2014 STATE OF THE BAY

HEALTH INDEX: 32/D+
WATER QUALITY: IMPROVING
FISHERIES: A CONCERN

CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

PRESIDENT'S MESSAGE

The Chesapeake Bay Foundation's *2014 State of the Bay* report presents a mix of good and bad news.

The great news: Water quality indicator scores have improved significantly over the 2010 and 2008 scores.

The worrisome news: Blue crabs and striped bass are not doing well. The declines in these metrics and in the phosphorus indicator offset the improvements in water quality. Overall, the 2014 score is unchanged from 2012.

We can celebrate the water-quality improvements. However, the Bay and its rivers and streams still constitute a system dangerously out of balance. We continue to have polluted water, risks to human health, and lost jobs—at huge societal costs.

The future is just around the corner; 2017—the year when 60 percent of programs to achieve the Chesapeake Clean Water Blueprint pollution-reduction targets are to be in place—is in our sights.

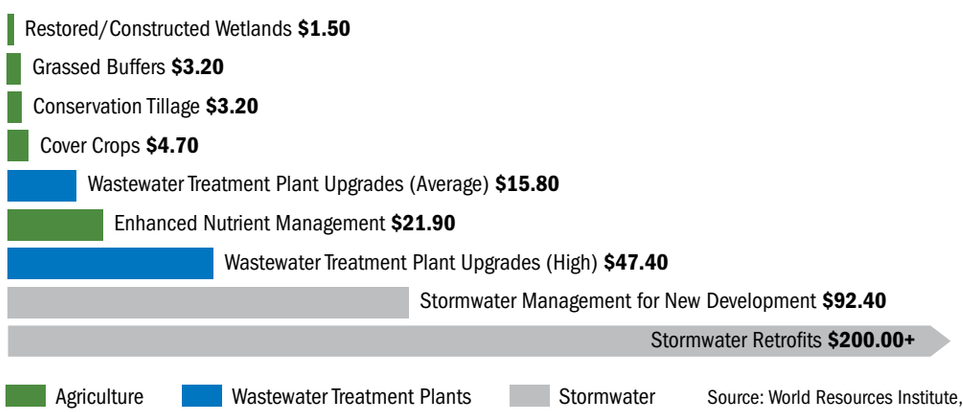
We must accelerate pollution reduction, particularly from agriculture. Runoff from farm fields remains the largest source of pollution to the Bay and its rivers and streams (see page 13). Ironically, this pollution is the least expensive to reduce and has the most generous federal and state cost-share funding available.

In some jurisdictions, polluted runoff from urban and suburban areas is the only source of pollution continuing to grow. Investments in reducing this source of pollution must be increased as well.

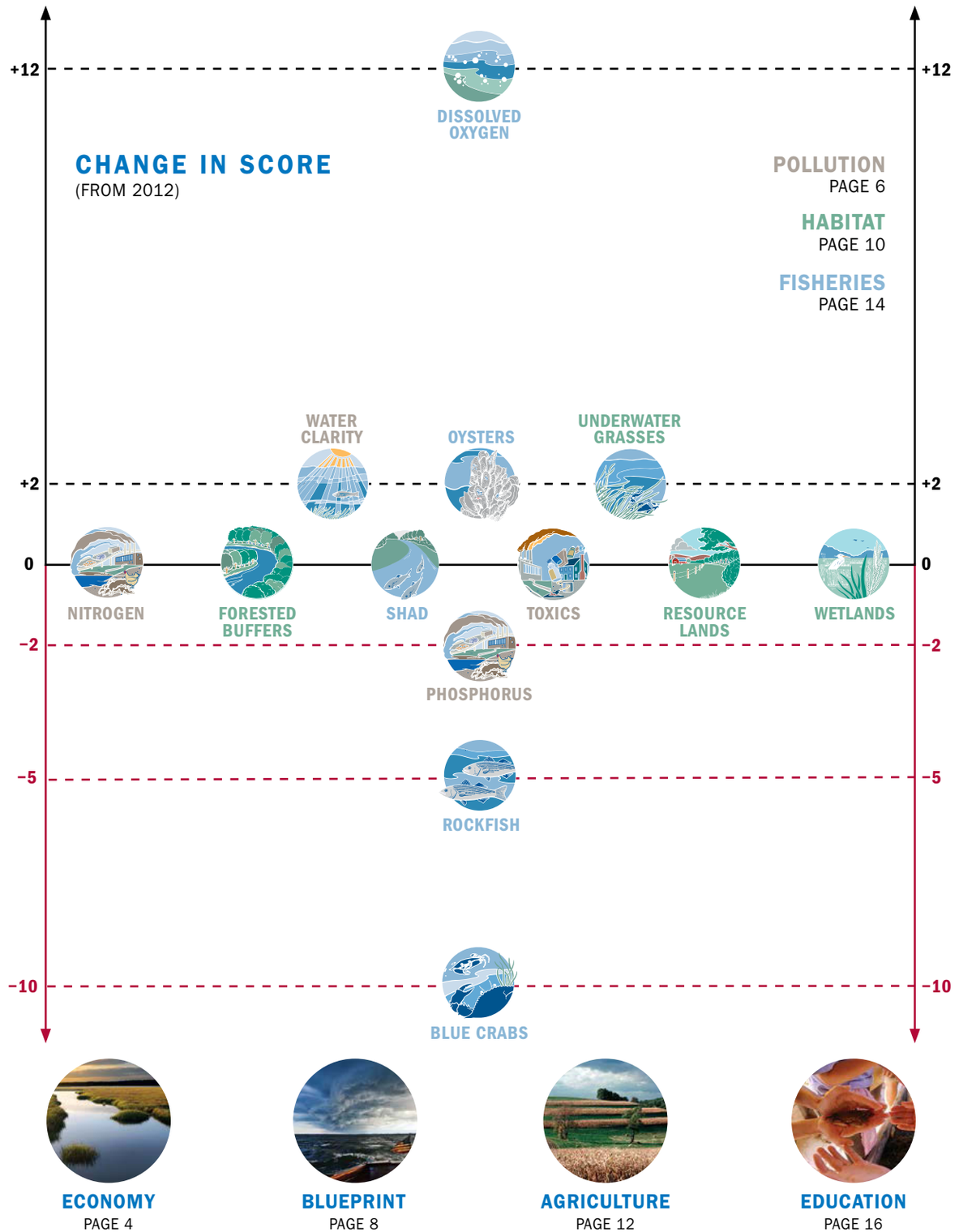
The Clean Water Blueprint is working so far, but there are danger signs ahead. States must expedite required implementation of agricultural and urban pollution reduction. If they do not, EPA must impose sanctions.

