REPORT OF THE SECRETARY OF NATURAL RESOURCES

FY 2020 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 2020 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 2020 as required in § 2.2-220.1. This consolidated report also addresses Item 361.A. in the 2018 Special Session I Budget (Chapter 2) for FY 2020 and FY 2021.

Water Quality Improvement Fund and Cooperative Nonpoint Source Pollution Programs

For FY 2020 (the period July 1, 2019 – June 30, 2020), DCR allocated $61.2 million in agricultural cost-share and technical assistance funds to Soil and Water Conservation Districts. This included $2.0 million in Conservation Reserve Enhancement Program (CREP) cost-share funds to be disbursed by Districts as state match for completed projects. Of the $61.2 million, approximately $53.3 million was allocated for farmers through the Virginia Agricultural Cost-Share Program (VACS) and CREP for implementation of best management practices (BMPs). An additional $7.9 million was allocated in technical assistance to Districts to provide implementation assistance to participants. Practices installed on farms during FY 2020 will result in estimated edge of field nitrogen reductions of approximately 14.2 million pounds, phosphorus reductions of approximately 5.2 million pounds, and sediment reductions of approximately 1 million tons.

Under the Water Quality Improvement Fund (WQIF) Point Source Program, since 1998, 67 point source WQIF grant agreements obligating $795.7 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-four 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 2019, 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 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 $2.7 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 2020 allocations from state sources for implementation of agricultural best management practices had the following breakdown:

FY 2020 (Program Name – amount):

VACS Cost-Share program funding - $37.28 million

District Technical Assistance - $9.25 million

District Financial Assistance - $7.1 million

FY 2020 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 best management practices through the FY 2020 - 2022 biennium are estimated in the 2020 Ag Needs Assessment Table on page 20. 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 2020, 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 best management practices 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 submitted its draft Chesapeake Bay TMDL Phase III Watershed Implementation Plan to EPA on April 5, 2019. The final plan was submitted to EPA on August 23, 2019. Virginia agencies are wrapping up the 2018-2019 WIP milestones period and drafting the 2020-2021 WIP milestones. DEQ submitted its draft five year Virginia Nonpoint Source Pollution Management Plan in April 2019, and it was conditionally approved in the Fall of 2019.

In FY 2020, DEQ developed 24 Total Maximum Daily Load (TMDL) equations for small watersheds and completed 2 TMDL Implementation Plans covering 16 waterbody impairments. The NPS program has shifted its reporting window due to the limited availability of information; in FY 2019, a total of 196 small TMDL Implementation Watersheds saw BMP activity resulting in a total of 2,517 BMPs installed using a total of $15,190,532 of Federal and State funds and 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 best management practices 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 Departments of Forestry and Mines, Minerals and 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 approved by the U.S. Environmental Protection Agency (EPA) in 2019. 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, 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 2020 was $61 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 available, DEQ works cooperatively with local governments to provide matching funds to locally administer identified solutions for nonpoint source runoff that causes or contributes to local water quality problems.

Although there has been no additional WQIF Nonpoint Source Program funding since a 2016 Request for Assistance (RFA) was made available for local governments (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, phosphorus or sediment were a funding priority. Projects with the highest pollution reduction relative to dollars requested were given priority. These projects will implement pollution control actions that will have a significant and lasting impact on local and state water quality. After four years of implementation, many projects are nearing completion. Four projects have been completed on budget and on schedule. One project has been terminated. DEQ successfully transferred funding from the terminated project into existing projects that had demand for additional implementation. The remaining three projects are expected to be completed this year. Overall, pollution reductions are expected to be in line with original reduction estimates.

2020 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, and the establishment of vegetative riparian buffers. 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	$15,916,719.61	$7,897,867.01	$6,524,548.00	$1,373,319.01	$2,572,224.08	$5,446,628.52	$810,336.72
2002	$23,085,809.39	$8,339,569.86	$6,576,358.82	$1,763,211.04	$6,506,805.74	$8,239,433.79	$889,591.94
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	$24,430,701.62	$13,890,689.06	$12,850,417.30	$1,040,271.76	$3,154,319.66	$7,385,692.90	$1,059,012.73
2009	$31,262,465.86	$15,934,893.13	$15,077,907.30	$856,985.83	$5,893,277.13	$9,434,295.60	$1,323,768.34
2010	$36,855,359.44	$23,323,770.94	$22,359,394.11	$964,376.83	$4,448,722.71	$9,082,865.79	$1,434,937.61
2011	$17,741,909.24	$10,721,389.77	$10,273,458.75	$447,931.02	$1,910,814.32	$5,109,705.15	$972,361.73
2012	$32,275,306.80	$21,577,911.03	$21,367,067.66	$210,843.37	$2,834,009.50	$7,863,386.27	$1,390,098.26
2013	$37,050,594.85	$28,209,730.28	$27,888,809.44	$320,920.84	$3,990,091.06	$4,850,773.51	$1,074,231.61
2014	$39,710,263.49	$30,686,841.96	$28,667,913.52	$2,018,928.44	$3,975,330.01	$5,048,091.52	$971,193.35
2015*	$76,808,191.85	$64,835,035.94	$60,997,385.11	$3,837,650.83	$5,481,111.27	$6,492,044.64	$1,049,707.26
2016	$17,080,956.92	$10,290,591.03	$9,924,708.77	$365,882.26	$1,082,858.23	$5,707,507.66	$886,628.72
2017	$27,532,664.18	$18,218,277.17	$17,627,954.21	$590,322.96	$2,556,445.23	$6,757,941.78	$844,374.19
2018	$29,408,523.55	$16,658,147.46	$14,275,797.89	$2,382,349.57	$3,560,832.61	$9,189,543.48	$1,665,908.80
2019	$25,605,352.50	$17,335,136.25	$16,612,962.55	$722,173.70	$2,551,812.62	$5,718,403.63	$957,509.64
2020**	$37,227,875.33	$30,896,095.06	$30,462,038.52	$434,056.54	$858,088.09	$5,473,692.18	$539,295.92
State Totals	**$576,951,401.84**	**$370,765,403.48**	**$348,407,723.68**	**$22,357,679.80**	**$69,662,088.34**	**$136,523,910.02**	**$21,378,740.31**

*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, 2017, 2018, 2019, and 2020 was transferred to FYs 2013, 2014 and 2015 to cover 100% SL-6s.

**2020 figures do not include approved BMPs carried forward into FY 2021 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 2020 is provided in the following table (Table 2).

Table 2: CREP Summary FY 2001-2020 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	$434,287.22	120.11	21.27
Chesapeake Bay	2018	$107,818.33	49.09	12.75
Chesapeake Bay	2019*	$39,673.25	13.16	3.39
Chesapeake Bay Totals:		**$7,152,698.09**	**19,621.42**	**1,254.66**
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	$620,819.55	247.81	30.17
Southern Rivers	2018	$283,234.40	85.04	22.54
Southern Rivers	2019*	$130,918.32	62.49	9.49
Southern Rivers	2020*	$36,316.70	12.52	1.20
Southern Rivers Totals:		**$7,058,482.13**	**16,619.76**	**1,456.95**
Statewide Totals:		**$14,211,180.22**	**36,241.18**	**2,711.61**

*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 best management practices that improve water quality and the 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 1, 2020, 126 RMPs have been certified as fully implemented. The certified RMPs are all located within the Chesapeake Bay watershed and include over 35,000 acres. Over 64,000 additional acres within the Chesapeake Bay watershed are included in an RMP that is currently being implemented. There are approximately 8,000 acres outside of the Chesapeake Bay watershed that are included in an RMP that is currently being implemented.

Livestock Stream Exclusion in Virginia

Through 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 since January 2013 (a 2.5-year period) 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 approximately $95.2 million has been provided by the Commonwealth for this initiative. Nearly $50 million has been provided to producers within Virginia's Chesapeake Bay watershed. Pollution reduction towards year 2025 WIP goals will result from approximately 5.6 million linear feet of stream bank protected and nearly 65,000 animal units in the Chesapeake Bay watershed that will be excluded (statewide, the impact would be almost 9.5 million linear feet of stream bank protected and 112,000 animal units excluded) once all of the 100% reimbursed SL-6 practices have been installed.

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). An additional $500,000 in state funding was provided for VCAP during the 2020 General Assembly Session. It provides cost-share and technical assistance to address natural resource and stormwater concerns by assisting in the voluntary installation of certain best management practices on land for which there is no other cost-share program assistance available. VCAP is also intended to retrofit existing infrastructure.

VCAP is administered by the Virginia Association of Soil and Water Conservation Districts. Virginia's Soil and Water Conservation Districts (Districts), with qualified, trained, and experienced staff, implement the voluntary stormwater best management practices and cost-share program for public, private, and non-profit landowners. Since March 2016, $3,660,348 has been allocated through VCAP and $287,000 has been provided for technical assistance from a total of $4,892,638 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, 67 point source WQIF grant agreements obligating $795.7 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-four of the projects have been completed and are operational. A summary of active construction grant projects is accessible via the DEQ WQIF webpage.

Since its formation in 1998, the WQIF Point Source Program has received a total of $959.5 million 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 $50 million in bonds to be issued to support point source nutrient reduction projects in the Chesapeake Bay watershed. Approximately $95.3 million of the $959.5 million 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 they have been obligated to a contract with 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, 2020, the grant amount owed under existing, signed WQIF agreements was $10,106,542. 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 is drafting guidance for evaluating and implementing those projects and will likely begin accepting applications for conveyance projects in early 2021.

WQIF & Virginia Natural Resources Commitment Fund Nutrient Reductions

Estimated Nutrient Reductions from Nonpoint Source WQIF-Funded Projects

During FY 2020, WQIF and VNRCF funding supported agricultural BMPs that are expected to reduce edge of field nutrient and sediment losses by over 14.2 million pounds of nitrogen, 5.2 million pounds of phosphorus, and 1 million 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	1,502,867.93	376,943.49	239,723.43
2002	1,650,603.65	363,653.89	282,881.74
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	6,102,705.02	1,654,369.18	833,920.46

2009	4,489,721.45	1,181,531.27	609,483.34
2010	6,707,384.86	2,034,200.58	757,289.24
2011	5,991,807.66	1,778,676.60	835,988.79
2012	9,561,068.05	2,904,498.23	1,300,403.03
2013	10,255,717.73	3,085,648.64	1,385,765.88
2014	7,647,439.40	2,612,812.01	718,091.95
2015*	9,471,391.27	3,345,639.16	761,650.29
2016	7,546,054.30	2,928,885.25	439,447.46
2017	10,950,989.45	3,752,694.14	932,950.65
2018	9,661,558.47	3,186,816.08	906,542.36
2019	10,670,179.20	3,715,779.39	877,683.78
2020**	14,189,231.43	5,164,684.23	1,067,314.17

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

**2020 figures do not include approved BMPs carried forward into FY 2021 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, 64 of the 67 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 Bay watershed have declined dramatically. From 2009 to 2019, annual nitrogen discharges were reduced by about 9,940,499 pounds; phosphorus annual loads were reduced by almost 794,247, 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 well 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, 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 2021 to 2025, an estimate of $770 million may be required from state funds as well as locality financial contributions to meet water quality goals. Approximately 52% of this total ($402 million) could be needed from the WQIF.

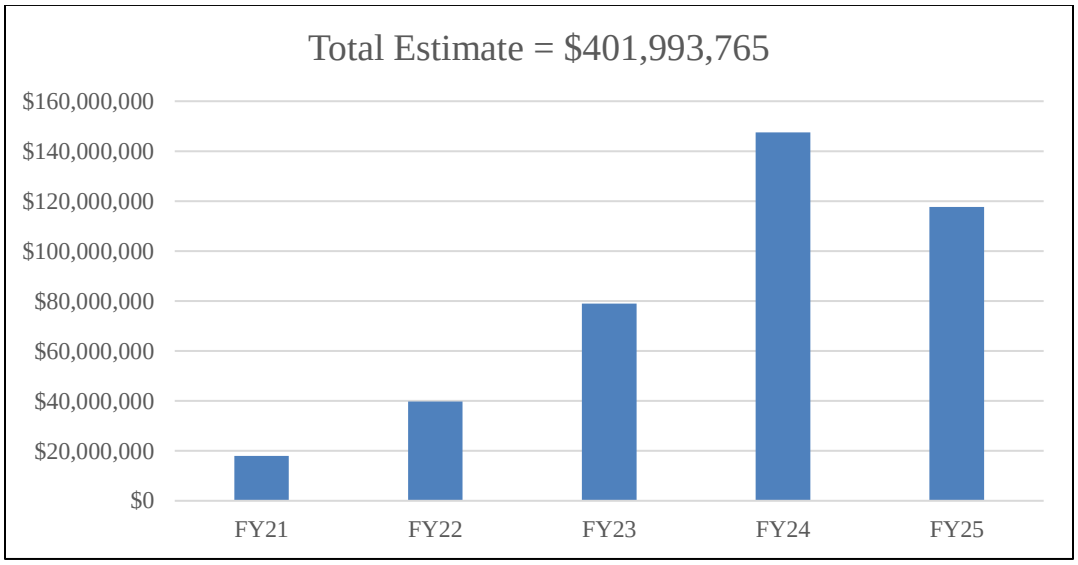

Figure 1: WQIF Needs Survey Results (FY 2021 – FY 2025)

The methodology for estimating the amount of Water Quality Improvement 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. During the survey period two virtual tutorial and question and answer sessions were held with VAMWA members. The survey requested: 1) general information, 2) programmatic information, and 3) total project cost with no time horizon. General information included the facility name and contact information. Programmatic information was requested on future WQIF funding needs over a five year time horizon (FY 2021 to FY 2025). 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 2025.

A total of 29 responses to the survey 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 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. Two respondents had not previously received a WQIF grant, but were assigned percentages based on data available for their respective locations.

