STATE *of the* BAY 2020

CHESAPEAKE BAY FOUNDATION

Saving a National Treasure

BILL PORTLOCK/CBF STAFF

Saving the Bay can be the world's greatest environmental success story...

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Finishing the Job

The Chesapeake Clean Water Blueprint—its pollution limits, accountability framework, and 2025 deadline—may be our last chance to save the Bay. It's working. But this year's State of the Bay reminds us the system remains dangerously out of balance, the road ahead is steep, and the clock is ticking.

In 2020, the score declined one point to 32, a D+, largely due to ineffective management of striped bass. Of the 13 indicators assessed, four declined. Nitrogen and phosphorus scores improved. Long-term data trends show a shrinking dead zone. Large-scale oyster restoration is working.

Still, efforts must drastically accelerate to implement the Blueprint by 2025 and reach a target score of 40. The Trump administration reversed dozens of clean-air and -water regulations, undermining forest and wetland protections and our ability to fight climate change, and failed to enforce the Blueprint's terms. Already facing a challenging road to the finish line, these actions put the entire restoration effort further at risk. In September, CBF, our partners, three watershed states, and the District of Columbia sued the U.S. Environmental Protection Agency to do its job. We won't back down until EPA holds all Bay states accountable for their pollution-reduction commitments.

Saving the Bay can be the world's greatest environmental success story and a model for tackling the existential threat of global climate change. We must demand our elected and appointed leaders follow science, enforce the Blueprint, and invest in finishing the job.

Save the Bay, save the planet!

William C. Baker, President

ANNE DAVIS

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

2020 HEALTH INDEX: 32 D+

–1 from 2018

	Indicator	2020 Score	Change From 2018	Grade
POLLUTION	Nitrogen	17	+5	F
	Phosphorus	27	+8	D
	Dissolved Oxygen	44	+2	C
	Water Clarity	17	+1	F
	Toxics	28	0	D
HABITAT	Forested Buffers	56	–1	B
	Wetlands	42	0	C
	Underwater Grasses	22	–3	D–
	Resource Lands	33	0	D+
FISHERIES	Rockfish	49	–17	C+
	Oysters	12	+2	F
	Blue Crabs	60	+5	B+
	Shad	7	–3	F

STATE of the BAY 2020

CORABELLA DIEGUEZ

KRISTA SCHLYER/ILCP

POLLUTION

Pollution knows no state boundaries. That's why the Chesapeake Clean Water Blueprint requires each of the six Bay states and the District of Columbia to reduce pollution flowing into the watershed's rivers, streams, and coastal waters. In 2020, we saw signs these pollution-reduction efforts are working: less nitrogen and phosphorus, a smaller dead zone, and improving water clarity. But favorable weather conditions also played a role, and the Bay's recovery remains fragile. Progress to date has relied heavily on pollution reductions at wastewater treatment plants. To meet the Blueprint's goals and ensure long-term water-quality improvements, efforts to reduce pollution from agriculture and urban and suburban runoff must accelerate—especially in Pennsylvania, which remains far off track largely due to a lack of resources to help farmers implement conservation practices. The influence of climate change, which scientists expect will intensify storms and wash more pollutants into waterways, must also be addressed.

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

JESSICA EARLE

HABITAT

Forests, wetlands, and underwater grasses are critical to the health of the Chesapeake Bay. They provide food and shelter to wildlife like blue crabs, ducks, brook trout, and many other species. They serve as natural filters that reduce pollution flowing into rivers, streams, and the Bay. And they help improve the wellbeing of communities by slowing flood waters, producing oxygen, and providing green spaces. Unfortunately, existing wetlands are under assault from rollbacks of key federal protections, and the federal program that has historically funded the planting of new streamside forest buffers in the Bay region is languishing. Development of farmland and forests also continues, though the total amount of protected lands increased in Maryland, Pennsylvania, and Virginia through 2019. Additionally, record-setting rainfall events in both 2018 and 2019 continued to impact the survival of underwater grasses, which have struggled after reaching their largest extent in 40 years in 2018. It's another example of how climate change threatens the Bay's recovery.