William C. Baker, President

Cost of Nitrogen Pollution Reduction by Sector and Practice (per pound)



Source: World Resources Institute, 2011



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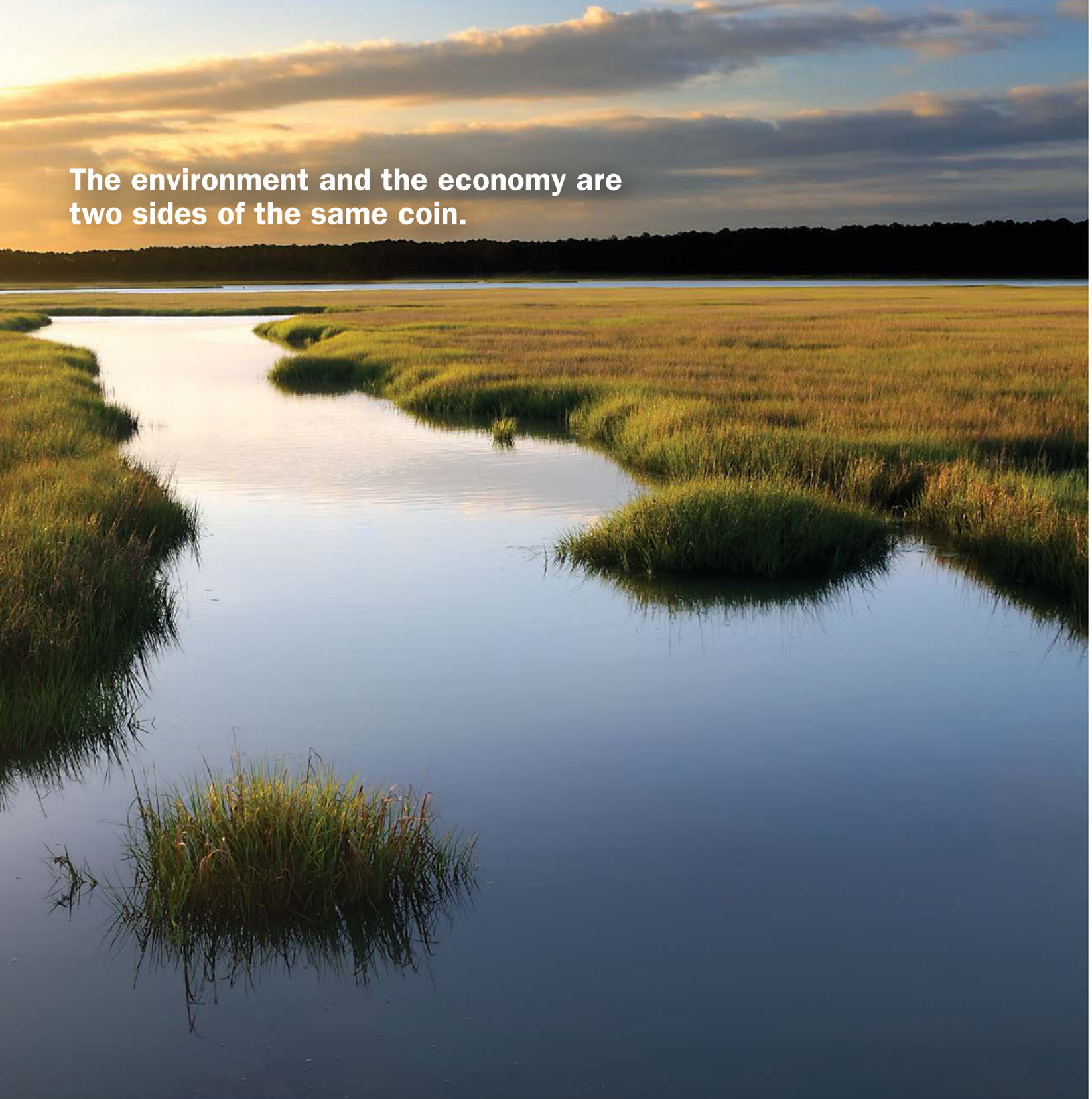