The overall project costs for those anticipating to request WQIF funds is $769,972,729 through FY 2025. Based on the estimated eligible grant percentage for each respondent, the amount of programmatic WQIF point source funding needed through FY 2025 is $401,993,765. The following is a breakdown of WQIF point source funding need by fiscal year:

FY 2021 – $18,018,474

FY 2022 – $39,792,860

FY 2023 – $78,961,097

FY 2024 – $147,518,333

FY 2025 – $117,703,000

These amounts include estimated funding needed for facilities to meet current permit limits and funding needed for future Chesapeake Bay WIP Phase III floating waste load allocations. Additionally, needs were included for nutrient removal technology and wastewater conveyance infrastructure projects that are potentially eligible for WQIF funding.

Table 1: 2020 WQIF Needs Survey Results

WQIF Grants	**2021-2022 Biennium**		**2023-2024 Biennium**		**FY 2025**	**Total Need**
	FY 2021	**FY 2022**	**FY 2023**	**FY 2024**		
Applicant	$18,018,474	$39,792,860	$78,961,097	$147,518,333	$117,703,000	$401,993,765
TOTALS	**$57,811,334**		**$226,479,430**		**$117,703,000**	**$401,993,765**

The total estimated project costs identified by respondents is $1,233,697,484. Of that total, the amount of WQIF eligible project costs is estimated to be $790,972,729. Based on the estimated eligible grant percentage for each respondent, the amount of WQIF point source funding needed with no specified time horizon totals $409,343,765. This amount differs from the total need of $401,993,765 for FY 2021 through FY 2025. The difference of $7,350,000 is needed in FY 2026 and beyond.

Table 2: 2020 WQIF Needs Survey Results - Total Project Costs (no time horizon)

Estimated Total Project Costs	WQIP Eligible Project Costs	Estimated Eligible Grant Amount
$1,233,697,484	$790,972,729	$409,343,765

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.

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. In accordance with § 62.1-44.15:29.2 of the *Code of Virginia* the Department of Environmental Quality, in consultation with stakeholders, including representatives of the Virginia Municipal Stormwater Association, 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 best management practices that are eligible for funding from the SLAF. For fiscal years 2021 to 2025, it is estimated that $267 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.

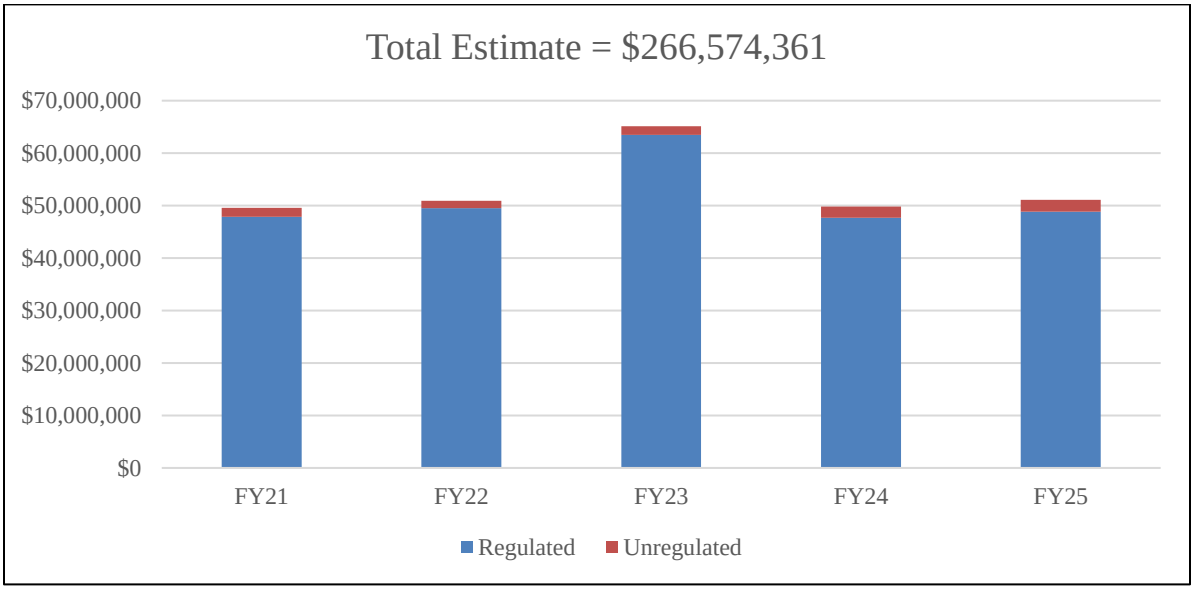

Figure 1: 2020 SLAF Needs Survey Results (FY 2021 – FY 2025)

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 the Virginia Municipal Stormwater Association (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: 1) general, 2) programmatic, and 3) 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 2021 to FY 2025). 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 2021 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 a FY 2021 SLAF grant application.

A total of 62 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 36 localities identified a programmatic funding need over the five year time horizon. Responses from 31 of those localities identified project specific funding needs for FY 2021. Of the survey respondents that identified a programmatic need, 30 are regulated as MS4s and 6 are unregulated.

The total amount of SLAF funding needed through FY 2025 to fully fund all needs identified in the survey is $266,574,361. The following is a breakdown of funding need by fiscal year:

FY 2021 – $49,593,633
FY 2022 – $50,910,884
FY 2023 – $65,145,300
FY 2024 – $49,817,794
FY 2025 – $51,106,750

Table 1: 2020 SLAF Needs Survey Results

Applicant	2021-2022 Biennium		2023-2024 Biennium		FY 2025	Total Need
	FY 2021*	FY 2022	FY 2023	FY 2024		
Regulated	$47,861,633	$49,508,884	$63,506,300	$47,672,794	$48,863,750	$257,413,361
Unregulated	$1,732,000	$1,402,000	$1,639,000	$2,145,000	$2,243,000	$9,161,000
TOTALS	**$49,593,633**	**$50,910,884**	**$65,145,300**	**$49,817,794**	**$51,106,750**	**$266,574,361**

*Locality need amount for FY 2021 was taken from FY 2021 project data, all other need amounts were taken from 5-year programmatic data

For the FY 2021 funding need, some localities provided programmatic and project specific data that were inconsistent. The total funding need of regulated localities for FY 2021, when calculated based on the FY 2021 input in the programmatic five year time horizon, is $42,756,533. Using project specific data, the total FY 2021 need is $47,861,633. For unregulated localities, the programmatic FY 2021 data show a need of $1,347,500. Project specific FY 2021 data total $1,732,000. Because the project specific data for regulated localities and unregulated localities represents the most complete data set, these two figures were used to determine the anticipated total need for FY 2021 of $49,593,633.

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.

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. 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 the fiscal years 2020– 2030 a revised estimate of $2.7 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 who implement the VACS program.

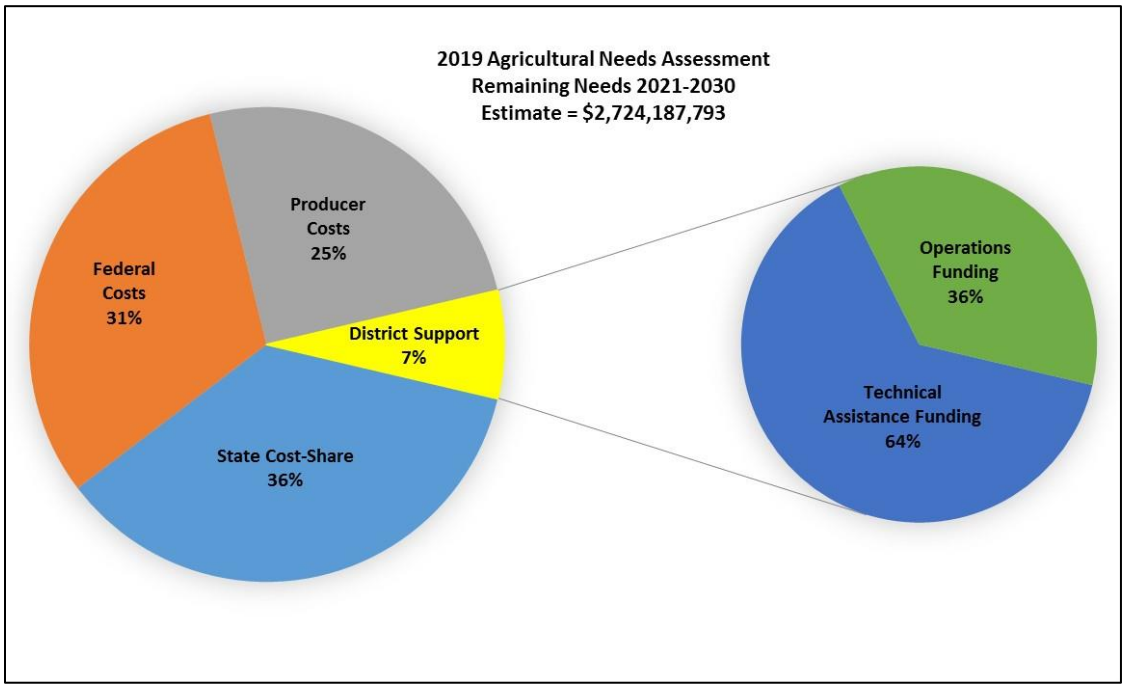

Figure 1: 2020 Agricultural Needs Assessment Summary[1]

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 best management practices

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

(BMPs). The methodology for the Agricultural Needs Assessment was revised in 2019 to more 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 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 2020 CHESAPEAKE BAY AND VIRGINIA WATERS CLEAN-UP PLAN

Table 1: 2020 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*	2022	2023	2024	2025	2026	2027	2028	2029	2030
CHESAPEAKE BAY STATE COST SHARE		**$14,384,534**	**$39,486,279**	**$24,473,977**	**$73,952,813**	**$79,311,509**	**$84,670,205**	**$90,028,901**	**$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**	**$9,613,866**	**$10,310,496**	**$11,007,127**	**$11,703,757**	**$11,021,054**	**$11,021,054**	**$7,125,912**	**$7,125,912**	**$7,125,912**
CHESAPEAKE BAY PRODUCER PORTION				$37,356,306	$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		**$16,503,312**	FFY20 in progress	$52,298,828	**$52,861,859**	**$57,550,718**	**$62,239,577**	**$66,928,436**	$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**	**$10,488,848**	**$31,694,062**	**$33,990,646**	**$36,287,230**	**$38,583,014**	**$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**	**$4,461,007**	**$4,759,563**	**$5,058,119**	**$5,356,571**	**$4,723,309**	**$4,723,309**	**$3,053,962**	**$3,053,962**	**$3,053,962**
OCB PRODUCER PORTION				$16,009,845	$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		**$16,503,311**	FFY20 in progress	$22,413,783	**$18,287,955**	**$22,306,977**	**$24,316,488**	**$26,325,999**	$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
		** FY20 cost share excludes $2M		* Difference between proposed FY21 state cost share funding compared to FY21 need has been included as an average increase in need for FY22 - FY25									
		CREP + $750K poulty litter transport		* Actual federal funding in FFY19 has been averaged and reduced the federal need for FY22 - 25. Actual FFY20 federal will also reduce FY22-FY25.									
		and Resource Management Plans		* FY21 state budget is not final and could change.									
	TOTALS	$67,768,324	$73,543,940	**$176,082,677**	**$256,213,353**	**$303,530,351**	**$325,577,558**	**$347,623,860**	**$325,711,657**	**$317,685,951**	**$213,137,765**	**$213,137,765**	**$2,691,838,701**
													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 one 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 also 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 Resources to plan for the cleanup of the Chesapeake Bay and Virginia's waters designated as impaired by the U.S. Environmental Protection Agency. 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

2020 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 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 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 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 79% of the statewide point source phosphorus loads in 2018.

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. Additional background information on the revised criteria can be found on the DEQ Nutrient Criteria Development website.

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. Initial 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. These results are being verified and additional model runs conducted to test if the location and degree of phosphorus reduction can be scaled back across the watershed and still be effective at meeting the criteria.

Appendix X of the TMDL identified two phases of additional Total Nitrogen and Total Phosphorous reductions necessary in the James 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 wasteload allocation reduction yet to be implemented in the Watershed General Permit is an additional one million pounds of Total Nitrogen from the aggregate HRSD James River wasteload allocation. In accordance with Part I.C. of the Watershed General Permit, this reduction in wasteload allocation 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 wasteload allocations in aggregate since 2012.

A Notice of Intended Regulatory Action (NOIRA) was published on November 25, 2019 in the Virginia Register to initiate modifications to the Water Quality Management Planning (WQMP) Regulation (9VAC 25-720) to include wasteload allocations that are protective of both DO and chlorophyll. This rulemaking also included the development of floating wasteload allocations for significant municipal wastewater treatment plants. The floating wasteload allocations are expected to further decrease point source loads in the York and James River basins, enable the Commonwealth to meet the overall goals of the Phase III WIP and provide a significant margin of safety to ensure chlorophyll criteria are met in the James River.

TMDL development and implementation for waters impacted by toxic contamination

2020 Progress Report

Bluestone River: The Virginia portion of the Bluestone 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 are 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 by 2022 will establish reductions needed to attain the fish consumption use within these impaired waters. A PCB source investigation study is in the final stages of completion and will tabulate PCB loadings from several source categories, or conveyances, 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 by 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 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 by 2021.

Mountain Run: The Mountain Run PCB impairment extends from the Route 15/29 bridge crossing near Culpeper City 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 by 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 has 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 Biological Systems Engineering (BSE) Department at Virginia Tech completed a TMDL, developed to restore the fish consumption use, 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, the Environmental Protection Agency (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. EPA continues their 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. Reductions will be necessary in those situations where the assigned TMDL loads are exceeded and will be addressed through the water permitting process.

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 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 action on the DuPont site is scheduled to be completed by the end of 2020. On-going off-site activities include dam removal, bank stabilizations, contamination capping in certain floodplain areas, implementing best management practices for livestock stream exclusion with grazing land management and animal waste control facilities practices, and land acquisitions to restore habitat.

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.