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

BRIAN BROWN

FISHERIES

Fish and shellfish support thousands of jobs and generate billions of dollars each year in the Bay watershed. But overfishing, pollution, and habitat loss have reduced the productivity of many of the region's fish and shellfish populations. One bright spot is the work to restore large-scale oyster reefs in more than 10 targeted tributary rivers in Maryland and Virginia, which is showing promising results and has paved the way for new investments—especially in Virginia. The blue crab population also remains healthy, though water-quality improvements that reduce dead zones and expand underwater grass habitat are important to help numbers fully rebound. Rockfish (striped bass), however, show worrisome trends. The fish were well below sustainable levels in 2019, and there has been below-average spawning activity in the Bay over the past two years, highlighting the need for bold management actions to rebuild the population. Science-based management remains critical for restoring oysters and sustaining blue crab populations, as well.

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

NITROGEN & PHOSPHORUS

17 F (+5 from 2018) **27 D** (+8 from 2018)

ISTOCK

In 2020, watershed-wide pollution loads were slightly below average and lower than in 2018. Nitrogen and phosphorus pollution from the Susquehanna and Potomac Rivers was well below the 10-year average, partially a reflection of below-average precipitation. The benefits of pollution-reduction measures may also be at play. For example, analysis of long-term trends (2009 to 2018) indicate significant reductions in pollution loads at roughly 40 percent of non-tidal, water-quality monitoring stations.[1] That said, trends in pollution loads at some stations are increasing over time.

This is not time to give up on water-quality goals. The 2025 deadline for implementing the Chesapeake Clean Water Blueprint is approaching, and we must accelerate implementation by ensuring sufficient state and federal funding. In particular, Pennsylvania, the state with the biggest pollution-reduction gap to close, must establish a state agricultural cost-share program to assist farmers. At the same time, we should expand scientific understanding of the effects of management actions and use this information to inform restoration efforts.

DISSOLVED OXYGEN

44 C (+2 from 2018)

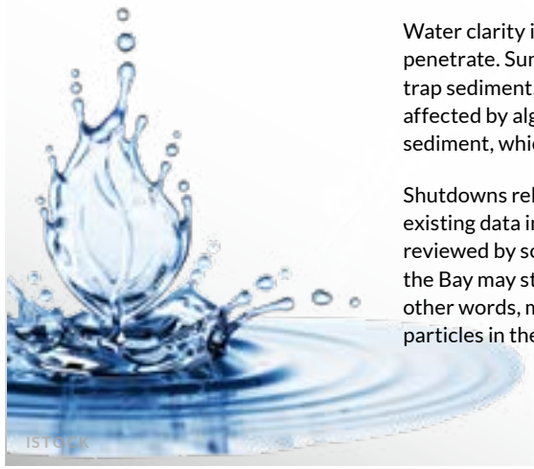
ISTOCK

The amount of nitrogen and phosphorus flowing into the Bay during the spring largely influences the size of the summer dead zone (areas with low or no oxygen). The pollution feeds algal blooms that are decomposed by oxygen-consuming bacteria. Based on this relationship, scientists predicted a slightly smaller-than-average dead zone in 2020.[2] In fact, monitoring data indicated the 2020 dead zone was the seventh smallest in the past 35 years.[3]

Scientists attributed this outcome to both weather and pollution reductions. This July, the warmest on record,[4] had worse than average dead zone conditions since warmer water holds less oxygen and impedes oxygen mixing into deeper waters. But cooler than normal temperatures in May and September, and winds from Hurricane Isaias that mixed and redistributed oxygen in the water column in August, resulted in better-than-average conditions overall. The small dead zone is also evidence pollution reductions are improving Bay resiliency. In 2018, scientists found a positive feedback loop—as the dead zone grows smaller due to pollution-reduction efforts, there is a change in how the Bay processes and cycles nutrients that ultimately will result in more oxygen in bottom waters.[5]

