


# STATE of the BAY 2018



CHESAPEAKE BAY  
FOUNDATION

*Saving a National Treasure*



*Scientists are  
pointing to  
evidence of the  
Bay's increasing  
resiliency.*

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## Building Resiliency

Experts agree that the science-based Chesapeake Clean Water Blueprint is our last chance to Save the Bay. Since the Blueprint's beginning in 2010, the Bay has been improving. But as this year's *State of the Bay* shows, progress is never a straight line.



MIKE BUSADA/MIKE B PHOTOGRAPHY

Simply put, the Bay suffered a massive assault in 2018. Extraordinary weather flushed enormous amounts of nitrogen, phosphorous, and debris—mostly from Pennsylvania, but also from other regions—off our lands and into the Bay. As a result, the *State of the Bay* score fell one point to a 33, equivalent to a D+.

The good news is that Bay grasses remain intact and recent studies indicate an improving trend in underwater dead zones over the long term. Scientists are pointing to this as evidence of the Bay's increasing resiliency. The Blueprint is working, but the system remains dangerously out of balance. And new challenges like climate change and a federal administration attempting to roll back fundamental environmental protections are threatening success.

Now more than ever, it is imperative for all 18 million of us who live in the Bay watershed to keep the pressure on our elected and appointed leaders. We can achieve the greatest environmental success story the world has ever seen. But only if we continue to work together, follow the science, and enforce the Blueprint.

Save the Bay!

A handwritten signature in white ink that reads "Will Baker". The signature is fluid and cursive.

William C. Baker, President



*The Blueprint is working, but the system remains dangerously out of balance.*

SANDRA ABEL

## How We Create Our Report

The *State of the Bay* report is based on the best available information about the Chesapeake Bay 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 show below.

70 or better .....	A
65–69 .....	A–
60–64.....	B+
55–59.....	B
50–54.....	B–
45–49 .....	C+
40–44.....	C
34–39.....	C–
30–33.....	D+
25–29 .....	D
20–24 .....	D–
19 or below .....	F

# STATE of the BAY

2018  
HEALTH  
INDEX:

33 **D+**  
-1 from 2016

	Indicator	2018 Score	Change From 2016	Grade
<b>POLLUTION</b>	Nitrogen	12	-5	<b>F</b>
	Phosphorus	19	-9	<b>F</b>
	Dissolved Oxygen	42	+2	<b>C</b>
	Water Clarity	16	-4	<b>F</b>
	Toxics	28	0	<b>D</b>
<b>HABITAT</b>	Forested Buffers	57	0	<b>B</b>
	Wetlands	42	0	<b>C</b>
	Underwater Grasses	25	+1	<b>D</b>
	Resource Lands	33	+1	<b>D+</b>
<b>FISHERIES</b>	Rockfish	66	0	<b>A-</b>
	Blue Crabs	55	0	<b>B</b>
	Oysters	10	0	<b>F</b>
	Shad	10	-1	<b>F</b>

# STATE of the BAY 2018

KIRAN KRISHNAMURTHY



**More significant rain storms could be the new normal. And that means more pollution running off farm fields and city streets into the Bay.** That is what happened in the summer of 2018. Nitrogen and phosphorus pollution increased significantly because of record rainfall. Water clarity was disrupted by sediment runoff and algal blooms fed by the additional nutrients.

Despite these effects, there are signs that the Bay is more resilient and better able to cope with extreme weather. For instance, in August, scientists observed that the underwater grass beds on the Susquehanna flats remained robust and dense, despite the summer's severe storms.

What does it all mean? The summer of 2018 is a stark reminder that the Bay's recovery is fragile. We have a long way to go, especially as climate change intensifies. And, the federal government could significantly undermine our progress by rolling back regulations that would have resulted in nitrogen reductions to the Chesapeake Bay.

