Report on the Implementation of the 2014 Chesapeake Bay Watershed Agreement to the Governor and the General Assembly

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Prepared pursuant to § 2.2-220.1 of the Code of Virginia by the Secretary of Natural Resources

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I.   Introduction:

Originally created by the *Chesapeake Bay Agreement of 1983*, the Chesapeake Program now includes all seven bay jurisdictions (Virginia, West Virginia, Maryland, Pennsylvania, Delaware, New York, and the District of Columbia), the Chesapeake Bay Commission, and the United States Environmental Protection Agency as well academic, federal, and nonprofit partners. The *Chesapeake Bay Watershed Agreement*[1], signed in 2014 by Governor McAuliffe and his counterparts on the Chesapeake Executive Council[2], expressed a renewed commitment to bay restoration, enumerated specific goals, and laid out concrete benchmarks for evaluating progress. Actionable management strategies were subsequently developed for each area and are in the process of being implemented through workplans developed by expert staff and approved through the partnership's Management Board.

Taken on the whole, evidence indicates an upward trajectory in the overall health of the Chesapeake Bay ecosystem. Unless otherwise noted, the information contained in this report were drawn from ChesapeakeProgress[3] and the annual "Bay Barometer"[4], both designed and maintained by Chesapeake Bay Program to facilitate oversight, management and public engagement towards meeting the goals and outcomes contained in the 2014 Chesapeake Bay Watershed Agreement.

Virginia agencies, led by the Secretary of Natural Resources, are full participants in the various committees, workgroups and other entities charged with the development and implementation of the goals and outcomes of the agreement.

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[1] http://www.chesapeakebay.net/documents/ChesapeakeBayWatershedAgreemenetFINAL.pdf
[2] https://www.chesapeakebay.net/who/group/chesapeake_executive_council
[3] http://www.chesapeakeprogress.com/about
[4] https://www.chesapeakebay.net/what/publications/bay_barometer_health_and_restoration_in_the_chesapeake_bay_watershed_2015_2

II. Goals & Outcomes Contained in the Chesapeake Bay Watershed Agreement:

- **Sustainable Fisheries 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:** The 2017 Chesapeake Bay Blue Crab Advisory Report, published on June 26, 2017 estimated 254 million female crabs live in Chesapeake Bay. This is above the abundance target on 215 million.[5]

  - **Blue Crab Management:** The Chesapeake Bay's blue crab stock is not overfished and overfishing is not occurring. According to the Chesapeake Bay Stock Assessment Committee (CBSAC), an estimated 15 percent of the female blue crab population was harvested in 2015. This is below the 34 percent overfishing threshold. In its 2016 Chesapeake Bay Blue Crab Advisory Report[6], CBSAC—which includes scientists and representatives from state agencies and academic institutions, as well as federal fisheries experts—recommends maintaining a risk-averse approach to blue crab management. Pursuant to the Chesapeake Bay Watershed Agreement, the Blue Crab Abundance and Management Workplan calls for support for the annual winter dredge survey and will adjust management actions based on the 2017 stock assessment.

  - **Forage Fish Management:** In August of 2016, the Mid-Atlantic Fisheries Management Council (Council) voted unanimously to approve a guidance document to facilitate the transition from species specific management to an ecosystem approach towards fisheries management in the Mid-Atlantic region. This change has been under consideration since the 1990s and will enable the Council to incorporate ecosystem considerations into their fishery management plans.

