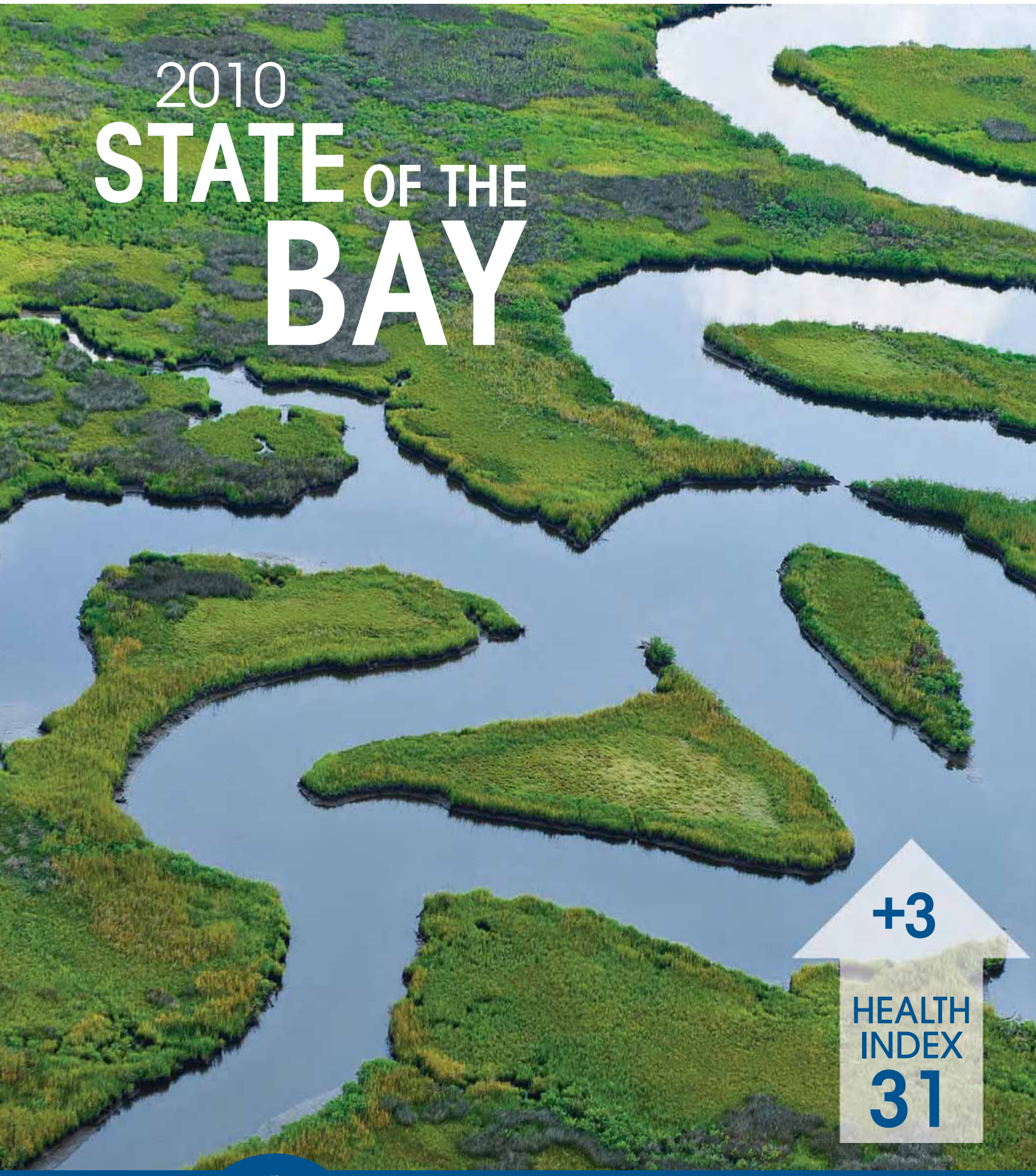
2010 STATE OF THE BAY



CHESAPEAKE BAY FOUNDATION

Saving a National Treasure

President's Message

Almost every day, I get asked how the Bay is doing. Recently, I started responding with an answer that I've long wanted to give. There are some encouraging signs of improvement. The index has increased three points since it was last issued for 2008.