WATER CLARITY

17 F (+1 from 2018)



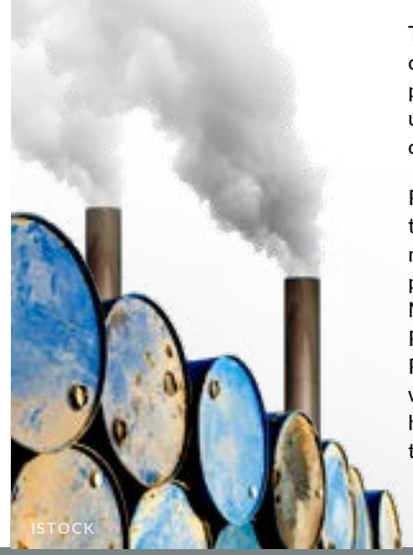
ISTOCK

Water clarity is measured as the depth in the water column to which sunlight can penetrate. Sunlight is vital to the growth and reproduction of underwater grasses, which trap sediment, add oxygen to the water, and provide habitat. Water clarity is negatively affected by algal blooms fueled by phosphorus and nitrogen pollution and suspended sediment, which enter the Bay through runoff from agricultural and urban lands.

Shutdowns related to COVID-19 affected water-clarity monitoring in early 2020, but existing data indicate an improvement over 2018. Three decades of data recently reviewed by scientists at the Chesapeake Bay Program revealed that, although waters in the Bay may still look cloudy to the human eye, light attenuation trends are improving[6]—in other words, more light is penetrating through the water due to changes in the types of particles in the water that block sunlight.

TOXICS

28 D (no change from 2018)



ISTOCK

The Chesapeake Bay Program concluded in a 2019 report[7] that a wide range of toxic contaminants continue to degrade water quality in the Bay and threaten fish and wildlife populations. Conditions appear static—neither worsening nor improving—though our understanding of the fate and effects of toxic chemicals, especially new and emerging ones, is hampered by limited information.

Polychlorinated biphenyls (PCBs), long banned in the U.S., continue to drive most of the fish consumption advisories in the Bay watershed.[8] Emerging contaminants include microplastics, personal care products, and pharmaceuticals. Recent studies also found per– and polyfluoroalkyl substances (PFAS) in the blood of fish from Antietam Creek in Maryland, the South Branch of the Potomac River in West Virginia, and the Susquehanna River in Pennsylvania,[9] as well as in water collected from St. Mary's River in Maryland.[10] PFAS are a group of man-made chemicals used in products such as nonstick cookware, water-repellant fabrics, and fire-fighting foam. They can accumulate in fish, foods, and humans, and there is evidence of adverse effects in humans and wildlife.[11] The effects on the Bay ecosystem are unknown for these chemicals and many others.

FOREST BUFFERS

56 B (–1 from 2018)

ISTOCK

Streamside forest buffers help prevent nutrient and sediment pollution from reaching waterways. They also enhance a stream's ability to process and remove nitrogen, prevent flooding, reduce air pollution, and are a cost-effective way to improve water quality in the Bay. Forest buffer planting remains far off track from state-established goals, and the cumulative acres of forest buffers in the Bay watershed decreased from 2014 to present.[12]

Programs exist to increase forest buffers in critical locations. For example, the Keystone 10 Million Trees Partnership, coordinated by CBF, is committed to planting 10 million trees throughout Pennsylvania by 2025. Since 2018, CBF, the partnership, and others across Pennsylvania have planted roughly 1.92 million trees.

Changes to the 2018 Federal Farm Bill aimed to improve delivery and implementation of the U.S. Department of Agriculture's (USDA) Conservation Reserve Enhancement Program (CREP), which historically funded the majority of buffers in the region. Unfortunately, the USDA has not embraced these legislative changes, and the program is languishing, leaving questions about CREP's role in attaining the watershed's forested buffer goals by 2025.