  - **Oyster Restoration:**
    - **Piankatank River:** Partners have set a goal to restore between 500 and 1,000 acres of reefs. An oyster population survey will help determine whether any existing reefs already meet our definition of a restored reef. Twenty-four acres of reefs have been constructed on the river, and an additional 40 acres will be built in 2016 or 2017.
    - **Lafayette River:** Partners have set a goal to restore 80 acres of reefs. Of this total, 70 acres already meet our definition of a restored reef, due to past restoration work and a decades-long harvest closure that has allowed some reefs to self-restore. Partners have determined which areas of the river are best suited for the 10 acres of restoration work that remains and have worked with the Virginia Marine Resources Commission to ensure past projects and self-

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[5] Chesapeake Bay Blue Crab Advisory Committee, June 26, 2017 available at https://www.chesapeakebay.net/who/group/sustainable_fisheries
[6] http://www.chesapeakebay.net/documents/CBSAC_2016_Report_6-30-16_FINAL.pdf

restored reefs will remain protected from leasing. In 2017 a grant from the National Fish and Wildlife Foundation has set the stage for the Lafayette oyster population to be considered "restored" under the management framework established through the 2014 Chesapeake Bay Watershed Agreement.

- o **Lynnhaven River:** Due to past restoration work, 63 acres of reefs already meet the definition of restored, and 2016 surveys indicate these reefs have been self-sustaining since 2008. In 2017, the National Oceanic and Atmospheric Administration will conduct additional surveys in high-priority restoration areas.

- o **Vital Habitats 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.**

- o **Black Duck:** On average, 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. This target is based on a goal set forth in the USFWS North American Waterfowl Management Plan[7], which calls for a continental black duck breeding population of 640,000 birds. Preserving habitat in the Bay watershed is critical to the long-term sustainability of the species. In 2017 the Chesapeake Bay Program lunched a "Black Duck Decision Support tool" that will assist managers in identifying suitable areas for conservation and habitat protections.

- o **Brook Trout:** According to an assessment by the Eastern Brook Trout Joint Venture, wild brook trout occupy 13,495 square kilometers of habitat in the Chesapeake Bay watershed. This area is comprised of 952 separate patches, or groups of contiguous catchments. It is the baseline from which progress will be measured, which means 14,575 square kilometers of total occupied habitat serves as our restoration goal. Challenges remain is managing temperatures in streams that support trout populations. Temperature is a key element in the ability of brook trout to survive.

- o **Fish Passage:** Progress toward this outcome is measured against a 2011 baseline of 2,510 stream miles open to the migration of fish. Between 2012 and 201, 11296 additional miles were opened to fish passage. Over 100 percent of the 1000 additional miles outcome in the Chesapeake Bay Watershed has been achieved.

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[7] http://www.fws.gov/birds/management/bird-management-plans/north-american-waterfowl-management-plan.php

- **Forest Buffers:** Through 2015, only 7 percent of the target goal has been achieved. In 2017, the Chesapeake Riparian Forest Buffer network was launched to attempt to accelerate implementation of this important land use. Significant focus has been placed on this practice by the Chesapeake Bay Program partners as we move forward.
- **Stream Health:** Over the last decade, thousands of stream samples have been collected to help us determine the physical, chemical and biological health of our waterways. This information is also used to generate a Chesapeake Bay-wide indicator of stream health: the Chesapeake Bay-wide Index of Biotic Integrity, or Chessie BIBI. In 2010, the Chessie BIBI ranked 43 percent of streams in fair, good or excellent condition and 57 percent in poor or very poor condition. Experts are continuing to work to refine the Chessie BIBI and update the index with more recent data. Experts are also working to establish a baseline from which to measure progress toward the stream miles portion of this outcome.
- **Submerged Aquatic Vegetation (SAV):** In 2016, the most recent data available, there were an estimated 97,433 acres of underwater grasses in the Chesapeake Bay. This surpasses the Chesapeake Bay Program's 2017 restoration and marks a 53 percent achievement of the partnership's 185,000-acre goal. The 2016 total is the highest amount ever recorded by the Virginia Institute of Marine Science aerial survey. Researchers attribute the rise in underwater grasses to a strong increase in the tidal freshwater and moderately salty regions of the Bay. The iconic grass beds at the mouth of the Susquehanna River, for instance, continued their four-year recovery following damage from Hurricane Irene and Tropical Storm Lee. And at over 10,000 acres, the grasses that stretch from Smith Island to Tangier Island have become the biggest contiguous grass bed in the Bay. Researchers observed a drop in the eelgrass that grows in the very salty waters of the lower Bay, where beds had increased in recent years following losses that occurred during the hot summers of 2005 and 2010.
- **Urban Tree Canopy:** 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**: Between 2010 and 2015, 7,623 acres of wetlands were created 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 2015 mark a nine percent achievement of the 83,000-acre goal.