Saving the Bay Makes Economic Sense

In 2010, the six Bay states, the District of Columbia, and the federal government launched a renewed, mandatory effort to restore the health of the Bay and its vast network of rivers and streams. That effort—the Chesapeake Clean Water Blueprint—is designed to reduce substantially the amount of nitrogen, phosphorus, and sediment pollution degrading local waters and the Bay. The Blueprint's goal: Restore the Bay system to good health. Fully implementing the Blueprint will reduce risks to our health, provide a legacy of clean water for our children and grandchildren, and increase economic benefits to the region.

Fully implementing the Blueprint will be a big job. It will require the commitment, time, and resources of all sectors of society.

Opponents suggest the juice may not be worth the squeeze. So, CBF followed the science to determine what the economic return would actually be. In October, we released *The Economic Benefits of Cleaning Up the Chesapeake*, a peer-reviewed report. The numbers are staggering.

In 2009 (before the Blueprint), the lands and waters of the Chesapeake Bay region provided economic benefits totaling $107.2 billion annually. This served as the baseline for our study. These benefits include air and water filtration, better agricultural and seafood production, higher property values, and improved flood and hurricane protection.

The value of these same benefits will increase by $22.5 billion annually to $129.7 billion if the Blueprint is fully implemented. Once realized, those benefits would be enjoyed year after year.

If, however, nothing more is done to implement the Blueprint, pollution will increase, and the value of the Bay system's natural benefits will decline by $5.6 billion annually to $101.5 billion.

Now we know with certainty what we have long suspected: The environment and the economy are two sides of the same coin. Read our report at cbf.org/economicbenefits.

Nitrogen: 16
(no change from 2012)

Phosphorus: 25
(–2 from 2012)

Excess nitrogen and phosphorus, which fuels algal blooms that ultimately cause the Bay's dead zone, is still largely driven by precipitation. Rain and snowmelt wash these and other contaminants off farmland, lawns, and city streets into local streams, rivers, and ultimately the Bay. The 2014 phosphorus score dropped because annual phosphorus loads were higher in 2014 compared to 2012, particularly in the Potomac and James Rivers and on Maryland's Eastern Shore. There is evidence, however, that we are making progress.

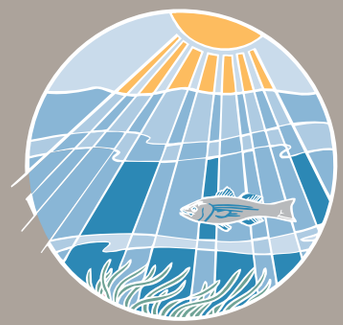
Observed decreases in nitrogen in mostly forested headwater streams in the Appalachian Mountains of Maryland, Pennsylvania, and Virginia have been attributed to regulatory reductions in air pollution from coal-fired power plants. Upgrades to sewage treatment plants continue to reap benefits as evidenced by the return of underwater grasses to the Potomac and Patuxent Rivers.[1] Reducing pollution from agriculture remains the region's biggest challenge, but the Chesapeake Clean Water Blueprint provides the way forward—implementation of this plan is the key to success.

1 Lyerly, C.M., A.L. Hernández Cordero, K.L. Foreman, S.W. Phillips, W.C. Dennison (eds.). 2013. *Lessons from Chesapeake Bay Restoration Efforts: Understanding the role of nutrient reduction activities in improving water quality.*

Dissolved Oxygen: 37
(+12 from 2012)

In a typical year, the amount of nitrogen and phosphorus pollution that flows into the Bay during the spring largely influences the size of the summer dead zone. This pollution feeds algal blooms that eventually die, sink to the bottom, and are decomposed by bacteria, which uses up oxygen in the process. This year, due to high spring pollution loads, scientists predicted a larger than average dead zone for the Chesapeake Bay.

