Upper Banister River and Stinking River, Bearskin, Cherrystone and Whitethorn Creeks (5/5)	Pittsylvania	Bc	DCR	2011
York Basin Watersheds – Beaver Creek, Goldmine Creek, Mountain Run, Pamunkey Creek, Plentiful Creek, Terry's Run (6/6)	Louisa, Orange, Spotsylvania	Bc	DCR	2011
James River Watersheds- James River and Bernards, Powhite Reedy, Gilles, Almond, Goode, Falling and Noname Creeks (10/10)	Chesterfield, Powatan, Henrico, Richmond	Bc	DEQ	2011
Little River Watershed – Little River, Meadow Run, Pine, West Fork Dodd, Dodd, Meadow, Brush, Laurel, Big Indian Creeks (26/26)	Montgomery & Floyd	Bc, Be (sed), Temp	DEQ	2012
Clinch River; Coal, Middle, and Plum Creeks (7/7)	Tazewell	Bc, Be (sed)	DEQ	2012
Hoffler Creek (1/1)	Suffolk & Portsmouth	Bc	DEQ	2012
Mill Creek (1/1)	Northampton	Be (DO, pH)	DEQ	2012
Lower Banister River, Polecat Creek and Sandy Creek (3/3)	Halifax, Pittsylvania	Bc	DCR	2013
Middle Fork Holston River & Wolf Creek (8/6)	Abingdon, Smyth, Washington, Wythe	Bc, Be (sed)	DCR	2013
Spout Run (4/3)	Clarke	Bc, Be (sed)	DCR	2013
Piankatank River, Milford Haven, Gwynns Island (17/16)	Matthews, Middlesex, Gloucester	Bc	DCR	2013
Mill Creek, Cove Creek, Miller Creek, Stony Fork, Tate Run, S.F. Reed Creek, Reed Creek (9/9)	Wythe	Bc	DEQ	2013
Beaverdam, Boatswain Creek, Chickahominy River, Collins Run, Stony Run (5/5)	Hanover, Henrico, Charles City, Richmond	Bc	DEQ	2013
Rockfish River (4/4)	Nelson	Bc, Be (sed)	DEQ	2013
South Fork Mayo River, North Fork Mayo River, Blackberry Creek, Smith Creek, Marrowbone Creek, Leatherwood Creek (8/8)	Henry, Patrick, and City of Martinsville	Bc	DEQ	2013
Darden Mill Run, Mill Swamp, Three Creek (9)	Brunswick, Greensville & Southampton	Bc	DEQ	2013
North Fork Holston River (35/35)	Scott, Washington, Smyth, Russell, Bland, Tazewell	Bc, Temp	DEQ	2013

Watershed (# of impairments / # of impaired segments)	Location (county or city)	Impairment	Lead	Fiscal year Completed
Linville Creek (2/1)	Rockingham, Broadway	Bc, Be (sed)	DEQ	2014
Wards Creek, Upper Chippokes Creek, Western Run, Crewes Channel, West Run, James River (6/6)	Charles City, Henrico & Hanover	Bc	DEQ	2014
Elk and Cripple Creek (2/2)	Grayson & Wythe	Bc	DEQ	2014
Tye River, Hat Creek, Rucker Run, Piney River, Mill Creek, Turner Creek, Rutledge Creek, Buffalo River (8/8)	Amherst, Nelson	Bc	DEQ	2014
Mattawoman, Hungars, UT-Hungars, Barlow, Jacobus, The Gulf (6/6)	Northampton	Bc	DEQ	2015
Colliers Creek, North Fork Buffalo Creek, South Fork Buffalo Creek, Buffalo Creek, Cedar Creek (5/5)	Rockbridge	Bc	DEQ	2015
Crab Creek (2/1)	Town of Christiansburg, Montgomery County	Bc, Be (sed)	DEQ	2015
Fairview Beach (1/1)	King George	Bc	DEQ	2015
Chestnut Creek (2/2)	Carroll & Grayson, Town of Galax	Bc, Be (sed)	DEQ	2015
Roanoke River Watersheds –Part 1 – Mud Lick Creek, Mason Creek, Murray Run, Ore Branch, Peters Creek, Roanoke River, Carvin Creek, Glade Creek, Laymantown Creek, Tinker Creek, Back Creek (40/34)	Botetourt, Montgomery, Roanoke, Roanoke City, Salem, Town of Vinton	Bc, Be (sed)	DEQ	2015/2016
Turley Creek, Long Meadow (2/2)	Rockingham	Be (sed)	DEQ	2016
Chuckatuck Creek, Brewers Creek (2/2)	Suffolk	Bc	DEQ	2016
Banister River, Winn Creek (3/3), Terrible Creek	Town of Halifax, Halifax	Bc	DEQ	2016
Hardware River (2/2)	Albemarle, Fluvanna	Bc	DEQ	2016
Upper Rapidan River Watersheds – Garth Run, UT Rapidan River, Rapidan River, Beautiful Run, Rapidan River, UT Rapidan River, Poplar Run, Blue Run, Marsh Run, Rippin Run (10/10).	Albemarle, Greene, Madison. Orange	Bc	DEQ	2016
Roanoke River Watersheds- Part 2 – North Fork Roanoke River, South Fork Roanoke River, Bradshaw Creek, Wilson Creek (8/4)	Floyd, Montgomery, Roanoke	Bc, Be (sed)	DEQ	2017
Crooked Run, Stephens Run, West Run, and Willow Run (4/4)	Frederick, Warren	Bc	DEQ	2017
Upper Clinch River and Tributaries (8/8)	Tazewell	Bc	DEQ	2017
Blackwater Creek, Clinch River, N.F. Clinch River, Stock Creek and Moll Creek (11/11)	Scott, Russell, Wise	Bc	DEQ	2017
Cromwells Run, Little River, Upper Goose Creek (3/3)	Fauquier, Loudoun	Bc	DEQ	2018
Little Calfpasture River (1/1)	Augusta, Rockbridge	Be (sed)	DEQ	2018
Powell River, North Fork Powell, South Fork Powell, Butcher Creek, Wallen Creek (12/10)	Lee, Wise	Bc, Be (sed)	DEQ	2018
Cunningham Creek (1/1)	Fluvanna	Bc, Be (sed)	DEQ	2018
Dan River- Birch Creek, Byrds Branch, Doubles Creek, Fall Creek, Sandy Creek (94/94)	Carroll, Floyd, Halifax, Henry, Patrick, Pittsylvania	Bc	DEQ	2019
Woods Creek IP (1/1)	Lexington, Rockbridge	Bc	DEQ	2019
North Fork Catoctin (2/2)	Loudon	Be (sed)	DEQ	2020

Watershed (# of impairments / # of impaired segments)	Location (county or city)	Impairment	Lead	Fiscal year Completed
Mattaponi River (14/14)	Caroline, King and Queen, Spotsylvania	Bc	DEQ	2020**
McClure River (6/6)	Dickenson	Bc	DEQ	2021*
Buffalo River (13/12)	Amherst, Nelson	Bc, Be	DEQ	2021*
Yeocomico River (13/13)	Northumberland, Westmoreland	Bc	DEQ	UD
Accotink Creek (3/3)	Fairfax, Fairfax County	Chloride	DEQ	UD
Peak Creek (6/6)	Wythe, Pulaski	Bc	Third Party	UD
Mountain Run, Muddy Run, Lower Hazel River (19/13)	Culpeper	Bc, Be	DEQ	UD
*Impairment types: Bc = bacteria, Be = Benthic, P = phosphorus, TSS = Total suspended solids, TDS = Total dissolved solids, Sed = sediment. *IP has been approved by USEPA, but not yet approved by the State Water Control Board. **IP has been approved by USEPA, but not yet by the State Water Control Board*				

Watershed Restoration and TMDL Implementation

2020 Progress Report[4]

The goal of the TMDL Implementation Program is to implement targeted, on-the-ground activities, identified in TMDL IPs, which will result in water quality improvements and subsequent delisting of impaired streams. Virginia uses a staged approach that provides opportunities for periodic evaluation of the effectiveness of the implementation actions and adjustment of efforts to achieve water quality objectives in a timely and cost-effective manner. Virginia's TMDL Implementation Program was developed by DCR in 2001 and has been funded by a mix of federal and state funds. In June 2013 the responsibility for program administration was moved to DEQ. From July 1, 2019 through June 30, 2020 DEQ managed 23 implementation projects funded partially or fully with Federal Section 319(h). All projects are listed below (Table 6).

[4] Due to the availability of BMP data at the time of this reporting deadline, the NPS program is not able to provide a FY 2021 programmatic report. The FY 2020 Clean-Up Plan Report to the same deadline issue. Subsequent reports will cover the period one year delayed. The program data included in this report is for FY 2020 activity (7/1/2019-6/30/2020).

Table 6: 319(h) Funded TMDL Implementation Projects Active in Virginia FY 2020

Watershed Area	District and/or Partner	Years of Implementation and Funding[5]
Banister and Winn Creeks IP: Lower Banister River and Terrible Creek	Halifax SWCD	§319(h): 2018-2021
Buffalo Creek, Colliers Creek and Cedar Creek	Natural Bridge SWCD	§319(h):2017-2020
Clinch Cove and Tributaries: Copper and Moll Creeks	Clinch Valley SWCD	§319(h): 2018-2021
Flat, Nibbs, Deep and West Creeks	Piedmont SWCD	§319(h): 2015-2023 (septic only); WQIF/VNRCF: 2007-2015– Agriculture only
Gulf, Barlow, Mattawoman, Jacobus and Hungars Creeks	Accomack-Northampton Planning District Commission	§319(h): 2019-2021 (Residential only)
Hardware River and North Hardware River	John Marshall SWCD	§319(h): 2015-2021
Linville Creek	Shenandoah Valley SWCD	§319(h): 2015-2020
Little Dark Run and Robinson River	Culpeper SWCD	§319(h): 2015-2023
North Fork Holston River – Scott County	LENOWISCO PDC	§319(h): 2017-2020 (Residential only)
North Fork Holston River – Smyth County	Evergreen SWCD	$319(h): 2018-2022
North Fork Holston River – Washington County	Holston River SWCD	§319(h): 2017-2023
Slate River and Rock Island Creek	Peter Francisco SWCD	§319(h): 2010-2022
Smith and Mayo Rivers IP: Smith River and Blackberry Creek	Blue Ridge SWCD	§319(h): 2017-2020 (Residential Only)
South River and Christians Creek	Chesapeake Bay Foundation and Headwaters SWCD	§319(h): 2017-2020 (Agriculture Only)
Spring, Briery, Little Sandy, Saylers Creeks and Bush River	Piedmont SWCD	§319(h): 2016-2023 (residential only); WQIF/VNRCF: 2007-2015– Agriculture only
Tye River, Hat Creek, Rucker Run and Piney River	John Marshall SWCD	§319(h): 2015-2023
Upper Clinch River	Upper TN River Roundtable, Inc,	§319(h): 2016-2013
Upper Goose Creek	John Marshal SWCD	$319(h): 2018-2022 (Agriculture only)
Upper Hazel River, Hughes River, Rush River and Thornton River	Culpeper SWCD	§319(h):2009-2023, VNRCF: 2011-2015, WQIF RFP: 2007-2009, 2016-2019
Upper Rapidan River	Culpeper SWCD	§319(h): 2016-2023
Upper Roanoke River Part 1 IP: Glade and Tinker Creeks	Mountain Castles SWCD	$319(h): 2018-2023 (Residential Only)
Upper Roanoke River Part 1 IP: Mudlick and Glade Creeks	Western Virginia Water Authority	$319(h): 2018-2023 (Residential Only)

[5] Federal EPA Nonpoint Source Implementation Grant (319h); Watershed Improvement Fund Request for Proposals (WQIF RFP), State Virginia Natural Resources Commitment Fund (VNRCF), Virginia Natural Resources Commitment Fund - Chesapeake Bay Livestock Exclusion Initiative (VNRCF- CBLEI).

Watershed Area	District and/or Partner	Years of Implementation and Funding[5]
Upper York River (Orange County)	Culpeper SWCD	§319(h): 2012-2023,VNRCF: 2012-2015, WQIF RFP: 2016-2019

The map below depicts the overall status of nonpoint source (NPS) TMDL implementation in Virginia since 2001 (Figure 10). It includes watersheds where TMDL implementation plans have been developed and TMDL implementation projects have been active that have received strategic funding. It should be noted that DCR administers a statewide agricultural cost-share program that resulted in BMP installation and implementation in various implementation plan areas and although not reflected on the maps, the information is presented in the remaining part of this section.