o   **Water Quality 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.**

Many of the goals laid out in the *Chesapeake Bay Watershed Agreement* rely directly or indirectly on improved water quality. Excluding cases of toxic contamination, water quality can be evaluated by measuring the loadings of three pollutants: nitrogen, phosphorus, and sediment. For the most part, these pollutants find their way to tidal waters from agricultural activities, stormwater runoff, and discharges from industrial and wastewater treatment facilities. To fulfill the goals of the agreement, reductions must be made across the range of sources.

Computer simulations show that pollution controls put in place in the Chesapeake Bay watershed between 2009 and 2015 lowered nitrogen loads eight percent, phosphorus loads 20 percent and sediment loads seven percent. Between 2014 and 2015, these controls lowered nitrogen loads three percent, phosphorus loads three percent and sediment loads four percent. Experts attribute this drop in estimated pollution loads to a number of factors, including the increased implementation of agricultural conservation practices; a drop in the atmospheric deposition of nitrogen; and significant reductions of nitrogen and phosphorus in the wastewater sector. Indeed, for the first time—and ten years ahead of schedule—the Chesapeake Bay Program partnership as a whole has met its 2025 pollution reduction targets for the wastewater sector.

Over the long term, trends in both nitrogen and phosphorus loads have improved at three monitoring sites (including the James, Patuxent and Potomac rivers) and degraded at one (the Choptank). Six sites show long-term improvements in nitrogen loads, while three show long-term improvements in phosphorus loads. Three sites (including the Choptank, Patuxent and Potomac rivers) show long-term improvements in sediment loads. The charts below show the 2009 loads (used as the starting point for the Chesapeake Bay Total Maximum Daily Load (TMDL), the most recently available progress estimates (calendar year 2016), the 2017 milestone and target levels and the 2025 goals of the TMDL.

Nitrogen Pollution					
Sector	2009 Pollution Loads (Pounds per Year)	2016 Pollution Loads (Pounds per Year)	2017 Pollution Milestones (Pounds per Year)	2017 Pollution Targets (Pounds per Year)	2025 Pollution Targets (Pounds per Year)

Agriculture	20,731,000	17,018,897	15,840,000	16,363,000	13,450,000
Urban Runoff	10,119,000	11,344,100	11,200,000	9,323,000	8,792,000
Wastewater + Combined Sewer Overflow	21,730,000	13,384,564	14,592,000	17,438,000	14,577,000
Septic	2,468,000	2,612,932	2,619,000	2,242,000	2,091,000
Forest	12,501,000	12,103,230	12,503,000	12,661,000	12,768,000
Non-Tidal Water Deposition	578,000	578,000	578,000	578,000	578,000
Reserve	0	0	0	200,000	333,000
Total	68,127,000	57,574,798	57,332,000	58,805,000	52,589,000

Phosphorus Pollution Loads					
Sector	2009 Pollution Loads (Pounds per Year)	2016 Pollution Loads (Pounds per Year)	2017 Pollution Milestones (Pounds per Year)	2017 Pollution Targets (Pounds per Year)	2025 Pollution Targets (Pounds per Year)
Agriculture	4,824,000	3,424,693	3,220,000	3,813,000	3,139,000
Urban Runoff	1,255,000	1,204,290	1,143,000	1,093,000	985,000
Wastewater + Combined Sewer Overflow	1,757,000	1,095,886	1,045,000	1,406,000	1,173,000
Forest	780,000	758,033	779,000	787,000	790,000
Reserve	0	0	0	155,000	257,000