June monitoring results were in line with this prediction. However, weather conditions in early July changed this trajectory. Hurricane Arthur produced strong winds as it passed the coast and mixed the oxygenated surface waters into the deep waters of the Bay causing a large reduction in the dead zone. Sustained, below-average temperatures throughout the rest of July resulted in the dead zone remaining the smallest it has been in thirty years of sampling—cooler water holds more oxygen. Towards the end of the summer, as temperatures increased, the dead zone returned to "above average" size. In this case, "above average" is not desirable, because it means large parts of the Bay and its tidal rivers are off-limits to aquatic life.



Water Clarity: 18
(+2 from 2012)

Water clarity decreased between 2012 and 2013 then improved through 2014, resulting in an increase in this indicator score. Water clarity is measured as the depth in the water column to which sunlight is able to penetrate. Sunlight is vital to the growth and reproduction of underwater grasses. Underwater grasses are critical to the Bay ecosystem as they trap sediment, provide habitat for fish and crabs, and food for waterfowl. Water clarity is negatively affected by algal blooms fueled by phosphorus and nitrogen pollution and suspended sediment in the water from runoff from agricultural and urban lands. These pollutants also negatively affect local streams and rivers.

Implementation of the Chesapeake Clean Water Blueprint will reduce the amount of nitrogen, phosphorus, and sediment that runs off the land resulting in clean, healthy streams and ultimately leading to better water clarity in the Bay. Practices, such as streamside forest buffers and conservation tillage on farmland, and creating more open spaces in urban areas, are particularly effective at preventing runoff of soil and nutrients.

Toxics: 28
(no change from 2012)

Toxic chemicals from air deposition, urban runoff, and industrial sources continue to degrade the health of the Bay and its tributaries. Over 70 percent of the Bay and its tidal rivers remain impaired due to chemical contaminants. Improvement is slow due to the persistent nature of many chemicals, especially PCBs and mercury, which cause most of the region's fish consumption advisories. Two new initiatives, however, give us hope.

First, after much urging from CBF and other environmental groups, the new Chesapeake Watershed Agreement includes a goal to "Ensure that the Bay and its rivers are free of effects of toxic contaminants on living resources and human health." One outcome associated with this goal calls for improvements to practices, controls, and existing programs to reduce and prevent the detrimental effects of toxic contaminants.

Second, the Anacostia River Toxics Remediation Act of 2014 passed by the District of Columbia City Council established a June 2018 deadline for establishing a clean-up plan for removing toxic chemicals from the Anacostia River, one of the region's toxic hotspots. We commend the District for this action.

Implementing the Blueprint

The Chesapeake Clean Water Blueprint is in place. Our *2014 State of the Bay* report confirms it's working. Comparing only the scores for pollution indicators—nitrogen, phosphorus, dissolved oxygen, water clarity, and toxics—we see an almost 11 percent improvement over the 2012 pollution indicators' scores and a 21.5 percent improvement over the 2010 scores.

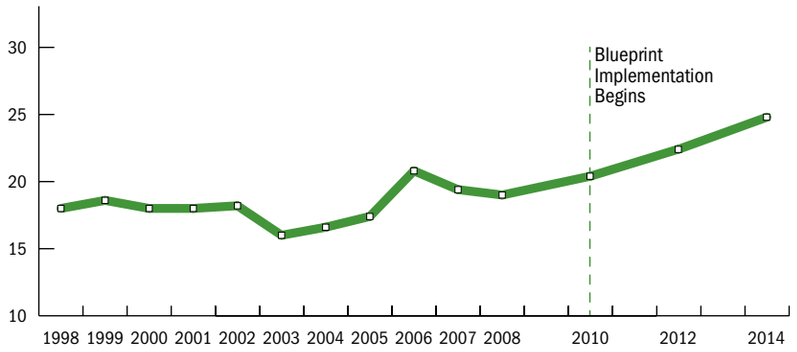
This water-quality improvement and the recent Milestone reports indicate that we are on track to achieve a restored Bay system if we fully implement the Blueprint. The benefits will be many—a significantly cleaner environment, fewer risks to human health, impressive economic gains, a proud legacy, and a model for the world.

But, digging deep into the data, we find there is reason for concern. Bay-wide, agriculture is not on pace to meet its 2017 mid-term goal, and urban and suburban polluted runoff (stormwater) is heading in the wrong direction.

Our concern is real; the price we all pay for pollution is expensive. We call on governments, businesses, and individuals; right now, starting in 2015, let's roll up our sleeves a little further, work together, follow the science-based plans for restoration, and accelerate pollution reduction.

