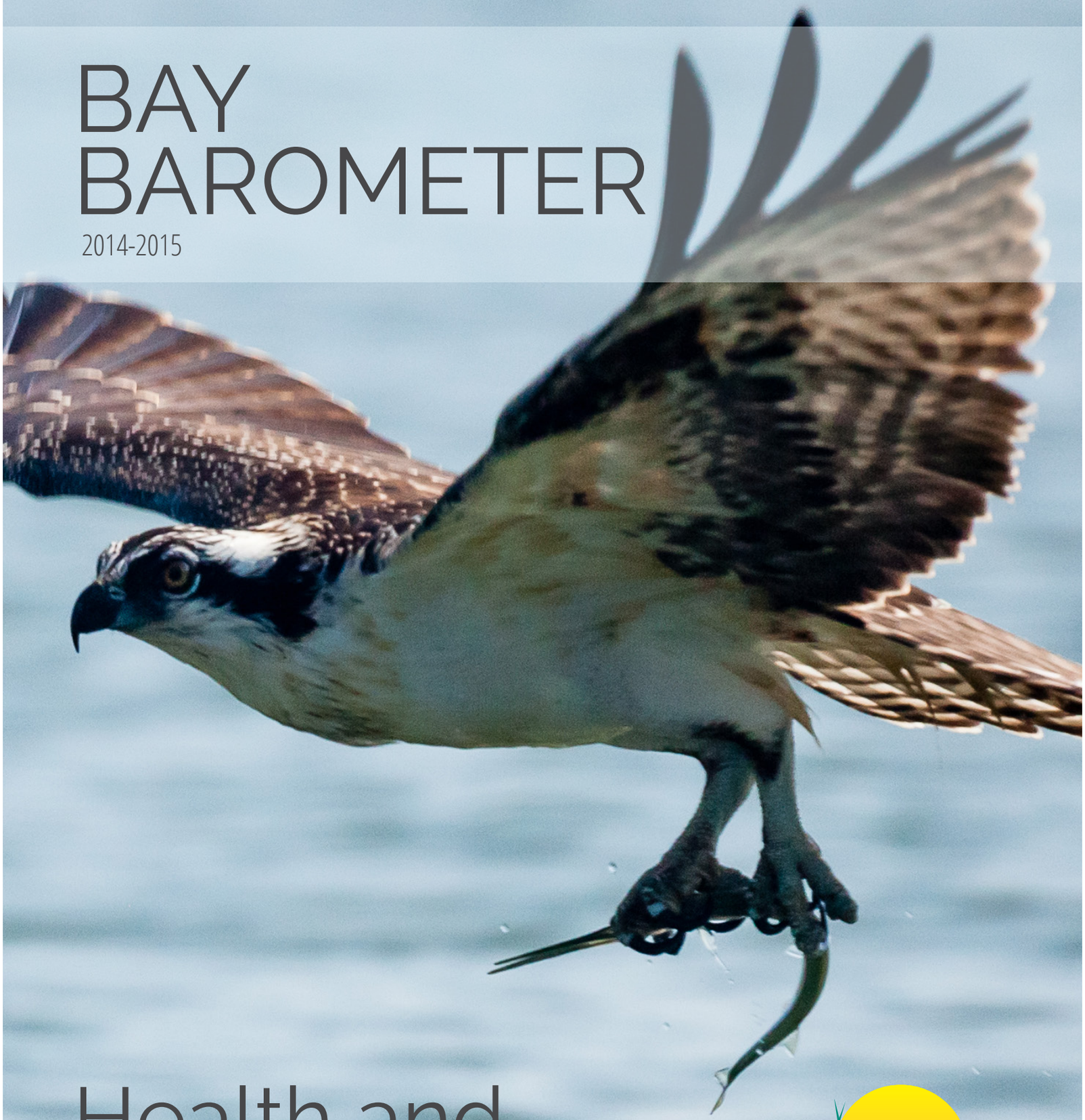
BAY BAROMETER

2014-2015



Health and Restoration

in the Chesapeake Bay Watershed

Chesapeake Bay Program

Science. Restoration. Partnership.