*See pages 6 and 7 for details on nitrogen, phosphorus, dissolved oxygen, clarity, and toxics.*



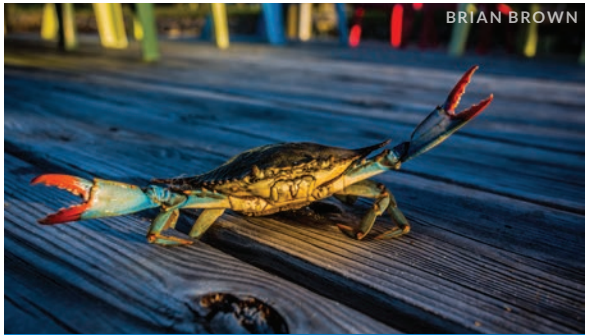
# HABITAT

**Forests, wetlands, and underwater grasses are the vital organs of the Chesapeake Bay ecosystem.**

They offer food, protection, and a home for the wildlife and aquatic life of the Bay. These habitats also help us, cleaning our air and water, slowing flood waters, and producing oxygen. Recognizing this, the six Bay states and the District of Columbia pledged years ago to protect and increase forested buffers (trees and other vegetation planted along streams), wetlands, and underwater grasses. Despite this commitment, there was no change from 2016 in our indicator scores for buffers or wetlands, reflecting limited progress. We did see a small but encouraging increase in underwater grasses, and while we are still far short of our restoration goal, 2017 marked the highest acreage of underwater grasses ever recorded.

Our resource lands indicator looks at the rates at which we are protecting open spaces, like forests and farmland, versus losing land to subdivisions and strip malls. A slight increase in the score is driven by fairly robust land protection efforts in Maryland, Virginia, and Pennsylvania.

*See pages 8 and 9 for details on forested buffers, wetlands, underwater grasses, and resource lands.*



# FISHERIES

**Healthy fish, crab, and oyster populations mean a healthy Bay.** Rockfish and crab populations remained stable over the past two years, and the State of the Bay scores remained unchanged. Populations are considered sustainable, thanks to wise management policies from the state and coastwide management partners. And while once abundant, American shad remained at all-time lows.

For oysters, the picture is mixed. Oyster populations remained at low levels, and wild fishery harvests were down dramatically, but oyster aquaculture continues to thrive. Notably, the Lafayette River was declared restored for oysters in 2018. As a result of these factors, the oyster score remains unchanged.

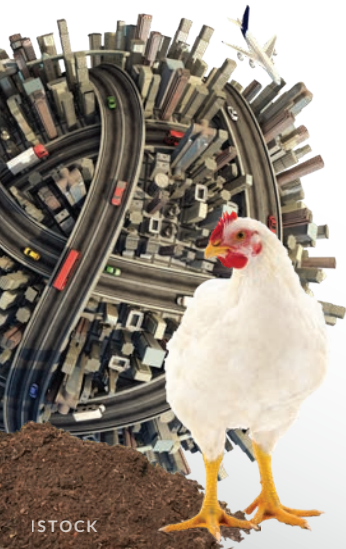
The steady growth of underwater grasses, and the shrinking of low oxygen dead zones should help the crab population in coming years. Shad could be helped by dam removals and better management of offshore fisheries, but hurt by budget cuts for stocking programs.

*See pages 10 and 11 for details on rockfish, blue crabs, oysters, and shad.*

# NITROGEN & PHOSPHORUS

**12 F** (-5 from 2016)

**19 F** (-9 from 2016)



In 2018, the Chesapeake watershed saw record-setting rainfall, and, with rain comes phosphorus and nitrogen pollution. In 2017, pollution loads were about average. Overall, the result is a substantial drop in the scores relative to 2016. Winter and early spring water flows down the Susquehanna, the largest river feeding the Bay, were higher than average in both years. And record rainfall during the summer of 2018 caused flooding and more pollution to enter the region's waterways.<sup>1</sup>

The Bay's health will always be influenced by the weather. Unfortunately, climate change models suggest the region will experience more frequent and severe storms in the future.<sup>2</sup> That said, the situation is far from hopeless. Fully implementing the state-specific, pollution-reduction plans included in the Chesapeake Clean Water Blueprint will mean less polluted runoff and flooding during storm events. We must continue to advocate for strong regulations and policies that support meeting the goals of the Blueprint, including the need to address climate change.