WETLANDS

42 C (no change from 2018)

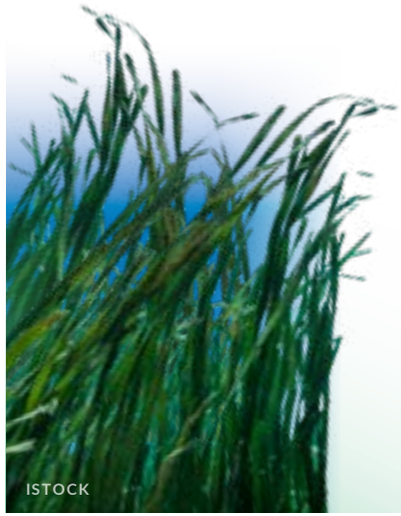
EDWARD EPISCOPO

Wetlands, both tidal and non-tidal, are among the most important natural resources found in the Chesapeake Bay watershed. Wetlands include swamps, bogs, marshes, ephemeral pools, many shallow areas of our rivers and creeks and the Bay, and even some forested areas. They provide habitat for wildlife and nursery areas for fish, as well as filter and remove pollutants from uplands and surface waters. Their ability to mitigate storm surges and reduce flooding is becoming increasingly critical as the watershed faces new threats and challenges from severe storms and sea-level rise occurring due to climate change.

We are losing wetlands, in part, due to a combination of sea-level rise and land subsidence. That said, 9,103 acres of wetlands were created on agricultural lands between 2010 and 2017.[13] There has been no watershed-wide assessment of wetlands in more than a decade, making it challenging to discern whether there is a net loss or gain across the watershed. However, we can say with certainty that protections for wetlands are greatly threatened. The U.S. Environmental Protection Agency has proposed to repeal and replace the 2015 Clean Water Rule. If successful, thousands of acres of wetlands within the Bay watershed would be vulnerable to destruction. CBF has joined many other organizations in staunchly opposing these proposed changes.

UNDERWATER GRASSES

22 D– (–3 from 2018)


ISTOCK

Underwater grasses provide the food, habitat, and oxygenated water that fish and crabs need to survive and flourish. Grasses need clear water and sunlight to thrive, making them a good indicator of water quality. In 2019, the Virginia Institute of Marine Science (VIMS) mapped an estimated 66,387 acres of grasses in the Chesapeake Bay and its tidal rivers, a 38 percent decrease from 2018 and the lowest-recorded acreage in the Bay since 2013.[14] The largest declines were seen in Tangier Sound's widgeon grass—a species notorious for its boom-and-bust population dynamics.

Record-setting rainfall events in both 2018 and 2019 wreaked havoc on water clarity, impacting the survival of grasses. Preliminary observations suggest improved conditions in 2020, but overall grasses appear down relative to their highpoint in 2018, when an estimated 108,000 acres thrived. Recent research indicates that, with respect to underwater grasses, nutrient reductions are more important for water clarity than sediment reductions.[15] This finding affirms the need to continue implementation of the Chesapeake Clean Water Blueprint to reduce the amount of nitrogen and phosphorus that runs off agricultural and urban lands into local streams, rivers, and ultimately the Chesapeake Bay.

RESOURCE LANDS

33 D+ (no change from 2018)[16]

ISTOCK

Maintaining undeveloped resource lands—including well-managed farmland, forests, and natural open areas—is vitally important to water quality. Significant open land conversion to development continues in Pennsylvania, Maryland, and Virginia, averaging about 33,000 acres per year between 2009 and 2019.

Since 2009, Maryland lost just under one percent of its forestland base, a term that refers to existing forests. Virginia experienced a 0.2 percent loss from its base, while Pennsylvania added 1.37 percent more forest. Pennsylvania's gain meant that the three states overall gained 83,000 acres of forest since 2009. On the other hand, Maryland lost close to six percent of its farmland over the same period, Pennsylvania lost nearly seven percent, and Virginia lost 1.6 percent. Together, the three-state average farmland loss was 14,000 acres per year since 2009.