"We envision an environmentally and economically sustainable watershed with abundant life, clean water, conserved lands and access to the water, a vibrant cultural heritage and a diversity of engaged citizens and stakeholders."

Vision statement of the *Chesapeake Bay Watershed Agreement*

The Chesapeake Bay watershed is a large and complex ecosystem, in which every piece is interconnected. The interconnectedness of the natural world has been recognized for centuries: Leonardo da Vinci noted, "Realize that everything connects to everything else," while Aldo Leopold once said, "To keep every cog and wheel is the first precaution of intelligent tinkering." In developing the Chesapeake Bay Watershed Agreement, these adages became readily apparent. Our goals and outcomes intertwine, just like nature itself is intertwined. You can't have abundant fish without clean water. You can't have clean water without wetlands and stream buffers. You can't have clean air without healthy forests.

The multitude of data reported in Bay Barometer illustrate this point. It would be perilous to focus on one aspect of environmental health as more important than another. We must view the environment as a system, not as a collection of indicators or discrete functions. As we move forward in achieving the goals and outcomes of the Watershed Agreement, we will need to develop additional measurements of progress. We will examine data we have collected for decades, as well as data we may have never examined before. We will work to understand the interrelationships between different aspects of watershed health, as well as the role and impact of humans on the environment. If we tinker with one part of the system, we know that it could have—and likely will have—consequences for another part of the system. We should not underestimate the difficulties this challenge poses or the rewards to be gained by securing such knowledge.

Nick DiPasquale
Director, Chesapeake Bay Program

Watershed Agreement

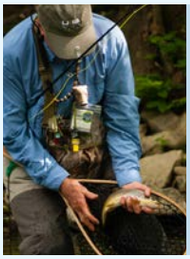
The Chesapeake Bay Program is guided by the goals and outcomes of the *Chesapeake Bay Watershed Agreement*. Signed on June 16, 2014, this agreement commits our partners to protecting and restoring the Bay, its tributaries and the lands that surround them. It includes ten goals, each of which is linked to a set of time-bound, measurable targets called outcomes.

Track our progress toward the Watershed Agreement at www.chesapeakeprogress.com.

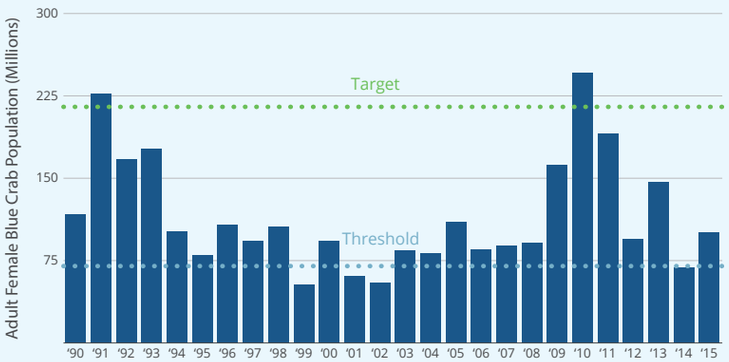
Bay Barometer

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.

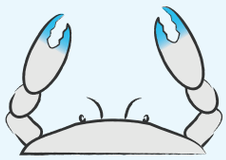
In the News: Climate Change



Scientists with the U.S. Geological Survey have found that most streams in the Chesapeake Bay region are warming: between 1960 and 2010, water temperatures have, on average, risen 1.4°C. This appears to be driven by the rising air temperatures associated with climate change, and could push brook trout and other cool-water fish out of their habitat. Further research found that while cool groundwater does influence warmer surface waters, this influence is variable. As air and water temperatures continue to warm, the distribution of suitable cool-water fish habitat could be patchy.