It would be a shame to snatch defeat from the jaws of victory.

***State of the Bay* Average Pollution Indicator Scores** (see page 6-7)



Forested Buffers: 58

(no change from 2012)

Streamside forested buffers provide numerous natural benefits. They serve as filters to prevent nutrient and sediment pollution from reaching waterways, enhance a stream's ability to process and remove nitrogen, and reduce air pollution. Accelerating forested buffer implementation is a key component of the Chesapeake Clean Water Blueprint and the federal Chesapeake Executive Order Strategy (EO13508). Yet despite these benefits and commitments, the rate of annual implementation of this vital practice continues to decline. In recent years, the average acres of forested buffers planted was roughly 4,000 acres per year. To achieve Blueprint commitments watershed-wide, an average of 14,000 acres per year is needed between now and 2025.

In June 2014, the Alliance for the Chesapeake Bay convened a "Forest Buffer Summit" attended by leaders from federal and state governments and nonprofit organizations to highlight the implementation gap and kick off an effort to accelerate implementation. One outcome was the establishment of state task forces, led by the U.S. Department of Agriculture (USDA), to develop recommendations for how to overcome current obstacles to greater implementation. We urge federal and state agencies, particularly USDA, which plays a lead role in providing financial and technical assistance for buffers, to embrace and implement these recommendations expeditiously in 2015.

Wetlands: 42

(no change from 2012)

Water-saturated lands like marshes or swamps—commonly known as wetlands—are a vital link to Bay health. They provide valuable habitat and act as natural filters that improve water quality by trapping and treating polluted runoff. For example, marshes in the tidal Patuxent River in Maryland are estimated to remove about 46 percent and 74 percent of the total nitrogen and phosphorus inputs, respectively.[1] Wetlands can also help mitigate sea level rise and provide natural protection from storm surges. Recent efforts to restore and protect wetlands have languished, but efforts are being made to change that.

In 2014, the new Chesapeake Watershed Agreement set a goal of restoring 85,000 acres of wetlands by 2025. For context, between 2010 and 2013, some 6,000 acres of wetlands were restored on farmland—about seven percent of this new goal.

Also in 2014, the Environmental Protection Agency released a draft regulation that attempts to clarify what types of water bodies are protected under the Clean Water Act. The rule responded to two Supreme Court decisions that had caused great confusion among regulators, the regulated community, and other stakeholders. This rule, clarifying wetland definitions and boundaries, will ensure vital wetland habitat remains protected.

1 Boynton, W.R., et al. 2008. *Nutrient Budgets and Management Actions in the Patuxent River Estuary, Maryland.* Coastal and Estuarine Research Federation.

Underwater Grasses: 22

(+2 from 2012)

Underwater grasses are an essential component of the Chesapeake Bay ecosystem. They provide crucial habitat and nursery grounds for fish and crabs and provide food for waterfowl. They also remove pollutants from the water and help reduce shoreline erosion by softening wave action. Grasses are a good indicator of the state of the Bay because their health and abundance is very closely linked to water quality.

From 2012 to 2013, underwater grasses increased roughly 24 percent, a strong recovery from the previous years of decline. Each of the four salinity zones of the Bay saw improvement. This recovery appears to have continued into 2014. In addition, many of the observed beds are dense and healthy, also a positive sign for Bay recovery. The huge, dense grass bed on the Susquehanna Flats, which was able to survive Hurricane Irene and Tropical Storm Lee in 2011, increased in acreage in 2013 and remained robust in 2014.

Resource Lands: 32

(no change from 2012)

The state of resource lands—forests, farms, wetlands, and stream valleys—is a mixed bag. Forestland increased statewide in Pennsylvania and Virginia over the past five years, yet there is still a net loss of a half million acres over the last 15 years in the three major Bay states.

Pennsylvania, Maryland, and Virginia continue to permanently protect resource land. Statewide, Pennsylvania's farmland protection program added 15,000 acres in 2013, as the Commonwealth neared the 500,000 acre preserved farmland mark. Maryland's preservation of resource lands slowed to just 9,000 acres in 2013, down from its previous low in 2011. Virginia added about 45,000 acres in 2013, which was more than occurred in 2011.

At the same time, land development has increased. In the Maryland and Virginia counties studied, the number of building permits has generally risen over the past several years. National statistics and growth in these locations suggest that damaging, spread-out development may be on the rise, absent good state and local policies to shape and manage it. Failure to effectively plan, account for and offset growth, and manage polluted runoff from new development with strong state stormwater programs, could endanger water-quality improvements.

Reducing pollution from agriculture is the most cost-effective way to reduce pollution.