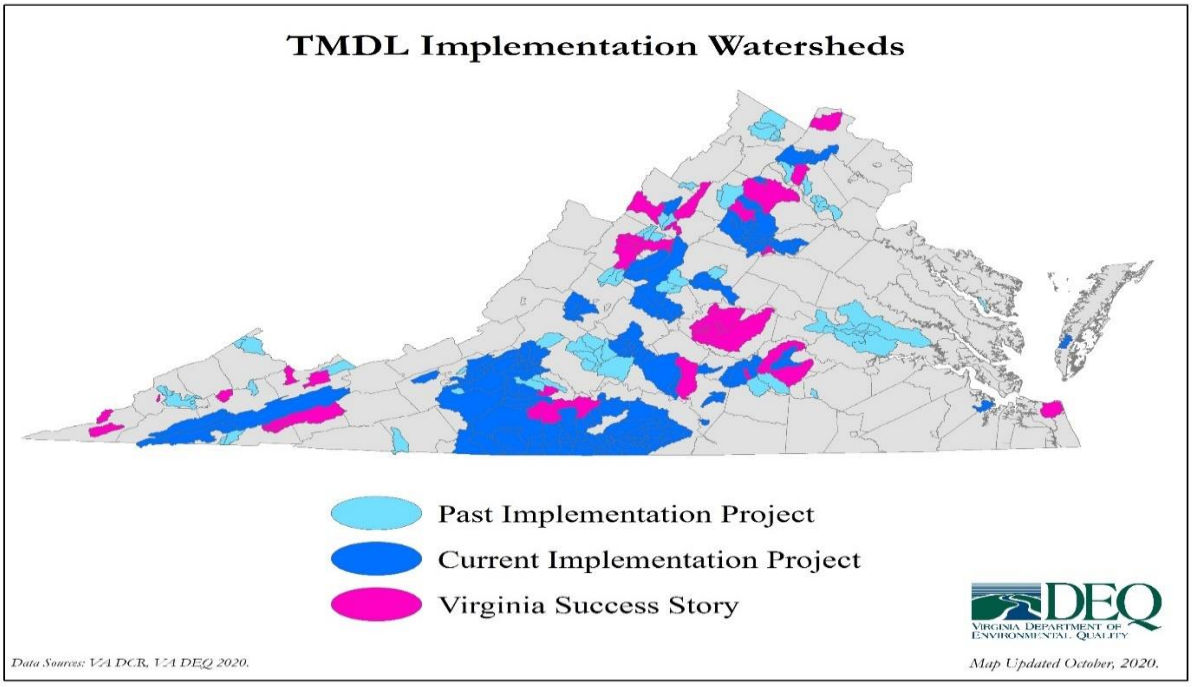


Figure 10: Status of NPS TMDL Implementation Projects by Watersheds in Virginia (2001 – October 2020)

The map below identifies the specific watersheds where there were 319(h) funded active NPS implementation projects in Virginia in FY 2020 (Figure 11).

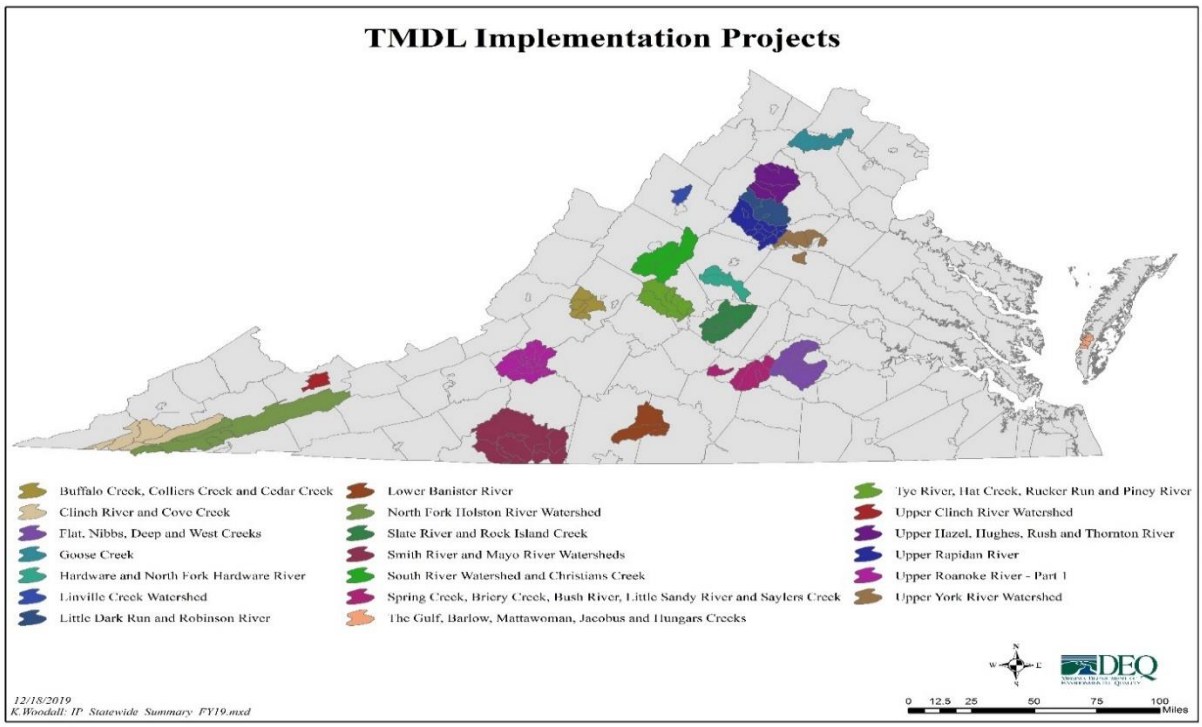


Figure 11: 319(h) funded NPS TMDL Implementation Projects in Virginia as of June 30, 2020

Past TMDL Implementation Projects with Continued Implementation Activity during FY 2021

Funding of Implementation

As the lead agency in TMDL implementation, DEQ utilizes both federal § 319(h) and Chesapeake Bay Implementation Grant (CBIG) Program grant funds to pay for staff that provide project management and technical support to watershed stakeholders implementing projects. In addition, Virginia runs a comprehensive cost-share program for BMP implementation utilizing both federal (§ 319(h) and CBIG) grants and state resources (from the Water Quality Improvement Fund, the Virginia Natural Resources Commitment Fund and the Virginia Agricultural Cost-Share program).

The 23 implementation projects listed earlier were supported in part by federal EPA § 319(h) grants. In addition other sources of agricultural and residential septic BMPs within implementation plan areas were reported. In FY 2020 a total of 4,129 BMPs were installed within 79 Implementation Plan areas encompassing 223 implementation watersheds, utilizing $22,921,761 in state, federal, private funds and landowner contributions. The table below summarizes the BMP installation in implementation plan areas, distinguishing what was coordinated by DEQ and what was not coordinated by DEQ (Table 7).

Table 7: Summary of BMP Installation by Project Coordinated by DEQ (7/1/2018 – 6/30/2020)

Coordination of Work	# of IP Reports	# of IP Watersheds	# of BMPs	Total BMP Cost	% of BMP	% of Funding	% # of IP Watersheds
Coordinated by DEQ	24	64	373	$2,248,896	9%	10%	29%
Not Coordinated by DEQ	78	209	3,756	$20,672,864	91%	90%	29%
Total	79[6]	223	4,129	$22,921,761			

Implementation was almost evenly split between work within and outside of the Chesapeake Bay drainage. Of the BMPs installed, 47% were outside of the Chesapeake Bay in 46% of the implementation plan watersheds, accounting for 49% of the total BMP funding. Table 8 below summarizes the BMP installation in implementation plan areas within the Chesapeake Bay drainage basin and activity outside of the Chesapeake Bay (Table 8).

Table 8: Summary of BMP Installation by Water Basin (7/1/2018 – 6/30/2020)

Watershed Drainage Basin	# of IP Reports	# of IP Watersheds	# of BMPs	Total BMP Cost	% of BMP	% of Funding	% # of IP Watersheds
Chesapeake Bay	43	133	2,852	$12,755,818	69%	56%	60%
Outside Chesapeake Bay	36	95	1,277	$10,165,943	431%	44%	43%
Total	79	223	4,129	$22,921,761	N/A	N/A	N/A

In FY 2020, a total of 4,129 BMPs were installed at a total cost of $16,112,876 in federal, state, and other funds and $6,808,885of landowner contributions for an overall total of $22,921,761 spent on BMPs in watersheds with TMDL implementation plans. A total of 316 BMPs were installed with partial or full funding from EPA Federal Section 319(h) funding. A summary of FY 2019 funding for BMP implementation by funding source is provided in the table below (Table 9).

[6] Some IPs and IP Watersheds include BMP installations both coordinated and not coordinated by DEQ.

Table 9: Summary of BMP Installation by Funding Source within IP Watersheds (7/1/2018 - 6/30/2020)

Funding Source	# of BMPs	$ of Cost-share Paid	$ Landowner or Other Contribution	Total BMP Cost
Federal-319H	303	$956,465	$493,926	$1,450,391
Federal – 319H & State Funding	13	$537,033	$5,944	$542,977
Federal - NRCS	13	0	$746,695	$746,695
Federal – NRCS_RCPP	6	$57,127	$134,486	$191,613
Local Funding	4	$9,253	$2,468	$11,721
Local Settlement	5	$417,011	$7,039	$424,050
Remediation Funds	0	$0	$0	$0
State-CREP	87	$204,817	$591,294	$796,111
State-VACS	3486	$12,745,117	$3,900,744	$16,645,862
State – VACS/WQIF & Settlement	6	$1,060,766	$302,435	$1,363,201
State-WQIF	57	$123,378	$132,151	$255,529
Whole Farm Approach Pilot	4	$1,908	$0	$1,908
Not Listed/associated	145	0	$491,704	$491,704
Grand Total	**4,129**	**$16,112,876**	**$6,808,885**	**$22,921,761**

In addition, a breakdown of BMP installation and funds spent by Implementation Plan area is shown in the table below (Table 10).

Table 10: Cost-share funds spent on implementation by TMDL IP Watershed (7/1/2019 - 6/30/2020)

TMDL Implementation Plan & TMDL Implementation Watershed	# BMPs	Cost-Share Paid	Landowner Contribution	Total Cost
Back Bay Watershed	14	$30,902	$0	$30,902
Back Creek	4	$147,740	$59,606	$207,346
Banister River, Winn Creek, and Terrible Creek	4	$116,351	-$10,724	$105,627
Beaver Creek and Little Creek	12	$43,684	$77,953	$121,637
Big Otter River Watershed	23	$574,255	$206,605	$780,860
Blackwater River (Upper, Middle, North Fork and South Fork)	13	$40,595	$87,066	$127,661
Bluestone River	1	$20,100	$5,025	$25,125
Buffalo Creek, Colliers Creek and Cedar Creek	11	$97,717	$39,938	$137,656
Carter, Great, Deep and Thumb Runs	15	$99,830	$2,785	$102,615
Catoctin Creek	30	$114,411	$84	$114,495
Cedar Creek, Hall Creek, Byers Creek and Hutton Creek	34	$38,111	$21,952	$60,063
Chestnut Creek Watershed	15	$4,285	-$624	$3,661
Chickahominy River and Tributaries	100	$129,283	$0	$129,283
Chowan River Watershed	307	$520,073	$177,287	$697,360
Chuckatuck and Brewers Creek	60	$84,594	$39,093	$123,687
Clinch River and Cove Creek	35	$949,905	$80,658	$1,030,564
Cooks Creek and Blacks Run	21	$13,909	$188,527	$202,436
Craig, Browns and Marsh Runs	11	$94,575	$297	$94,872
Cripple Creek and Elk Creek	28	$186,176	$400,404	$586,580
Crooked, Stephens and West Runs and Willow Brook	2	$9,931	$2,527	$12,458
Cub Creek, Turnip Creek, Buffalo Creek and UT to Buffalo Creek	10	$187,695	$26,133	$213,828
Cunningham Creek Watershed Plan				
Dan River and Birch Creek	41	$101,652	$74,697	$176,350
Dodd Creek				
Fairview Beach				
Falling River	14	$431,867	$10,578	$442,445
Flat, Nibbs, Deep and West Creeks	59	$248,019	$372,570	$620,589
Greenvale, Paynes and Beach Creeks	39	$28,761	$0	$28,761
Guest River	1	$38,447	$10,870	$49,317
Hardware and North Fork Hardware River	21	$310,742	$139,550	$450,292
Hawksbill Creek and Mill Creek	4	$15,160	$36,363	$51,523
Hays, Moffatts, Walker and Otts Creeks	16	$21,950	$11,961	$33,910
Holmans Creek	5	$5,564	$29,229	$34,793
James River - Lynchburg	3	$15,227	$79,318	$94,545
James River and Tributaries - City of Richmond	81	$209,357	$1,393	$210,750
Kings Creek	2	$2,600	$1,455	$4,055
Lewis Creek	3	$7,242	$0	$7,242
Linville Creek Watershed	44	$76,209	$437,454	$513,663
Little Calfpasture River	1	$70,000	$29,025	$99,025
Little Dark Run and Robinson River	42	$330,175	$36,385	$366,559