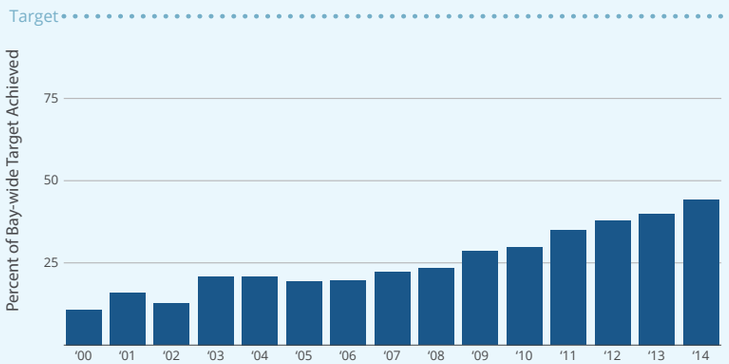


Blue Crab Abundance

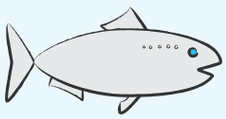


Maintain a sustainable blue crab population based on a target of 215 million adult females.

Between 2014 and 2015, the abundance of adult female blue crabs in the Chesapeake Bay increased from 68.5 million to 101 million. This number is above the 70 million overfishing threshold but below the 215 million target that would support a sustainable blue crab stock. Blue crabs support commercial and recreational fisheries across the region, but water quality, habitat loss, harvest pressure and predation affect their continued health.



American Shad Abundance



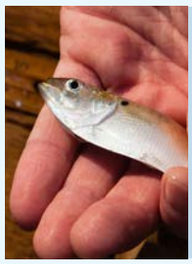
No related outcome.

Between 2000 and 2014, American shad abundance as measured in five Chesapeake Bay tributaries increased from 11 percent to 44 percent of the target, due in large part to rises in Potomac and Rappahannock River abundance. Further increases will only occur if shad also return to those rivers with consistently low spawning stocks: the James, Susquehanna and York.

In the News: Oyster Restoration

More than two billion oysters have been planted in Maryland's Harris Creek, marking the completion of the in-water construction phase of one of the largest oyster restoration projects in the world. Harris Creek is the first of ten waterways to be selected for oyster restoration under the Watershed Agreement.

In the News: Forage Fish



Despite their importance to the Chesapeake Bay ecosystem, uncertainty remains about the status of the smaller fish, shellfish and other invertebrates that are food for underwater predators. According to our Scientific and Technical Advisory Committee, a better understanding of the species that make up this aquatic forage base could better support the management of predator species and of the Bay ecosystem as a whole.

Climate Change

Increase the resiliency of our communities, living resources and wildlife habitats to withstand the impacts of climate change.

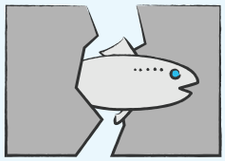
Abundant Life: Fish & Shellfish

Protect and restore the ecological relationships among finfish, shellfish and other living resources to sustain the region's fisheries and foster a balanced ecosystem.

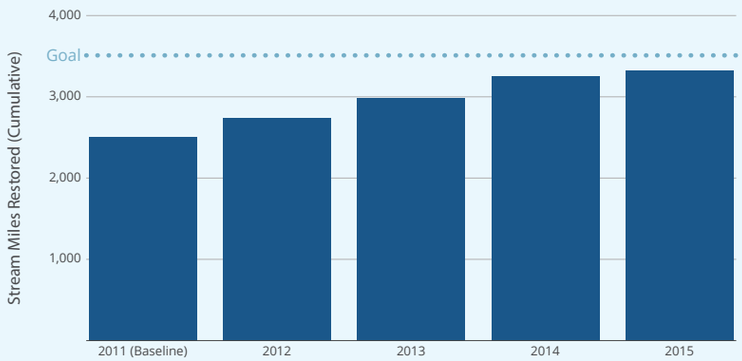
Abundant Life: Habitats

Protect and restore land and water habitats to support fish, wildlife and clean water and offer scenic and recreational benefits.

Fish Passage

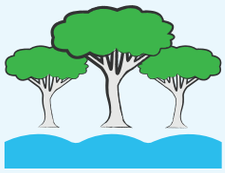


Beginning with a baseline of 2,510 stream miles open to the migration of fish, open an additional 1,000 stream miles to fish passage by 2025.