# DISSOLVED OXYGEN

**42 C** (+2 from 2016)



Spring rainfall plays a large role in determining the size of the Chesapeake Bay's dead zone (areas of low or no oxygen) in summer. With rain comes the runoff of nitrogen and phosphorus pollution that feeds algal blooms. The algae eventually die, sink to the bottom, and are decomposed by oxygen-consuming bacteria. Scientists use the historic relationship between spring pollution loads and dead zone size to do a forecast the upcoming summer. For the past two years, scientists have predicted a larger-than-average dead zone, based on above-average pollution loads.<sup>3</sup>

In 2017, the size of the Bay's dead zone was the second smallest on record.<sup>4</sup> In 2018, the dead zone was average.<sup>5</sup> Factors like wind can affect the accuracy of the dead zone forecasts, and wind did help reduce the dead zone in both 2017 and 2018. But there may be more to the story. A recent study by scientists at the University of Maryland indicates the Bay is responding to pollution-reduction efforts by starting to help itself.<sup>6</sup> Scientists have detected a change in a feedback loop in the Bay's bottom waters that results in less fuel for algae and oxygen-consuming bacteria, and therefore more oxygen in bottom waters. One of the study's authors, a well-respected scientist, noted: "It's hard to overstate the significance of these findings."<sup>7</sup>



# WATER CLARITY

16 **F** (-4 from 2016)



After three years of improving water clarity, Bay-wide clarity dropped in 2017,<sup>8</sup> and 2018 appeared even worse. The summer of 2018 was characterized by a persistent algal bloom on the western shore and punctuated by periods of drought and torrential rains, especially in late July and August when record rainfall, upstream in the Susquehanna watershed, brought muddy water and lots of debris downstream to the Chesapeake Bay. The U.S. Geological Survey estimated that the freshwater flows into the Bay in August 2018 were the highest ever recorded for that month.<sup>9</sup>

These storms provide a stark visual reminder that we have not finished the job of restoring local waters and the Chesapeake Bay. They also provide a glimpse of how climate change will make restoration more challenging by increasing the frequency and severity of storm events. To that end, we must ensure the full implementation of the Blueprint's pollution-reduction plans by the 2025 deadline and the institution of strong regulations and policies that support those goals and address climate change.

# TOXICS

28 **D** (no change from 2016)



The assessment of this indicator is difficult as there is no watershed-wide monitoring program.<sup>10</sup> Two upcoming studies should help fill some of these data gaps. In 2019, the U.S. Geological Survey will complete a five-year study on the effects of known endocrine-disrupting compounds and chemicals of emerging concern on fish and wildlife in the Chesapeake region. In 2020, the University of Maryland and U.S. Department of Agriculture will complete a study that will provide information on the occurrence of toxic compounds in oysters and mussels.

Progress reducing toxic contaminants, however, may be undermined by the U.S. Environmental Protection Agency's proposals to roll back regulations. For example, in 2017, EPA reversed a 2015 proposal to ban chlorpyrifos, a very toxic insecticide that is ranked third on the Chesapeake Bay Program's Toxics of Concern list.<sup>11</sup> In 2018, EPA released regulations regarding the storage of coal-ash, a by-product of coal-fired electricity generation, that fail to adequately protect ground and surface waters from toxic pollutants. Coal-ash is stored along many of the region's waterways, including the Potomac and James Rivers. CBF will continue to fight the rollback of these and other regulations, like those affecting air emissions from coal-fired power plants and automobiles, that jeopardize Bay restoration efforts.

# FOREST BUFFERS

57 **B** (no change from 2016)



ISTOCK

Planting trees along streams is one of the most cost-effective practices to improve water quality and habitats in the Bay watershed. Forested buffers trap and remove pollution from runoff, and their deep roots absorb nitrogen in shallow groundwater. A recent study estimated that buffers provide over \$10,000 per acre in value.<sup>12</sup> In addition to water-quality benefits, these values include flood prevention, outdoor recreational opportunities, and better air quality. Despite these benefits, planting of forested buffers continues to be far off track from goals established in the states' pollution-reduction plans. Only 344 acres were reported planted between 2016 and 2017 (most recent data), far off the 14,000 acres-per-year needed.

New initiatives offer hope. In April 2018, the Keystone 10 Million Trees Partnership was launched. Coordinated by CBF, this collaborative effort committed to planting 10 million trees, most of them streamside, throughout Pennsylvania by 2025. In addition, Pennsylvania Senator Bob Casey introduced the Conservation Reserve Enhancement Program (CREP) Improvement Act that was eventually included in the final version of the federal Farm Bill.<sup>13</sup> This provision is designed to improve delivery and implementation of CREP—the U.S. Department of Agriculture program that pays for a majority of the region's forested buffers.

# WETLANDS

42 **C** (no change from 2016)



EDWARD EPISCOPO

Wetlands are among the most important natural resources found in the Chesapeake Bay watershed. They provide valuable wildlife habitat and act as natural filters that improve water quality by trapping and treating polluted runoff. They also can help mitigate the impacts of climate change by reducing flooding and minimizing storm surge. Despite these multiple benefits and long-standing commitments by the Bay partners to protect and restore wetlands, progress toward the region's wetland goal has nearly come to a halt.