TMDL Implementation Plan & TMDL Implementation Watershed	# BMPs	Cost-Share Paid	Landowner Contribution	Total Cost
Little River Watershed	4	$101,149	$35,939	$137,088
Long Meadow Run and Turley Creek	11	$67,580	$32,651	$100,231
Lower Banister River	5	$43,322	$11,621	$54,944
Lower Blackwater River, Maggodee and Gills Creek	7	$12,589	$37,141	$49,730
Mattaponi River Watershed	781	$883,695	$3,543	$887,238
Middle Clinch River	22	$392,015	$185,061	$577,076
Middle Fork Holston River and Wolf Creek	21	$73,445	$14,542	$87,987
Middle River Watershed	113	$502,047	$174,476	$676,523
Mill Creek, Montgomery County	2	$20,632	$13,375	$34,007
Mill Creek, Northampton County	3	$1,000	$4,747	$5,747
Mill Creek, Powhatan Creeks Watersheds	1	$3,692	$0	$3,692
Moores Creek				
Mossy Creek, Long Glade Run and Naked Creek	63	$565,678	$78,998	$644,676
North Fork Holston River Watershed	111	$859,263	$469,476	$1,328,739
North Landing Watershed (including Milldam, Middle, West Neck and Nanney Creeks)	27	$68,986	$3,958	$72,944
North River	62	$311,420	$540,009	$851,429
Occohannock Creek	52	$76,814	$3,116	$79,930
Opequon Creek Watershed	13	$201,972	$109,987	$311,959
Piankatank River, Gwynns Island, Milford Haven	200	$142,578	$0	$142,578
Pigg River and Old Womans Creek Watersheds	14	$53,312	$144,892	$198,203
Powell River and Tributaries	37	$1,268,564	$332,977	$1,601,542
Reed Creek Watershed	23	$133,628	$215,102	$348,730
Rockfish River Watershed	2	$5,171	$6,376	$11,548
Slate River and Rock Island Creek	55	$137,071	$27,180	$164,252
Smith Creek Watershed	38	$57,112	$414,790	$471,902
Smith River and Mayo River Watersheds	31	$83,739	$106,992	$190,730
South River Watershed and Christians Creek	138	$1,123,509	$101,037	$1,224,546
Spout Run	1	$660	$0	$660
Spring, Briery, Saylers Creeks, and Bush and Little Sandy Rivers	32	$157,573	$97,419	$254,992
The Gulf, Barlow, Mattawoman, Jacobus and Hungars Creeks	39	$70,280	$9,305	$79,585
Three Creek, Mill Swamp, Darden Mill Run	373	$475,469	$74,684	$550,153
Tye River, Hat Creek, Rucker Run and Piney River	31	$161,065	$213,675	$374,740
Upper Banister River and Tributaries	8	$89,675	$44,515	$134,190
Upper Clinch River and Tributaries	1	$10,375	$1,503	$11,877
Upper Clinch River Watershed	1	$4,968	$1,242	$6,210
Upper Goose Creek, Cromwells Run and Little River	32	$594,306	$37,824	$632,130
Upper Hazel River, Hughes River, Rush River and Thornton River	57	$237,203	$80,758	$317,961
Upper Nansemond River	408	$534,471	$295,306	$829,778
Upper Rapidan River	81	$633,533	$24,258	$657,791

TMDL Implementation Plan & TMDL Implementation Watershed	# BMPs	Cost-Share Paid	Landowner Contribution	Total Cost
Upper Roanoke River - Part 1	26	$34,941	$30,248	$65,189
Upper Roanoke River - Part 2	2	$47,941	-$3,653	$44,288
Upper York River Watershed	59	$239,924	$99,200	$339,124
Willis River Watershed	16	$213,414	$59,175	$272,590
Grand Total	**4129**	**$16,112,876**	**$6,808,885**	**$22,921,761**

BMP Implementation and Pollutant Reductions

Tracking both BMP implementation and water quality improvements in TMDL watersheds is critical in measuring success of the TMDL program. BMPs are effective and practical ways to prevent or reduce pollutants from nonpoint sources to protect and restore water quality. While highly effective BMP tracking programs are in place to account for BMPs installed using state or federal cost share funds, tracking BMPs installed voluntarily (without government assistance) has proven challenging. DEQ, along with partner agencies, is planning mechanisms by which voluntary practices can be accounted for; however, BMP implementation and associated pollutant reductions reported to date are mostly practices installed with government cost share funds.

As previously stated, 4,129 BMPs were installed from July 1, 2019 through June 30, 2020. These actions resulted in over 1,245,709 linear feet of stream exclusion (excluding 15,251 animal units from accessing streams), 1,734 acres of riparian buffer, and the reduction of 3,074,754 pounds of nitrogen, 92,185 pounds of phosphorous, 126,901 tons of sediment, and 7.15E+16 colony forming units (CFU) of fecal coliform bacteria. In addition, the program was able to address straight pipes and failing or failed septic systems from 488 homes with TMDL Implementation Plan areas.

The tables below provide a summary of BMP related information, pollutant reductions achieved and a detailed accounting of the type of BMPs installed in TMDL watersheds (Tables 11 and 12).

Table 11: Summary of BMP related information achieved through TMDL Implementation (7/1/2018 - 6/30/2020)

Data	Total
Number of BMPs Installed	4,129
Number of Implementation Plan Reports	79
Number of Implementation Plan Watersheds	223
Acres of Buffer Created/Installed	1,734
Linear Feet of Streambank excluded from livestock	1,245,709
Number of Homes for which Septic Systems were addressed	488
Number of Animal Units excluded from Stream Access	15,251
Total Pounds of Nitrogen Reduced	3,074,754
Total Pounds of Phosphorus Reduced	92,185
Total Tons of Sediment Reduced	126,901
Total Bacteria Reduced (CFU)	7.15E+16

Table 12: Types of BMPs Installed through TMDL Implementation (7/1/2018 – 6/30/2020)

Practice	Practice Description	# of BMPs	Extent of BMP Installed	Units	Acres Riparian Buffer	Linear Ft. Streambank protected	Animal Units Excluded
CCI-CNT	Long Term Continuous No-Till Planting Systems	781	25,650	Acres			-
CCI-FRB-1	Forested Riparian Buffer - Maintenance Practice	4	35	Acres			-
CCI-HRB-1	Herbaceous Riparian Buffer - Maintenance Practice	2	6	Acres			-
CCI-SE-1	Stream Exclusion - Maintenance Practice	3	5,830	Lin. Feet		5,830	-
CCI-SL-6N	Stream Exclusion with Narrow Width Buffer - Maintenance Practice	7	21,419	Lin. Feet	29	21,419	204
CCI-SL-6W	Stream Exclusion with Wide Width Buffer - Maintenance Practice	63	374,014	Lin. Feet	640	374,014	3,050
CCI-WP-2N	Stream Protection Fencing with Narrow Width Buffer - Maintenance Practice	3	13,217	Lin. Feet	5	13,217	113
CCI-WP-2W	Stream Protection Fencing with Wide Width Buffer - Maintenance Practice	10	17,972	Lin. Feet	23	17,972	231
CP-22	CREP Riparian Forest Buffer	28	48	Acres			-
CRFR-3	CREP Woodland Buffer Filter Area	29	52	Acres			-
CRSL-6	CREP Stream Exclusion with Grazing Land Management	30	79,291	Lin. Feet	71	79,291	1,246
CRWP-2	CREP Stream Protection	-		Lin. Feet			
CRWQ-1	CREP Herbaceous Riparian Buffers	-		Acres			
FR-1	Afforestation of Crop, Hay and Pasture Land	16	257	Acres			-
FR-3	Woodland buffer filter area	13	48	Acres			-
LE-1T	Livestock Exclusion with Riparian Buffers for TMDL Imp.	20	73,226	Lin. Feet	67	73,226	615
LE-2	Livestock Exclusion with Reduced Setback	9	32,737	Lin. Feet		32,737	575
LE-2T	Livestock Exclusion with Reduced Setback for TMDL Imp.	-		Lin. Feet			
RB-1	Septic Tank Pumpout	198	198	Count			-
RB-2	Connection to Public Sewer	1	1	Count			-
RB-3	Septic Tank System Repair	22	22	Count			-

RB-3R	Conventional Onsite Sewage Systems Full Inspection and Non-permitted Repair	43	43	Count			-
RB-4	Septic Tank System Replacement	48	48	Count			-
RB-4P	Septic Tank System Installation/Replacement with Pump	14	14	Count			-
RB-5	Installation of Alternative Waste Treatment System	13	13	Count			-
SL-1	Long Term Vegetative Cover on Cropland	63	1,786	Acres			-
SL-10	Prescribed Grazing Land Management	25	2,884	Acres			-
SL-10T	Pasture Management	2	212	Acres			-
SL-11	Permanent vegetative cover on critical areas	3	7	Acres			-
SL-11B	Farm Road, Animal Travel Lane, Heavy Use Area Stabilization	2	1	Acres			-
SL-15A	Continuous High Residue Minimal Soil Disturbance Tillage System	16	2,164	Acres			-
SL-6	Stream Exclusion With Grazing Land Management	119	389,708	Lin. Feet	511	389,708	5,374
SL-6B	Alternative Water System	2	94	Acres			-
SL-6N	Stream Exclusion with Narrow Width Buffer and Grazing Land Management	2	4,070	Lin. Feet	2	4,070	318
SL-6W	Stream Exclusion with Wide Width Buffer and Grazing Land Management	73	178,546	Lin. Feet	347	178,546	2,924
SL-6T	Stream Exclusion with Grazing Land Management for TMDL Imp.	-		Lin. Feet			
SL-7	Extension of CREP Watering Systems	20	869	Acres			-
SL-8	Protective cover for specialty crops	32	1,284	Acres			-
SL-8B	Small Grain and Mixed Cover Crop for Nutrient Management and Residue Management	1,827	75,922	Acres			-
SL-8H	Harvestable Cover Crop	512	24,424	Acres			-
SL-9	Grazing Land Management	7	292	Acres			-
VSE-5	Voluntary Stream Exclusion	-		Lin. Feet			

VSL-6	Voluntary Stream Exclusion with Grazing Land Management	-		Lin. Feet			
VSL-8	Voluntary Protective cover for specialty crops	-		Acres			
VSL-8H	Voluntary Harvestable Cover Crop	-		Acres			
WP-1	Sediment retention, erosion or water control structures	6	6	Count			-
WP-2	Streambank protection (fencing)	2	10,160	Lin. Feet	8	10,160	46
WP-2B	Stream Crossing & Hardened Access	2	2	Count			-
WP-2N	Stream Protection Fencing with Narrow Width Buffer	3	17,141	Lin. Feet	5	17,141	110
WP-2W	Stream Protection Fencing with Wide Width Buffer	6	28,378	Lin. Feet	25	28,378	445
WP-4	Animal waste control facilities	25	25	Count			-
WP-4B	Loafing lot management system	4	4	Count			-
WP-4C	Composter Facilities	2	2	Count			-
WQ-12	Roof Runoff Management System	2	23,022	Sq. Feet			-
WQ-4	Legume-Based Cover Crops	15	1,940	Acres			-
	Grand Total	**4,129**	**N/A**	**N/A**	**1,734**	**1,245,709**	**15,251**

Virginia Water Quality Improvements and Success Stories

The success of Virginia's Nonpoint Source Management Program and the TMDL Implementation Program is also documented by describing improvement of water quality conditions via NPS Success Stories. Through Section 319 Nonpoint Source Success Stories, EPA and DEQ document progress of partially or fully restoring waterbodies associated with NPS implementation actions.

Since 2002 Virginia’s Nonpoint Source Management Program and associated TMDL Implementation Program and its partners have written 31 success stories that address delisting and/or water quality improvement of 46 impaired stream segments. These stories are classified into two types: Type 1 stories are related to partial or full restoration (delisting of impairments), Type 2 indicates significant water quality improvement (Table 13). The map below shows the location of success stories in Virginia (Figure 13).

