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

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

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Introduction:

Since 1983, the Chesapeake Bay clean-up has been coordinated by the Chesapeake Bay Program, a unique regional partnership administered by the Environmental Protection Agency (EPA). Originally created by the *Chesapeake Bay Agreement of 1983*, the Program 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, 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.

As with any environmental undertaking of this duration and scale, some portions of the Chesapeake Bay restoration have been accomplished more easily than anticipated while others have lagged behind expectations. Many goals are deeply interconnected with their ultimate success reliant on shared habitat or improvements in water quality.

Taken on the whole, evidence indicates an upward trajectory in the overall health of the Chesapeake Bay ecosystem. The partnership's progress towards each goal will be discussed in the following section. Due to limited resources and the abstract nature of some desired outcomes, not all targets can be quantified or tracked on annual basis. Additionally, the bay's ecology is a frequent focus of observation and study by a variety of governmental and non-governmental entities, complicating the aggregation and complete analysis of all available data. Still, every effort has been made to offer as thorough a summation as possible using reputable, scientifically sound sources. Unless otherwise noted, the facts and figures quoted below were drawn from ChesapeakeProgress[2], a tool designed and maintained by Chesapeake Bay Program to facilitate oversight, management and public engagement.

[1] http://www.chesapeakebay.net/documents/ChesapeakeBayWatershedAgreemenetFINAL.pdf
[2] http://www.chesapeakeprogress.com/about

Goals & Outcomes:

1.) **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.

Fisheries management is a rapidly developing area of study, fueled by recent advances in monitoring and a growing understanding of the complicated causal web connecting seemingly disparate areas of the ecosystem. Virginia's regulatory strategy and management framework has evolved substantially and increasingly acknowledges the impacts that forage fish populations can have on species occupying higher trophic levels. While the long-term results of these changes will take years to manifest and study, strong and growing evidence exists demonstrating that the Commonwealth's strategy is working and will yield a more productive, more profitable, and more sustainable aquatic economy for years to come.

- **Blue Crab Abundance:** Between 2015 and 2016, the abundance of adult (age 1+) female blue crabs in the Chesapeake Bay increased 92 percent from 101 million to 194 million. This number is above the 70 million threshold but below the 215 million target. This outcome's female-specific reference points were recommended by the 2011 blue crab benchmark stock assessment and adopted in 2012.
- **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[3], 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. This subcommittee of the Chesapeake Bay Program's Sustainable Fisheries Goal Implementation Team (GIT) notes that just two years ago, the blue crab stock was considered depleted.
- **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

[3] http://www.chesapeakebay.net/documents/CBSAC_2016_Report_6-30-16_FINAL.pdf

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-restored reefs will remain protected from leasing.
- **Lynnhaven River:** Partners are working to develop a restoration goal.

2.) **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.

Like many ecosystems worldwide, the Chesapeake Bay has faced an unprecedented loss of habitat as the result of human activities. Between 1950 and 2015, the bay watershed's population has increased 116 percent from an estimated 8.4 million people to more than 18.1million. That number is expected to surpass 20 million by 2030 and reach 21.4 million by 2040[4], making the timely and sustained restoration of damaged habitat an urgent environmental priority. While progress is being made in many areas, efforts to restore riparian buffers along stream and river banks have lagged throughout the watershed. This is of concern not just for the many animal populations reliant on this type of habitat, but for the clean-up as a whole given the role riparian buffers play in filtering stormwater runoff from both urban and agricultural sources.

- **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[5], 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.
- **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.

[4] http://www.chesapeakebay.net/indicators/indicator/chesapeake_bay_watershed_population
[5] http://www.fws.gov/birds/management/bird-management-plans/north-american-waterfowl-management-plan.php

- **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 2015, 817 additional miles were opened to fish passage. This marks an 82 percent achievement of the 1,000-mile goal. Of the total stream miles opened between 2012 and 2015, 64 percent (more than 525 miles) were opened in Pennsylvania and 36 percent (more than 295 miles) were opened in Virginia. Three miles were opened in Maryland.
- **Forest Buffers:** Between 2014 and 2015, about 64 miles of forest buffers were planted along the Chesapeake Bay watershed's rivers and streams. While this marks progress toward the outcome, it is 836 miles below the 900-mile-per-year goal and the lowest restoration total of the last 16 years. Of the riparian forest buffers planted last year, 28.7 miles were planted in New York, 15.4 miles were planted in Maryland, 9.1 miles were planted in Virginia, 6.4 miles were planted in Pennsylvania and 4.6 miles were planted in West Virginia. An estimated 55 percent of the watershed's 288,000 miles of stream banks and shorelines currently have forest buffers in place. A high-resolution aerial forest buffer assessment is expected to help experts determine the mileage that would be needed to ensure 70 percent of riparian areas in the watershed are forested. Significant focus has been placed on this practice by the Chesapeake Bay Program partners.
- **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 working 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 2015, there were an estimated 91,621 acres of underwater grasses in the Chesapeake Bay. This surpasses the Chesapeake Bay Program's 2017 restoration target two years ahead of schedule and marks a 49 percent achievement of the partnership's 185,000-acre goal. The 2015 total is the highest amount ever recorded by the Virginia Institute of Marine Science aerial survey. Researchers attribute the boost in bay grasses to the recovery of wild celery and other species in the fresher waters of the upper Bay, the continued expansion of widgeon grass in the moderately salty waters of the mid-Bay and a modest recovery of eelgrass in the very salty waters of the lower Bay. Experts have advised cautious optimism: because widgeon grass is a "boom and bust" species whose abundance can rise and fall from year to year, this widgeon-dominant spike is not guaranteed to persist in future seasons.