But make no mistake, the Bay is still a system dangerously out of balance—the U.S. Environmental Protection Agency (EPA) lists the Chesapeake and its tidal tributaries as impaired. Health departments still caution people to stay out of the water for 48 hours after a heavy rain. Fish consumption warnings continue. Human health is at risk. And tens of thousands of jobs have been lost in fishing and related industries alone.

A Bay Health Index of only 31 versus a score of 100 when Colonial settlers arrived is a sad testament to how we have treated a National Treasure. There is a great deal left to do.

For a moment, however, let's celebrate the progress that has been made, even as we rededicate ourselves to a fight for the Bay's future.

Nothing could be more short-sighted than apathy, lax enforcement, or fear mongering. The time for action and stewardship is now.

Eight of CBF's 13 *State of the Bay* indicators have improved this year. In 2008, Maryland and Virginia set science-based regulations to curtail female crab catch, and this year's crab score leapt by 15 points. Underwater grasses, once devastated by pollution, are doing much better. That indicator score advanced by two. The dissolved oxygen, buffers, water clarity, and toxics scores showed measurable progress as well.

In part, these advances are the result of decades of advocacy that are starting to pay off.

But if the Bay is to reach that elusive tipping point we all seek, we will need a near revolution of public outrage and commitment. We must hold government accountable to enforce pollution reduction laws. And we must overcome those forces which argue that the environment is expendable, that it must be sacrificed to building "the economy." Consider the massive economic losses in the Gulf caused by oil pollution last summer. Here in the Bay region, ongoing pollution continues to eliminate thousands of jobs and increase the cost to all of us for clean drinking water and wastewater treatment.

Nothing could be more short-sighted than apathy, lax enforcement, or fear mongering. The time for action and stewardship is now.

William C. Baker
President

State of the Bay in 2010

POLLUTION

F
N Score=16
-1
D-
P Score=23

F
+5
Score=19

F
+2
Score=16

D
+1
Score=28

HABITAT

B+
+2
Score=58

D-
+2
Score=22

C+
Score=42

D+
+1
Score=31

FISHERIES

A
-1
Score=69

F
+1
Score=5

B+
+15
Score=50

F
Score=9

31

A	EXCELLENT
B	GOOD
C	FAIR
D	POOR
F	CRITICAL

Chesapeake Energy uses hydraulic fracturing to extract natural gas at this Windham Township site in Wyoming County, Pennsylvania.

POLLUTION: The Gas Rush

No one disputes the need for clean, efficient energy resources right here at home. Found 5,000 to 9,000 feet below the surface, the Marcellus Shale formation—lying beneath parts of New York, Pennsylvania, Ohio, Maryland, Virginia, and West Virginia—holds huge supplies of clean-burning natural gas.

Activity in the Marcellus Shale increased dramatically beginning in 2009 and is continuing to accelerate. Today, there are approximately 5,000 drilled or permitted wells in Pennsylvania alone, and some estimate there could be as many as 60,000 wells drilled by 2030 if trends continue.

There is increasing debate about drilling in the Marcellus Shale. Much of it focuses on drilling methods. Called hydraulic fracturing, or "fracking," this method uses a combination of water, sand, and chemicals to drill through the shale until the layer of gas is reached. Drilling advocates claim the process is safe, but a number of scientists and public health experts have called the claim into question. The U.S. Environmental Protection Agency (EPA) is studying the issue and intends to publish its findings by the end of 2012.

There is also concern about compliance. The Pennsylvania Land Trust Association reported last summer that since 2008 there have been 1,641 permit violations, of which 1,056 were deemed "likely to harm the environment." Preliminary studies by the Philadelphia Academy of Natural Sciences suggest that water quality may be degraded simply by the sheer number of well pads within a given region.

Also of concern are drinking water contamination; habitat and forest fragmentation; water withdrawal; management and treatment of waste water; costly stress on roads, bridges, and other infrastructure; siting of drill pads on pristine public lands; and the Pennsylvania General Assembly's failure to pass a severance tax, which would pay for the public costs of gas extraction.

Natural gas offers tremendous promise. At the same time, being vigilant about protecting our natural resources is everyone's responsibility.