Table 13: Virginia TMDL Success Stories (2001 – 2020)

Type	# segments delisted or WQ improved	Name of Success Story	Year Approved by EPA	Topic
2	1	Cabin Branch Mine Orphaned Land Project	2001	Mining
2	1	Toncrae Mine Orphaned Land Project	2002	Mining
2	1	Middle Fork Holston River (Three Creeks)	2005	TMDL Implementation
2	2	Muddy Creek and Lower Dry River	2007	TMDL Implementation
1	1	Batie Creek	2008	Karst Program
1	3	Lynnhaven, Broad and Linkhorn Bays	2009	Shellfish
2	1	Valzinco Mine Orphaned Land Project	2008	Mining
1	3	Willis River	2010	TMDL Implementation
1	1	Middle Creek	2012	Mining
2	1	Black Creek	2012	Mining
1	1	Muddy Creek	2012	TMDL Implementation
2	1	Carter Run	2013	TMDL Implementation
2	1	Flat Creek	2013	TMDL Implementation
1	1	Upper Clinch River	2014	TMDL Implementation
1	2	Cub Creek	2014	TMDL Implementation
1	2	Byers and Hutton Creeks	2015	TMDL Implementation
1	1	Little Sandy Creek	2015	TMDL Implementation
1	2	Blackwater River	2016	TMDL Implementation
2	1	Big Chestnut Creek	2016	TMDL Implementation
1	3	Upper Robinson River	2017	TMDL Implementation
1	2	Mountain Run	2018	TMDL Implementation
1	1	Stone Creek	2018	Mining
1	2	Willis River	2018	TMDL Implementation
1	1	Slate River-Rock Island Creek	2019	TMDL Implementation
1	1	Dumps Creek	2019	TMDL Implementation
1	1	Deep Creek	2019	TMDL Implementation
1	1	Middle River	2019	TMDL Implementation
1	1	Little Cub Creek	2019	TMDL Implementation
1	2	South Fork Back Creek	2020[1]	TMDL Implementation
1	2	Indian Creek	2020[2]	TMDL Implementation
1	2	Buffalo Creek-North Fork	2021[3]	TMDL Implementation
Total	**46**			

1= Submitted to EPA in 2020 and approved and published by EPA in 2021

2= Submitted to EPA in 2020 and under review by EPA

3= Submitted to EPA in 2021, and under review by EPA

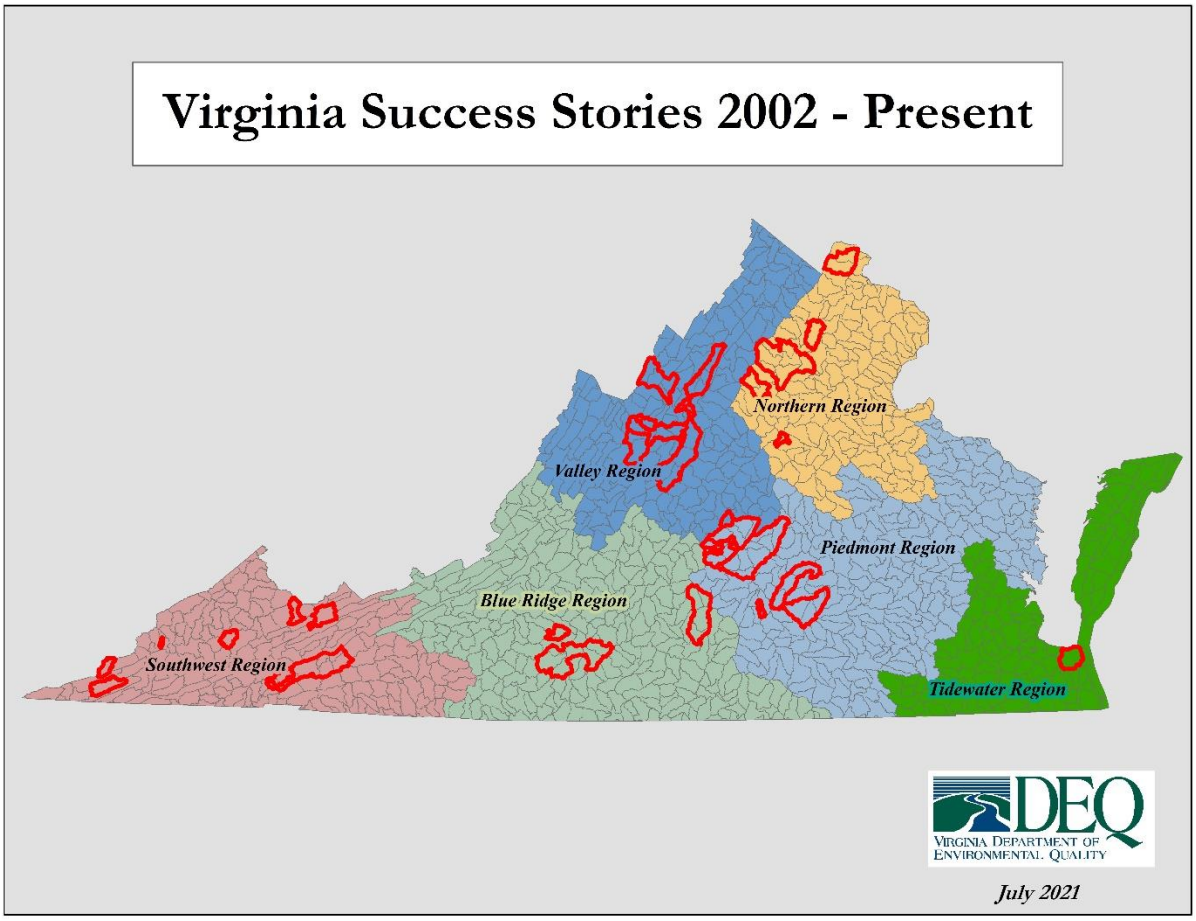


Figure 12: Virginia Success Stories (2002 – Present)

Healthy Waters

2021 Progress Report

The Commonwealth of Virginia defines ecologically healthy waters and watersheds as those that maintain high ecological integrity when viewed in a holistic assessment approach that addresses in-stream habitat, stormwater inputs, invasive species and natural flows. The Natural Heritage Program's (NHP) mission is conserving Virginia's biodiversity through inventory, protection, and stewardship. The Virginia Natural Area Preserves Act, 10.1-209 through 217 of the *Code of Virginia*, was passed in 1989 and codified DCR's powers and duties related to statewide biological inventory: maintaining a statewide database for conservation planning and project review, land protection for the conservation of biodiversity, and the protection and ecological management of natural heritage resources. The NHP leads Virginia's efforts in the identification, monitoring and protection of unique aquatic and terrestrial communities and rare plant and animal species that contribute important ecosystem services or represent significant ecological resources or rare biodiversity from plant and animal species, population and exemplary natural communities. Virginia is a member of the NatureServe Network of 80 Natural Heritage Programs through North, Central and South America, with a common goal of advancing biodiversity conservation, using

consistent methods of data management, mapping and modeling. The Virginia Natural Heritage Program is a leading program in the network, with a well-established record of identifying, prioritizing and achieving protection for rare species and terrestrial communities. The DCR Healthy Waters Program (HWP) at NHP, collaborates with Virginia Commonwealth University (VCU) and DEQ, to provide a key component for aquatic community classification, prioritization and conservation. The challenges associated with these important efforts, specifically as they relate to aquatic communities, include:

- Developing an application of objective, quantitative, and diagnostic stream assessment protocols which are consistent statewide assessments to identify communities with intact aquatic integrity; that includes a resampling protocol and schedule for assessing existing resources to identify long-term changes and track trends in protection and identification of ecologically healthy resources.
- Conducting ongoing assessment and expansion to all stream reaches of the Commonwealth to define measurable goals for protection efforts.

These challenges are dependent on an understanding of, and comparison to, relevant reference conditions that describe accurately and quantitatively the ecological potential of streams and rivers within a specific region.

The HWP has included a multiagency partnership from its inception. NHP manages the HWP and provides program administration; data management and tool development; assistance with field data collection; programmatic oversight; and coordination with land trusts, local governments and others toward conservation of identified Healthy Waters. DEQ has provided significant data and funding from EPA Section 319, CBIG and NOAA CZM to support the Program with ongoing partnerships with VDOF, NGOs and the private sector assisting in broadening the applicability of the Program. VCU has provided the majority of the significant technical, field data collection, model development and data management services. This partnership continues to grow a comprehensive aquatic resource assessment program to identify and protect the most biologically diverse and valuable aquatic resources in the Commonwealth. The HWP continues to collaborate with the DEQ, VCU, EPA, the Albemarle-Pamlico National Estuary Program, the Nature Conservancy, the North Carolina Department of Natural Resources and private land brokers to advance the identification and conservation of natural resources. The Healthy Waters Program is continually self-evaluating to fine tune the direction of the Program.

Despite the continued challenges posed by the ongoing COVID-19 pandemic, the HWP and partners have continued to make significant progress on improving the utility of the program and forging stronger partnerships. This has included the development and refinement of a watershed-based conservation planning model to guide the protection of aquatic integrity; continued research to the designate and map stream catchments as a possible replacement to the buffer-based approach for identifying priority Stream Conservation Units; enhancements to Governor Northam's *ConserveVirginia* tool to improve the function of planning tools for watershed protection and agricultural BMP targeting and facilitating inter-state coordination to advance shared watershed priorities.

Traditionally, water quality based programs have emphasized the assessment of streams to determine if water bodies meet water quality standards with a subsequent restoration plan to improve degraded surface waters. While this is a critical activity to provide the Commonwealth a healthy ecosystem, it is equally as

important to seek viable opportunities for BMPs to protect streams that are already considered to have high aquatic, ecological integrity. It is economically and ecologically preferable to conserve and protect healthy ecosystems than to restore them after they have been damaged. Agricultural BMPs may serve a key role in the protection of healthy waters and healthy watersheds. The health of streams is tightly linked to the watersheds of which they are a part. There is a direct relationship between land cover, key watershed processes and the health of streams. Therefore, the Healthy Waters program operates from a basic understanding: the conservation and protection of healthy waters is ecologically and economically prudent and deserves consideration over expending often exorbitant resources in attempts to restore streams after they have been damaged.

Virginia has more than 400 ecologically healthy streams, creeks and rivers throughout the state, and there are more to be identified. Healthy streams are identified by factors that include: high numbers of native species and a broad diversity of species, few or no non-native species, few generalist species that are tolerant of degraded water quality, high numbers of native predators, migratory species whose presence indicates that river or stream systems are not blocked by dams or other impediments, and low incidence of disease or parasites. The HWP uses high-quality archival data, combined with extensive, new data collected by the VCU stream assessment team, often with assistance from the DCR NHP field personnel, to develop a broad suite of georeferenced databases of aquatic resources, including fish and macroinvertebrate communities, instream and riparian habitat, and geomorphological data to provide the basis for community level identification and protection of critical resources. Healthy streams in Virginia have been identified and ranked through a stream ecological integrity assessment known as the Interactive Stream Assessment Resource (INSTAR), as “outstanding”, “ecologically healthy”, “restoration candidate” or “compromised.” INSTAR is designed to assist individuals with planning and land use decisions by identifying healthy streams in their communities and encouraging their protection.

While the Chesapeake Bay Basin has been and continues to be a priority, statewide data collection is necessary for the Program to make a long lasting impact on the natural resources of the Commonwealth. Governor Northam’s *ConserveVirginia*, is Virginia’s data-driven, statewide, land conservation strategy that identifies high value lands, waters, and conservation sites across the Commonwealth of Virginia. Categories in the *ConserveVirginia* are Agriculture & Forestry; Natural Habitat & Ecosystem Diversity; Floodplains & Flooding Resilience; Cultural & Historic Preservation; Scenic Preservation; and Protected Landscapes Resilience, which identify 6.3 million acres of high priority conservation areas representing the best of each category. The *ConserveVirginia* tool will help guide a long-term land conservation strategy for Virginia by serving as a “menu” to guide and inform state land acquisitions, environmental mitigation projects and Virginia Land Conservation Foundation Grants. In addition to the six categories identified above, in June 2020, the NHP and DEQ developed the first enhancement of the tool by adding the new category of Water Quality Improvement Areas. This category identifies 790,112 acres of the highest priority lands for conservation in the interest of water quality improvement, which are now part of the *ConserveVirginia* tool. This input was developed via collaboration between the DCR and DEQ using estimates of nitrogen, phosphorus, and sediment loadings from agricultural sources from the Chesapeake Bay Program Phase 6 Watershed Model (CAST-2017d) and the Virginia Water Quality Assessment, and with consideration of the goals of the Chesapeake Bay WIP3. The approach identifies HUC12 watersheds in the 90th percentile in terms of nitrogen, phosphorous, or sediment loadings from any of the assessments used, and then identifies within those watersheds riparian areas along streams, creeks, and

rivers for conservation. Buffers were mapped for these waterways, where buffers ranged from 100 feet to 400 feet, depending on steepness of slope of adjacent lands. Generally, wider buffers were mapped for steeper slopes and for headwater streams. These buffer lands are where land conservation would be most effective to maintain and improve water quality. Once conserved permanently, water quality benefits of these lands will be further increased by establishing and maintaining natural vegetation in buffers. Conservation easements including deed requirements for such vegetated buffers will qualify as a *ConserveVirginia* success.