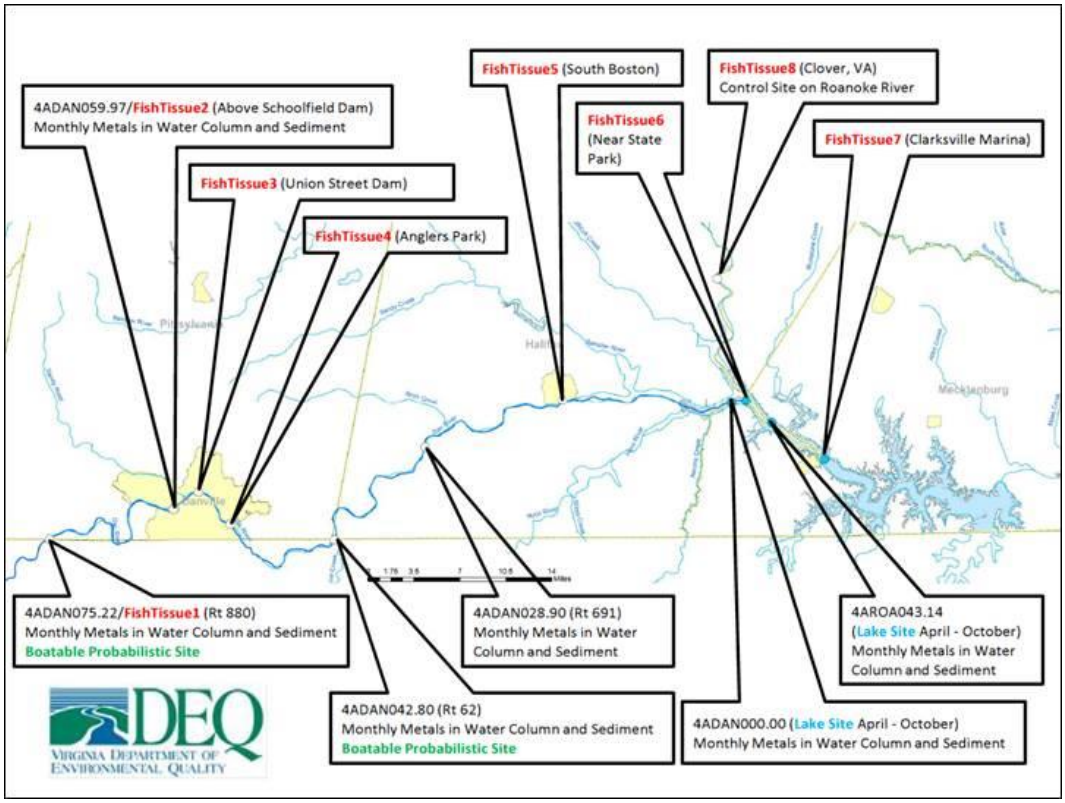

Figure 1: Map of Dan River Monitoring Program Sites

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 2014-2017 monitoring program:

- Sediment metals levels remain low, below thresholds of potential concern, and the ash continues to be mixed and covered by native sediment to non-detectable levels in the biologically active layer throughout the river.
- Water column dissolved metals levels remain below water quality standards for both aquatic life and human health protection.
- Fish tissue collection and analysis has been completed for all samples taken (705 total) from 2014 through 2018. 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.

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

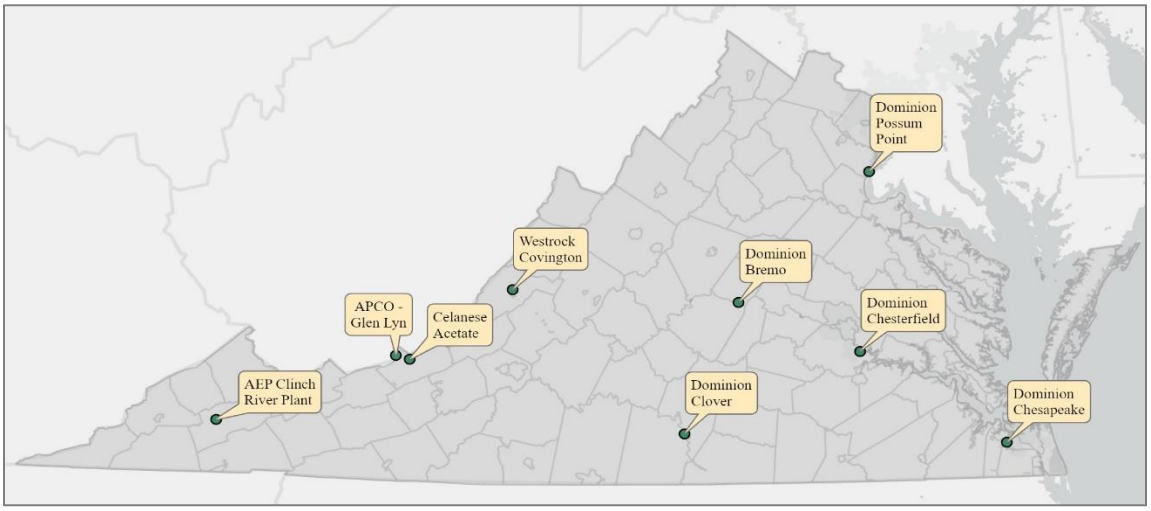

Figure 2: Map of Coal Ash Impoundments in Virginia

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. House Bill 2786/Senate Bill 1355 (2019 Va. Acts Chs. 650 & 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

2020 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 2014, DEQ transmitted four NDZ applications for Virginia's Northern Neck (the peninsula of land separating the tidal Potomac and Rappahannock Rivers) to Virginia's Secretary of Natural Resources (SNR) for review. The SNR concurred with the applications and submitted them to EPA - the federal agency with the authority to designate NDZs per § 312 of the Clean Water Act and enabling regulations at 40 CFR Part 140. EPA has since completed a review of the applications and provided DEQ with preliminary comments. DEQ and the Northern Neck Planning District Commission are working together to address these comments, after which the applications will be resubmitted to EPA for continuation of the final determination process.

An NDZ application has been developed for Sarah Creek and Perrin River in Gloucester County, Virginia. The Go-Green Gloucester Advisory Committee of the Gloucester County Board of Supervisors, the Virginia Institute of Marine Science and DEQ worked together to develop the application for Sarah Creek and Perrin River in Gloucester County, Virginia. A public meeting was held on July 27, 2016. All

comments received were in support of the NDZ application. DEQ presented the application to the State Water Control Board in December 2016 after which it was sent to the SNR for review and transmittal to EPA. EPA did not initially act on the application but in 2019 informed DEQ that it was ready to proceed with a determination. EPA requested that DEQ provide a letter affirming the Commonwealth's continued interest in an affirmative determination for the application and a verification that the application content remains accurate. After reviewing the application, DEQ made a few minor modifications after which a letter and updated application was submitted to EPA in September 2019 for final determination. EPA published a public notice for a 30 day comment period in March 2020. No comments were received and an affirmative determination was published in the federal register on September 23, 2020.

On-site septic systems

2020 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 30,000 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 directs 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. The bill specifies that the plan address localities in the Northern Neck, Middle Peninsula and Eastern Shore. VDH is working with stakeholders in the identified areas to develop a plan to transfer the oversight and enforcement of pump-out requirements from localities to VDH. The anticipated goals of the plan are to facilitate a more consistent approach to enforcing pump-out requirements, increase the number of septic pump-outs occurring, reduce ground water pollution, and extend the life of citizens' onsite systems.

Another piece of legislation, HB 2811 (2019 Va. Acts Ch. 441) passed in the General Assembly and was signed by Governor Northam with an immediate enactment clause. The bill amended § 58.1-3660 of the *Code of Virginia* to designate VDH as a "state certifying authority." This designation means VDH can certify certain equipment as "pollution control equipment," exempting it from state and local taxation. The exemption applies to equipment for onsite sewage systems serving 10 or more households that use nitrogen-reduction processes and technology and that are constructed, wholly or partially, with public funds. This bill encourages the use of community onsite systems over individual system installations, which provides more pollution reduction. GMP # 2020-01 which implements HB 2811 has gone through a public comment process and became effective March 19, 2020. So far VDH has provided certification of tax exemption for two projects; the Town of White Stone Sewage Collection and Treatment System Phase I project and the Catlett Calverton Community Wastewater System project.

In 2019, the Secretaries of Natural Resources, Health and Human Resources, and Commerce and Trade worked together to form the Wastewater Infrastructure Work Group (Work Group) consisting of

representatives of DEQ, VDH, Virginia Department of Housing and Community Development, and Virginia Resources Authority. The goal of the work group is to coordinate and maximize grants to landowners and localities to protect water quality, human health and economic disadvantaged communities from inadequate, failing or failed wastewater systems. The Center for Coastal Resources Management at the College of William & Mary Virginia Institute of Marine Science (VIMS), with partnership and resources from VDH, used regulatory system permit data to create a map identifying areas in the Chesapeake Bay watershed with consistently high rates of septic system failures. The Work Group intends to use this map to help identify areas where grant resources could be used with the greatest impact. Additionally, the Workgroup has provided recommendations for initiatives, research and data needs to more comprehensively and effectively assess and address wastewater infrastructure needs in the Commonwealth.

To assist in the repair of failing onsite sewage systems, 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. These funds will be used to repair failing septic systems and remediate illicit sewage discharges (straight pipes) from homes in the Yarmouth Creek and Morris Creek watersheds in James City County, the Pagan River and Lawnes Creek watersheds in Isle of Wight County and the Lawnes Creek watershed in Surry County. VDH's primary objective is to help homeowners in these watersheds bring their systems into current regulatory compliance, thereby reducing total nitrogen and fecal coliform loads from each system.

The grant provides homeowners with failing septic systems a financial incentive to upgrade to an advanced treatment system with nitrogen reduction or to connect to public sewer. VDH will base cost-share amounts on total household income level. The grant period runs for no more than three years (January 1, 2019 to December 31, 2021). During the first year of the grant, funding is available to homeowners in the four targeted watersheds with a household income of 200 percent or less of the Federal Poverty Guidelines (FPG) and a failing septic systems. In April 2020, the program was expand to include any portion of James City County, Isle of Wight, or Surry located within the James River watershed. The program was also expand to all income levels. VDH is currently working with 11 property owners to repair failing onsite sewage systems with nitrogen reducing systems or sewer connections.

In October and November of 2018, VDH sent approximately 8,000 reminder letters to alternative onsite sewage system (AOSS) owners who were out of compliance with annual maintenance. The maintenance helps to ensure that AOSS are operating correctly and not polluting groundwater. The letter campaign was largely successful with health districts reporting up to a 60% increase in received reports compared to the same time in 2017.

VDH also worked with the internal communications office and an advertising agency to create a social media campaign to remind septic system owners to have their system pumped regularly. The video ads reached citizens in the rural areas of Virginia and helped to increase the number of pump-outs occurring.

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

2019 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 2019, DEQ provided $859,292 from 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.

Table 1: Residential Septic Program – Grant Funded BMPs (7/1/2018 – 6/30/2019)

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	422	1,182	2.10E+12	$79,836	$64,313	$144,149
RB-2	Connection to Public Sewer	1	31	4.98E+10	$4,684	$4,684	$9,368
RB-3	Septic Tank System Repair	28	647	1.04E+12	$42,434	$36,690	$79,125
RB-3R	Conventional Onsite Sewage Systems Full Inspection and Non-permitted Repair	26	601	9.70E+11	$12,212	$10,083	$22,295
RB-4	Septic Tank System Replacement	32	739	1.19E+12	$121,522	$97,748	$219,270
RB-4P	Septic Tank System Installation/Replacement with Pump	14	324	5.22E+11	$93,643	$78,357	$171,999
RB-5	Installation of Alternative Waste Treatment System	10	231	3.73E+11	$120,064	$93,022	$213,086
Total		**533**	**3,755**	**6.25E+12**	**$474,395**	**$384,897**	**$859,292**

*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).

[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 2020 programmatic report. The FY 2019 Report included the first two quarters of FY 2019 data (7/1/2018 - 12/31/2018) due to the same deadline issue. The program data included in this report is for FY 2019 activity.

Table 2: Residential Septic BMPS for Waters Outside the Chesapeake Bay Watershed (7/1/2018 – 6/30/2019)

River Basin	# of BMPs	Federal 319(h) and State WQIF NPS Funds	Total Cost of Practice	Bacteria Reductions CFU	Nitrogen Reduction Lbs./Year
New River	0	$0	$0	0.00E+00	N/A
Roanoke-Dan	14	$19,759	$30,422	5.15E+11	292
Tennessee-Clinch	0	$0	$0	0.00E+00	N/A
Tennessee-Holston	97	$34,665	$45,154	2.16E+11	132
Upper Roanoke	11	$35,242	$52,703	6.25E+12	3,755
Total	122	$89,666	$128,279	6.99E+12	4,179

Table 3: Residential Septic BMPs for Waters Inside the Chesapeake Bay Watershed (7/1/2018 – 6/30/2019)

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	46	$61,443	$107,248	5.20E+11	312
James-Rivanna	2	$6,800	$11,646	7.46E+10	46
Middle James	97	$127,478	$227,195	1.26E+12	759
Potomac-Shenandoah	45	$51,169	$105,612	5.15E+11	309
Rappahannock	197	$120,155	$247,784	2.63E+12	1,588
York	24	$17,685	$31,530	2.49E+11	148
Total	411	$384,730	$731,014	5.25E+12	3,162

Adoption of cost-effective agricultural best management practices

2020 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. Complaints alleging that a specific agricultural activity is causing or will cause water pollution are received by the Commissioner. If a complaint meets the criteria for investigation, the Commissioner (through the ASA program staff) contacts the appropriate SWCD 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

2020 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. 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 2020, the VDOF was involved in 120 water quality actions initiated under the Silvicultural Law. Of these actions, none resulted in a Special Order nor an Emergency Special Order being issued for violations of the law. In addition, there were 29 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 2019, 96.9 percent of the timber harvest acres in Virginia conducted within the boundaries of the Bay Watershed were under BMPs and 95 percent of the timber harvest acres statewide were under BMPs. The audit also showed that none of the sites visited had

any signs of active sedimentation present after the closeout of a 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 2020, VDOF field personnel conducted 20,197 inspections on 4,623 timber harvest sites across Virginia on 204,877 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.