F 16 ↓

Nitrogen

-1 from 2008

D- 23 ↔

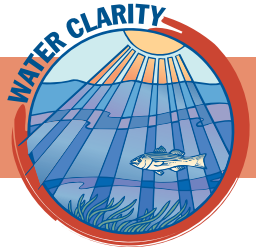
Phosphorus

no change from 2008

Amounts of nitrogen and phosphorus pollution to the Chesapeake remain highly influenced by river flows. In 2010, river flows and the associated pollution loads were well above normal during the winter and early spring (remember all that snow), but below normal in the late spring and early summer.

The total annual average ten-year loads to the Chesapeake Bay are 300 million and 18 million pounds respectively for nitrogen and phosphorus pollution. These loads are well above the recommended limits to restore the Chesapeake and the rivers and streams that feed it. The Bay Total Maximum Daily Load (TMDL), or pollution budget, calls for a 187-million pound cap on nitrogen and a 12-million pound cap for phosphorus.

To achieve these caps, the jurisdictions must reduce and better manage stormwater pollution from urban and agricultural areas, protect and restore natural filters like riparian forest buffers and wetlands, and control erosion from shorelines and construction sites. And, the U.S. Environmental Protection Agency (EPA) must see to it that the states effectively implement these programs.



F 16 ↑

Water Clarity

+2 from 2008

After decades of decline in water clarity, the last few years have witnessed consistent improvement. Water clarity is measured by the depth to which sunlight can penetrate. Sunlight is critical to the growth and survival of underwater grasses, which provide shelter for fish and crabs and food for migrating waterfowl. In addition, recent research indicates that the amount of sunlight that reaches the bottom influences whether or not nitrogen and phosphorus tend to be stored or released from bottom sediments. Bottom areas without sunlight release more nutrients into the water column, which then serve as fuel for more algae. The good news is that the converse is also true.

Both algal blooms, fed by nitrogen and phosphorus pollution, and suspended sediment particles are responsible for poor water clarity. To improve it, Bay jurisdictions must aggressively execute their Watershed Implementation Plans (WIPs) and EPA must ensure pollution reduction achievement.

F 19 Dissolved Oxygen

+5 from 2008

In a typical year, the size of the Bay's dead zone is heavily influenced by the amount of pollution that enters the Bay and its rivers. In particular, spring pollution loads feed summertime algal blooms that eventually die, sink to the bottom, and are decomposed by bacteria that use up oxygen in the process.

In 2010, pollution loads were well above normal during the early spring, but below normal in the late spring and early summer. This "frontloading" of pollution resulted in the development of a severe dead zone in June, but by July and August, dissolved oxygen conditions actually improved. Despite a substantial improvement in the score, dissolved oxygen still receives a failing grade because a huge amount of summer habitat remains off-limits for the Bay's fish, crabs, and even oysters. Reducing pollution to improve this indicator—and the Bay's capacity to support aquatic life—remains the main challenge of Bay restoration.

D 28 Toxics

+1 from 2008

The improved score this year is largely attributable to the remediation of a portion the Elizabeth River—one of the Chesapeake Bay's three toxic "hotspots." The effort, led by the Elizabeth River Project, included removing tons of black, toxic sediment from a section of the Southern Branch of the river and then planting marshes and wetlands along the shoreline known as Money Point. As a result, aquatic life has returned to these waters, long considered a toxic dead zone.

Efforts to restore the other two toxic hotpots—Baltimore Harbor and the Anacostia River—have lagged behind. In particular, cleanup of the largest industrial hazardous waste site in Baltimore Harbor, Sparrows Point, has been languishing despite a legal consent decree requiring cleanup and numerous violations of state and federal laws. In July, the Chesapeake Bay Foundation (CBF), seven local residents, and the Baltimore Harbor Waterkeeper sued the current and former owners of the site—seeking a full investigation and cleanup of pollution from the site.

Rainwater carries silt into a Mount Rainier, Maryland, storm drain, which eventually empties into the Chesapeake Bay.

HABITAT: Stormwater

When it comes to stormwater management, Edmonston, Maryland, is the little town that could. The small, working-class municipality on the banks of the Anacostia River in Prince George's County reduced the volume of rainwater washing off its main street by about 90 percent with a little help from Uncle Sam and a lot of leadership from the Mayor.