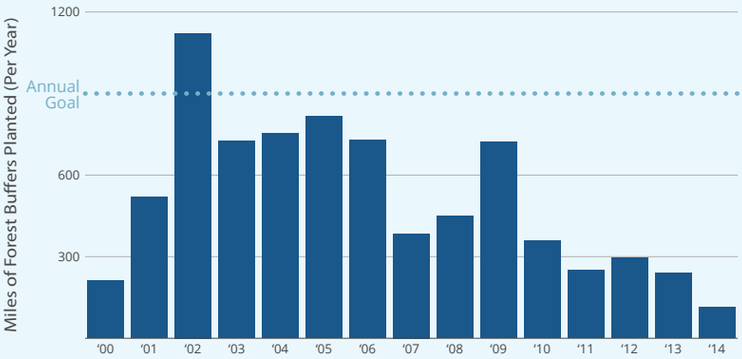


Progress toward the goal to restore historical fish migration routes is measured against a 2011 baseline of 2,510 open stream miles. Between 2012 and 2015, 817 additional miles were opened to fish passage, including almost 300 miles in Virginia and more than 500 miles in Pennsylvania. This marks an 82 percent achievement of the 1,000-mile goal. Removing the barriers that block migratory fish from reaching their spawning grounds can reduce sediment build-up in streams and allow shad, herring and other migratory species to move between fresh- and saltwater habitats.

Forest Buffers

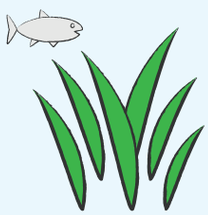


Conserve existing forest buffers and restore 900 miles of forest buffers each year until at least 70 percent of the watershed's riparian areas are forested.

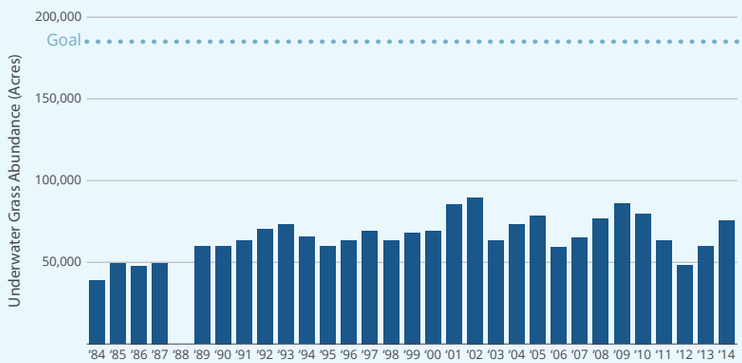


Between July 2013 and June 2014, about 114 miles of forest buffers were planted along the watershed's rivers and streams. More than half of these miles were planted in New York and Pennsylvania. This watershed-wide total is the lowest of the last 15 years. An estimated 55 percent of the watershed's stream banks and shorelines have forest buffers in place, and our partners will plant new buffers and conserve existing buffers until at least 70 percent of these riparian areas are forested. Forest buffers stabilize stream banks, prevent pollution from entering waterways, provide food and habitat to wildlife, and keep streams cool during hot weather. Because of these benefits, forest buffers are considered the most cost-effective best management practice.

Underwater Grasses



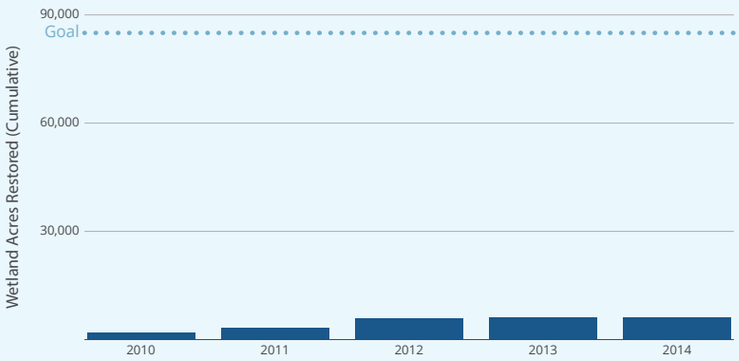
Sustain 185,000 acres of underwater grasses across the Chesapeake Bay.