The most recent commitment, in the 2014 Chesapeake Watershed Agreement, was a goal of creating or reestablishing 85,000 acres of tidal and non-tidal wetlands to the watershed by 2025. At the current rate of implementation, it will take 67 years to achieve this goal. To make matters worse, EPA recently proposed repealing the 2015 "Waters of the United States" regulation that provided protection for non-tidal wetland habitats nationwide.

There is some good news, though. In 2018, the U.S. Army Corps of Engineers developed a draft Chesapeake Bay Comprehensive Water Resources and Restoration Plan. This federal plan is a road map for where and how the corps' mission areas can be used to complement ongoing efforts to achieve the Bay restoration goals. A major focus of the plan was to identify opportunities for restoration of wetlands and other valuable habitats.

# UNDERWATER GRASSES

25  (+1 from 2016)



Underwater grasses provide the habitat and clear water that fish and crabs need to survive and grow. In 2017, the Virginia Institute of Marine Science (VIMS) mapped an estimated 104,843 acres of grasses in the Chesapeake Bay and its tidal rivers—the highest ever recorded—and marked the third consecutive year that grasses increased Bay-wide.

A recent study linked this recovery of underwater grasses to long-term reductions in nitrogen and phosphorus pollution.<sup>14</sup> According to the co-authors: “Our study validates 30 years of environmental policy and provides a road map for future ecological restoration.” In other words, the Chesapeake Bay Blueprint is working and must be continued. State and federal funding for the VIMS survey must also be continued. A funding shortfall is projected for 2019.

Early 2018 reports indicated that grasses in many areas remained robust; unfortunately, torrential rains in late July through September wreaked havoc on water clarity, raising concerns about survival of grasses. How the grasses respond will be telling. Theoretically, as grasses become healthier and more resilient, they are better able to withstand the vagaries of mother nature. We should learn more from the 2019 VIMS survey.

# RESOURCE LANDS

33  (+1 from 2016)



Maintaining resource lands—well-managed farmland, forests, and natural open areas—is important for water quality. The picture for this indicator is mixed.

From 2007 to 2017, developed land across Pennsylvania, Maryland, and Virginia increased at a rate of about 40,000 acres annually. Using the latest Chesapeake Bay Program data from the same period, calculations show that the same states lost about four percent of their Bay watershed farmland, an unsustainable average rate of 28,000 acres per year.

Recalculated forestland trends show some good news. From 2007 to 2017, Pennsylvania's forestland numbers held steady, and Virginia lost less than one percent of its forest cover, about 64,000 acres. The largest ten-year forest loss by percentage (more than one percent) has been in Maryland, some 28,000 acres, with the highest rates of loss in Maryland's developing counties.

From 2011 to 2017, permanently protected resource lands in the Bay watershed portions of Pennsylvania, Maryland, and Virginia increased by more than a million acres, an average annual addition of 150,000 acres. By 2018, these states' protected watershed land reached 8.3 million acres. Between 2014 and 2016, however, the amount of land actively being protected in Virginia annually decreased.

# ROCKFISH

**66 A-** (no change from 2016)



ISTOCK

Rockfish, one of the Chesapeake Bay's most iconic fish, have been holding their own in Bay waters, thanks in part to management actions taken in 2015 that sought to help stem the population's 10-year decline. These actions have helped provide more consistent reproduction throughout the Bay region. While juvenile numbers have been strong, the third largest since 2005, adult females have recently declined, prompting concern for this important segment of the population. In 2019, the Atlantic States Marine Fisheries Commission will complete a new assessment of the population's status, which will likely result in new management actions to attempt to reverse this decline.

Good fishery management decisions and pollution reduction go hand-in-hand toward improving the health of the Bay's rockfish population. Bay states have made strides to protect young striped bass in the Bay. Maryland requires the use of circle hooks when using natural baits, which helps increase the survival rates of released fish, especially during summer months. Reduced pollution improves important foraging habitats such as underwater grasses that are key to maintaining a healthy rockfish population in the region. Recent management efforts to ensure robust amounts of prey such as menhaden will also pay dividends for striped bass if fully adopted.