Elected officials usually wring their hands over stormwater management—controlling the volume and quality of rain water washing off streets, parking lots, and other hard surfaces into local creeks and rivers. It is the only source of nutrient pollution still increasing around the watershed. Eighty percent of nitrogen, and 66 percent of phosphorus loads to the Anacostia River come from stormwater.

But Edmonston Mayor Adam Ortiz understood that ignoring the problem would only make it more expensive to deal with later. He wanted Edmonston to become a model of what to do and what not to do with stormwater. In the process, Edmonston reduced pollution going into the Anacostia and spurred employment. The mayor believes the town's property values have likely increased, too.

With $1 million in federal job stimulus funds, the town narrowed Decatur Street, its main street, to allow room for special landscaping called "rain gardens," which filter and soak up stormwater. The town added porous pavement along curbs to further reduce runoff. A canopy of large, native oak, sycamore, and maple trees was planted along the thoroughfare.

Decatur Street was due for repaving, and Ortiz said the landscaping and other measures added little to construction costs. Yet, the mayor said he expects the improvements to save the town money in maintenance of its traditional stormwater facilities.

Other municipalities and counties are realizing the importance of stormwater management. But funding is limited. The time has come to establish dedicated funding sources to pay for such repairs and retrofits.

B+ 58 ↑ Forested Buffers

+2 from 2008

Pennsylvania, which continues to lead efforts to restore forested buffers in the watershed, is responsible for 90 percent of the roughly 700 stream miles planted between 2008 and 2009 (the most recent year for which data were available). Many of the gains watershed-wide were due to increased conservation dollars provided by the federal Farm Bill and the Chesapeake Bay Foundation (CBF) investment in restoration.

In addition to serving as filters—preventing nutrient and sediment pollution from reaching the water—forested buffers also provide habitat for wildlife, stabilize stream banks from erosion, and keep river waters cool, an important factor for many fish. Furthermore, an often overlooked, but critically important, benefit is that forested streams are two to eight times more efficient at removing nitrogen pollution in the water than non-forested streams.

As the states move to implement the Bay-wide Total Maximum Daily Load (TMDL) and their specific Watershed Implementation Plans (WIPs), each of them is relying heavily on planting buffers to achieve pollution reductions.

C+ 42 ↔ Wetlands

no change from 2008

Wetlands are natural filters that improve water quality by trapping and treating polluted runoff. They also provide important habitat for fish and wildlife and protect shorelines from the effects of flooding.

Despite these important ecological services, efforts to restore wetlands in the Bay watershed have fallen far short of established goals. As of 2009, the Bay states had achieved little more than half of the 25,000 acres restoration goal for 2010. States made some progress last year; in particular, Maryland was responsible for more than half of the 600 acres that were created between 2008 and 2009 (the most recent year for which data were available). In addition, permitted losses of wetlands have slowed in recent years, likely a reflection of the economic slow down and its continuing impact on land development.

CBF supports increasing efforts to protect and restore these ecologically valuable, and vulnerable, habitats.

D- 22 ↑ Underwater Grasses

+ 2 from 2008

Underwater grasses in the northern part of the Bay—like the Susquehanna Flats and the Elk and Gunpowder rivers—continued to flourish this year, providing a potential sign of ecosystem recovery. A recent study established a clear relationship between the abundance of underwater grasses in the Bay and levels of pollution and linked increased grasses in the Susquehanna Flats with declines in nitrogen levels. Moreover, scientists speculate there may be a positive feedback loop where the presence of grasses helps improve water clarity that, in turn, creates more favorable conditions for establishment of additional grasses.

Unfortunately, grasses in other parts of the Bay—like Eastern Bay, the Choptank River, and many parts of the Potomac River—continued to struggle. High water temperatures at the end of the summer appear to have stressed and killed eelgrass in the Lower Bay, a die-off that may have ramifications for the crab population, which relies on these grasses to hide from predators.

D+ 31 ↑ Resource Lands

+1 from 2008

This indicator score improved due to progress in protecting lands and the slowed pace of development.

In 2010, Pennsylvania added more than 11,000 acres to its preserved farmland total, which now exceeds 440,000 acres. Maryland conserved 76,000 acres of land in 2009 and more than 20,000 acres in 2010. And, Virginia conserved 63,000 acres within the Bay watershed in 2009, thus surpassing the 400,000-acre goal set by former Governor Kaine by more than 28,000 acres. Current Virginia Governor McDonnell has committed to an additional 400,000 acres by 2014, of which 37,000 were achieved through mid-November of 2010.