Between 2013 and 2014, the abundance of underwater grasses in the Chesapeake Bay increased from 59,711 acres to 75,835 acres: an achievement of 41 percent of the 185,000-acre goal. Researchers attribute this boost in bay grasses to a rapid expansion of widgeon grass, the modest recovery of eelgrass in areas that experienced diebacks after the hot summers of 2005 and 2010, and the continued recovery of grasses in areas impacted by Hurricane Irene and Tropical Storm Lee in 2011. Underwater grass beds provide food and shelter to fish and wildlife, add oxygen to the water, absorb nutrient pollution, reduce shoreline erosion and help suspended particles of sediment settle to the bottom.

Abundant Life: Habitats

Protect and restore land and water habitats to support fish, wildlife and clean water and offer scenic and recreational benefits.



Wetlands

Create or reestablish 85,000 acres of wetlands and enhance the function of 150,000 acres of degraded wetlands by 2025.

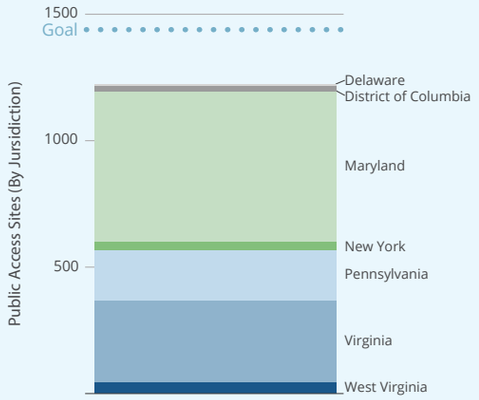
Between 2010 and 2014, 6,191 acres of wetlands were created or reestablished on agricultural lands. Maryland, New York and Virginia reported more than 90 percent of the acres restored in 2014 (24, 29 and 32 acres, respectively). The cumulative watershed-wide total marks a seven percent achievement of the 85,000-acre restoration goal. Healthy wetlands trap polluted runoff and slow the flow of nutrients, sediment and chemical contaminants into rivers, streams and the Bay.

In the News: Stream Health

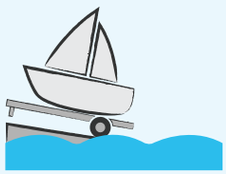
Preventing livestock from entering streams can improve the health of both animals and waterways. According to the Chesapeake Bay Commission, livestock exclusion reduces the amount of sediment and animal waste entering streams and lowers reports of livestock disease and injuries.

Engaged Communities

Expand public access to the water, foster environmental literacy and increase the number and diversity of individuals engaged in our conservation and restoration work.



Public Access Sites Established



Beginning with a 2010 baseline of 1,139 public access sites, add 300 new access sites to the watershed by 2025.

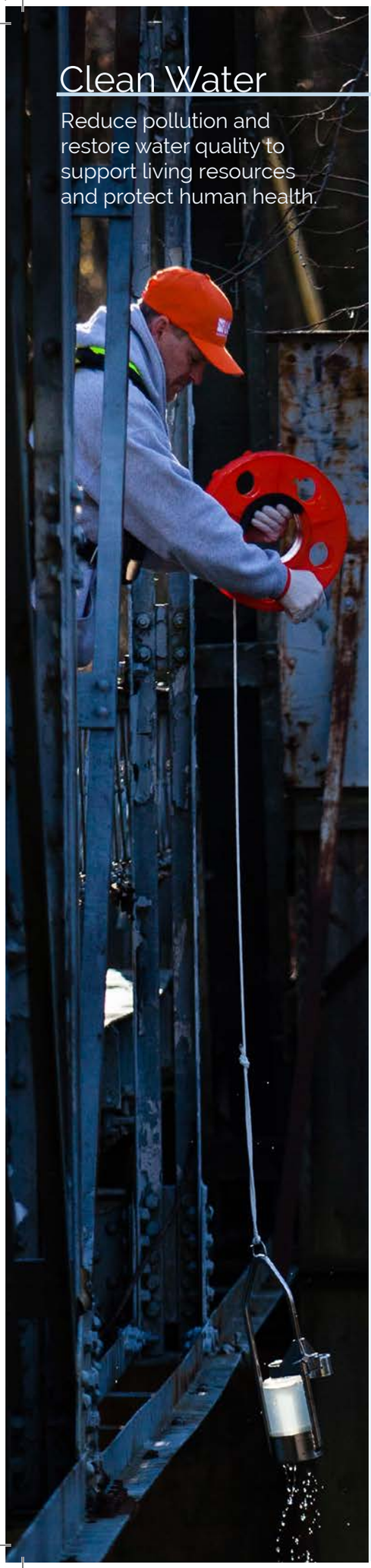
Between 2010 and 2014, 86 public access sites were opened in the watershed, bringing the total number of access sites in the region to 1,225. Virginia, Maryland and Pennsylvania have seen the biggest increases in access sites during this time, at 40, 20 and 16 new sites, respectively. The cumulative watershed-wide total marks a 29 percent achievement of the goal. Public access to open space and waterways can improve public health and quality of life. Access to the water can also build personal connections with places that have shaped life in the region, boosting tourism economies and creating citizen stewards.