In total, the amount of lands protected from development increased in the three states through 2019, though the amount of protected lands added annually in Maryland decreased each of the last three years. Pennsylvania's farmland protection program saw annual increases, and Virginia's land-conservation efforts had several solid recent years.

ROCKFISH

49 C+ (–17 from 2018)

ISTOCK

The most recent data on the rockfish (striped bass) population highlight worrisome trends for this iconic Bay species. In 2019, a new estimate of the population showed it well below sustainable levels. Coupled with below-average spawning activity in the Chesapeake Bay in the past two years, these indicators underscore the need to take bold action to rebuild the population to levels observed in the early 2000s.

The Atlantic States Marine Fisheries Commission (ASMFC), the interstate cooperative that manages striped bass, is taking action on two fronts. First, the ASMFC began efforts to increase the population by requiring Maryland and Virginia adopt new regulations that would result in an 18 percent reduction in striped bass harvest. Although both states have adopted regulations that close and shorten certain fishing seasons, Maryland took a piecemeal approach that raises serious concerns about its effectiveness. Second, the ASMFC recently took action to ensure more menhaden, one of striped bass' top food sources, are available to support a recovering population. While these measures are an important start, the ASMFC and the states must implement further management actions that more effectively limit striped bass mortality and improve striped bass habitat.

OYSTERS

12 F (+2 from 2018)

ISTOCK

Record rainfall events in 2018 increased oyster mortality and severely limited reproduction in some areas of the Bay. Fortunately, tributary-scale restoration efforts continue, and data from these efforts indicate success. During the last two years, Maryland and Virginia completed 343 and 21 acres of reef restoration projects in the Little Choptank River and the Eastern Branch of the Elizabeth River, respectively. In addition, the final two tributaries targeted for large-scale restoration were selected. This progress paved the way for unprecedented new investments by Virginia, and renewed investments by the U.S. Army Corps of Engineers, in oyster restoration efforts.

Maryland's updated 2020 oyster stock assessment showed an improvement in the number of adult oysters since the 2018 stock assessment. Unfortunately, regulations implemented in Maryland have failed to reduce fishing rates or resolve chronic overfishing. A group of diverse stakeholders will use the stock assessment to develop recommendations for long-term oyster management in Maryland that hopefully reverses the trajectory of decline. Virginia recorded abundant spat sets (juvenile oysters) last year and has seen above-average reproduction three of the last four years. Ensuring these oysters are managed in a way that both increases adult biomass and allows for successful oyster harvest is important for the long-term health of the resource.

BLUE CRABS

60 B+ (+5 from 2018)

ISTOCK

The Chesapeake Bay blue crab population continues to exhibit relative stability, with some expected variations from year to year. Although the most recent population estimate declined slightly, it remained within the bounds fishery scientists consider healthy. Moving forward, it is important for fishery managers to maintain current plans that focus on protecting adult female crabs. The population has only reached its target number of adult females—215 million—once during the last four years, and the population remains below the highs recorded in the early 1990s, indicating there is room for improvement.

Maryland and Virginia are both piloting programs to improve harvest reporting, a long-running recommendation from Bay scientists to improve our understanding of blue crab populations. But fishery management is only one aspect of ensuring a healthy blue crab population. Water-quality improvements that help restore underwater grasses and reduce dead zones will help provide much-needed habitat and food for blue crabs. Underwater grass beds are important nursery areas for juvenile blue crabs as they migrate back into the Chesapeake Bay each summer, and reducing the size of the summer dead zone increases the availability of food in the bottom-water habitats where adult blue crabs commonly forage.