Unfortunately, legislation and policy to effectively slow sprawl and land conversion remain inadequate. As the economy improves, open land conversion will erode the watershed's important resource land base. In addition, thousands of acres of forest land are at risk from natural gas drilling in the Marcellus Shale formation (see page 5). Ultimately the region's water quality will suffer, unless governments implement stronger policies restricting these activities.

Now the only menhaden processor on the east coast, Virginia's Omega Protein Corp. vacuums up tons of menhaden onto ships that bring their catches to factories for processing into fishmeal and fish oil.

FISHERIES: Menhaden

Though not an indicator species in the Chesapeake Bay Foundation's (CBF) *State of the Bay* report, Atlantic menhaden are among the most important creatures in the Chesapeake Bay. A boney, oily fish not prized for human consumption, menhaden are prodigious "filter feeders," swimming in large schools with mouths agape to consume plankton (tiny floating plants and animals), thereby helping to maintain a balance of microscopic life in Bay waters.

Menhaden are also essential prey for many important Chesapeake Bay species, including striped bass, bluefish, weakfish, ospreys, herons, and marine mammals. Author Bruce Franklin has called menhaden "the most important fish in the sea" because of their critical ecological role.

Menhaden are the object of an intense commercial harvest in the Chesapeake Bay. Omega Protein Corp., the nation's largest producer of fishmeal, operates a fleet of menhaden purse seiners from Reedville, Virginia. Assisted by airplanes aloft to spot menhaden schools, the boats annually net between 85,000 and 90,000 tons of menhaden from the Bay. The company processes the fish into meal and oil used in animal feed, nutritional supplements, and other products.

For many years, fisheries scientists, including those at CBF, increasingly have been concerned about declining numbers of menhaden and the impact the commercial fishery has on the menhaden population. Consequently, the Atlantic States Marine Fisheries Commission (ASMFC) capped the Bay's menhaden harvest at 109,020 tons in 2006 and extended the cap again in 2009, pending further study.

A 2010 ASMFC analysis concluded that the population of Atlantic menhaden has fallen to historically low levels, having been overfished routinely for decades. Further action by ASMFC to establish more sustainable harvest limits is expected. Because of menhaden's critical ecological value up and down the food chain, CBF supports this likely action. The fishery must be managed conservatively so that large numbers are left in the water to benefit both the Bay and mankind.

A 69

Rockfish

-1 from 2008

Coast-wide numbers of rockfish (striped bass) are well above the fisheries management target.

There is, however, continued concern about the Chesapeake population of "stripers." In 2010, spawning success in the Chesapeake was below average for the third year in a row. While this is not unusual, it does mean that the population will likely decrease. Additionally, Chesapeake stripers are not migrating as far north as they have historically, which is typically a sign of population decline.

Rockfish born in the Chesapeake Bay spend their first four to eight years here before migrating. These "resident" stripers have been dying at increasing rates in recent years apparently as a result of mycobacteriosis, a serious disease not often seen at high levels in marine fisheries. Water-quality stress from exposure to low oxygen levels and poor nutrition from lack of sufficient forage species, especially menhaden, are two likely culprits.

While numbers of stripers are high, these warning signs raise concern.

B+ 50

Blue Crabs

+15 from 2008

The Bay's blue crab population more than doubled from a low of 120 million adult crabs in 2008 to 315 million in 2010. The increase was primarily the result of Maryland and Virginia cooperating to put in place tighter regulatory limits on crabbing, including cutting the catch of female crabs by a third. The protection of female crabs was intended to boost reproduction, a strategy that was validated when in 2010 the number of juvenile crabs jumped dramatically to 343 million after being below the average of 250 million for a dozen years.

Continuing science-based management of the crab fishery is essential for maintaining a stable population, but a fully restored and healthy crab population will require substantial improvements in water quality and habitat. Low dissolved oxygen levels have been shown to kill the bottom life essential as food for crabs, and loss of grass beds exposes crabs to increased predation by striped bass and other predators.