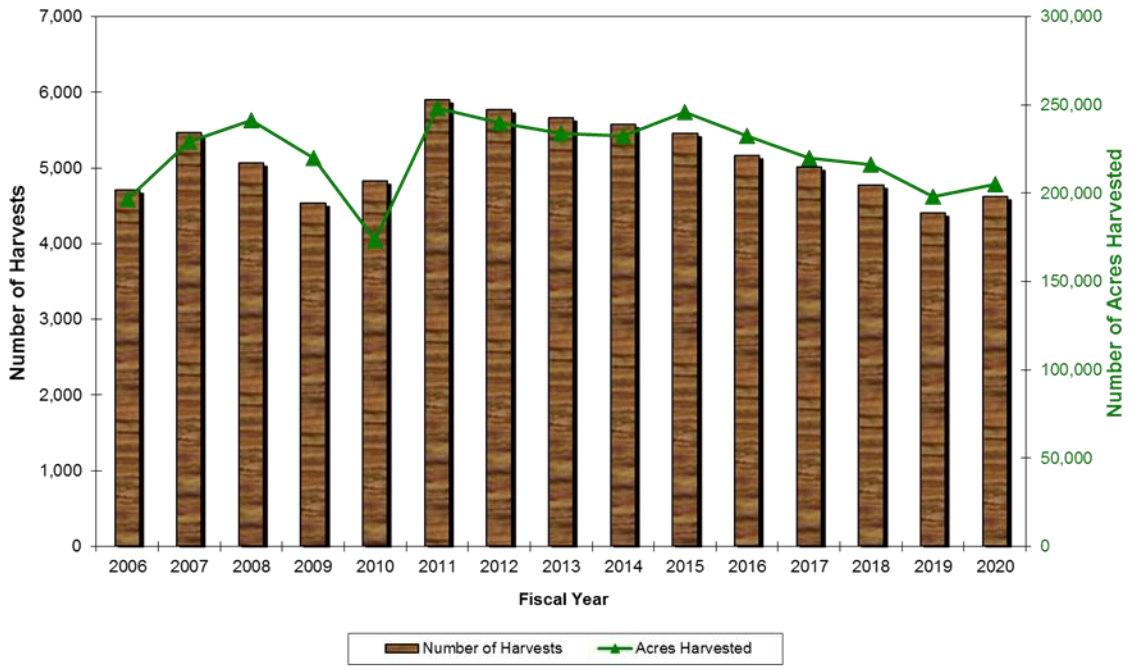

Figure 3: Number of harvests inspected and total number of acres harvested: 2005 through 2020

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. Forty stream protection projects were funded in FY 2019 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 2020 cycle has allocated $172,946.00 to 28 projects in 25 different HUC12 watersheds utilizing funds from the Commonwealth's WQIF. The majority of the projects funded are in highly urbanized parts of the state including Richmond, Virginia Beach, Fredericksburg and Northern Virginia. Technical assistance by VDOF ISA Certified Arborist staff was also provided. Projects funded included tree planting for establishment of riparian forest buffers, school and park plantings and stormwater retrofits that incorporated the use of trees. To date, VDOF has assisted in completing 178 projects resulting in more than 53,000 trees being planted in Virginia communities.

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.

Logger Education

VDOF was involved in 21 Logger education programs in FY 2020 educating 604 timber harvesting professionals through the Virginia SHARP Logger Program in cooperation with Virginia Tech and the Sustainable Forestry Initiative (SFI®) State Implementation Committee. This program has enabled VDOF to assist in training 10,317 harvesting professionals in 347 programs relating to water quality protection since its inception. Figure 4 exhibits historical levels of participation in VDOF logger education programs since 2005.

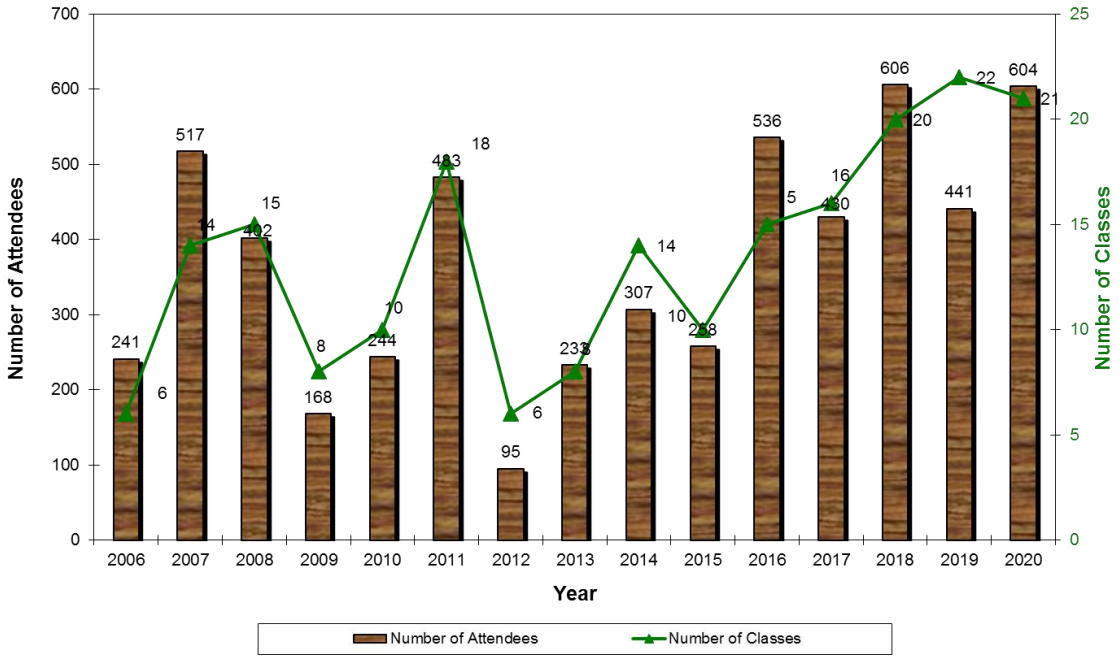

Figure 4: VDOF logger education: 2006 through 2020

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 successfully establish buffers through tree planting or natural means. In FY 2020, VDOF recorded riparian forest buffer establishment on 257 sites acres in the 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 2019, VDOF issued Riparian Forest Buffer tax credits on 112 applications covering 1,795 acres of retained forested buffers. The tax benefit to forest landowners was $738,720.51 on timber valued at $3,258,226.86.

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 (SWCD's), 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 194 conservation easements in 60 counties and the City of Suffolk that permanently protect over 84,000 acres of vital forestland. Of these, 117 easements consisting of 30,230 acres lie within the Chesapeake Bay watershed.

In FY 2020, the VDOF permanently protected 27,868 acres of open space and more than 118 miles of water courses through 10 conservation easements. Four of the easements comprising 1,789 acres were within the Chesapeake Bay watershed.

Forest Management Planning

The Virginia Department of Forestry 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. Similar, equivalent plans, like the American Tree Farm Program certification, or plans assisted by USDA, Natural Resources Conservation Service, are prepared by private consulting foresters. 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 2020 VDOF recorded over 1,500 plans for 91,000 acres in the 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 2020, VDOF recorded over 900 forest management projects on approximately 32,000 acres in the Bay Watershed. More specifically, VDOF reported tree planting on over 600 sites on approximately 22,000 acres in the Bay Watershed. Of this, over 400 acres were established on previously non-forested open land.

VDOF manages 25 State Forests that cover 69,441 acres. These are operational, working forests that 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 will provide green stormwater infrastructure benefits, thereby improving water quality across Virginia and specifically, in the Chesapeake Bay. USFS Urban and Community Forestry Program (U&CF) will also support Urban Tree Canopy (UTC) analyses, tree inventories and urban forest management plans for communities to give them 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 is being developed to help with reporting new tree plantings using ESRI® software. This innovative project tracking application is titled, "My Tree Counts" and is serving a valuable function of tracking projects of multiple scales from individual tree to partner group multi-acre. Funding will also be used to educate communities on how to use the platform for tracking and reporting.

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 two Virginia counties (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 ($50M+) 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 in the 2019 legislative session to enable EDA's to serve such an aggregating role.

Implementing the findings and recommendations of the Healthy Watersheds/Forest project have been incorporated into Virginia's WIP III strategies. Projected outcomes in 2020 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.

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.

Vital Habitat

VDOF is working with landowners, other agencies and partners to restore diminished tree species and related habitats, specifically longleaf and shortleaf pine. Both exhibit the attributes of good quality, value, adaptability to fire and drier conditions, and providing unique associated plant communities and habitats. These attributes have drawn landowners and agencies to these target species, which has resulted in additional commitment and investment in tree planting, forest improvement and restoration, and land conservation. Significant efforts made toward longleaf and shortleaf pine restoration in FY 2020. include: the first operational harvest of longleaf cones from the VDOF seed orchard (New Kent) in addition to wild seed collection; and the production of over 125,000 longleaf pine and almost 200,000 shortleaf pine seedlings at VDOF nurseries to support these restoration efforts.

Implementation of Nutrient Management Planning

2020 Progress Report

Currently, there are over 353,762 active nutrient management planned acres in the Commonwealth that 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	135,218	54,745	44,497	2,332	236,792
Outside the Chesapeake Bay Watershed	66,936	26,895	22,868	270	116,969
Totals	**202,154**	**81,640**	**67,365**	**2,602**	**353,761**

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 32,343.4 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 and 2020 General Assembly Session, 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.

Funding appropriated by the 2019 and 2020 General Assembly will provide $900,000 for direct pay grant opportunities for certified nutrient management planners. These funds will pay for the development,

revision, and verified implementation of nutrient management plans, particularly in counties with fewer plans, which will assist the Commonwealth in reaching its water quality goals.

In order to continue progress toward meeting goals for the Chesapeake Bay TMDL, DCR has dedicated certain certified nutrient management staff to work exclusively with small dairies and other small farms to develop nutrient management plans. There are 511 dairies in Virginia. Seventy-two permitted and 244 unpermitted dairies have nutrient management plans. Sixty-one of these permitted operations have current nutrient management plans, although 11 have expired plans that are being renewed as of June 30, 2020. 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, NutMan 4, 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. NutMan 4 is being implemented with DCR certified nutrient management planners and DCR private sector contractors and is anticipated to be utilized by additional private nutrient management planners by FY 2021.

Implementation of and compliance with erosion and sediment control programs

2020 Progress Report

From July 2019 through June 2020, the main 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 six 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

2020 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 2019 through June 2020, new (*i.e.*, first-time) coverage under the 2019 Construction

General Permit was approved for 339 land-disturbing activities where DEQ is the local Virginia Stormwater Management Program (VSMP) authority and new coverage under the 2019 Construction General Permits was approved for 1,444 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.

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 which resulted in 15 localities with 24 projects being authorized.

In FY 2020, DEQ authorized $18,000,000 in funding for 22 projects and one 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, 2020, the six funding cycles of SLAF grants have resulted in 37 localities that signed grant agreements to implement 138 projects, totaling $63,630,146 in cost-share. Additionally, 32 projects authorized for funding from the solicitations (19 from the first cycle, nine from the second, one from the third cycle and three from the fourth cycle) have been withdrawn by the localities.

Virginia Clean Water Revolving Loan Fund

For FY 2020 (the period July 1, 2019 – June 30, 2020), the Virginia Clean Water Revolving Loan Fund (VCWRLF) allocated roughly $659 million in loan funds to 25 localities for wastewater and stormwater infrastructure projects and one brownfield remediation. The Virginia Clean Water Revolving Loan Fund (VCWRLF) was created in 1987 and DEQ, on behalf of the State Water Control Board (SWCB), 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 scope of VCWRLF activity was expanded by the State Water Control Board and DEQ implemented additional programs to provide low interest loans related to agricultural and other non-point source water quality issues.

From 1988 to 2019, under the VCWRLF Program, DEQ has authorized over 665 projects, providing $3.4 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 best management practices (BMPs) and agricultural BMPs.

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

2020 Progress Report

Chesapeake Bay Preservation Act (CBPA) compliance reviews continued 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 76 localities now through the compliance review process, and being found fully compliant or working to resolve conditions under a Corrective Action Agreement, 8 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, 2019 – December 31, 2019), 143 soil and water quality conservation assessments on agricultural land were conducted and 19,780 septic systems were pumped out.

Chesapeake Bay Total Maximum Daily Load Implementation

2020 Progress Report

The following graphs shows 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 2009-2019. 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).