ConserveVirginia has been identified in the Chesapeake Bay Watershed Implementation Plan Phase III (WIP III) to play an important role in meeting water quality goals. The Healthy Waters Program is identified in the FY 2020 - 2023 CBIG Workplan as Objective 9 with the output: *Provide information to facilitate improved resource protection in the Commonwealth, and to advance the identification and protection of those ecologically healthy sites, referred to as: Healthy Waters. Develop technical assistance tools and publications regarding the health and restoration of the Chesapeake Bay.* The *ConserveVirginia* tool will be used to maximize the benefits derived from land conservation efforts within the State and is designed to include regular updates as new data are available and priorities refined, such as the inclusion of ecologically healthy waters. DCR NHP developed two new inputs to inform the Water Quality Improvement Category within the *ConserveVirginia* tool both utilizing the INSTAR data to both identify areas for conservation and those agricultural areas that would benefit from additional protections due to INSTAR characterization of being Restoration Candidates or Compromised. The *Healthy Waters Conservation Opportunity Areas* identify those highest priority lands for conservation in the interest of improving water quality to maintain confirmed healthy waters. These include the identification of those HUC12 watersheds in the 50th percentile in terms of nitrogen, phosphorous, or sediment loadings from any of the assessments used, and to identify those watersheds containing confirmed healthy waters. Within these watersheds, topographic position, stream catchments, stream networks, land cover, and other datasets may be used to model and target lands that could be conserved and improved with riparian buffers to maintain confirmed healthy waters. Once conserved, natural vegetation would need to be established and protected in perpetuity under easement to qualify as a success for *ConserveVirginia*.

The second input to the Water Quality Improvement Category is a management tool to identify the highest priority lands for targeting agricultural BMP efforts to improve water quality for lower-scoring INSTAR reaches with the goal of elevating those scores to facilitate possible, eventual inclusion in the healthy waters dataset. The improvement and protection of water quality is essential for increasing the diversity and integrity of these systems, which in turn may lead to higher INSTAR scores for these vulnerable reaches. Focusing on those agricultural areas that would benefit from cattle exclusion and riparian buffers, utilize INSTAR (historic or new) data as baseline to determine if aquatic integrity could be improved from the application of agricultural BMPs. The process identified where pasture and cropland occur in the landscape relative to INSTAR reaches as indicated by land cover data from the Virginia Geographic Information Network (VGIN). These are areas where agricultural practices might impact the quality of water flowing into INSTAR reaches. Spatial data, including topographic position, stream networks, stream catchments, slope, land cover, and proximity to open water, will be analyzed to determine where those agricultural areas are upstream of INSTAR reaches and to identify the best places to establish riparian buffers and exclude animals to improve water quality were considered in the development. To maximize improvement efforts, areas that were likely to have pollution inputs from non-

agricultural sources (e.g. urban/suburban NPS or industrial/municipal point source pollution) were excluded from the analysis. The process developed a modeled output that used available data to determine the feasibility of predicting and prioritizing the best agricultural lands for restoration efforts. The relationships between agricultural lands and INSTAR reaches were cross-referenced using Random Forests and the predictor variables mentioned above. Because randomness is introduced for each step and each iteration of the ensemble model, Random Forests is excellent at finding multiple solutions and it is not necessary to ensure predictor variables are uncorrelated. The product highlights pastures where cattle exclusion, and pastures or cropland where riparian buffers, might improve water quality for downstream INSTAR reaches and be used to supplement the data as SB 704 and HB 1422 advance.

Among the tools NHP develops for conservation planning and environmental review are Natural Heritage Conservation Sites (ConSites), the Predicted Suitable Habitats Summary (PSHS), and *ConservationVision*. ConSites are a tool for representing key areas of the landscape worthy of protection and stewardship action because of the natural heritage resources and habitat they support. Terrestrial sites are boundaries that contain one or more rare plant, animal or natural community. Sites are designed to include the element (i.e. tracked species and exemplary natural communities) and, where possible, its associated habitat and buffer or other adjacent land needed for the element's conservation. For rare aquatic species, Stream Conservation Units (SCUs) identify stream reaches that contain aquatic natural heritage resources, including upstream and downstream buffer and tributaries associated with these reaches. There are more than 1,800 terrestrial and SCU site records in the ConSites layer. These sites encompass all reliable, extant element occurrences (EOs) (i.e. mapped locations of elements) documented in the NHP data system. ConSites are given a biodiversity significance ranking based on the rarity, quality and number of natural heritage resources they contain. The highest ranks ConSites are included in *ConserveVirginia*. With the Program residing in NHP, the juncture of both aquatic and terrestrial resource protection lays the foundation for long-term identification, prioritization and protection of resources that will benefit future generations. Streams identified as "healthy" or "outstanding" via INSTAR are integrated into the Natural Heritage Data Explorer and Biotics database at NHP as EOs and SCUs. The continual update of the existing INSTAR point data also delineates Healthy Catchments, a clarification has been made to improve the identification of Healthy Watersheds and the DCR NHP Biotics database reflecting those new SCUs and EOs

The NHP developed and maintains Virginia’s *ConservationVision* as a digital atlas for green infrastructure planning. Green infrastructure is a strategically planned and managed network of natural lands, working landscapes, and other open spaces that conserves ecosystem values and functions and provides associated benefits to human populations. *ConservationVision*, different from *ConserveVirginia*, consists of a suite of maps and spatial data, intended as a resource for guiding strategic conservation efforts by government agencies, private conservation organizations, and regional and local planners. The NHP and its partners use Geographic Information Systems (GIS) to develop spatially explicit models evaluating the importance of areas for diverse interests. The seven models are the Virginia Natural Landscape Assessment, Agricultural Model, Forest Conservation Values (developed by the VDOF), Cultural Resource Preservation Index (developed by DHR), Recreation Access Model, Watershed Model, and Development Vulnerability Model. The ConservationVision Watershed Model includes four primary components are Watershed Integrity, Landscape Position, Soil Sensitivity, and Land Cover.

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The Virginia HWP has continued to represent the Commonwealth in the Chesapeake Bay Program Goal Implementation Team Four (GIT4; Healthy Watersheds). The HWP Manager has begun tracking the Fish Passage, Habitat, Brook Trout, and Stream Health Goal Teams at the suggestion of the Office of the Secretary of Natural and Historic Resources. The focus has remained on being the state Chair for the HW GIT where the Chesapeake Bay Program has brought together the various state Healthy Waters programs in the Chesapeake Bay watershed and leads discussions to improve communication materials illustrating the location of identified healthy resources and to develop strategies to advance resource protection in the Chesapeake Bay. The partnership between VCU and NHP allows prioritization of vulnerable sites to be communicated to the Virginia DEQ Water Planning Division where TMDLs could be matched to apply protection measures *and* restoration approaches in areas with overlapping goals, based on the characterization of ecological health. Virginia has committed to a Chesapeake Bay Program goal of 100 percent of state-identified, currently healthy waters and watersheds to remain healthy, as identified in 2014, by 2025. This goal was set by the Healthy Watersheds GIT and, for Virginia, is based on VCU collected INSTAR data, and the identified Healthy Waters and subsequent SCUSs in the Chesapeake Bay watershed. However, in 2015 when the Commonwealth submitted the watershed associated with the HW site data, the scale of those identified watersheds varied greatly based on watershed position and may range from first or second headwater catchments to fourth order watersheds. To achieve that goal and refine a practical area for on-the-ground conservation, NHP has continued to develop a watershed-based conservation model to protect aquatic integrity at a finer scale. The model has identified 2, 5, 7 and 10km upstream distances from a known HW point to outline the contributing drainage areas based on NHDPlus-HR catchments. Those areas are applied to a suite of land use and water quality metrics to predict stream health and areas for conservation opportunity, as confirmed by the assessed INSTAR data. The model is being ground validated with additional field data to refine the upstream distance by which will identify those areas to conserve. Based on model results, a strong scientific basis for delineating priority areas for protection will guide conservation actions by field personnel and partners. The watershed-based conservation modelling process will result in the identification of areas that will be priorities for protection ensuring long-term protections might be applied. For the long-term and to meet objectives under the Chesapeake Bay Agreement, NHP is considering resubmitting to the Chesapeake Bay Program newly defined areas that would revise the catchments based on those aforementioned criteria. This refinement will permit a manageable area to focus on the ground conservation efforts in Virginia by NHP staff, DEQ, Conservation Districts, land trusts, nongovernmental organizations such as the Virginia Chapter of the Nature Conservancy, and other on the ground conservation partners. The ecologically healthy watershed-based conservation model and *ConserveVirginia* tools will be matched with the HWP *Criteria for Ecologically Healthy Watershed Conservation* to advance the protection of those ecologically healthy streams.

SCUs identify stream reaches that contain aquatic natural heritage resources or EOs, and include a two-mile upstream and one-mile downstream buffer and tributaries associated with these reaches. However, the linear buffered area that delineates the SCUs have little informative value for land conservation purposes and often miss those terrestrial areas that may be adjacent to the aquatic EO. Therefore, for conservation planning, prioritization, and project review if a drainage area delineated to a specific pour-point is identified, it permits the clear identification of riparian and terrestrial resources most relative to

the EO. Based on a similar approach as outlined above, the NHP continues to evaluate changing the area to an NHDPlus-HD catchment-defined area. This would be similar to that used in the watershed-based conservation planning model to focus those areas to be considered as part of project review. That new area is being considered to be called the Stream Conservation Site (SCS). A pre-delineated, high-resolution catchment data provide a roadmap of opportunities for project review and for the conservation of critical resources to ensure long-term protection of aquatic ecological integrity. The challenge that is presented is that the number of projects that would fall under requirements for review would increase significantly, therefore, pushing the limits of capacity to the Environmental Review Team

As previously stated, the *Criteria for Ecologically Healthy Watershed Conservation* are an adaptation of EPA's Nine Key Elements of Watershed Planning to a create Healthy Watersheds Conservation Plan. This iterative approach adapts the planning elements with a focus on protection. As the lead nonpoint source agency, DEQ was directly engaged in the development of these planning elements. There are fundamental differences between conservation-based planning and restoration-based planning. One consistent difference is the need to integrate ecosystem-based principles into the conservation elements. This approach moves beyond physical and chemical water quality parameters and considers a holistic, systems-based approach, consistent with the INSTAR assessment. There are also differences between monitoring, resource assessment and the actions typically taken to conserve natural resources that may differ from corrective actions taken to restore degraded water quality. Protection measures such as land conservation and land use plan and ordinance development are strong factors for consideration. The uniqueness of the conservation criteria are the ability to integrate with the existing Watershed planning process to address TMDLs. Since any of those sites identified as impaired are also ecologically healthy, the criteria knit with similar concepts. Applying the criteria to guide conservation actions is based on integrating Natural Heritage terrestrial data with the INSTAR assessment and land use characterizations conducted through the *ConservationVision* Watershed Mode to result in protection of identified ecologically healthy waters. The A-I *Criteria for Ecologically Healthy Watershed Conservation* are as follows:

A. Quantify and verify the empirical basis for aquatic communities identified with high ecological integrity

B. Identify conditions needed to maintain existing ecological integrity (*e.g.*, sediment loadings)

C. Identify best management practices and other preventative actions to achieve and maintain the system with high ecological integrity

D. Estimate needed technical and financial resources

E. Provide information, education and public participation component

F. Include schedule for implementing Non-Point Source (NPS) management measures

G. Identify interim measurable milestones for implementation

H. Establish criteria to determine high ecological integrity is maintained (*e.g.*, land cover as related to sediment)

I. Provide a monitoring component to evaluate effectiveness

The NHP and the Healthy Waters Program Manager was requested by the Office of the Secretary of Natural and Historic Resources to facilitate the development and implementation of a Memorandum of Understanding (MOU) for the continued and expanded coordination and cooperation among the North Carolina Departments of Environmental Quality, Natural and Cultural Resources, and Agriculture and Consumer Services, and the North Carolina Wildlife Resources Commission, the Secretary of Natural and Historic Resources and the Secretary of Agriculture and Forestry and other key partners as named in the Albemarle-Pamlico National Estuary Partnership (APNEP) Comprehensive Conservation and Management Plan (CCMP) toward the protection and restoration of water and ecosystem resources throughout the Albemarle-Pamlico watershed and estuarine system.