# OYSTERS

**10 F** (no change from 2016)



ISTOCK

The Bay's oyster recovery is showing both success and cause for concern. In late 2018, a host of partners celebrated the completion of reef construction in the Lafayette River, the first tributary in Virginia to complete such efforts. In Maryland, recent monitoring of the Bay's first restored tributary, Harris Creek, shows more than 95 percent of reefs are meeting the success criteria for the number of oysters. These success stories highlight how partnerships that help ensure crucial funding, the best available science, successful implementation, and community support are key to restoring the Chesapeake Bay's oyster population. These restoration successes, however, are tempered by the continued poor performance of the wild oyster fishery. Oyster harvests in Maryland were down nearly 45 percent in 2016 and 2017. Virginia's total oyster harvests have remained stable at around 600,000 bushels for the past several years. The state's growing oyster aquaculture industry accounts for much of Virginia's total harvest.

Unprecedented rainfall in 2018 will likely limit the production of young oysters, especially in Maryland waters. Restoration projects that help supplement wild oysters and appropriate management of the wild oyster fishery are key to Bay restoration efforts. In 2018, to help ensure goals are met, the Chesapeake Oyster Alliance was formed to accelerate oyster recovery efforts and add 10 billion new oysters to the Bay by 2025.

# BLUE CRABS

**55 B** (no change from 2016)



ISTOCK

The iconic Chesapeake Bay blue crab continues to show that complexities abound when it comes to managing this species. In 2017, adult females reached a record high of 254 million, juvenile numbers dropped dramatically, and adult males dipped slightly. In 2018, the population displayed some resilience despite the cold winter with adult male and female crabs declining, but the number of juvenile crabs increasing.

Overall, the crab population remains stable and not overfished, but there is room for improvement. Conservative management approaches adopted by Maryland and Virginia in 2008 have helped ensure that fishing levels are in line with the size of the population. Maintaining strong female spawning populations is key to a more robust and resilient population. Fortunately, habitat improvements resulting from the Chesapeake Bay Blueprint are likely to help the Bay's blue crab population. In 2017, underwater grasses continued to show signs of improvement, and long-term data indicate the size of the Bay's low-oxygen dead zone continues to shrink, providing more habitat and food for this bottom-dwelling species. These are positive signs that water-quality improvements are helping the recovery of critical habitats for juvenile crabs.

# SHAD

**10 F** (-1 from 2016)



YURI HUTA

Populations of American shad, the largest of the Bay region's herring species and once an iconic sign of the coming of spring, remain at all-time lows. Although Potomac River populations continued to rebound, other rivers, like the Susquehanna, experienced record low returns. Fishery biologists in Virginia have also seen declines in the returns of adults in the Pamunkey River where broodstock were previously harvested for restoration purposes.

Although some shad runs are showing promise, challenges remain for rebuilding this species. Budget cuts and low returns for stocking programs have led to the shutdown of several shad stocking efforts with others under threat. For the first time in more than 20 years, no shad were stocked in the James River, leading to questions about whether this historical spawning ground will ever recover. Fishery managers are hoping to better understand the impacts of incidental catches of shad in offshore fisheries, which undermine the success of stocking efforts.

Fortunately, Chesapeake Bay states are still pursuing fish passage projects that are opening historic spawning habitat for these species. Removal of the Bloede Dam on the Patapsco River in Maryland is one of the latest examples of this important ongoing work.



## Taking Action: Moving Forward

The Chesapeake Bay's restoration has the potential to be the most dramatic example of environmental recovery ever seen. The Chesapeake Clean Water Blueprint is working. Underwater grasses continue to thrive. And dead zones are shrinking. The Bay is improving and becoming more resilient, but the recovery is fragile. Climate change and the current federal administration both present new and significant challenges.

The Chesapeake Bay and its rivers and streams can become the model of environmental improvement—collaborative restoration based on science that can restore watersheds and clean water across the globe. A healthy Bay is essential to a vibrant economy and the lives of the watershed's 18 million residents.

That's why we have launched the Making History campaign. Focused on restoring two of the Bay's most effective natural filters—trees and oysters—the campaign will improve water quality, engage new advocates, and drive economic benefits across the region. Together with our partners, members, and other supporters, we can ensure a healthy Bay for us, our children, and grandchildren. Our efforts today will create a cleaner environment tomorrow.

This is history in the making. Now it is time to take action and finish the job.