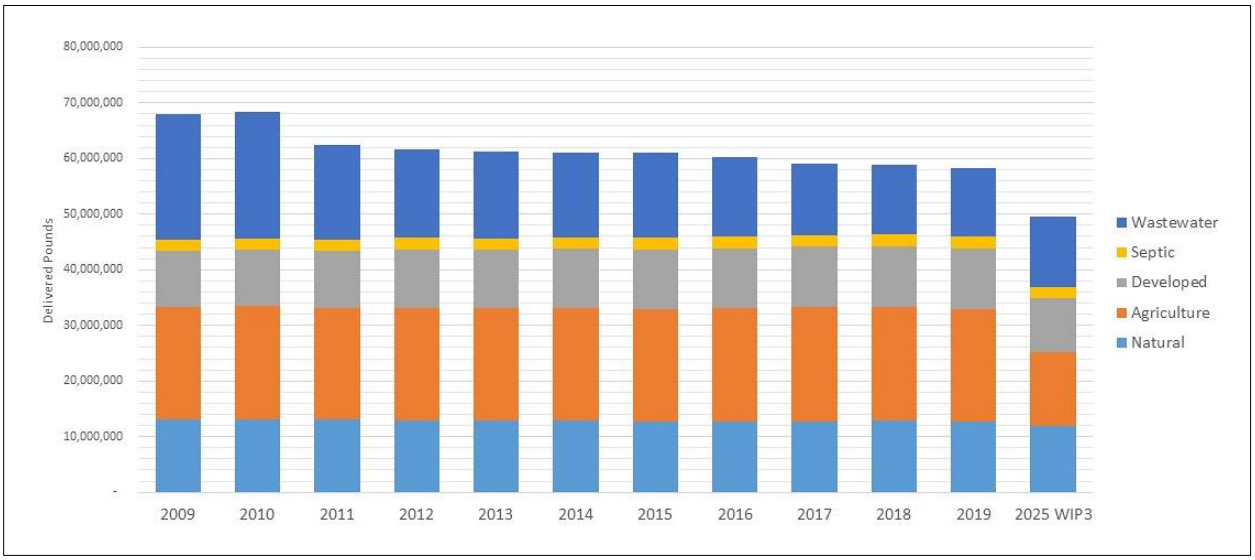

Figure 5: Virginia's Annual Nitrogen Progress Loads for 2009-2019 with WIP III Planned 2025 Loads

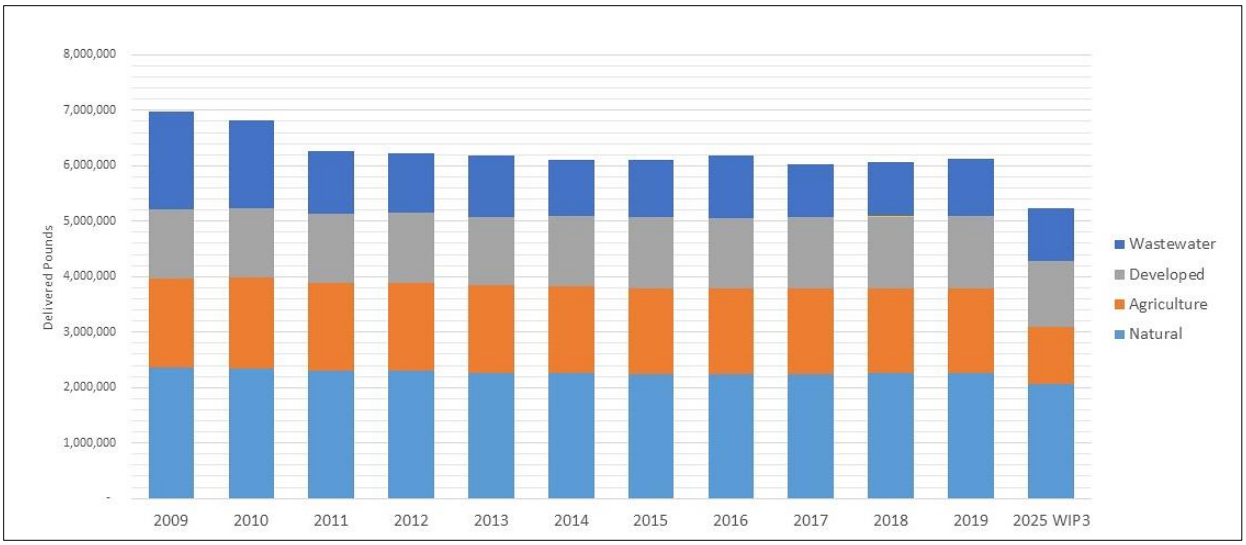

Figure 6: Virginia's Annual Phosphorus Progress Loads for 2009-2019 with WIP III Planned 2025 Loads

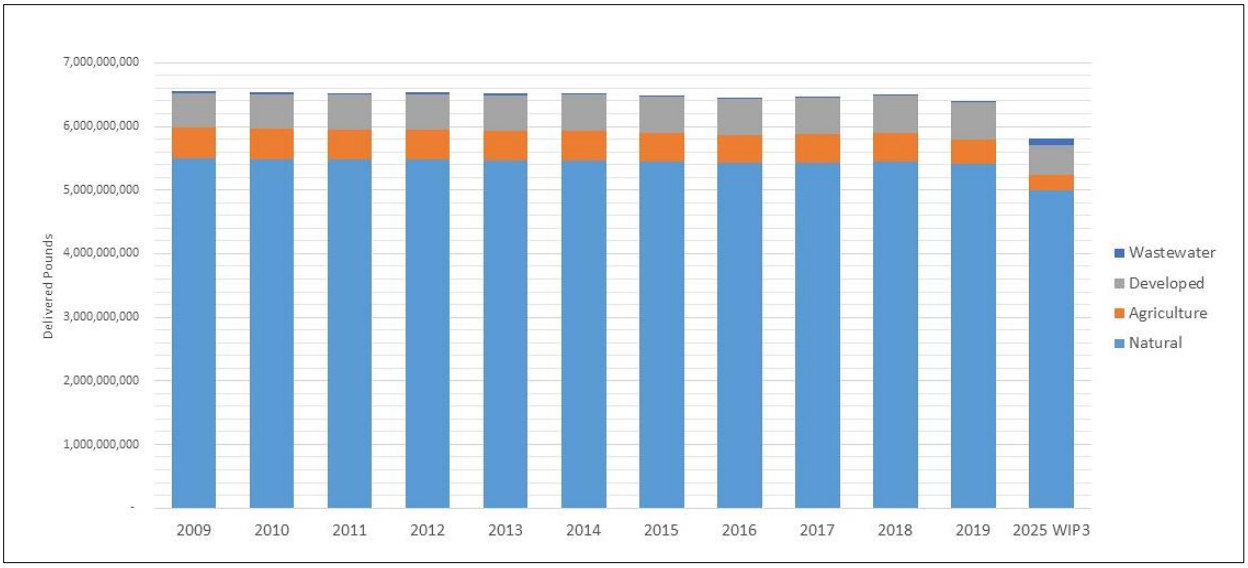

Figure 7: Virginia's Annual Sediment Progress Loads for 2009 – 2019 with WIP III Planned 2025 Loads

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

2020 Progress Report

As of June 2020, 12 new TMDL equations, each representing a watershed area draining to impaired surface waters, have been EPA approved since July 2019. The figure below shows the number of TMDL equations by pollutant set across Virginia since the inception of the TMDL program (Figure 8).

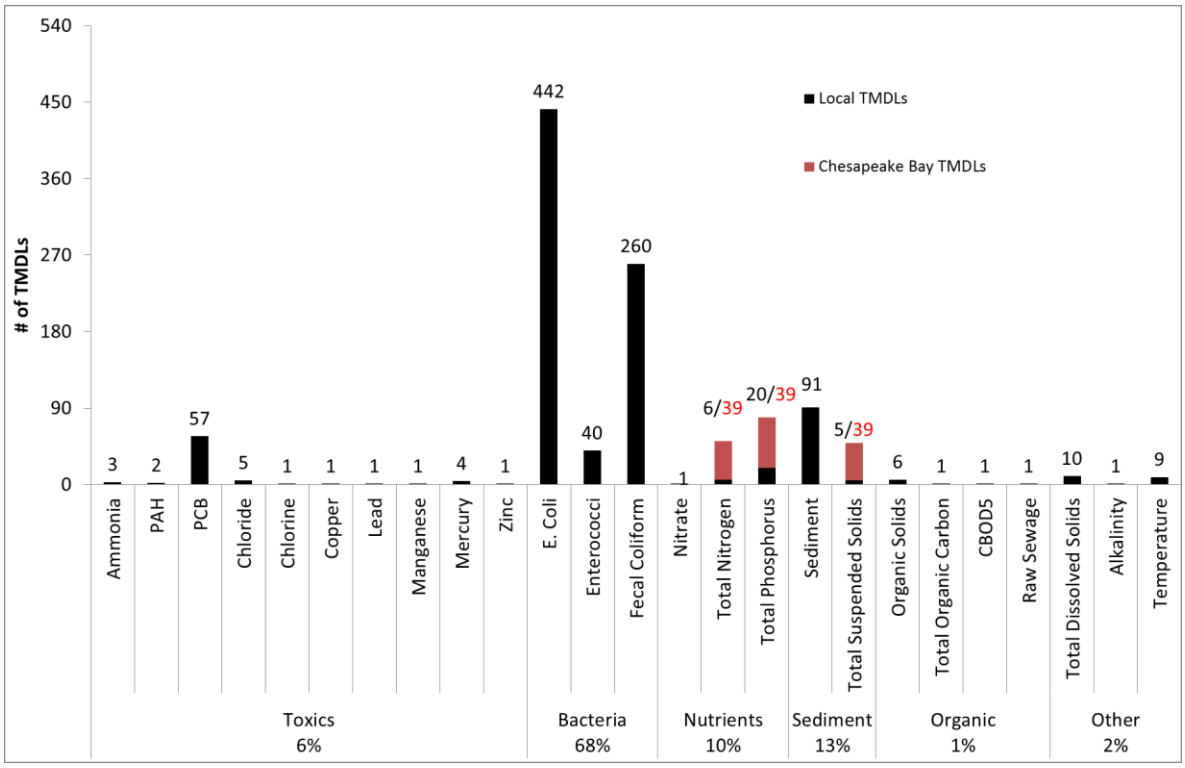

Figure 8: TMDL Equations by Pollutant[3]

Based on the 2018 Integrated Report, Virginia estimates that 8,460 miles of rivers, 81,744 acres of lake, and 2,044 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

[1] 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. Again 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 4th, 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 on Virginia's TMDL website.

Development of TMDL Implementation Plans

2020 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 2020, DEQ and partners completed 2 IPs covering 16 impairments. In addition, 5 IPs covering 54 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 95 IPs, addressing 588 impairments (Figure 9).

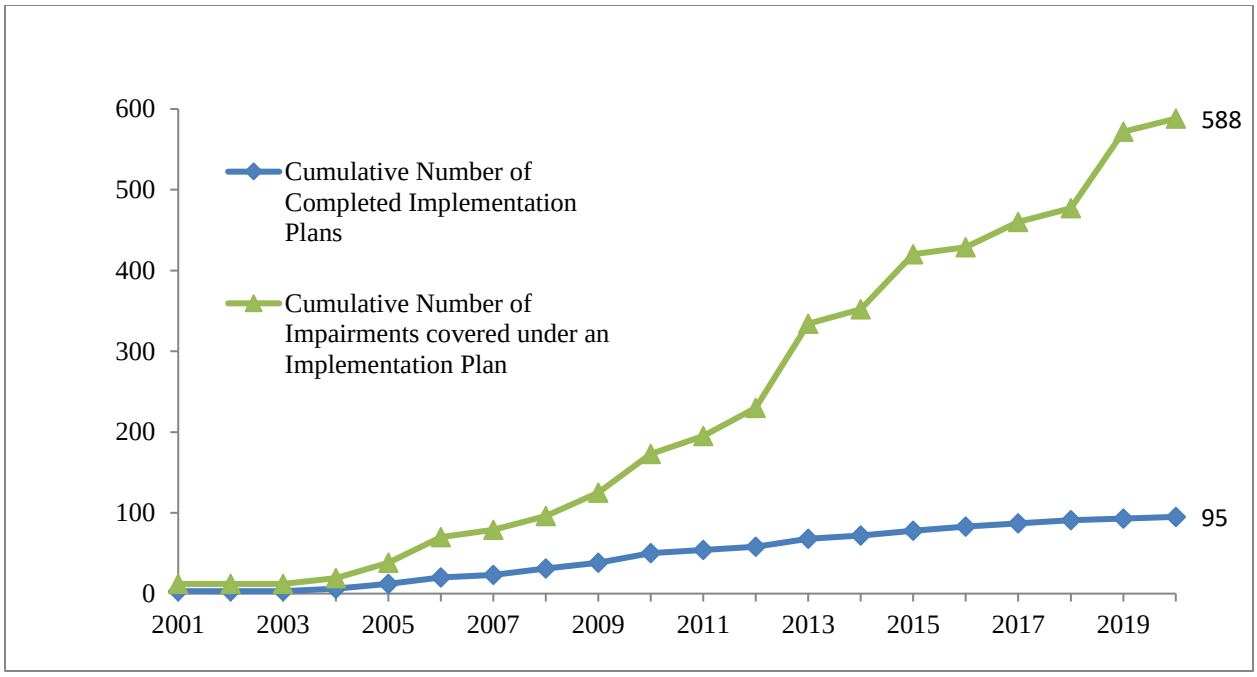

Figure 9: Cumulative Summary of Implementation Plan Development (July 2001 – June 2020)

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.

A list of all completed Implementation Plans through June 2020 is provided in the table below (Table 5). Bacteria and sediment continue to be the most common pollutants addressed through implementation planning. More information on Implementation Plans completed or under development can be found on DEQ's Implementation Planning webpage.

Table 5: Completed Implementation Plans (January 2001 – June 2020)

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

Watershed (# of impairments / # of impaired segments)	Location (county or city)	Impairment	Lead	Fiscal year Completed
Ash Camp and Twitty's Creek (2/2)	Charlotte	Be (sed)	DCR	2010
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

Watershed (# of impairments / # of impaired segments)	Location (county or city)	Impairment	Lead	Fiscal year Completed
North Fork Holston River (35/35)	Scott, Washington, Smyth, Russell, Bland, Tazewell	Bc, Temp	DEQ	2013
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*
Yeocomico River (13/13)	Northumberland, Westmoreland	Bc	DEQ	UD
Accotink Creek (3/3)	Fairfax, Fairfax County	Chloride	DEQ	UD
McClure River (6/6)	Dickenson	Bc	DEQ	UD
Buffalo River (13/12)	Amherst, Nelson	Bc, Be	DEQ	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.*				

Watershed Restoration and TMDL Implementation

2019 Progress Report[4]

The goal of the TMDL Implementation Program is to implement targeted, on-the-ground activities, identified in TMDL implementation plans, 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, 2018 through June 30, 2019 DEQ managed 23 implementation projects funded partially or fully with Federal Section 319(h). All projects are listed below (Table 6).

Table 6: 319(h) Funded TMDL Implementation Projects Active in Virginia FY 2019

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

[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 2020 programmatic report. The FY 2019 Clean-Up Plan Report included the first two quarters of FY 2019 data (7/1/2018 - 12/31/2018) due to the same deadline issue. The program data included in this report is for FY 2019 activity.