The Albemarle-Pamlico estuary was designated by Congress as "an estuary of national significance" in 1987, and it continues to be recognized as a nationally important resource. With more than 3,000 square miles of open water, the Albemarle-Pamlico estuary is the second largest estuarine complex in the contiguous United States. Spanning 43 counties in North Carolina and 38 counties and cities in Virginia, the watershed of the Albemarle-Pamlico estuary is almost 31,500 square miles. Tributaries to the Albemarle and Pamlico Sounds include the Chowan, Roanoke, Pasquotank, Tar, Pamlico, Neuse, and White Oak Rivers. The Roanoke River stretches from the headwaters of the Blue Ridge Mountains in Virginia to the coast of North Carolina. The Chowan River and Pasquotank River Basins also span both North Carolina and Virginia.

The Albemarle-Pamlico Estuary and its tributary system support a wide array of ecological and economic functions of local, regional, and national importance and is home to nearly four million people. Agriculture, forestry, travel, tourism, and recreation are leading sectors for economic growth in the Albemarle-Pamlico region, with concerted efforts by states, regional agencies, and local jurisdictions to manage and promote nature-based economic opportunities.

The MOU is the interest of all parties to the agreement to manage properly significant resources for the benefit of present and future generations. The MOU acknowledges continued support for the “Cooperative Conservation and Management Objectives of the Albemarle-Pamlico Region” MOU signed by the North Carolina Department of Environmental Quality, the North Carolina Department of Natural and Cultural Resources, and the Virginia Secretary of Natural Resources on November 1, 2017. Specific goals and actions have been identified internally to advance the continued development of the program to meet the objectives of maintaining those systems that have high ecological integrity. The MOU was signed and made effective August 31, 2020, with the intent to expedite the missions of the agencies responsible for the environmental and natural resource identification, conservation, and restoration by facilitating interagency and interstate collaboration and coordination of related activities. Two outcomes of the MOU were a report on progress since the 2017 MOU and the creation and signing of a Governor’s Agreement between the states and EPA to ensure long-term attention to the region. The report was completed in the second quarter, forwarded to the signatories of the 2020 MOU and a draft Agreement was developed with discussions for a 2021 date for signatures. The process awaits the approval of the EPA Administrator for its inclusion.

Chapter 6 - 2014 Chesapeake Bay Watershed Agreement Progress Report

State of the Chesapeake Bay Program Report to the Chesapeake Bay Executive Council, August 2021

Pursuant to § 2.2-220.1

The Chesapeake Bay Program is a regional partnership that works across state lines to protect and restore the Chesapeake Bay watershed. The partners include the U.S. Environmental Protection Agency, the Chesapeake Bay Commission, the District of Columbia and all six watershed states. Through the Bay Program, federal, state and local agencies, non-profit organizations, academic institutions and citizens come together to secure a brighter future for the Bay region. Learn more at www.chesapeakebay.net.

The Chesapeake Bay Program is guided by the goals and outcomes of the *Chesapeake Bay Watershed Agreement*. Signed on June 16, 2014, this agreement commits the partners to protecting and restoring the Bay, its tributaries, and the lands that surround them. Our environment is an interconnected system and achieving the goals and outcomes of this agreement will support improvements in the health of the watershed and the people who live here. Track progress toward the *Chesapeake Bay Watershed Agreement* at www.chesapeakeprogress.com.

The Chesapeake Bay watershed is a dynamic ecosystem. Tracking changes in its health over time allows scientists to understand the effects of management actions and progress toward meeting health and restoration goals. The data in this report reflect just some of the conditions that are monitored to better understand the Bay and how to protect and restore it.

Sustainable Fisheries

Habitat loss, poor water quality, non-native and invasive species, toxics and fishing pressure continue to threaten the sustainability of the Chesapeake Bay's fisheries. Sustaining fish and shellfish populations contributes to a strong economy and maritime culture and supports a healthy ecosystem for all Bay watershed residents.

> GOAL: Protect, restore and enhance finfish, shellfish and other living resources, their habitats and ecological relationships to sustain all fisheries and provide for a balanced ecosystem in the watershed and Bay.

Blue Crab Abundance

- Outcome: Maintain a sustainable blue crab population based on a target of 215 million adult females.
- Progress Statement: In November 2020, the three jurisdictions (Maryland, Virginia, and the Potomac River Fisheries Commission) formally adopted new female-specific reference points generated by the 2017 blue crab stock assessment update, which included more recent survey and harvest data. The threshold abundance of 70 million mature adult female crabs (age 1+) increased to 72.5 million, and the target abundance of 215 million adult females decreased to 196 million. Between 2020 and 2021, the abundance of adult (age 1+) female blue crabs in the Chesapeake Bay increased 12% from 141 million to 158 million. This number is above the new 72.5 million threshold which is considered to be the minimum sustainable level for female blue crabs in the

Bay, but lower than the new target of 196 million. Blue crab populations exhibit natural variability due to their biology and environmental factors such as temperature, coastal currents, weather patterns, and predation. Blue crab abundance in the Chesapeake Bay is expected to exhibit annual fluctuations as a result of this natural variability, as seen in recent years.

Blue Crab Management

- Outcome: Manage for a stable and productive blue crab fishery.
- Progress Statement: In November 2020, the three jurisdictions (Maryland, Virginia and the Potomac River Fisheries Commission) formally adopted new female-specific reference points generated by the 2017 blue crab stock assessment update, which included more recent survey and harvest data. This was an update to the previous reference points that had been recommended in 2011 and implemented in 2012. As a result of this update, the target female exploitation rate, or percentage of female crabs removed by harvest, increased from 25.5% to 28%, and the threshold increased from 34% to 37%. According to the Chesapeake Bay Stock Assessment Committee (CBSAC), an estimated 19% of the female blue crab population was harvested in 2020. This is below both the target (now 28%) and overfishing threshold (now 37%) for the 13th consecutive year since female-specific management measures were implemented in 2008, which suggests that management has been effective. The Chesapeake Bay's blue crab stock is not depleted and it is not being overfished.

Fish Habitat

- Outcome: Identify and characterize critical fish and shellfish spawning, nursery and forage areas within the Chesapeake Bay and its tributaries. Integrate information and conduct assessments to inform restoration and conservation efforts.
- Monitoring Progress: This outcome targets habitats that fish and shellfish use at critical points in their life histories. Due to the range of areas that comprise fish habitat and the existing gaps in our understanding of which habitats offer the highest value for fish reproduction, feeding, growth or refuge, there is no established baseline for this outcome at this time. Fish and shellfish rely on a range of habitats in the Chesapeake Bay watershed, many of which are threatened by pollution, development and other stressors. Knowing where these habitats are located and addressing threats to their integrity will be critical to supporting healthy fish populations.

Forage Fish

- Outcome: Improve our capacity to understand the role of forage fish in the Chesapeake Bay. By 2016, develop a strategy for assessing the forage base available as food for predatory species.
- Monitoring Progress: Forage fish and invertebrates provide important ecosystem services in the Chesapeake Bay. Forage species support the ecosystem structure, serve as conduits of energy transfer between primary producers and predator species, and, in some cases, support commercial fisheries. Because forage species play such a critical role, it is essential that we develop a strong understanding of and establish effective monitoring programs for these species.

Oysters

- Outcome: Increase finfish and shellfish habitat and the water quality benefits of restored oyster populations. Restore native oyster habitat and populations in 10 tributaries by 2025 and ensure their protection.
- Progress Statement: Ten Chesapeake Bay tributaries have been selected for oyster reef restoration: Harris Creek, the Little Choptank, Tred Avon, upper St. Mary's and Manokin rivers in Maryland, and the Great Wicomico, Lafayette, Lower York, Lynnhaven and Piankatank rivers in Virginia. The Sustainable Fisheries GIT approved the Eastern Branch of the Elizabeth River in Virginia as an eleventh bonus tributary in 2020. Each of these tributaries is at a different level of

progress in a process that involves developing a tributary restoration plan, building and seeding reefs, and monitoring and evaluating restored reefs. As of 2020, three of the ten originally selected tributaries have been restored (Harris Creek and the Little Choptank River in Maryland and the Lafayette River in Virginia), in addition to the eleventh bonus tributary (the Eastern Branch of the Elizabeth River). Monitoring and evaluation will take place at three- and six-year intervals following construction and seeding. This monitoring and evaluation phase will not be complete until after 2025.

Vital Habitats

Increasing needs for land and resources have resulted in fragmentation and degradation of many habitats across the watershed while also challenging the health of many Bay watershed species. Conserving healthy habitats and restoring the connectivity and function of degraded habitats is essential to the long-term resilience and sustainability of the ecosystem and the region's quality of life.

GOAL: Restore, enhance and protect a network of land and water habitats to support fish and wildlife, and to afford other public benefits, including water quality, recreational uses and scenic value across the watershed.

Black Duck

- Outcome: By 2025, restore, enhance and preserve wetland habitat to support a wintering population of 100,000 black ducks.
- Progress Statement: The U.S. Fish and Wildlife Service (USFWS) conducts a Mid-winter Waterfowl Survey each January to determine the abundance and distribution of several species of waterfowl. While the USFWS Division of Migratory Birds, Atlantic Flyway Council, Atlantic Joint Venture and Black Duck Joint Venture are working to revise this survey and improve abundance and distribution estimates, a rolling three-year average of pertinent survey results can be used to track progress toward this outcome. According to survey results, an average of 51,332 black ducks were observed in Chesapeake Bay watershed states between 2013 and 2015. This marks a five percent increase from the average number of black ducks observed in the region between 2012 and 2014 and 51 percent of the 100,000 bird goal.

Brook Trout

- Outcome: Restore and sustain naturally reproducing brook trout in the Chesapeake Bay's headwater streams, with an eight percent increase in occupied habitat by 2025.
- Monitoring Progress: According to an assessment completed in 2015 by the Eastern Brook Trout Joint Venture (EBTJV), wild brook trout occupy 33,200 square kilometers of habitat in the Chesapeake Bay watershed. This includes the streams they share with brown and/or rainbow trout. There are 13,500 square kilometers of allopatric or "wild brook trout only" streams, which are comprised of 990 separate patches, or groups of contiguous catchments. This is the baseline from which progress toward this outcome will be measured, which means 14,600 square kilometers of habitat occupied only by wild brook trout serves as our restoration goal. Our annual restoration target is 137 square kilometers of habitat.

Fish Passage

- Outcome: Increase habitat to support sustainable migratory fish populations in the Chesapeake Bay watershed's freshwater rivers and streams. By 2025, restore historical fish migration routes by opening 1,000 additional stream miles to fish passage.
- Progress Statement: In 2018 and 2019, 1,379 additional stream miles were opened to fish passage through dam removal projects, far exceeding the target to open an additional 132 miles every two years.

Forest Buffers

- Outcome: Increase the capacity of forest buffers to provide water quality and habitat benefits throughout the Chesapeake Bay watershed. Restore 900 miles of riparian forest buffers per year and conserve existing buffers until at least 70 percent of the watershed's riparian areas are forested.
- Progress Statement: Between 2017 and 2018, about 158 miles of forest buffers were planted along rivers and streams in the Chesapeake Bay watershed, followed by about 83 miles in 2019. While this marks progress toward the outcome, it is 742 and 817 miles below the 900-mile-per-year target, respectively.

Stream Health

- Outcome: Improve the health and function of 10 percent of stream miles above the 2008 baseline.
- Progress Statement: In 2018, researchers and resource managers established the six years between 2006 and 2011 as the baseline period for our indicator of stream health. Known as the Chesapeake Basin-wide Index of Biotic Integrity, or Chessie BIBI, this indicator describes the quality of assessed streams in relation to all of the streams in the watershed. During this baseline period, the Chessie BIBI ranked 25 percent of the Bay watershed with fair, good or excellent stream conditions and 21 percent with poor or very poor conditions.

Underwater Grasses

- Outcome: Sustain and increase the habitat benefits of submerged aquatic vegetation (SAV) in the Chesapeake Bay. Achieve and sustain 185,000 acres of SAV Bay-wide, with a target of 90,000 acres by 2017 and 130,000 acres by 2025.
- Progress Statement: According to preliminary data from the Virginia Institute of Marine Science (VIMS), 62,169 acres of underwater grasses were mapped in the Chesapeake Bay in 2020. This is 48% of the Chesapeake Bay Program's 2025 restoration target of 130,000 acres and 34% of the partnership's 185,000-acre goal. Although the 62,169 acres mapped in 2020 is a 60% increase from the 38,958 acres observed during the first survey in 1984, it is a 20% decrease from the current 10-year average of 78,168 acres and a 7% decrease from 2019 when 66,684 acres of underwater grasses were mapped.