In the News: Environmental Literacy

In 2015, the National Oceanic and Atmospheric Administration directed more than $2.4 million toward environmental education in the watershed. Thirty-two projects received this funding through the Bay Watershed Education and Training (B-WET) program, and will connect outdoor experiential learning with classroom lessons for students in kindergarten through twelfth grade.

In the News: Environmental Justice

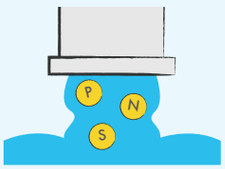
In June, the U.S. Environmental Protection Agency released a mapping tool that helps identify communities that may face a high risk of environmental harm. EJSCREEN combines demographic and environmental data to relate hazards like air pollution and toxic waste to factors like the percentage of a population that is low-income or minority.



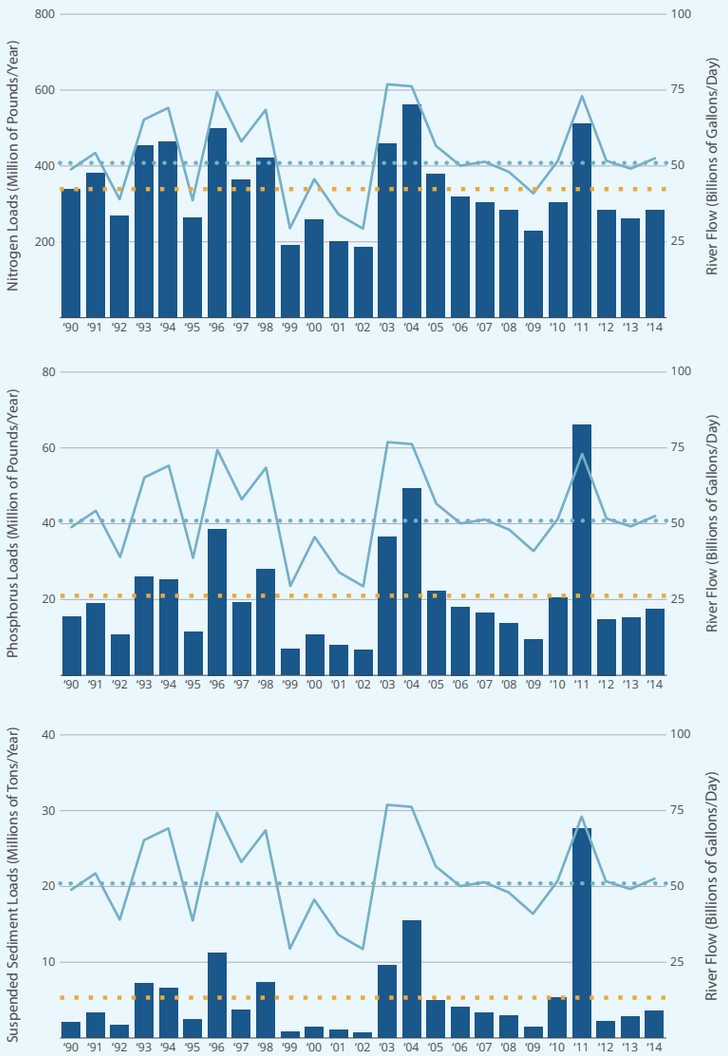
Clean Water

Reduce pollution and restore water quality to support living resources and protect human health.