[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]
Flat, Nibbs, Deep and West Creeks	Piedmont SWCD	§319(h): 2015-2020 (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): 2015-2019
Linville Creek	Shenandoah Valley SWCD	§319(h): 2015-2019
Little Dark Run and Robinson River	Culpeper SWCD	§319(h): 2015-2021
North Fork Holston River – Scott County	LENOWISCO PDC	§319(h): 2017-2020 (Residential only)
North Fork Holston River – Smyth County	Evergreen SWCD	$319(h): 2018-2021
North Fork Holston River – Washington County	Holston River SWCD	§319(h): 2017-2020
Slate River and Rock Island Creek	Peter Francisco SWCD	§319(h): 2010-2021
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): 2016-2020 (residential only); WQIF/VNRCF: 2007-2015– Agriculture only
Tye River, Hat Creek, Rucker Run and Piney River	John Marshall SWCD	§319(h): 2015-2021
Upper Clinch River	Upper TN River Roundtable, Inc,	§319(h): 2016-2019
Upper Goose Creek	John Marshal SWCD	$319(h): 2018-2021 (Agriculture only)
Upper Hazel River, Hughes River, Rush River and Thornton River	Culpeper SWCD	§319(h):2009-2021, VNRCF: 2011-2015, WQIF RFP: 2007-2009, 2016-2019
Upper Rapidan River	Culpeper SWCD	§319(h): 2016-2021
Upper Roanoke River Part 1 IP: Glade and Tinker Creeks	Mountain Castles SWCD	$319(h): 2018-2021 (Residential Only)
Upper Roanoke River Part 1 IP: Mudlick and Glade Creeks	Western Virginia Water Authority	$319(h): 2018-2021 (Residential Only)
Upper York River (Orange County)	Culpeper SWCD	§319(h): 2012-2021,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.

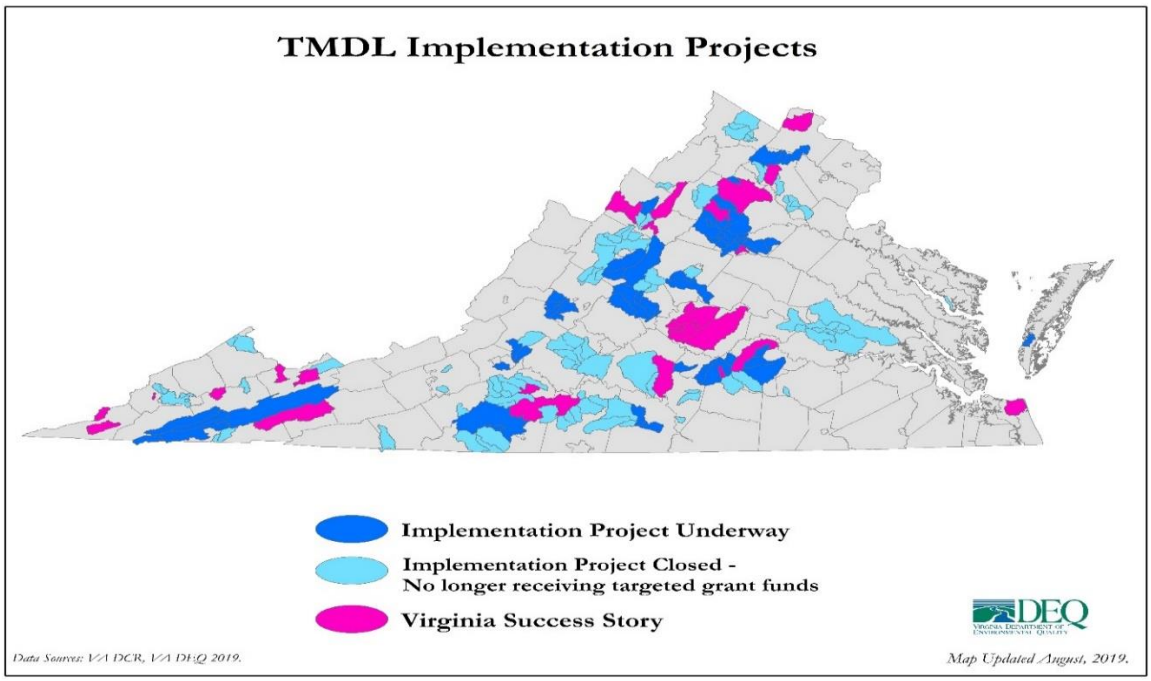

Figure 10: Status of NPS TMDL Implementation Projects by Watersheds in Virginia (2001 – August 2019)

The map below identifies the specific watersheds where there were 319(h) funded active NPS implementation projects in Virginia in FY 2019 (Figure 11).

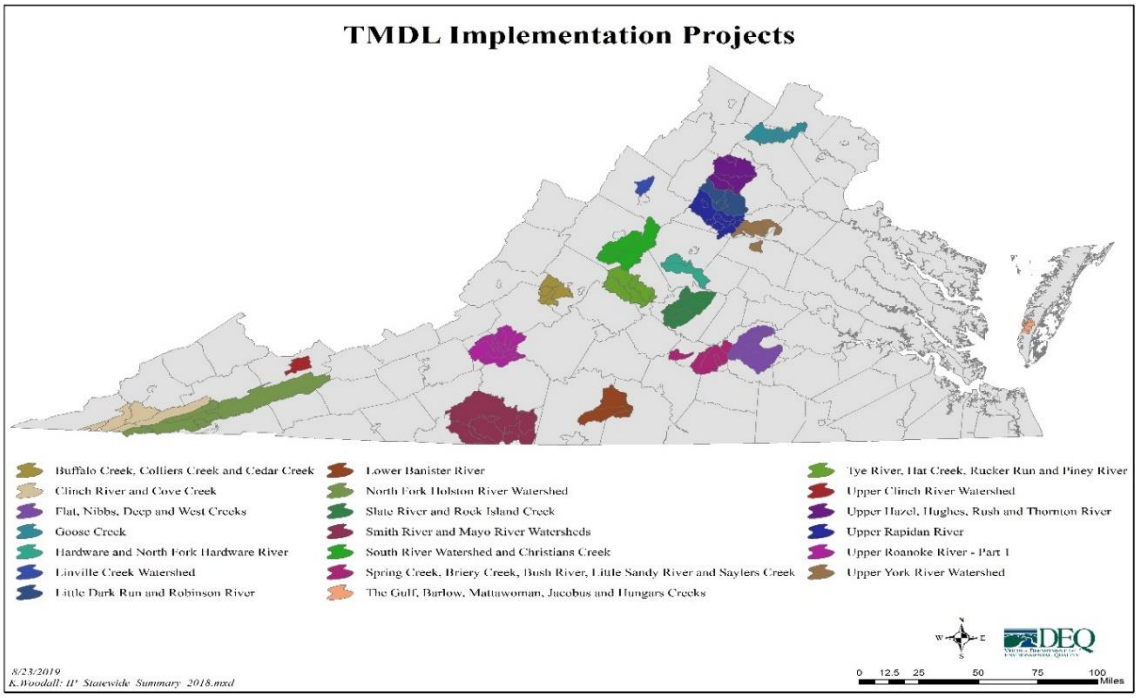

Figure 11: 319(h) funded NPS TMDL Implementation Projects in Virginia as of June 30, 2019

Past TMDL Implementation Projects with Continued Implementation Activity during FY 2020

Funding of Implementation

As the lead agency in TMDL implementation, DEQ utilizes both federal § 319(h) and Chesapeake Bay Implementation Grant 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 2019 a total of 2,517 agricultural and residential septic BMPs were installed within 76 Implementation Plan areas encompassing 196 implementation watersheds, utilizing $15,190,532 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 wasn't coordinated by DEQ (Table 7).

Table 7: Summary of BMP Installation by Project Coordinated by DEQ (7/1/2018 – 6/30/2019)

Coordination of Work	# of IP Reports	# of IP Watersheds	# of BMPs	Total BMP Cost	% of BMP	% of Funding	% # of IP Watersheds
Coordinated by DEQ	20	82	954	$7,068,667	38%	47%	41%
Not Coordinated by DEQ	57	120	1,563	$8,121,865	62%	53%	59%
Total	76[6]	196	2,517	$15,190,532			

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 2-5 below summarizes the BMP installation in implementation plan areas within the Chesapeake Bay drainage basin and activity outside of the Chesapeake Bay (Table 8).

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

Table 8: Summary of BMP Installation by Water Basin (7/1/2018 – 6/30/2019)

Watershed Drainage Basin	# of IP Reports	# of IP Watersheds	# of BMPs	Total BMP Cost	% of BMP	% of Funding	% # of IP Watersheds
Chesapeake Bay	41	109	1,327	$7,796,186	53%	51%	54%
Outside Chesapeake Bay	35	91	1,190	$7,394,346	47%	49%	46%
Total	76	196	2,517	$15,190,532	N/A	N/A	N/A

In FY 2019, a total of 2,517 BMPs were installed at a total cost of $10,192,536 in federal, state, and other funds and $4,997,996 of landowner contributions for an overall total of $15,190,532 spent on BMPs in watersheds with TMDL implementation plans. A total of 486 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).

Table 9: Summary of BMP Installation by Funding Source within IP Watersheds (7/1/2018 - 6/30/2019)

Funding Source	# of BMPs	$ of Cost-share Paid	$ Landowner or Other Contribution	Total BMP Cost
Federal-319H	479	$952,441	$402,608	$1,355,049
Federal – 319H & State Funding	7	$163,368	$104,725	$268,093
Federal – NRCS_RCPP	2	$16,200	$50,377	$66,577
Local Funding	304	$20,804	$1,313,038	$1,333,842
Local Settlement	5	$176,858	$2,927	$179,785
State-CREP	53	$168,149	$481,827	$649,977
State-VACS	1,591	$8, 548,799	$2,556,316	$11,105,114
Remediation Funds	2	$66,715	$0	$66,715
State-WQIF	74	$79,203	$86,177	$165,380
Grand Total	**2, 5172**	**$10,192,536**	**$4,997,996**	**$15,190,532**

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 (7/1/2018 - 6/30/2019)

TMDL Implementation Plan & TMDL Implementation Watershed	# BMPs	Cost-Share Paid	Landowner Contribution	Total Cost
Back Bay Watershed	11	$26,298	$0	$26,298
Back Creek	1	$2,260	$447	$2,706
Banister River, Winn Creek, and Terrible Creek	3	$15,456	$4,911	$20,367
Beaver Creek and Little Creek	11	$5,789	$225	$6,014
Big Otter River Watershed	11	$419,130	$57,585	$476,715
Blackwater River (Upper, Middle, North Fork and South Fork)	7	$87,407	$40,236	$127,644
Buffalo Creek, Colliers Creek and Cedar Creek	10	$103,016	$40,391	$143,407
Carter, Great, Deep and Thumb Runs	6	$50,417	$13,633	$64,050
Catoctin Creek	8	$38,448	$5,039	$43,487
Cedar Creek, Hall Creek, Byers Creek and Hutton Creek	29	$30,153	$21,500	$51,652
Chestnut Creek Watershed	18	$9,876	$1,864	$11,740
Chickahominy River and Tributaries	33	$82,864	$0	$82,864
Chowan River Watershed	211	$250,485	$58,692	$309,177
Chuckatuck and Brewers Creek	26	$38,711	$0	$38,711
Clinch River and Cove Creek	20	$432,518	$134,354	$566,872
Cooks Creek and Blacks Run	20	$98,892	$27,517	$126,409
Craig, Browns and Marsh Runs	7	$30,154	$10,342	$40,496
Cripple Creek and Elk Creek	25	$138,802	$192,375	$331,177
Crooked, Stephens and West Runs and Willow Brook	2	$63,453	$36,028	$99,481
Cub Creek, Turnip Creek, Buffalo Creek and UT to Buffalo Creek	8	$371,293	$10,903	$382,196
Cunningham Creek Watershed Plan	1	$5,200	$3,972	$9,172
Dan River and Birch Creek	21	$75,298	$42,727	$118,024
Dodd Creek	1	$30,662	$7,665	$38,327
Fairview Beach	1	$708	$0	$708
Falling River	1	$0	$21,196	$21,196
Flat, Nibbs, Deep and West Creeks	58	$202,526	$260,606	$463,132
Greenvale, Paynes and Beach Creeks	9	$11,661	$0	$11,661
Guest River	2	$27,342	$9,114	$36,456
Hardware and North Fork Hardware River	30	$125,239	$148,416	$273,654
Hawksbill Creek and Mill Creek	10	$17,983	$66,167	$84,150
Hays, Moffatts, Walker and Otts Creeks	12	$82,217	$102,160	$184,378
Holmans Creek	5	$588	$1,638	$2,225
James River - Lynchburg	58	$128,886	$837	$129,723
James River and Tributaries - City of Richmond	2	$1,742	$0	$1,742
Kings Creek	1	$1,584	$0	$1,584
Linville Creek Watershed	50	$64,247	$275,188	$339,434
Little Dark Run and Robinson River	99	$627,980	$183,045	$811,026
Little River Watershed	6	$160,807	$66,827	$227,634
Long Meadow Run and Turley Creek	10	$2,653	$72,277	$74,930
Lower Banister River	9	$38,195	$4,023	$42,217
Lower Blackwater River, Maggodee and Gills Creek	8	$159,285	$43,543	$202,829
Middle Clinch River	10	$174,364	$88,105	$262,469