**Please contact your local, state, and federal officials and urge them to support the Chesapeake Clean Water Blueprint.**

For information on how to do this and to learn about the Keystone 10 Million Trees Partnership and the Chesapeake Oyster Alliance, please visit [cbf.org](http://cbf.org), [chesapeakeoysteralliance.org](http://chesapeakeoysteralliance.org), and [tenmilliontrees.org](http://tenmilliontrees.org).

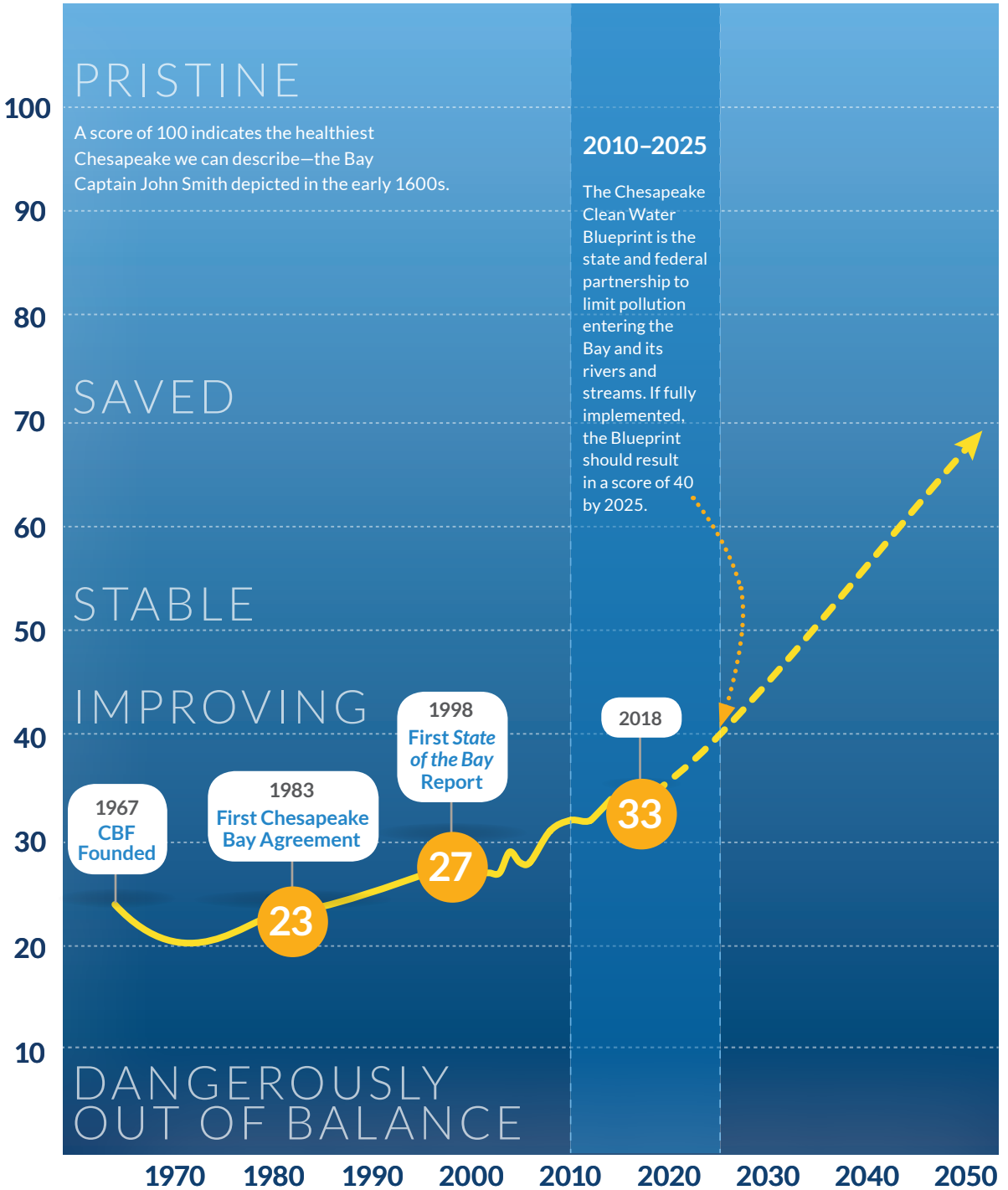


Chesapeake  
**OYSTER ALLIANCE**  
10 Billion for the Bay



Keystone  
**10 MILLION TREES**  
PARTNERSHIP

ISTOCK





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*Saving a National Treasure*

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### ENDNOTES

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