Nitrogen, Phosphorus and Sediment Loads

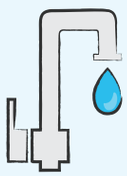


Reduce pollution to achieve the water quality standards outlined in the Chesapeake Bay's "pollution diet," or Total Maximum Daily Load.

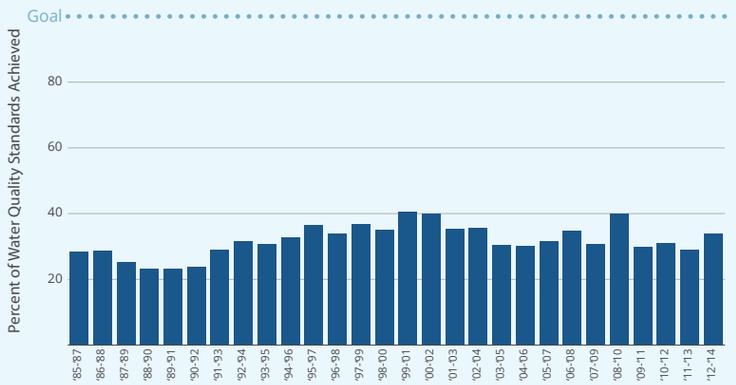


Between October 2013 and September 2014, approximately 285 million pounds of nitrogen, 17.5 million pounds of phosphorus and 3.62 million tons of sediment reached the Chesapeake Bay. This is below the long-term average of both nutrient and sediment loads. Nutrient and sediment pollution are among the leading causes of the Bay's poor health. Nitrogen and phosphorus can fuel the growth of algae blooms that lead to low- or no-oxygen conditions harmful to aquatic life. Sediment can suffocate shellfish and block sunlight from reaching underwater plants.

Water Quality Standards Achieved



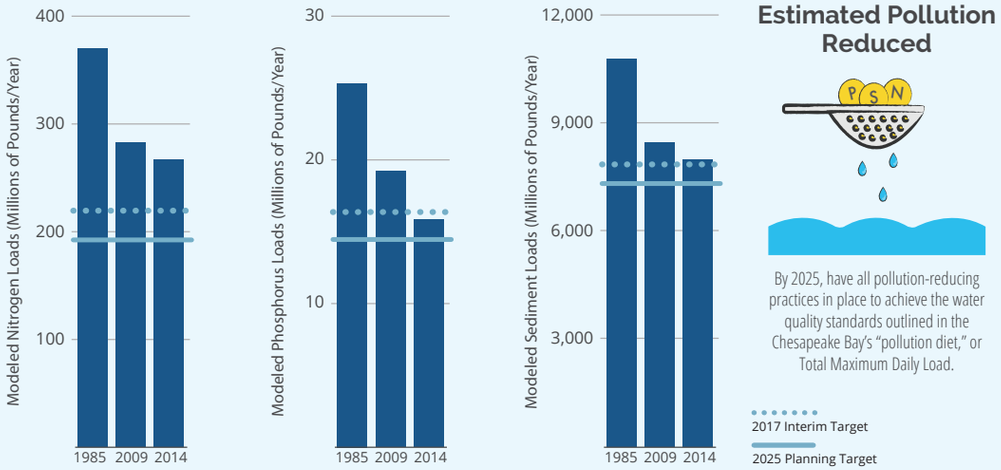
Achieve the water quality standards outlined in the Chesapeake Bay's "pollution diet," or Total Maximum Daily Load.