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.

3.) **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 overabundance of three pollutants: nitrogen, phosphorus, and sediment. For the most part, these pollutants find their way to tidal water from agricultural activities, stormwater runoff, and point source discharges from industrial and wastewater treatment facilities. To fulfill the goals of the agreement, reductions must be made across the range and 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.

During the 2013 to 2015 assessment period, an estimated 37 percent of the Chesapeake Bay and its tidal tributaries met water quality standards. This marks an almost 10 percent increase from the previous assessment period, but is below the 100 percent attainment needed to meet established water quality standards.

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.

Nitrogen Pollution					
Sector	**2009 Pollution Loads (Pounds per**	**2015 Pollution Loads (Pounds per**	**2017 Pollution Milestones (Pounds**	**2017 Pollution Targets (Pounds per**	**2025 Pollution Targets (Pounds per**

	Year)	Year)	per Year)	Year)	Year)
Agriculture	20,731,000	17,642,000	15,840,000	16,363,000	13,450,000
Urban Runoff	10,119,000	11,207,000	11,200,000	9,323,000	8,792,000
Wastewater + Combined Sewer Overflow	21,730,000	14,592,000	14,592,000	17,438,000	14,577,000
Septic	2,468,000	2,595,000	2,619,000	2,242,000	2,091,000
Forest	12,501,000	12,149,000	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**	**58,763,000**	**57,332,000**	**58,805,000**	**52,589,000**

Phosphorus Pollution Loads					
Sector	**2009 Pollution Loads (Pounds per Year)**	**2015 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	3,494,000	3,220,000	3,813,000	3,139,000
Urban Runoff	1,255,000	1,166,000	1,143,000	1,093,000	985,000
Wastewater + Combined Sewer Overflow	1,757,000	1,045,000	1,045,000	1,406,000	1,173,000
Forest	780,000	760,000	779,000	787,000	790,000

Non-Tidal Water Deposition	56,000	56,000	56,000	56,000	56,000
Reserve	0	0	0	155,000	257,000
Total	8,672,000	6,521,000	6,243,000	7,310,000	6,400,000

Sediment Pollution Loads					
Sector	**2009 Pollution Loads (Pounds per Year)**	**2015 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	2,255,938,000	2,002,927,000	1,929,484,000	1,608,912,000
Urban Runoff	698,120,000	724,570,000	687,363,000	573,660,000	490,686,000
Wastewater + Combined Sewer Overflow	47,137,000	29,948,000	29,948,000	106,677,000	146,370,000
Forest	587,324,000	563,812,000	584,456,000	592,024,000	592,024,000
Reserve	0	0	0	246,153,000	410,255,000
Total	**3,742,922,000**	**3,574,268,000**	**3,304,694,000**	**3,447,998,000**	**3,251,381,000**

4.) **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[6] 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 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[7] of the study examines how practices meant to control stormwater can remove urban toxic contaminants from the environment, while Part Two[8] 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.

5.) **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.

[6] http://executiveorder.chesapeakebay.net/ChesBayToxics_finaldraft_11513b.pdf
[7] http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2016/02/Toxics-Report-1.pdf
[8] http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2016/03/Final-Report-on-Ag-and-Wastewater-Toxics.pdf

6.) **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. Including diverse communities in our work fosters creativity, drives innovation and ensures all people in the watershed can share in the vibrancy of the region.

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.

7.) **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.

8.) **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.

There is no better way to turn citizens into stewards than through meaningful and frequent engagement with the natural assets of the Chesapeake Bay watershed. Recognizing the important of these experiences, the *Chesapeake Bay Watershed Agreement* prioritized the construction of new and improved public access infrastructure including boat ramps and trails. These investments in our communities are already paying dividends for the environmental, quality of life, and the economy.

Between 2010 and 2015, 108 public access sites were opened to the public. This marks a 36 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—lies within these states. There are currently seven public access sites in Delaware, 24 in the District of Columbia, 36 in New York, 44 in West Virginia, 203 in Pennsylvania, 336 in Virginia and 597 in Maryland.

9.) **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.

10.) **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:

On Earth Day of this year, Governor McAuliffe took the advice of the Commonwealth's Climate Change and Resiliency Update Commission and created the Commonwealth Center for Recurrent Flooding. This innovative partnership between Old Dominion University, the College of William and Mary, and the Virginia Institute of Marine Science will serve as a clearinghouse for data, analysis, and best practices for addressing the growing threat of climate change. The Center's work will help aggregate available data to avoid the unnecessary replication of efforts and inform decision-makers at the state and local level.

Climate Adaption:

Virginia remains on the cutting edge when it comes to climate adaption. The Hampton Roads region was recently awarded a $120.5 million dollar grant from the United States Department of Housing and Urban Development's National Resilience Competition[9]. These funds will support the development of innovative adaption strategies to protect our economy, communities, and environment. In addition, hardened shores are being with living shorelines on both public and private land throughout the Commonwealth. At Leesylvania State Park, a demonstration project has been created to increase awareness and optimize the design for environmental benefit, soil accretion, and the efficient attenuation of waves.

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

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.

The Chesapeake Bay is among Virginia's largest economic and environmental assets. The bay's seafood pads our waists and our wallets, and its recreational opportunities are important components in our identity and way of life. With continued aggressive action here and across the watershed, Virginia is well positioned to watch this ecological and environmental gem's value continue to grow for generations to come.