Farming for Clean Water

Agriculture is the largest source of nitrogen, phosphorus, and sediment pollution damaging local rivers, streams, and the Chesapeake Bay. This is not because agriculture is more polluting than other land use, but because agriculture is the second-largest land use in the region, behind forests.

Farmers have made progress, but not enough. Science has identified the practices necessary to reduce pollution from all sources. And the states have developed plans to achieve those reductions. Those plans expect to get 75 percent of their pollution reduction from agriculture.

However, the region is not on track to meet the 2017 Chesapeake Clean Water Blueprint interim goals from agriculture. Meeting the interim and final 2025 goals requires accelerating agricultural pollution reduction.

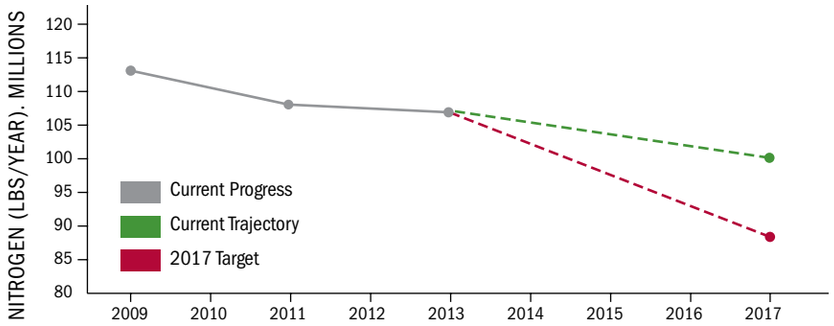
Fortunately, reducing pollution from agriculture is the most cost-effective way to reduce pollution.

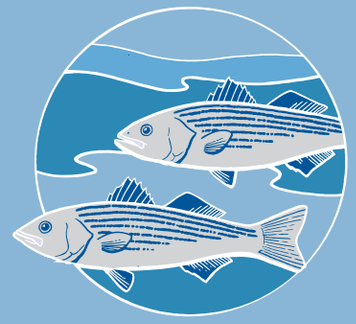
The Clean Water Act allows the federal Environmental Protection Agency to regulate the largest animal raising operations, but gives the states the option to regulate the large majority of smaller farms.

Because we need to significantly increase efforts to reduce farm pollution, it is primarily up to the states to implement programs and policies to achieve those reductions. Business as usual will not get the job done.

With budget shortfalls throughout the region, the prospects for significant additional cost-share funding for agriculture may not be bright. We will continue to advocate for cost-share funding, however, and we will also consider enforcement, litigation, better use of existing public funds, and bringing more private money to the table. If the states fail to meet agricultural reduction goals, EPA must look elsewhere—at point sources, for example—for pollution reduction.

Watershed Modeled Nitrogen Pollution from Agriculture





Rockfish: 64

(–5 from 2012)

A new scientific assessment[1] documents a ten-year decline in the rockfish (striped bass) population since 2003, to the level that triggers conservation action. Catches coastwide will be cut back beginning in 2015 in an effort to bring numbers up. While down substantially from an all-time high in 2003, the current population level is still fully capable of reproducing. In fact, spawning in 2014 was about average, and the 2011 hatch was very good and will help bring adult numbers up in the next few years.

Rockfish spend the first four to eight years of their life year-round in the Bay. Once Bay rockfish have matured, they migrate up the East Coast in summer. During the resident period, they are exposed to conditions in the Bay including the summer dead zone. Scientists have found that they are dying at higher rates in recent years, probably because of *Mycobacteriosis*, a disease triggered by stress from low oxygen levels and poor nutrition from lack of preferred forage species like menhaden. Improvements in both will help the 2011 year class survive in numbers that will bolster future rockfish populations.

1 Atlantic States Marine Fisheries Commission, Atlantic Striped Bass Benchmark Assessment, 2013.

Blue Crabs: 45

(–10 from 2012)

The Bay's blue crab population dropped dramatically to less than half its 2012 level (from 765 to 297 million). Most noteworthy, the number of adult female crabs (the spawning stock) dropped below the level considered depleted, forcing the states to cut back on catches to improve the chances of good reproduction. Crabbers suffered poor catches in both 2013 and 2014. The science-based management approach put in place in 2008 provides important guidelines for the fishery, but has not been able to stabilize the fishery at sustainable levels. Consideration should be given to a quota-based system for managing total catch as a way to improve the quality of the fishery.

Factors other than harvest are evidently also limiting the crab population. The large numbers of juvenile crabs produced in 2011 did not mature into large numbers of adults as expected. Continued low levels of underwater grass habitat probably exposed small crabs to high predation by striped bass and other predatory fish. Clearly the management of the crab catch needs to be supplemented by further efforts to reduce nitrogen and phosphorous pollution and restore crab habitat.