TMDL Implementation Plan & TMDL Implementation Watershed	# BMPs	Cost-Share Paid	Landowner Contribution	Total Cost
Middle Fork Holston River and Wolf Creek	17	$20,989	$17,452	$38,441
Middle River Watershed	49	$206,111	$45,270	$251,381
Mill Creek, Montgomery County	1	$0	$9,663	$9,663
Mill Creek, Northampton County	3	$4,009	$0	$4,009
Moores Creek	1	$1,600	$874	$2,474
Mossy Creek, Long Glade Run and Naked Creek	24	$119,343	$270,936	$390,279
North Fork Holston River Watershed	149	$793,512	$238,635	$1,032,147
North Landing Watershed (including Milldam, Middle, West Neck and Nanney Creeks)	21	$43,975	$0	$43,975
North River	60	$41,397	$191,520	$232,917
Occohannock Creek	20	$27,275	$0	$27,275
Opequon Creek Watershed	3	$26,533	$31,630	$58,164
Piankatank River, Gwynns Island, Milford Haven	38	$36,423	$0	$36,423
Pigg River and Old Womans Creek Watersheds	10	$331,134	$79,092	$410,227
Powell River and Tributaries	17	$507,801	$43,424	$551,225
Reed Creek Watershed	28	$439,260	$197,480	$636,740
Rockfish River Watershed	1	$225	$75	$300
Slate River and Rock Island Creek	54	$71,278	$36,422	$107,700
Smith Creek Watershed	39	$56,599	$689,145	$745,744
Smith River and Mayo River Watersheds	36	$362,293	$81,819	$444,111
South River Watershed and Christians Creek	93	$286,381	$83,080	$369,462
Spring, Briery, Saylers Creeks, and Bush and Little Sandy Rivers	34	$75,982	$87,713	$163,695
The Gulf, Barlow, Mattawoman, Jacobus and Hungars Creeks	19	$22,853	$0	$22,853
Three Creek, Mill Swamp, Darden Mill Run	473	$355,866	$158,348	$514,214
Tye River, Hat Creek, Rucker Run and Piney River	37	$250,864	$263,514	$514,379
Upper Banister River and Tributaries	1	$28,346	$59,811	$88,156
Upper Clinch River Watershed	1	$58,747	$10,367	$69,114
Upper Goose Creek, Cromwells Run and Little River	22	$303,995	$36,192	$340,187
Upper Hazel River, Hughes River, Rush River and Thornton River	76	$72,173	$34,672	$106,845
Upper Nansemond River	144	$183,957	$2,383	$186,341
Upper Rapidan River	106	$768,433	$104,965	$873,398
Upper Roanoke River - Part 1	18	$209,212	$36,160	$245,372
Upper Roanoke River - Part 2	1	$43,659	$0	$43,659
Upper York River Watershed	42	$149,717	$55,170	$204,887
Willis River Watershed	8	$58,009	$78,636	$136,645
Grand Total	**2,517**	**$10,192,536**	**$4,997,996**	**$15,190,532**

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, 2,517 BMPs were installed from July 1, 2018 through June 30, 2019. These actions resulted in over 1,122,756 linear feet of stream exclusion (excluding 9,525 animal units from accessing streams), 675 acres of riparian buffer, and the reduction of 310,370 pounds of nitrogen, 33,824 pounds of phosphorous, 18,297 tons of sediment, and 3.70E+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 533 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 - 6/30/2019)

Data	Total
Number of BMPs Installed	2,517
Number of Implementation Plan Reports	78
Number of Implementation Plan Watersheds	196
Acres of Buffer Created/Installed	675
Linear Feet of Streambank excluded from livestock	1,122,756
Number of Homes for which Septic Systems were addressed	533
Number of Animal Units excluded from Stream Access	9,525
Total Pounds of Nitrogen Reduced	310,370
Total Pounds of Phosphorus Reduced	33,824
Total Tons of Sediment Reduced	18,297
Total Bacteria Reduced (CFU)	3.70E+16

Table 12: Types of BMPs Installed through TMDL Implementation (7/1/2018 – 6/30/2019)

Practice	Practice Description	# of BMPs	Extent of BMP Installed	Units	Acres Riparian Buffer	Linear Ft. Streambank protected	Animal Units Excluded
CCI-FRB-1	Forested Riparian Buffer - Maintenance Practice	3	19	Acres	N/A	N/A	N/A
CCI-SE-1	Stream Exclusion - Maintenance Practice	67	445,786	Lin. Feet	N/A	445,786	N/A
CRFR-3	CREP Woodland Buffer Filter Area	25	77	Acres	N/A	N/A	N/A
CRSL-6	CREP Stream Exclusion with Grazing Land Management	26	49,234	Lin. Feet	42	49,234	753
CRWP-2	CREP Stream Protection	1	890	Lin. Feet	2	890	N/A
CRWQ-1	CREP Herbaceous Riparian Buffers	1	0	Acres	1	N/A	N/A
FR-1	Afforestation of Crop, Hay and Pasture Land	10	112	Acres	N/A	N/A	N/A
FR-3	Woodland buffer filter area	7	27	Acres	N/A	N/A	N/A
LE-1T	Livestock Exclusion with Riparian Buffers for TMDL Imp.	21	73,114	Lin. Feet	65	73,114	913
LE-2	Livestock Exclusion with Reduced Setback	7	20,379	Lin. Feet	N/A	20,379	222
LE-2T	Livestock Exclusion with Reduced Setback for TMDL Imp.	2	5,300	Lin. Feet	N/A	5,300	22
RB-1	Septic Tank Pumpout	422	422	Count	N/A	N/A	N/A
RB-2	Connection to Public Sewer	1	1	Count	N/A	N/A	N/A
RB-3	Septic Tank System Repair	28	28	Count	N/A	N/A	N/A
RB-3R	Conventional Onsite Sewage Systems Full Inspection and Non-permitted Repair	26	26	Count	N/A	N/A	N/A
RB-4	Septic Tank System Replacement	32	32	Count	N/A	N/A	N/A
RB-4P	Septic Tank System Installation/Replacement with Pump	14	14	Count	N/A	N/A	N/A
RB-5	Installation of Alternative Waste Treatment System	10	10	Count	N/A	N/A	N/A
SL-1	Long Term Vegetative Cover on Cropland	35	1,137	Acres	N/A	N/A	N/A
SL-10T	Pasture Management	1	166	Acres	N/A	N/A	N/A
SL-11	Permanent vegetative cover on critical areas	6	8	Acres	N/A	N/A	N/A
SL-15A	Continuous High Residue Minimal Soil Disturbance Tillage System	5	252	Acres	N/A	N/A	N/A
SL-6	Stream Exclusion With Grazing Land Management	150	500,943	Lin. Feet	541	500,943	7,222
SL-6T	Stream Exclusion with Grazing Land	2	10,850	Lin. Feet	12	10,850	240

Practice	Practice Description	# of BMPs	Extent of BMP Installed	Units	Acres Riparian Buffer	Linear Ft. Streambank protected	Animal Units Excluded
	Management for TMDL Imp.						
SL-7	Extension of CREP Watering Systems	8	621	Acres	N/A	N/A	N/A
SL-8	Protective cover for specialty crops	21	1,137	Acres	N/A	N/A	N/A
SL-8B	Small Grain and Mixed Cover Crop for Nutrient Management and Residue Management	1,192	42,339	Acres	N/A	N/A	N/A
SL-8H	Harvestable Cover Crop	331	15,456	Acres	N/A	N/A	N/A
SL-9	Grazing Land Management	11	541	Acres	N/A	N/A	N/A
VSE-5	Voluntary Stream Exclusion	1	10,000	Lin. Feet	8	10,000	50
VSL-6	Voluntary Stream Exclusion with Grazing Land Management	1	4,930	Lin. Feet	4	4,930	50
VSL-8	Voluntary Protective cover for specialty crops	2	25	Acres	N/A	N/A	N/A
VSL-8H	Voluntary Harvestable Cover Crop	4	194	Acres	N/A	N/A	N/A
WP-2	Streambank protection (fencing)	2	1,330	Lin. Feet	1	1,330	54
WP-4	Animal waste control facilities	24	24	Count	N/A	N/A	N/A
WP-4B	Loafing lot management system	2	2	Count	N/A	N/A	N/A
WP-4C	Composter Facilities	7	7	Count	N/A	N/A	N/A
WQ-4	Legume-Based Cover Crops	9	917	Acres	N/A	N/A	N/A
	Grand Total	**2,517**	**N/A**	**N/A**	**675**	**1,122,756**	**9,525**

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 29 success stories that address delisting and/or water quality improvement of 42 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[1]	TMDL Implementation
1	1	Stone Creek	2018[1]	Mining
1	2	Willis River	2018[1]	TMDL Implementation
1	1	Slate River-Rock Island Creek	2019[2]	TMDL Implementation
1	1	Dumps Creek	2019[2]	TMDL Implementation
1	1	Deep Creek	2019[3]	TMDL Implementation
1	1	Middle River	2019[3]	TMDL Implementation
1	1	Little Cub Creek	2019[3]	TMDL Implementation
1	2	South Fork Back Creek	2020[4]	TMDL Implementation
Total	**42**			

1= Submitted to EPA in 2017 and approved and published by EPA in 2018

2= Submitted to EPA in 2018 and approved and published by EPA in 2019

3= Submitted to EPA in 2019, and approved and published by EPA in 2020

4= Submitted to EPA in 2020 and currently under review by EPA

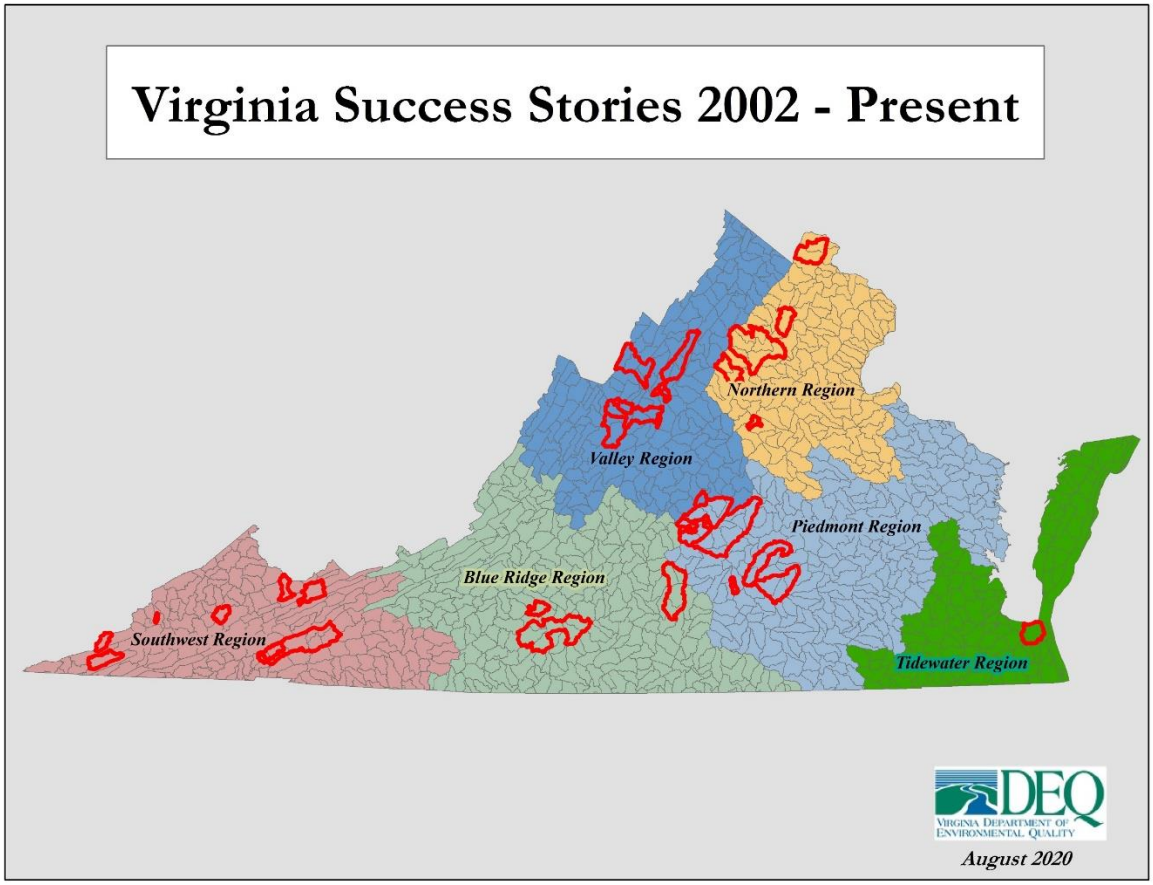

Figure 12: Virginia Success Stories (2002 – Present)

Healthy Waters

2020 Progress Report

The Commonwealth of Virginia defines ecologically healthy 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 role of Virginia's Department of Conservation and Recreation, Natural Heritage Program (NHP) is 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 VA DCR Healthy Waters Program (HWP) at NHP, operated in close collaboration and coordination with Virginia Commonwealth University (VCU) and DEQ, provides 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.

Defining 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.

Despite the challenges posed by the COVID-19 Pandemic, the HWP and partners have continued to make significant progress on improving the utility of the program and forging stronger partnerships, including working toward the development of a watershed-based conservation planning model to guide the protection of aquatic integrity; the designation and mapping of stream catchments to replace a 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 best management practices 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 Healthy Waters Program uses high-quality archival data, combined with extensive, new data collected by the VCU stream assessment team 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.

The Healthy Waters Program has included a multiagency partnership from its inception. NHP manages the Healthy Waters Program and provides program administration, data management, field data collection, oversight, and coordination with land trusts, local governments and others toward conservation of identified Healthy Waters. DEQ has provided significant data and funding from USEPA 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.

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 Ralph Northam officially launched *ConserveVirginia*, Virginia's first in the nation, data-driven, state-wide, land conservation strategy that identifies high value lands, waters, and conservation sites across the Commonwealth of Virginia. The categories are: Agriculture & Forestry; Natural Habitat & Ecosystem Diversity; Floodplains & Flooding Resilience; Cultural & Historic Preservation; Scenic Preservation; and Protected Landscapes Resilience identifying 6.3 million acres of high priority conservation areas representing the best of each category. These mapped acres 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. 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.

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 FY20-23 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.

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*.