F 5 ↑

Oysters

+1 from 2008

While there is no definitive estimate of the total number of oysters in the Bay, their prospects have improved substantially during the last two years. Well over a billion oysters were planted in the Bay since 2008, and even with conservative survival assumptions, oyster numbers should be increasing. Disease mortality, the dominant cause of oyster losses in recent decades, has slowed significantly. The average rate of loss from disease in Maryland waters was 17 percent from 2005 to 2009, compared with 29 percent for the years 1985 to 2004. In Virginia where disease losses have been greatest due to high salinity, scientists are also reporting development of disease resistance in oysters.

Oysters nevertheless have a long way to go before they again fulfill their important ecological roles as builders of reef habitat and filters of Bay waters. Scientists and managers agree that oyster restoration must be scaled up substantially to be successful. However, budget shortfalls have limited the states' ability to do so.

F 9 ↔

Shad

no change from 2008

The numbers of American shad along the Atlantic coast are as low as they have ever been, and the Chesapeake Bay is not much different. Shad spend most of their lives in the ocean but migrate well upstream to spawn in freshwater tributaries. Pollution, migration barriers, and harvest can reduce their numbers. While programs to reopen spawning rivers to migration and stock hatchery-reared shad in target tributaries have shown success, shad numbers have not responded consistently.

The Potomac River has had the most apparent success, with numbers of returning adult shad increasing annually until a recent downturn. The shad run on the Susquehanna River, which had declined steadily in recent years, increased significantly in 2009 and 2010 but was still well below the previous high. Similar variable results have plagued the James, Rappahannock, Nanticoke, and Patuxent rivers suggesting that stocking programs are holding their own, but other factors are preventing progress. The most likely culprits seem to be predation on juvenile shad and bycatch in offshore fisheries.

Stormy skies hang over the marshlands surrounding Smith Island in the Chesapeake Bay.

TMDL & WIPS

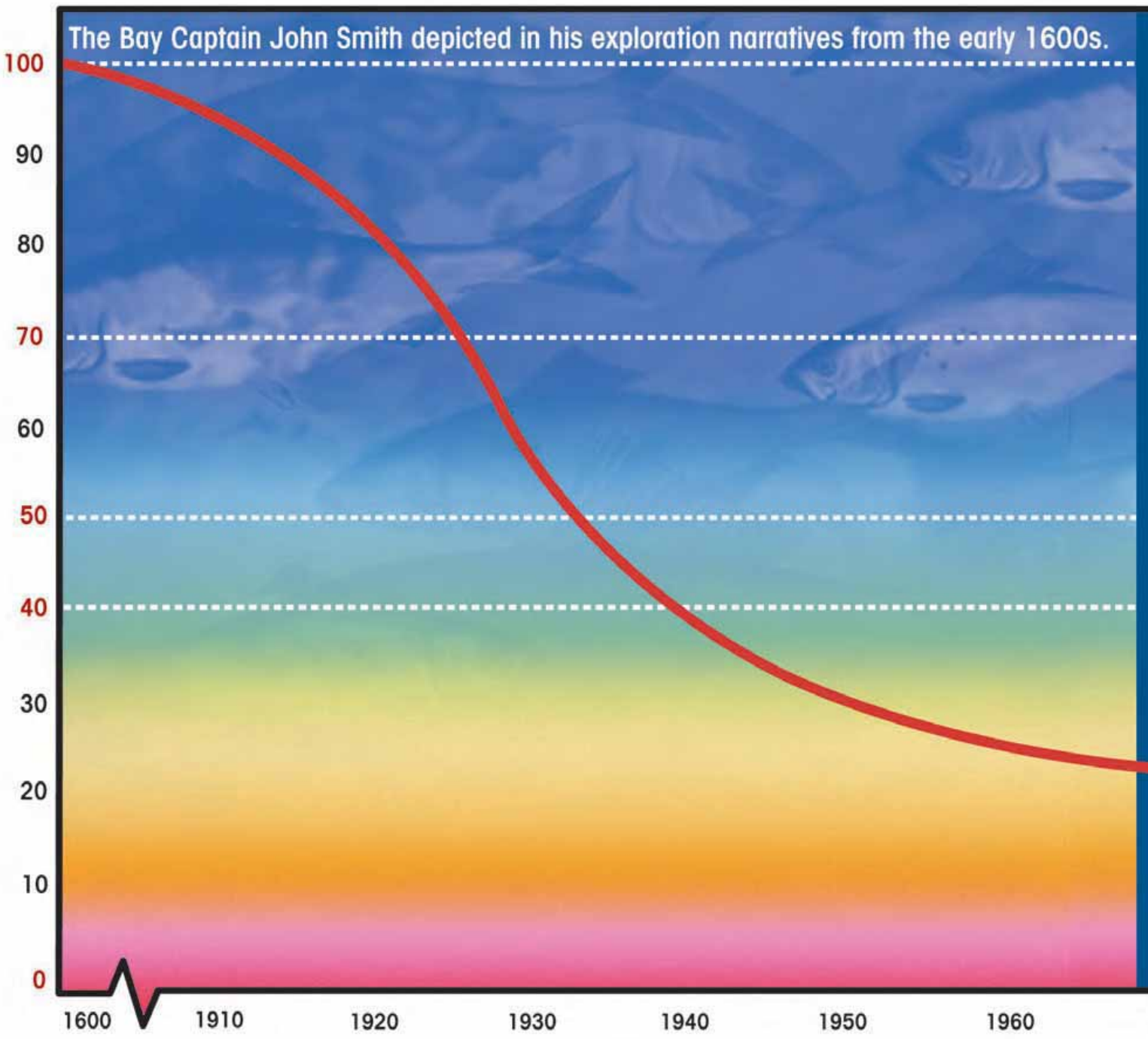
After decades of failure from voluntary efforts to save the Bay, the Chesapeake Bay Foundation (CBF) and many others are dedicated to achieving an enforceable pollution-reduction program and to finally get the Chesapeake and its tidal tributaries off the U.S. Environmental Protection Agency's (EPA) "impaired waters" list.