Oysters: 8

(+2 from 2012)

Oysters continue to rebound. Roughly a billion oysters are now planted annually in the Bay and its tributaries. Surveys show they are surviving better than they have in decades. Over 90 percent have survived in Maryland waters in each of the last three years, indicating reduced losses from disease. In addition, a good spat set (the number of baby oysters attaching to hard surfaces) in recent years is boosting restoration efforts and watermen's catches. The total Baywide catch nearly hit one million bushels in the 2013-14 season, the first time that benchmark has been approached since 1987. Most importantly, a thriving aquaculture industry has taken root, producing five times what it did just five years ago.

Collaboration between state and federal agencies has never been better. A new approach that targets individual river systems with a goal of restoring ten tributaries by 2025 is showing great promise. Still, there are major challenges. The increased catches are improving the availability of shell, the preferred material for restoring reefs, but quantities are still well below what is needed. Alternative materials are being tried successfully and will be essential for rebuilding the once-common, three-dimensional reefs. Most importantly, continued dedicated funding will be essential to maintain momentum and recover the essential role that oysters play in the Bay ecosystem.

Shad: 9

(no change from 2012)

American shad numbers in the Chesapeake Bay and along the Atlantic coast remain low. Most traditional fisheries are closed. Rebuilding the formerly bountiful spring shad migrations up Bay rivers faces several challenges. Dams that block those migrations are the most direct impediment to restoring the fishery. The unintentional catch of shad in large-scale ocean fisheries also undermines recovery and must be a top priority for the agencies that manage fisheries in federal waters.

The spring 2014 shad run was relatively good in Virginia rivers, and the Potomac River remains a bright spot. But the Susquehanna River, the site of enormous historical shad runs, had its lowest number of returns since the Conowingo Dam fish lift began operations in 1997. The dam is currently undergoing relicensing. Improving upstream and downstream fish passage is a critical element in the relicensing.

State and federal efforts to re-stock shad juveniles have met their targets in recent years.

Once the most valuable fishery in the Chesapeake, shad are now in danger of being the forgotten fishery and will only recover with a formula that includes restocking of juveniles, protecting adult fish in the ocean and the Bay, and restoring access to historic spawning grounds.

Investing in the Future

Key to the success of any long-term plan to save the Chesapeake Bay and its rivers and streams is the environmental literacy of future generations of watershed residents. As our region's population continues to grow, it is critical that today's young people develop the knowledge and skills they need to make informed decisions and act as responsible clean-water stewards.

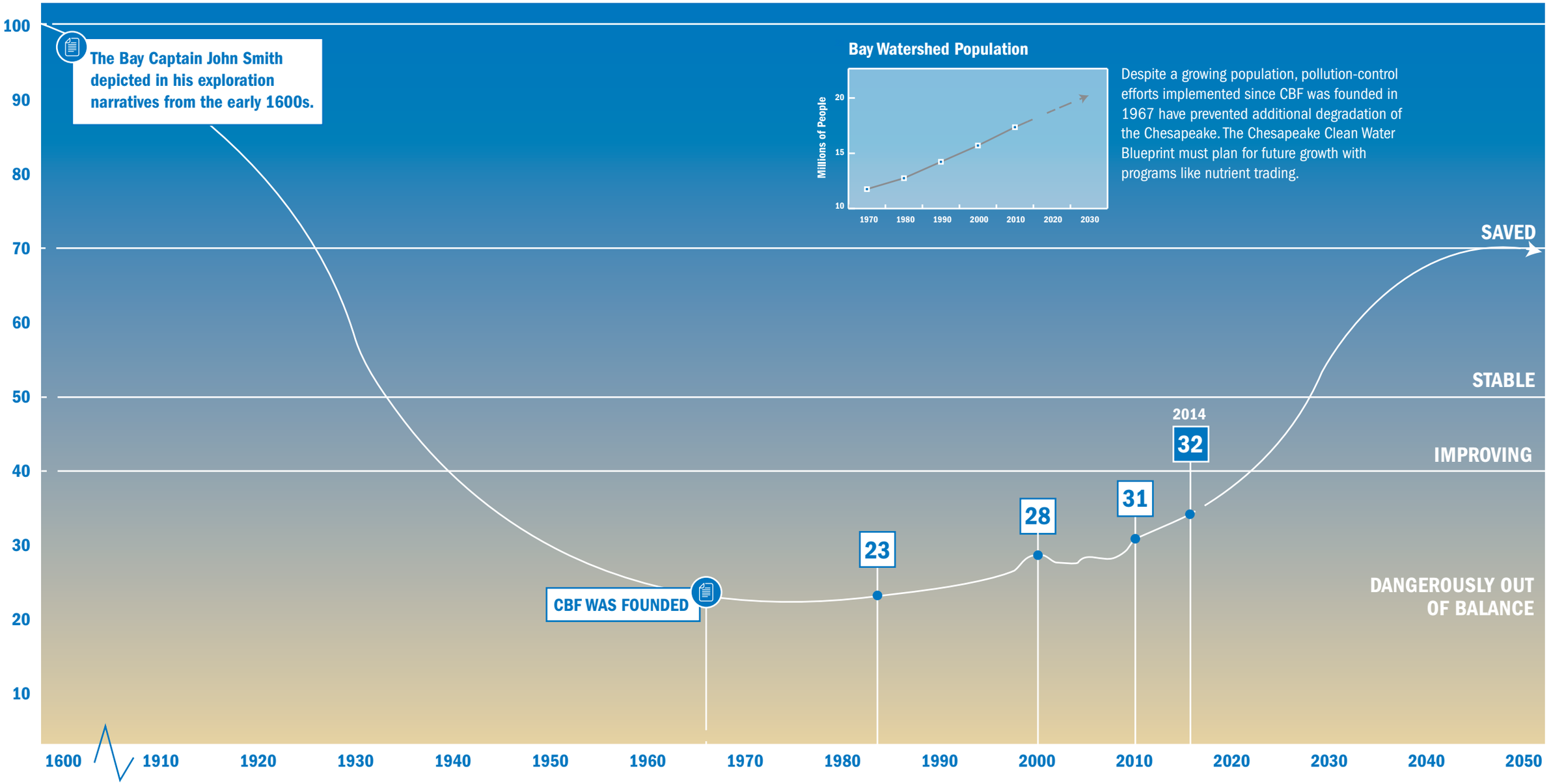
There are many building blocks needed to establish a solid foundation for environmental literacy. Reaching all students requires a systemic approach to environmental education. Teachers need tools and resources to teach about our watershed—in and out of the classroom. School leaders need to understand how environmental education can support overall achievement and help meet educational goals. Students need opportunities to explore and learn outside. And once they've been inspired to do more, they need meaningful ways to take action to protect and restore their local waterways.