Total	8,672,000	6,571,204	6,243,000	7,310,000	6,400,000

Sediment Pollution Loads					
Sector	**2009 Pollution Loads (Pounds per Year)**	**2016 Pollution Loads (Pounds per Year)**	**2017 Pollution Milestones (Pounds per Year)**	**2017 Pollution Targets (Pounds per Year)**	**2025 Pollution Targets (Pounds per Year)**
Agriculture	2,410,341,000	2,179,626,356	2,002,927,000	1,929,484,000	1,608,912,000
Urban Runoff	698,120,000	762,720,492	687,363,000	573,660,000	490,686,000
Wastewater + Combined Sewer Overflow	47,137,000	22,829,088	29,948,000	106,677,000	146,370,000
Forest	587,324,000	562,021,601	584,456,000	592,024,000	592,024,000
Reserve	0	0	0	246,153,000	410,255,000
Total	**3,742,922,000**	**3,536,610,824**	**3,304,694,000**	**3,447,998,000**	**3,251,381,000**

- o **Toxic Contaminants Goal: Ensure that the Bay and its rivers are free of effects of toxic contaminants on living resources and human health.**

Toxic contamination presents a serious and sustained threat to the long-term health of both people and animals in the Chesapeake Bay watershed. Toxins come in many forms from a variety of sources and can remain active for years or even decades, causing sustained harm throughout an ecosystem. Bioaccumulation can serve to amply these effects in apex predators including Bald Eagles and other birds of prey.

A technical report[8] shows polychlorinated biphenyls (PCBs) and mercury are particularly problematic in the region, and are considered widespread in severity and extent. Polycyclic aromatic hydrocarbons (PAHs) and some herbicides are also considered widespread in extent, while dioxins, petroleum hydrocarbons, some chlorinated insecticides and some metals occur

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[8] http://executiveorder.chesapeakebay.net/ChesBayToxics_finaldraft_11513b.pdf

locally. Information is insufficient to determine the extent of biogenic hormones, household and personal care products, pharmaceuticals or flame retardants.

In 2016, the Chesapeake Stormwater Network completed a study to determine the relative amount of toxic contaminant reduction that might occur across the range of best management practices implemented as part of the nutrient- and sediment-focused Chesapeake Bay Total Maximum Daily Load (Bay TMDL). Part One[9] of the study examines how practices meant to control stormwater can remove urban toxic contaminants from the environment, while Part Two[10] examines how the agricultural and wastewater sectors influence antibiotics, biogenic hormones and pesticides.

In 2016, the Toxic Contaminants Workgroup completed a story map depicting the extent of jurisdiction-listed waters that are impacted by PCBs. Additional maps that depict the need for, development of and presence of active PCB Total Maximum Daily Loads were built to help partners target activities related to PCB reductions.

The U.S. Geological Survey (USGS) continues studies on the sources and effects of endocrine-disrupting compounds, including chemicals of emerging concern, and other stressors on fish, so that partners will have improved information to reduce their effects on fisheries. Their research has found that 85 percent of male smallmouth bass and 27 percent of male largemouth bass caught in waters in or near 19 National Wildlife Refuges in the northeastern United States had intersex conditions (or had eggs that are usually only found in females).

- o **Healthy Watersheds Goal: Sustain state-identified healthy waters and watersheds recognized for their high quality and/or high ecological value.**

In Virginia, those waters and watersheds that are identified as having high aquatic integrity according to the Virginia Department of Conservation and Recreation's Division of Natural Heritage Healthy Waters Program are defined as ecologically healthy waters. DCR-Natural Heritage manages the Healthy Waters Program, in collaboration with Virginia Commonwealth University (VCU) and the Virginia Department of Environmental Quality (VDEQ).