Tree Canopy

- Outcome: Expand urban tree canopy by 2,400 acres by 2025 to provide air quality, water quality and habitat benefits throughout the Chesapeake Bay watershed.
- Monitoring Progress: In this outcome, urban tree canopy is broadly defined as tree plantings in communities of any size—including urban, suburban and rural—that are not on agricultural lands. Each watershed jurisdiction will have its own annual and long-term planning targets that will contribute to the 2,400 acre-goal. While these jurisdictions do report urban tree planting data to the U.S. Environmental Protection Agency, most do not yet have comprehensive or consistent tracking, reporting or verification systems in place. Furthermore, a high-resolution aerial tree canopy assessment—which would track net gain or loss of tree canopy over time—is still in the process of being completed for the entire watershed. As such, a more robust estimate of the baseline for this outcome is being developed. Expanding tree cover in communities can benefit people and the environment. Increased tree canopy can enhance air quality, water quality, energy savings, public health and community investment.

Wetlands

- Outcome: Increase the capacity of wetlands to provide water quality and habitat benefits throughout the Chesapeake Bay watershed. Create or reestablish 85,000 acres of tidal and non-

tidal wetlands and enhance the function of an additional 150,000 acres of degraded wetlands by 2025, primarily on agricultural or natural landscapes.

- Progress Statement: Progress toward this outcome is measured against a 2010 baseline, as it was at this point that jurisdictions adopted the Watershed Implementation Plans (WIPs) that outlined the pollution-reducing practices that would help them meet the Chesapeake Bay Total Maximum Daily Load (Bay TMDL). Wetland restoration targets were included in these pollution-reducing practices. As of 2010, according to data from the National Oceanic and Atmospheric Administration's Coastal Change Analysis Program, there were approximately 282,291 acres of tidal wetlands in the watershed's estuarine drainage area. This marks a loss of 1,566 acres since 1992. Between 2010 and 2017, 9,103 acres of wetlands were established, rehabilitated or reestablished on agricultural lands. While this outcome includes a target to restore 85,000 acres of tidal and non-tidal wetlands in the watershed, 83,000 of these restored acres should take place on agricultural lands. The wetlands restored on agricultural lands between 2010 and 2017 mark an 11 percent achievement of the 83,000-acre goal.

Clean Water

Restoring the Bay's waters is critical to overall watershed restoration because clean water is the foundation for healthy fisheries, habitats and communities across the region. However excess amounts of nitrogen, phosphorus and sediment in the Bay and its tributaries have caused many sections of the Bay to be listed as "impaired" under the Clean Water Act. The Chesapeake Bay Total Maximum Daily Load (TMDL) is driving nutrient and sediment reductions as described in the Watershed Implementation Plans (WIPs), adopted by the states and the District of Columbia, and establishes the foundation for water quality improvements embodied in this Agreement. These plans set nutrient and sediment reduction targets for various sources—stormwater, agriculture, air deposition, wastewater and septic systems.

GOAL: Reduce pollutants to achieve the water quality necessary to support the aquatic living resources of the Bay and its tributaries and protect human health.

2017 and 2025 Watershed Implementation Plan (WIPs)

- Outcome: By 2017, have practices and controls in place that are expected to achieve 60 percent of the nutrient and sediment load reductions necessary to achieve applicable water quality standards compared to 2009 levels. By 2025, have all practices and controls in place to achieve applicable water quality standards as articulated in the Chesapeake Bay Total Maximum Daily Load.
- Progress Statement: Pollution-reducing practices were in place by 2017 to achieve 40 percent of the nitrogen reductions, 87 percent of the phosphorus reductions and 67 percent of the sediment reductions necessary to attain applicable water quality standards as compared to the 2009 baseline established by the U.S. Environmental Protection Agency (EPA) as part of the Chesapeake Bay Total Maximum Daily Load (Bay TMDL). According to the Chesapeake Bay Program's Watershed Model Phase 5.3.2, pollution controls put in place in the Chesapeake Bay watershed between 2009 and 2017 lowered nitrogen loads 11 percent, phosphorus loads 21 percent and sediment loads 10 percent. Experts attribute this drop in estimated pollution loads to technological upgrades at wastewater treatment plants and the increased implementation of agricultural best management practices (BMPs). While the Chesapeake Bay Program partnership has exceeded its 2017 pollution reducing targets for phosphorus and sediment, it fell short of its pollution reducing target for nitrogen by 15 million pounds. This outcome was established as a midpoint assessment from the 2009 baseline and the 2025 goal described in the Bay TMDL and these results mark completion of this outcome. In July 2018, pollution reduction targets were revised using updated data and new science in a Phase 6 version of the Chesapeake Bay Program's Watershed Model. As of 2019, best management practices (BMPs) to reduce pollution

are in place to achieve 39% of the nitrogen reductions, 49% of the phosphorus reductions and 100% of the sediment reductions needed to attain applicable water quality standards when compared to the 2009 baseline established in the Chesapeake Bay Total Maximum Daily Load (Bay TMDL). According to the Chesapeake Assessment Scenario Tool (CAST), BMPs (pollution controls) put in place in the Chesapeake Bay watershed between 2009 and 2019 lowered nitrogen loads 11%, phosphorus loads 10% and sediment loads 4%. According to BMP and wastewater data from jurisdictions, and the watershed conditions incorporated in CAST, the reductions in estimated nitrogen and phosphorus pollution loads between 2009 and 2019 are mostly due to upgrades to wastewater treatment facilities. The reductions in sediment loads are primarily from the agricultural sector. Between 2018 and 2019, nitrogen loads decreased an estimated 0.5% compared to the average annual load change of 1.2%, phosphorus loads increased an estimated 3% compared to the average annual load reduction of 1.5%, and sediment loads decreased an estimated 0.6% compared to the average annual load reduction of 0.4%.

Water Quality Standards Attainment and Monitoring

- Outcome: Improve our capacity to monitor and assess the effects of the management actions being taken to implement the Chesapeake Bay Total Maximum Daily Load and improve water quality. Report annual progress being made in attaining water quality standards and trends in reducing nutrients and sediment in the watershed.
- Progress Statement: An estimated 38% of the Chesapeake Bay and its tidal tributaries met water quality standards during the 2016-2018 assessment period. This score is lower than the record high of 42% during the 2015-2017 assessment period but is still the fifth highest estimate of water quality standards attainment since 1985. A decline in open water dissolved oxygen in a large area of the Bay impacted the attainment results. Open water habitat in a large area of the Bay failed to meet its standards in this period which had a big effect on lowering the indicator score. However, dissolved oxygen conditions in deep water habitat and surface chlorophyll a measures improved from the 2015-2017 assessment period which may indicate increasing resilience in the Bay ecosystem. Nonetheless, water quality measures remain far below the 100% attainment necessary to fully support survival, growth and reproduction of its living resources, and 62% of tidal waters are estimated to be impaired during the 2016-2018 assessment period. In 2018, research published in Science of the Total Environment described the “positive and statistically significant trend” observed in this indicator of environmental health. One factor helping drive this improvement is an increase in the acres of estuarine underwater grass beds. Total underwater bay grass acres for Chesapeake Bay tidal waters have rebounded from the impacts of Hurricane Agnes on the Bay in 1972, and most recently from a decline sustained from Hurricane Irene and Tropical Storm Lee in 2011. The long-term improving trend for this indicator is not by chance but because of our decades-long effort to reduce nutrient pollution.

Toxic Contaminants Policy and Prevention Outcome

- Outcome: Improve practices and controls that prevent or reduce the effects of toxic contaminants on aquatic systems and humans. Build on existing programs to reduce the amount and effects of PCBs in the Chesapeake Bay watershed. Evaluate the implementation of additional policies, programs and practices for other contaminants that need to be further reduced or eliminated.
- Progress Statement: According to data submitted by Delaware, Maryland, Virginia and the District of Columbia to the U.S. Environmental Protection Agency in 2016, 82 percent of the Chesapeake Bay’s tidal segments are partially or fully impaired by toxic contaminants. Chesapeake Bay Program partners have set a goal to observe no such impairments. The latest listings of impaired waters under Section 303(d) of the Clean Water Act mark a continued increase in the observation of toxic contaminant impairments since 2010. An analysis to

determine whether this observed increase is the result of a rise in the number of tidal segments analyzed or an actual decline in environmental conditions has not been conducted.

Toxic Contaminants Research Outcome

- Outcome: Increase our understanding of the impacts and mitigation options for toxic contaminants. Develop a research agenda and further characterize the occurrence, concentrations, sources and effects of mercury, PCBs and other contaminants of emerging and widespread concern. In addition, identify which best management practices might provide multiple benefits of reducing nutrient and sediment pollution as well as toxic contaminants in waterways.
- Monitoring Progress: Working with stakeholders, the Toxic Contaminants Workgroup determined its research agenda should address the following issues: supplying information related to the safe consumption of fish and shellfish; understanding the influence of contaminants degrading the health and contributing to the mortality of fish and wildlife; documenting the sources, occurrence and transport of contaminants in different landscapes; providing science to help mitigate contaminants and emphasize the co-benefits of nutrient and sediment reductions; and gathering information on issues of emerging concern.

Healthy Watersheds

- Outcome: Ensure 100 percent of state-identified currently healthy waters and watersheds remain healthy.
- Monitoring Progress: Each jurisdiction in the Chesapeake Bay region has its own definition of healthy waters and watersheds, and its own programs to support watershed protection. Honoring state preference, the Chesapeake Bay Program's Maintain Healthy Watersheds Goal Implementation Team will not seek a single definition for healthy waters and watersheds but will strategically track and support the preservation of state-identified healthy waters and watersheds. These waters and watersheds as identified in 2017 will serve as the baseline from which we assess watershed health and measure progress toward this outcome.

Conserved Lands

The landscapes around the Bay and its tributaries are ecologically, culturally, historically and recreationally valuable to the people and communities of the region. Stimulating, renewing and expanding commitments to conserve priority lands for use and enjoyment is an integral part of furthering the watershed's identity and spirit.

GOAL: Conserve landscapes treasured by citizens in order to maintain water quality and habitat; sustain working forests, farms and maritime communities; and conserve lands of cultural, indigenous and community value.

Land Use Methods and Metrics Development

- Outcome: By 2016, develop a watershed-wide methodology and local-level metrics for characterizing the rate of farmland, forest and wetland conversion, measuring the extent and rate of change in impervious surface coverage and quantifying the potential impacts of land conversion to water quality, healthy watersheds and communities. Share this information with local governments, elected officials and stakeholders.
- Monitoring Progress: Work is underway to develop a methodology and metrics for characterizing the rate of farmland, forest and wetland conversion; measuring the extent and rate of change in impervious surface coverage; and quantifying the potential impacts of land conversion on water quality, healthy watersheds and communities. This work will be based on changes to the landscape observed between 2005 and 2015. It will be updated every two to five years and serve

as the source of information for a public awareness campaign. Forests, farms and wetlands provide valuable ecosystem services. These landscapes produce food, improve water quality and wildlife habitat, and give us opportunities to have fun in the natural world. Monitoring the conversion of these natural and working landscapes is critical to minimizing the extent and mitigating the effects of the conversion process.

Land Use Options Evaluation

- Outcome: By the end of 2017, with the direct involvement of local governments or their representatives, evaluate policy options, incentives and planning tools that could assist them in continually improving their capacity to reduce the rate of conversion of agricultural lands, forests, and wetlands as well as the rate of changing landscapes from natural lands to those that are impervious. Strategies should be developed for supporting local governments' and others' efforts in reducing these rates by 2025 and beyond.
- Monitoring Progress: In June of 2017, the National Center for Smart Growth Research and Education published the Conservation Land-Use Policy Toolkit as part of our work to evaluate policy options, incentives and planning tools that can help local governments conserve land. While state and federal governments play a critical role in conservation, cities, towns and counties often design the regulations that dictate how a region can grow and can establish incentives that support conservation. This toolkit was published with Chesapeake Bay Program funds administered by the Chesapeake Bay Trust. It describes and evaluates seven policy tools that local governments can use to slow the conversion of farms, forests and wetlands, thus protecting the environment, preserving rural character and sustaining the economic vitality of farm and forestry industries.

Protected Lands

- Outcome: By 2025, protect an additional two million acres of lands throughout the watershed—currently identified as high-conservation priorities at the federal, state or local level—including 225,000 acres of wetlands and 695,000 acres of forestland of highest value for maintaining water quality.
- Progress Statement: According to data collected through early 2019, nearly 1.36 million acres of land in the Chesapeake Bay watershed have been permanently protected since 2010. This marks an achievement of 68 percent of the land conservation goal adopted in the Chesapeake Bay Watershed Agreement and brings the total amount of protected land in the watershed to 9.16 million acres.