The good news is that parents, teachers, and school administrators increasingly recognize the value of environmental education to student engagement and citizenship. Education agencies at the state and local levels have developed plans for increasing environmental literacy through programs, partnerships, and policies. Teacher and principal professional development programs provide much needed training in using the outdoors as a context for teaching and learning. Non-profit environmental organizations and natural resource agencies are partnering with schools to provide meaningful outdoor educational experiences for students of all ages. And students across the watershed are taking action at school and in the community—installing rain gardens, monitoring stream health, raising oysters, educating others, and much more.

Building on this momentum, the six Chesapeake Bay states and the District of Columbia have signed a Chesapeake Bay Agreement that includes a first-ever goal for environmental literacy. This plan commits leaders from around the Bay watershed to increase outdoor learning experiences for students, encourage environmental education during the school day, and support the "greening" of schools and schoolyards. If these commitments are met, the benefits will be long-lasting and far-reaching.

When schools and community partners collaborate to educate and inspire students, we make a sound investment in a clean and vibrant Chesapeake Bay for generations to come.

STATE OF THE BAY 2014



The State of the Chesapeake Bay is improving. Slowly, but improving. What we can control—pollution entering our waterways—is getting better. But, the Bay is far from saved. Our 2014 report confirms that the Chesapeake and its rivers and streams remain a system dangerously out of balance, a system in crisis. If we don't keep making progress—even accelerate progress—we will continue to have polluted water, human health risks, and declining economic benefits—at huge societal costs.

The good news is that we are on the right path. A Clean Water Blueprint is in place and working. All of us, including our elected officials, need to stay focused on the Blueprint, push harder, and keep moving forward. Saving the Bay and restoring local water quality will not just benefit us; clean water will benefit our children and all future generations.

Please contact your local, state, and federal officials and urge their unwavering support for the Chesapeake's Clean Water Blueprint. You can find information on how to do this at cbf.org/getinvolved.

How We Create Our Report

The *State of the Bay* report is based on the best available information about the Chesapeake for indicators representing three major categories: pollution, habitat, and fisheries. Monitoring data serve as the primary foundation for the report, supplemented by in-the-field observations.

We measure the current state of the Bay against the healthiest Chesapeake we can describe—the Bay Captain John Smith depicted in his exploration narratives from the early 1600s, a theoretical 100.

We assign each indicator a score and then average the scores in the three categories to determine the overall state of the Chesapeake Bay. Our number scores correlate with letter grades as follows:

70 or better	A+
60–69	A
50–59	B+
45–49	B
40–44	C+
35–39	C
30–34	D+
25–29	D
20–25	D-
Below 20	F

The Chesapeake Bay's 64,000-square-mile watershed covers parts of six states and is home to more than 17 million people.

Map:
Lucidity Information Design

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