Virginia has more than 300 ecologically healthy streams, creeks and rivers and there are more to be identified. Healthy streams are identified by factors that include: high numbers of native species, a broad diversity of species, few or no non-native species, few 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.

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[9] http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2016/02/Toxics-Report-1.pdf
[10] http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2016/03/Final-Report-on-Ag-and-Wastewater-Toxics.pdf

- o **Stewardship Goal: Increase the number and the diversity of local citizen stewards and local governments that actively support and carry out the conservation and restoration activities that achieve healthy local streams, rivers and a vibrant Chesapeake Bay.**

The long-term success of our restoration work will depend on the support of the people who call this watershed home. As more individuals and organizations direct their time, talents and resources toward reducing pollution, restoring streams and protecting the environment, we will build a larger, broader and more diverse community of citizen stewards to support our conservation goals. When diversity is taken into account in the planning and implementation of conservation and restoration work, this work is more likely to benefit underrepresented and underserved communities.

In 2017, residents of the Chesapeake Bay region scored a 24 out of 100 on the first-ever Citizen Stewardship Index. There are three components to this baseline score. The Personal Action score—which is currently 38—measures the adoption of 19 actions that individuals can take to improve water quality and environmental health. The Volunteering score—which is currently 23—measures the portion of the public participating in community efforts to improve water quality and environmental health. And the Advocating score—which is currently 19—measures the portion of the public engaging in local and regional activities on behalf of water quality and environmental health. To score a 100 on the Citizen Stewardship Index, everyone in the region would need to do everything they could in their daily lives to improve water quality and environmental health

Local officials have diverse experiences, values and agendas, and the communities they serve range in resource capacity. Increasing officials' knowledge about the Chesapeake Bay and drawing clear links between watershed health and local priorities will engage those officials who haven't yet committed to our restoration work. Creating and nurturing a culture of excellence among these officials will showcase their work and provide easy access to models that officials can adapt and replicate in their own communities. A report commissioned by the Chesapeake Bay Program's Local Leadership Workgroup and released in July 2017, provides recommendations for the design of a strategic outreach and education program for elected officials to meet the local leadership outcome in the Chesapeake Bay Watershed Agreement. The report makes recommendations in five key areas: content that needs to be conveyed to local elected officials to increase their knowledge and capacity for water resource protection and restoration; informational programs and delivery mechanisms (what exists and where gaps lie); the best way to coordinate and focus delivery mechanisms to tailor to needs of local elected officials; program cost and recommended funding sources and how to measure progress.

o **Land Conservation 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 Conservation remains a priority for Virginia's environmental community and government. The Virginia Treasures initiative focuses conservation efforts on quality by safeguarding sites and assets of particular significance rather than exclusively maximizing the raw acreage of acquisitions. The idea is to preserve, protect and highlight Virginia's most important ecological, cultural, scenic and recreational assets as well as its special lands.

The conservation of working farms, forests, waterways and open space continues. Most of this effort is being accomplished through conservation easements, which preserve land and improve the health of waterways, including that of the Chesapeake Bay. Particular attention will be paid to land with rare and endangered species and habitat.

Since the beginning of the McAuliffe administration, Virginia has identified and protected over 900 land conservation treasures, many of them within the Chesapeake Bay watershed. A land protection treasure is one permanent, fee-simple conservation or open-space easement, or an amendment of an existing easement that permanently protects significant resources. Significance is measured using 14 criteria including Natural Heritage Conservation Sites, wetlands, forest land with high water quality value, and riparian buffers. Virginia contributes to the overall goal for the Chesapeake Bay Program. Data collected between 2015 and 2016 show that, since 2010, approximately 1,004,500 acres of land in the Chesapeake Bay watershed have been permanently protected from development. This marks an achievement of 50 percent of the goal to protect an additional two million acres, and brings the total amount of protected land in the watershed to 8 million acres. State agencies are the largest entity contributing to land protection: they hold approximately 46 percent of the protected acres in the watershed.