ConserveVirginia, as a data-driven, state-wide, land conservation strategy that identifies high value lands, waters, and conservation sites across the Commonwealth of Virginia. As the HWP is tasked with identifying, protecting and maintaining the ecological integrity of ecologically healthy waters in Virginia, the expansion and identification of new Healthy Waters data is critical to the success of the Healthy Waters Program. The VCU and NHP are working to integrate the HWP and INSTAR data to enhance the *ConserveVirginia* tool by developing two new inputs and to provide guidance on the implementation of conservation actions and agricultural BMPs as informed by these data. For the HW portion, NHP is working to develop the second input to the Water Quality Improvement Category of the tool, the *Healthy Waters Conservation Opportunity Areas*. This would assist in identifying those highest priority lands for conservation in the interest of improving water quality to maintain confirmed healthy waters data. The second input identifies 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. DCR and DEQ have met over the period to discuss the inclusion of additional water quality data collected by DEQ to create an additional input based on a broader suite of parameters. Due to budgetary constraints and limited capacity, the conclusion was to delay the development of that additional input and evaluate the process once the two new inputs were integrated.

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 the VDHR), 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.

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 Virginia HWP has continued to represent the Commonwealth in the Chesapeake Bay Program Goal Implementation Team Four (GIT4; Healthy Watersheds). This working group 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 Watershed 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 is based on INSTAR data, identified Healthy Watersheds in the Chesapeake Bay watershed. However, the scale of those identified watersheds varies based on watershed position and may range from headwater catchments to third order watersheds. To achieve that goal and refine a practical area for on-the-ground conservation, NHP is in the process of developing a watershed-based conservation model to protect aquatic integrity. The model is evaluating different scales of contributing drainage areas based on NHDPlus-HR catchments and a suite of land use and water quality metrics to predict stream health as confirmed by the assessed INSTAR data. The final evaluation will refine those areas to conserve, by further validating with additional INSTAR sampling. 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.

As stated earlier, 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. The NHP is evaluating the change to an NHDPlus-HD catchment area 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.

For the long-term and to meet objectives under the Bay Agreement, NHP is continuing to conduct a prioritization of those SCUs using their aquatic community biodiversity ranks, in addition to the amount of core forest, agriculture, developed land cover types, etc., in each watershed in order to identify those aquatic resources most need of conservation. This will further inform conservation and protection actions in Virginia by NHP staff, DEQ, Conservation Districts, land trusts and nongovernmental organizations such as the Virginia Chapter of the Nature Conservancy. The ecologically healthy watershed-based conservation model, the SCS identification and *ConserveVirginia* tools will be matched with the HWP *Criteria for Ecologically Healthy Watershed Conservation* to advance the protection of those ecologically healthy streams.

As previously stated, the *Criteria* 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 Virginia Secretary of Natural Resources' Office to facilitate the development and implementation of a Memorandum of Understanding 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 Resources and the Secretary of Agriculture and Forestry of the Commonwealth of Virginia 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 MOU, effective August 31, 2020, is intended 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.

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.

Chapter 6 - 2014 Chesapeake Bay Watershed Agreement Progress Report

State of the Chesapeake Bay Program Report to the Chesapeake Bay Executive Council, August 2020

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. Our 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 our 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 our 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 our management actions and our progress toward meeting health and restoration goals. The data in this report reflect just some of the conditions we monitor to better understand the Bay and how we might 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: The abundance of female blue crabs throughout the Chesapeake Bay decreased 26% from 191 million to 141 million between 2019 and 2020. Despite this decrease, the population remains above the 70 million threshold which is considered to be the minimum sustainable level for female blue crabs in the Bay, but lower than the target of 215 million. Blue crabs have natural variability and the abundance is expected to fluctuate from year-to-year.

Blue Crab Management

- Outcome: Manage for a stable and productive blue crab fishery.
- Progress Statement: An estimated 17% of the female blue crab population was harvested in 2019. For the twelfth consecutive year, this number is below the 25.5% target and the 34% overfishing threshold. The Chesapeake Bay blue crab stock is not depleted or 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 the habitats that fish and shellfish use at critical life stages. Due to the range of habitat types throughout the watershed and the gap in our understanding of the quality of habitat needed for fish reproduction, feeding, growth or refuge, there is currently no established baseline for this outcome.
- 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: Three studies relevant to researching forage species in the Chesapeake Bay were funded, and a citizen science project that examines how forage fish use certain habitats continues.

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 River, 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 2019 Maryland Oyster Restoration Update indicates that 788 acres of oyster reefs have been restored throughout the five tributaries in Maryland. Harris Creek was the first large-scale oyster restoration site to be completed, and monitoring and evaluation show that 98% of the reefs constructed between 2012 and 2014 meet the minimum threshold for both oyster density and biomass. The 2019 Virginia Oyster Restoration Update indicates that 539 acres of oyster reefs have been restored, with reef construction and seeding to the Lafayette River now complete.

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: 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 analysis by the Eastern Brook Trout Joint Venture, wild brook trout occupy 33,200 square kilometers of habitat (including streams shared with brown and/or rainbow trout) in the Chesapeake Bay watershed. Of that habitat, 13,500 square kilometers of the watershed is 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: Over 100 percent of outcome achieved.
- Progress toward this outcome is measured against a 2011 baseline of 2,510 stream miles open to the migration of fish. Between 2012 and 2017, 1,236 additional miles were opened to fish passage, surpassing the 1,000-mile goal.

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: Six percent of annual target achieved.
- According to jurisdiction-reported data, about 56 miles of forest buffers were planted along the Chesapeake Bay watershed's rivers and streams in 2017. While this marks some progress toward the outcome, it is 844 miles below the 900-mile-per-year target and the lowest restoration total of the last 22 years. High-resolution land cover data indicate that approximately 70 percent of the watershed's 288,000 miles of stream banks and shorelines currently have forest buffers in place. An aerial assessment of riparian land across the watershed revealed 1.4 million acres that could be converted from crops, pasture or turf to streamside trees and shrubs. Forest buffers are important in both agricultural and urban areas to slow the flow of runoff, absorb nutrients and prevent pollution from entering rivers and streams.

Stream Health

- Outcome: Improve the health and function of 10 percent of stream miles above the 2008 baseline.
- Progress Statement: Twenty-five percent of streams in fair, good, or excellent condition.
- Over the last decade, thousands of stream samples have been collected to help us determine the physical, chemical and biological health of our waterways. In 2018, this information was used to establish the baseline for an indicator of stream health. This indicator—known as the Chesapeake Basin-wide Index of Biotic Integrity, or Chessie BIBI—ranked 25 percent of streams in fair, good or excellent condition and 21 percent in poor or very poor condition. Fifty-four percent of streams in the watershed were not included in this assessment, due to insufficient or absent data. Experts are working to fill this data gap with a model that will use landscape variables to predict Chessie BIBI ratings in areas with few or no sampling sites.

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, 66,387 acres of underwater grasses were mapped in the Chesapeake Bay in 2019. This is 36% of the partnership's 185,000 goal.

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: 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.

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: Eleven percent of outcome achieved.
- 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: Practices are in place to achieve 40 percent of the nitrogen, 87 percent of the phosphorus and 67 percent of the sediment reductions necessary to attain applicable water quality standards by 2025.
- In December 2019, EPA released its evaluations of the final Phase III WIPs from each watershed jurisdiction. This third and final phase provides information on actions each jurisdiction intends to take between 2019 and 2025 to meet the goals of the Bay TMDL. To measure the progress each jurisdiction is making toward meeting their Bay TMDL goals, EPA evaluates milestones on a two-year basis. The evaluations of the most recent, the 2020-21 milestones, were released in late July 2020.

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. While lower than the previous year, it is still the fifth highest estimate of water quality standards attainment since 1985.
- The U.S. Geological Survey reports that from October 2017—September 2018, approximately 423 million pounds of nitrogen, 42.1 million pounds of phosphorus and 15,689 million pounds of sediment reached the Bay; a 66%, 181% and 262% increase from the previous year, respectively. An influx of rain in 2018 brought the highest flows of fresh water into the Chesapeake Bay since data was first collected in 1937.

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: Eighty-three percent of the Chesapeake Bay and its tidal tributaries were partially or fully impaired by toxic contaminants in 2016.
- According to data submitted by jurisdictions in 2016, 83 percent of the Chesapeake Bay's tidal segments are partially or fully impaired by toxic contaminants. This marks a continued increase in the observation of toxic contaminant impairments since 2010. 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: The research agenda of the Toxic Contaminants Workgroup has improved our understanding of several issues related to toxic contaminants. Studies in the Susquehanna River basin have identified disease as an important factor leading to fish health problems and mortality. Studies by the U.S. Geological Survey suggest that toxic contaminants are compromising the immune systems of fish, making them more susceptible to disease and other factors degrading their health.
- Because PCBs and mercury are widespread in extent and severity and cause fish consumption advisories, options to mitigate these contaminants are being addressed first.
- Issues of concern include the effects of microplastics; harmful algal blooms and their associated toxins; the potential effects of poly- and perflouroalkyls (PFASs); coal ash reuse, and the effects of road salt.

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 preferences, the Chesapeake Bay Program 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. The Chesapeake Bay Program is working to determine the feasibility of using a framework like the Environmental Protection Agency's Preliminary Healthy Watersheds Assessments to track change from this baseline.

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.

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: Considered Phase I and Phase II of a three-phase task, the Healthy Watersheds Forest Retention Project explains how local governments can save resources by using forest conservation as a method of managing stormwater and includes "toolkits" of policies and practices that can support forest conservation in Pennsylvania and Virginia.
- Phase III of the Healthy Watersheds Forest Retention Project will be completed in 2019 and will train local leaders in the implementation of the policies and practices described in Phase II. The project leads will work with a pilot locality in Virginia to quantify the impacts of land conversion, evaluate the policies and incentives that support conservation, and create a "How To" guide to help local governments across the region prioritize land protection.

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: Sixty-eight percent of outcome achieved.
- 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: Between 2010 and 2019, 194 boat ramps, fishing piers and other public access sites were opened on and around the Chesapeake Bay watershed (including 18 in 2019). This marks a 65% achievement of the goal to add 300 new access sites to the watershed by 2025 and brings the total number of access sites in the region to 1,333.

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: Data from the Environmental Literacy Indicator Tool (ELIT) Survey allowed the Workgroup to identify gaps, determine the needs of individual school districts and celebrate successful efforts. State working groups champion environmental literacy planning in their respective jurisdictions. The most recent biennial Chesapeake Bay Environmental Literacy Leadership Summit focused on the theme of ensuring equity in environmental education.

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: Increased professional development and the offering of continuing education credits has furthered the penetration and implementation of MWEEs. 'The Educator's Guide to a MWEE' and the MWEE 101 course available through NOAA helped expand systemic initiatives. The Outdoor Learning Network was launched in September 2019 to build the capacity of school districts and nonprofit partners to advance environmental education by establishing a network of local school districts and their partners to share information, coordinate efforts and connect with regional and state networks.

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: Funding was secured in 2018 to install best management practices (BMPs) at schools that contributed directly to Bay restoration goals. As part of that funding, an online ArcGIS tool was developed that displays school, demographic, environmental and land use data that can be used to analyze and make recommendations for the types of BMPs that should be installed on school grounds that will yield the greatest benefit to the Chesapeake Bay Program. The tool is accompanied by guidelines for how state and local planners can use these BMPs for Bay TMDL credit, as well as for how school district personnel can include BMPs in their school district sustainability plans.

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: The Workgroup has strategically focused on building stewardship through behavior change practices. The Workgroup is currently working with the Chesapeake Bay

Program Web Team to build a tool that will allow practitioners to access data from the Stewardship Index.

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 conducted its second survey to measure the engagement of diverse and underrepresented voices within the partnership. In the past three years, the percentage of respondents who self-identified as people of color rose from 13.7% in 2016 to 14.6% in 2019. Additionally, the percentage of people of color in leadership positions rose from 9.1% to 10.3%. The Chesapeake Bay Program has a goal to reach 25% diversity in the partnership, including 15% in leadership positions, by 2025.

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 local elected officials will be administered in 2019.

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.
- Climate divisions are used by the National Oceanic and Atmospheric Administration to understand regional trends, changes and anomalies in temperature, precipitation, and other climate and weather conditions around the country. Between 1901-2017, of the 33 climate divisions in the Chesapeake Bay watershed, 32 have experienced statistically significant long-

term increases in air temperature. Average increases in air temperature have ranged from 0.4 degrees Fahrenheit in southern West Virginia to more than 2.5 degrees Fahrenheit in Delaware. Regions closer to the mainstem of the Bay have warmed more than regions farther upstream. As average air temperatures continue to rise, rivers and streams will absorb more heat. Between 1960 and 2014, 31 of the 72 stream sites across the Chesapeake Bay watershed experienced a statistically significant increase in water temperature. At these sites, temperatures increased by an average of 2.1 degrees Fahrenheit. Increasing stream temperature can impact the habitat available to brook trout. As the temperature of the region's streams has increased, scientists have documented the disappearance of the only native trout in our watershed, which need cold, clean water to survive. In fact, high water temperature has been named the greatest disturbance to brook trout populations in Maryland and Virginia. In general, the largest increases in stream temperature have occurred in the southern part of the watershed. Relative sea level has increased at each of the Chesapeake Bay's long-term tide gauge stations. Between 1960 and 2017, sea level increased between one-eighth of an inch and approximately one-sixth of an inch each year. Total increases in sea level range from seven inches in Baltimore to more than 10 inches in Norfolk, Virginia. Regionally, relative sea level rise is compounded by the natural sinking of the land's surface. Locally, it can be exacerbated by the human extraction of groundwater.

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: The Chesapeake Bay Program is exploring the adoption of up to nine indicators that will track our progress toward climate resiliency. These indicators include hardened shorelines, restored habitat, protected lands, urban tree canopy, land use and land cover, the availability of wetland migration corridors, the spatial distribution of climate-sensitive fish species, the community composition of underwater grasses, and the extent of local policies that support climate resiliency and local practices designed to manage stormwater. The development of these indicators will depend on the quality of supporting data, the added value of the indicators for helping to understand and explain management successes, and the priorities and resources of the Climate Resiliency Workgroup.

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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