To comply with the Clean Water Act and a series of legal actions and negotiations, EPA is taking the lead in the development of a pollution diet for the Bay, called a Total Maximum Daily Load (TMDL). EPA has released a draft TMDL calling for annual reductions of approximately 25 percent in nitrogen and phosphorus and at least 16 percent in sediment flowing into the Bay and its tidal waters from the Chesapeake's six-state, 64,000-square-mile watershed.

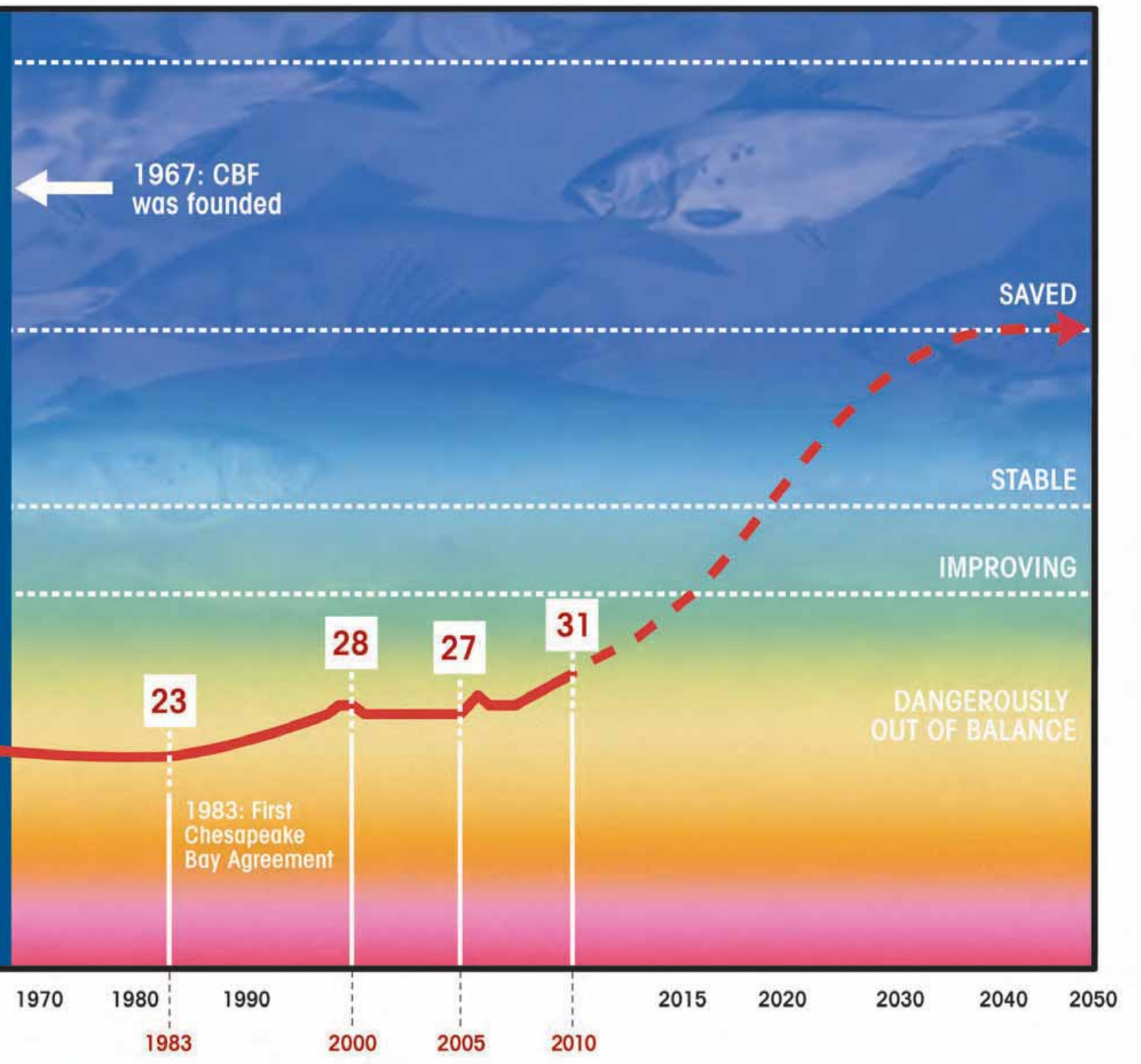
As part of the implementation of the TMDL, EPA has required each state and the District of Columbia to prepare jurisdiction-specific, pollution-reduction plans, called Watershed Implementation Plans (WIPs). EPA will evaluate the WIPs and then release its final TMDL by the end of December 2010, as required by the agency's settlement of the lawsuit brought by CBF and several other co-plaintiffs.

The requirement for the WIPs is one element that distinguishes this TMDL from any other. The WIPs must do two things. The first is explain how each jurisdiction will achieve its pollution reductions from various sources (e.g., sewage treatment plants or agriculture). The second is provide "reasonable assurance" that specify legislative, regulatory, funding, or otherwise enforceable guarantees that implementation occurs.

A second element distinguishing this TMDL is EPA's intent to invoke consequences for failed performance by the states. If a WIP is inadequate or not implemented, EPA can impose consequences, including withholding federal funds, requiring more reductions from permitted sources, or exercising other authorities it has under the Clean Water Act.