Preliminary results of the 2012-2014 assessment period indicate that 34 percent of the water quality standards in the Chesapeake Bay and its tidal tributaries were met during this time. The U.S. Environmental Protection Agency developed water quality standards for a healthy Bay in 2003. Five aquatic habitats were identified, each with its own criteria for dissolved oxygen, water clarity/underwater grasses and chlorophyll *a* (which measures algae). If the Bay and its tidal tributaries are to function as a healthy ecosystem, all aquatic habitats must meet all of these protective clean water criteria.

Clean Water

Reduce pollution and restore water quality to support living resources and protect human health.

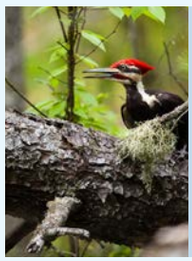


Estimated Pollution Reduced

By 2025, have all pollution-reducing practices in place to achieve the water quality standards outlined in the Chesapeake Bay's "pollution diet," or Total Maximum Daily Load.

Computer simulations show that pollution controls put in place in the Chesapeake Bay watershed between July 2009 and June 2014 lowered nitrogen pollution six percent, phosphorus pollution 18 percent and sediment pollution four percent. These simulations were generated using the Chesapeake Bay Program's Watershed Model (Phase 5.3.2) and jurisdiction-reported wastewater discharge data and calibrated using long-term non-tidal water quality monitoring data. Practices are in place to achieve 21 percent of the nitrogen pollution reductions, 71 percent of the phosphorus pollution reductions and 25 percent of the sediment pollution reductions necessary to attain applicable water quality standards for dissolved oxygen, water clarity/underwater grasses and chlorophyll *a* as compared to 2009, the year before the U.S. Environmental Protection Agency established the Chesapeake Bay Total Maximum Daily Load. This "pollution diet" limits the amount of nutrient and sediment pollution that can enter the Bay if it is to achieve water quality standards.

In the News: Healthy Watersheds



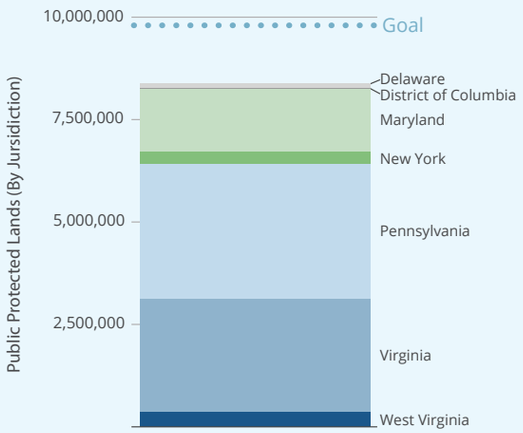
Research conducted in Virginia and funded by our Healthy Watersheds Goal Implementation Team confirmed forests are highly valuable when it comes to meeting the Bay's "pollution diet." The results were stark: more than $100 million could be saved in the Rappahannock study area alone if additional provisions to protect forests are put in place.

In the News: Toxic Contaminants

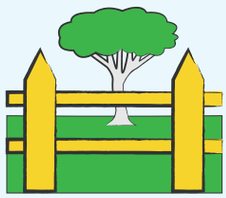
According to data submitted in 2012 to the U.S. Environmental Protection Agency, 74 percent of the Chesapeake Bay's tidal waters are partially or fully impaired by toxic contaminants. A technical report shows polychlorinated biphenyls (PCBs) and mercury are particularly problematic in the region, and are considered widespread in severity and extent.

Protected Lands

Protect treasured landscapes; sustain working forests, farms and maritime communities; and conserve lands of cultural, indigenous and community value.



Protected Lands



Beginning with a 2010 baseline of 7.8 million acres of land protected from development, protect an additional two million acres, including 225,000 acres of wetlands and 695,000 acres of forests.

Between 2010 and 2013, close to 572,000 acres of land in the watershed were permanently protected from development. This marks an achievement of 29 percent of the goal, and brings the total amount of protected land in the watershed to 8.37 million acres. State agencies are the largest entity contributing to land protection, holding about 44 percent of protected acres. Protecting land from development protects water quality, sustains fish and wildlife, maintains working farms and forests, preserves our history and provides opportunities for outdoor recreation.

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**

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