o **Public Access Goal: Expand public access to the Bay and its tributaries through existing and new local, state and federal parks, refuges, reserves, trails and partner sites.**

Between 2010 and 2016, 130 public access sites were opened to the public. This marks a 43 percent achievement of the goal to add 300 new access sites to the watershed, and brings the total number of access sites in the region to 1,247. Virginia, Maryland and Pennsylvania have seen the biggest increases in access sites over the past five years: 90 percent of the access sites opened between 2010 and 2015 are located in these states. This is not surprising, as the bulk of the Chesapeake Bay watershed—as well as existing access sites and opportunities for new access sites—lie within these states. There are currently seven public access sites in Delaware, 23 in the

District of Columbia, 36 in New York, 46 in West Virginia, 205 in Pennsylvania, 354 in Virginia and 598 in Maryland.

- o **Environmental Literacy Goal: Enable very student in the region to graduate with the knowledge and skills to act responsibly to protect and restore their local watershed.**

The first step to solving the problems facing the Chesapeake Bay is understanding them. Access to quality environmental education is critical for cultivating the next generation of stewards and scientists necessary to protect and study the bay ecosystem. In addition, environmental literacy contributes to ecologically sound decision-making at the individual and societal level. Recognizing this, improving environmental literacy is among the central goals listed in the *Chesapeake Bay Watershed Agreement*.

The baseline for this outcome will be established from data gathered during the 2014-2015 school year. This data was collected through a survey instrument that measures local education agency progress.

In the coming decades, the public will be called upon to understand complex environmental issues. Ensuring the public is capable of this task will require a concerted effort toward environmental education. Indeed, students exposed to environmental education score higher on environmental knowledge, sensitivity and behaviors than those who are not. These students will form the core of an informed and environmentally active citizenry.

- o **Climate Resiliency 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 change is a threat of global proportions, and the Chesapeake Bay is among the most vulnerable regions in the nation to its impacts. Warming temperatures, rising seas, flooding coasts, eroding shorelines, extreme weather events and changes in the abundance and migration patterns of wildlife have already been observed in the region. Adjusting our environmental protection and restoration efforts to these changing environmental conditions will ensure our living resources, habitats and communities can recover from and adapt to the impacts of climate change over time.

Climate Monitoring and Assessment:

. The Chesapeake Bay Program's Climate Resiliency Workgroup is developing a suite of climate-related indicators that can be used to track and analyze trends, impacts and progress toward advancing climate resiliency. The suite will include measurements of physical and chemical environmental attributes; measurements of ecological, economic and societal impacts;

and measurements of programmatic progress toward resilience and adaptation over time. The Climate Resiliency Workgroup is currently reviewing and prioritizing proposed indicators and will release an initial subset of indicators along with an implementation plan for the full suite by July 2018.

In Virginia, the Governor signed Executive Order 57 to establish regulations for the reduction of carbon emissions form power generation facilities in Virginia and to determine the feasibility of joining regional markets for the purpose of achieving carbon reductions.

Climate Adaption:

Virginia remains on the cutting edge when it comes to climate adaption. The Hampton Roads region was awarded a $120.5 million dollar grant from the United States Department of Housing and Urban Development's National Resilience Competition[11]. These funds are supporting the development of innovative adaption strategies to protect our economy, communities, and environment.

III.   Conclusion:

Recent observations offer considerable cause for hope and paint a clear picture that the Chesapeake Bay clean-up is making progress. Though the level of success varies between outcomes, the 2014 Chesapeake Bay Watershed Agreement has undoubtedly spurred a renewed commitment from the signatory states and significant efforts are underway to achieve its goals. Additional information on all of the issues contained in this report can be found at www.chesapeakebay.net

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[11] https://governor.virginia.gov/newsroom/newsarticle?articleId=13972