The health of the Chesapeake Bay is dangerously out of balance. Its degraded condition is especially staggering in the context of the public resources and attention focused on Bay health since the 1980s. Clearly, what public officials have done to date is insufficient, and has fallen short of their



commitments to restore water quality in the Bay. If we are to significantly reduce pollution, remove the Bay from the nation's "dirty waters" list, and restore our national treasure, it is time for urgent action; time to hold our government leaders accountable to get the job done.

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**

ABOUT THE COVER:
A team of internationally known photographers from the International League of Conservation Photographers (iLCP) donated time to help CBF. Many photos in this year's *State of the Bay* report are from their expeditions in August, 2010, including this beautiful aerial shot of wetlands.

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CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

Maryland
Philip Merrill Environmental Center
6 Herndon Avenue
Annapolis, MD 21403
410/268-8816
410/269-0481 (from Baltimore metro)
301/261-2350 (from D.C. metro)

Pennsylvania
The Old Water Works Building
614 North Front Street, Suite G
Harrisburg, PA 17101
717/234-5550

Virginia
Capitol Place
1108 East Main Street, Suite 1600
Richmond, VA 23219
804/780-1392

District of Columbia
725 8th Street SE
Washington, DC 20003
202/544-2232

Web site: cbf.org
E-mail: chesapeake@cbf.org
Membership information: 888/SAVEBAY

Chesapeake Bay Watershed

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

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