Engaged Communities

The well-being of the Chesapeake Bay watershed will soon rest in the hands of its youngest citizens—the more than three million students in kindergarten through twelfth grade. Establishing strong, targeted environmental education programs now provides a vital foundation for these future watershed stewards.

GOAL: Enable every student in the region to graduate with the knowledge and skills to act responsibly to protect and restore their local watershed.

Public Access

- Outcome: By 2025, add 300 new public access sites to the Chesapeake Bay watershed, with a strong emphasis on providing opportunities for boating, swimming and fishing, where feasible.
- Progress Statement: In 2020, 12 new public access sites were added (six in Virginia, five in Maryland, and one in Pennsylvania). This brings the total to 206 public access sites that have opened on and around the Chesapeake Bay between 2010 and 2020, marking 69% achievement

of the partnership's goal to add 300 new access sites to the watershed by 2025. Although the number of new public access sites decreased from 2019's total of 18 new sites, annual variation is expected based on partner ability to fund and develop sites in any given year. In 2020, partners reported that COVID-19 may have impacted public access site development. In addition, some states and local governments are focusing on maintenance of and upgrades to existing sites due to COVID-19, age of the public access site's infrastructure, climate change, and budgets.

Environmental Literacy Planning

- Outcome: Each participating Chesapeake Bay jurisdiction should develop a comprehensive and systemic approach to environmental literacy for all students in the region that includes policies, practices and voluntary metrics that support the environmental literacy goals and outcomes of the *Chesapeake Bay Watershed Agreement*.
- Progress Statement: In 2019, local education agencies—55% of the total (when combined with a small subset of 2017 data)—responded to the Chesapeake Bay Program's Environmental Literacy Indicator Tool (ELIT) that measures the degree of environmental literacy preparedness among school districts across the watershed: 27% of respondents self-identified as "well-prepared" to put a comprehensive and systemic approach to environmental literacy in place. 52% of respondents self-identified as "somewhat prepared" to put a comprehensive and systemic approach to environmental literacy in place. 22% of respondents self-identified as "not prepared" to put a comprehensive and systemic approach to environmental literacy in place.

Student MWEEs

- Outcome: Increase students' age-appropriate understanding of the watershed through participation in teacher-supported Meaningful Watershed Educational Experiences (MWEEs) and rigorous, inquiry-based instruction, with a target of at least one MWEE in elementary, middle and high school depending on available resources.
- Progress Statement: In 2019, local education agencies —55% of the total (when combined with a small subset of 2017 data)—responded to a Chesapeake Bay Program survey that measured the extent of Meaningful Watershed Educational Experiences (MWEEs) among schools: Elementary School Level: 35% reported providing system-wide MWEEs to at least one grade level while 32% reported providing some MWEEs to at least one grade level. Middle School Level: 39% reported providing system-wide MWEEs to at least one grade level while 38% reported providing some MWEEs to at least one grade level. High School Level: 35% reported providing system-wide MWEEs in at least one required course while 43% reported providing some MWEEs in at least one required course.

Sustainable Schools

- Outcome: Increase the number of schools in the region that reduce the impact of their buildings and grounds on their local watershed, environment and human health through best practices, including student-led protection and restoration projects.
- Progress Statement: In 2019, 15% of public and charter schools in the Chesapeake Bay watershed—634 schools in all—were certified sustainable. This marks a 4% increase from the number of sustainable schools in the watershed in 2017.

Citizen Stewardship

- Outcome (Citizen Stewardship): Increase the number and diversity of trained and mobilized citizen volunteers who have the knowledge and skills needed to enhance the health of their local watersheds.
- Progress Statement: In 2017, residents of the Chesapeake Bay region scored a 24 out of 100 on the Stewardship Index: the first comprehensive survey of stewardship actions and attitudes in the

Chesapeake Bay watershed. There are three components to this score. The Personal Action score—which is currently 38—measures the adoption of 19 actions that individuals can take to improve water quality and environmental health. The Volunteering score—which is currently 23—measures the portion of the public participating in community efforts to improve water quality and environmental health. And the Advocating score—which is currently 19—measures the portion of the public engaging in local and regional activities on behalf of water quality and environmental health. To score a 100 on the Stewardship Index, everyone in the region would need to do everything they could in their daily lives to improve water quality and environmental health, from personal actions to volunteering and advocating for the environment.

Diversity

- Outcome: Identify minority stakeholder groups not currently represented in the leadership, decision-making or implementation of current conservation and restoration activities. Create meaningful opportunities and programs to recruit and engage these groups in the Chesapeake Bay Program's work.
- Progress Statement: In 2019, the Chesapeake Bay Program's diversity survey indicated a slight increase in the percentage of respondents who self-identified as people of color from 13.7% in 2016 to 14.6% in 2019. The partnership has set a target to increase the percentage of people of color in the Chesapeake Bay Program to 25% by 2025. The Chesapeake Bay Program has also set a target to increase the percentage of people of color in leadership positions to 15% by 2025. The 2019 survey results showed an increase in the percentage of people of color in leadership positions from 9.1% to 10.3%.
  While both the 2016 and 2019 surveys were distributed to approximately 750 people who work for or with the partnership, the latest survey had a low response rate of 38% compared to 50% in 2016. The lower response rate may have affected the results.

Local Leadership

- Outcome: Increase the knowledge and capacity of local officials on issues related to water resources and in the implementation of economic and policy incentives that will support local conservation actions.
- Monitoring Progress: Before the Chesapeake Bay Program can increase the knowledge and capacity of local elected officials to protect the Chesapeake Bay, the partnership must determine how many local governments are participating in restoration activities and what their local elected officials know about the watershed. To this end, a survey of the baseline level of knowledge of local elected officials will be administered in 2019. The Local Leadership Workgroup is also working to identify trusted sources who can share information with local elected officials that will help them become leaders in watershed restoration. The workgroup is exploring the development of a peer-to-peer information-sharing network, and is considering conducting tours that will teach local elected officials about watershed restoration and coordinating the development of a local elected official watershed education program. Local elected officials have diverse experiences, values and agendas, and the communities they serve range in resource capacity. Increasing officials' knowledge about the Chesapeake Bay and drawing clear links between watershed health and local priorities will engage those officials who haven't yet committed to our restoration work. Creating and nurturing a culture of excellence among these officials will showcase their work and provide easy access to models that officials can adapt and replicate in their own communities.

Climate Change

Changing climate and sea level conditions may alter the Bay ecosystem and human activities, requiring adjustment to policies, programs and projects to successfully achieve our restoration and protection goals

for the Chesapeake Bay and its watershed. This challenge requires careful monitoring and assessment of these impacts and application of this knowledge to policies, programs and projects.

GOAL: Increase the resiliency of the Chesapeake Bay watershed, including its living resources, habitats, public infrastructure and communities, to withstand adverse impacts from changing environmental and climate conditions.

Climate Monitoring and Assessment

- Outcome: Monitor and assess the trends and likely impacts of changing climatic and sea level conditions on the Chesapeake Bay ecosystem, including the effectiveness of restoration and protection policies, programs and projects.
- Monitoring Progress: The Chesapeake Bay is one of the most vulnerable regions in the nation experiencing the impacts of climate change. As part of the Chesapeake Bay Program's work toward this outcome, the partnership has adopted five indicators to track the impact that changing climatic conditions are having on the physical environment. Patterns and trends observed in these indicators—which include air temperature, stream temperature, precipitation, river floods, and sea level rise—will inform our understanding of the environmental conditions that could influence our ability to protect and restore the Bay. Water temperature, for instance, can impact the abundance and distribution of underwater grasses and the stream habitat available to brook trout.

Climate Adaptation

- Outcome: Pursue, design and construct restoration and protection projects to enhance the resiliency of the Chesapeake Bay and its aquatic ecosystems against the impacts of coastal erosion, coastal flooding, more intense and more frequent storms, and sea level rise.
- Monitoring Progress: Climate resiliency is understood as the ability to anticipate, prepare for and adapt to a changing climate and to withstand, respond to and recover from the disruptions climate change can cause. The Chesapeake Bay Program is considering the development or adoption of up to nine indicators to track our progress toward building climate resiliency. These indicators may include: The relative proportion of hardened shoreline along the Chesapeake Bay and its tidal tributaries; The availability of corridors that will allow tidal wetlands to migrate inland in response to sea level rise; Restored habitat, including wetlands and oyster reefs; Lands permanently protected from development; Tree canopy in urban communities; Land use and land cover across the watershed; The extent of local policies that support climate resiliency and local practices designed to better manage stormwater; The spatial distribution of select, climate-sensitive fish species; and The community composition of underwater grasses in the Chesapeake Bay. In 2018, Eastern Research Group, Inc., (ERG) worked with the Chesapeake Bay Program to develop an implementation strategy that defines and describes the steps and resources needed to create each indicator in this proposed suite. As partnership priorities evolve and new sources and methods of analyzing data emerge, the Chesapeake Bay Program may choose to change its course or implement certain indicators from this suite. The ultimate development of these indicators will depend on the quality of supporting data, the added value of the indicators in question and the priorities and resources of the Climate Resiliency Workgroup.

Chesapeake Bay Watershed Agreement Progress Report Glossary of Acronyms and Abbreviations

AMD – Acid Mine Drainage

AOSS – Alternative Onsite Sewage System

ASA – Agricultural Stewardship Act

Bc – Bacteria

Be – Benthic

BMP – Best Management Practice

CBIG – Chesapeake Bay Implementation Grant

CBLEI – Chesapeake Bay Livestock Exclusion Initiative

CBP – Chesapeake Bay Program

CD – Consent Decree

CFR – Code of Federal Regulations

CFU – Colony Forming Unit (bacteria)

CREP – Conservation Reserve Enhancement Program

CSO – Combined Sewer Overflow

DCR – Department of Conservation and Recreation

DEQ – Department of Environmental Quality

DMLR – Division of Mine Land Reclamation

DMME – Department of Mines, Minerals and Energy

DNH – Division of Natural Heritage

EIT – Engineer in Training

EPA – United States Environmental Protection Agency

FGD – Flue Gas Desulfurization

FSA – Farm Service Agency

FY – Fiscal Year (Virginia, July 1 – June 30)

GIS – Geographic Information System

GIT4 – Chesapeake Bay Program Goal Implementation Team Four

HWP – Healthy Waters Program

IFRIS – Integrated Forest Resource Information System

INSTAR – Interactive Stream Assessment Resource

IP – Implementation Plan

IT – Information Technology

MG – Master Gardner

MS4 – Municipal Separate Storm Sewer System

MTD – Manufactured Treatment Device

NCDENR – North Carolina Department of Environment and Natural Resources

NDZ – No Discharge Zone

NFWF – National Fish and Wildlife Foundation

NPS – Nonpoint Source

NRCS – Natural Resources Conservation Service

NRDAR – Natural Resources Damage Assessment and Restoration

ODU – Old Dominion University

PCB – Polychlorinated Biphenyl

PDC – Planning District Commission

PE – Professional Engineer

PFL – Project Funding List

PMP – Pollutant Minimization Plans

R3 – Environmental Protection Agency Region 3

RFP – Request for Proposals

SAG – Stakeholder Advisory Group

SAPS – Successive Alkalinity Producing System

Sed – Sediment

SFI – Sustainable Forestry Initiative

SHARP – Sustainable Harvesting and Resource Professional

SLAF – Stormwater Local Assistance Fund

SNR – Secretary of Natural Resources

SR – Southern Rivers

SWCD – Soil and Water Conservation District

TDS – Total Dissolved Solids

TMDL – Total Maximum Daily Load

TSS – Total Suspended Solids

UD – Under Development

USDA – United States Department of Agriculture

USFWS – United States Fish and Wildlife Service

VA – Virginia

VAC – Virginia Administrative Code

VACS – Virginia Agricultural Cost Share Program

VCU – Virginia Commonwealth University

VDACS – Virginia Department of Agriculture and Consumer Services

VDH – Virginia Department of Health

VDOF – Virginia Department of Forestry

VDOT – Virginia Department of Transportation

VECI – Virginia Enhanced Conservation Initiative

VENIS - Virginia Environmental Information System

VIMS – Virginia Institute of Marine Science

VITA- Virginia Information Technology Agency

VNRCF – Virginia Natural Resources Commitment Fund

VPA –Virginia Pollution Abatement (permit)

VPDES –Virginia Pollutant Discharge Elimination System (permit)

VSMP – Virginia Stormwater Management Program

VSWCB- Virginia Soil and Water Conservation Board

WIP – Watershed Implementation Plan

WQIA – Water Quality Improvement Act

WQIF – Water Quality Improvement Fund

WQMIRA – Water Quality Monitoring, Information, and Restoration Act