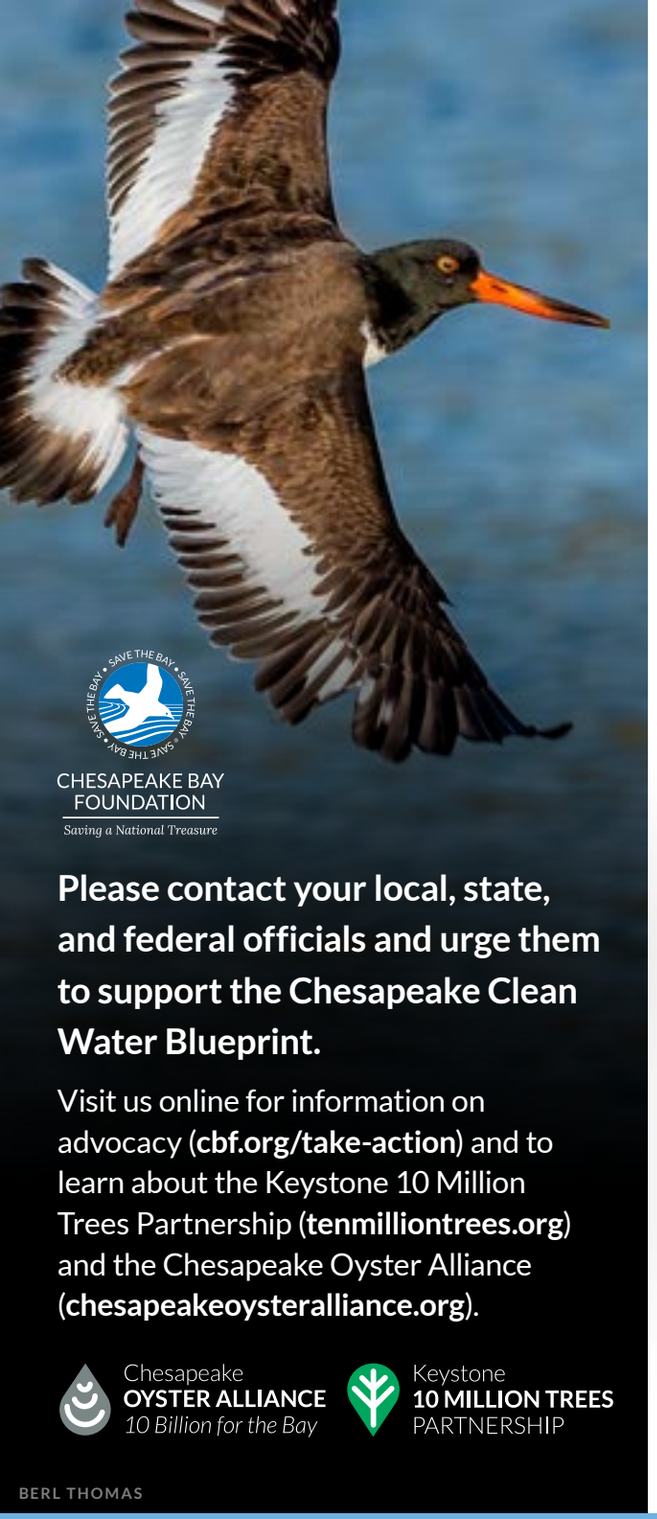
SHAD

7 F (–3 from 2018)

YURI HUTA

American shad once supported one of the largest fisheries in Chesapeake Bay, but the population has been subjected to many stressors. Numerous habitat restoration projects, fish passage efforts, and a moratorium on shad fishing since the 1980s have failed to result in a population rebound. In fact, a recently published estimate of the population classified it as "depleted" and labeled the population status in most Chesapeake Bay tributaries as "unknown" or, as in the Potomac River, "unsustainable."

Most Chesapeake Bay tributaries have more than 70 percent of their historical spawning habitat open to shad. The Susquehanna River is a notable exception, where more than 90 percent of historical shad spawning habitat is blocked by the Conowingo Dam. Operation of the dam's fish ladder, which allows some passage of fish, did not occur due to COVID-19 restrictions in 2020. Although much historical habitat is now open to spawning fish returning from the Atlantic Ocean each spring, that habitat is often degraded due to excess nutrient and sediments. In addition, there are significant concerns that non-native predators, like blue catfish, are having negative impacts on the shad population, especially on juveniles. These concerns highlight the need to prioritize dam-removal projects, improve water quality in the spawning reaches, and develop markets for non-native predators.



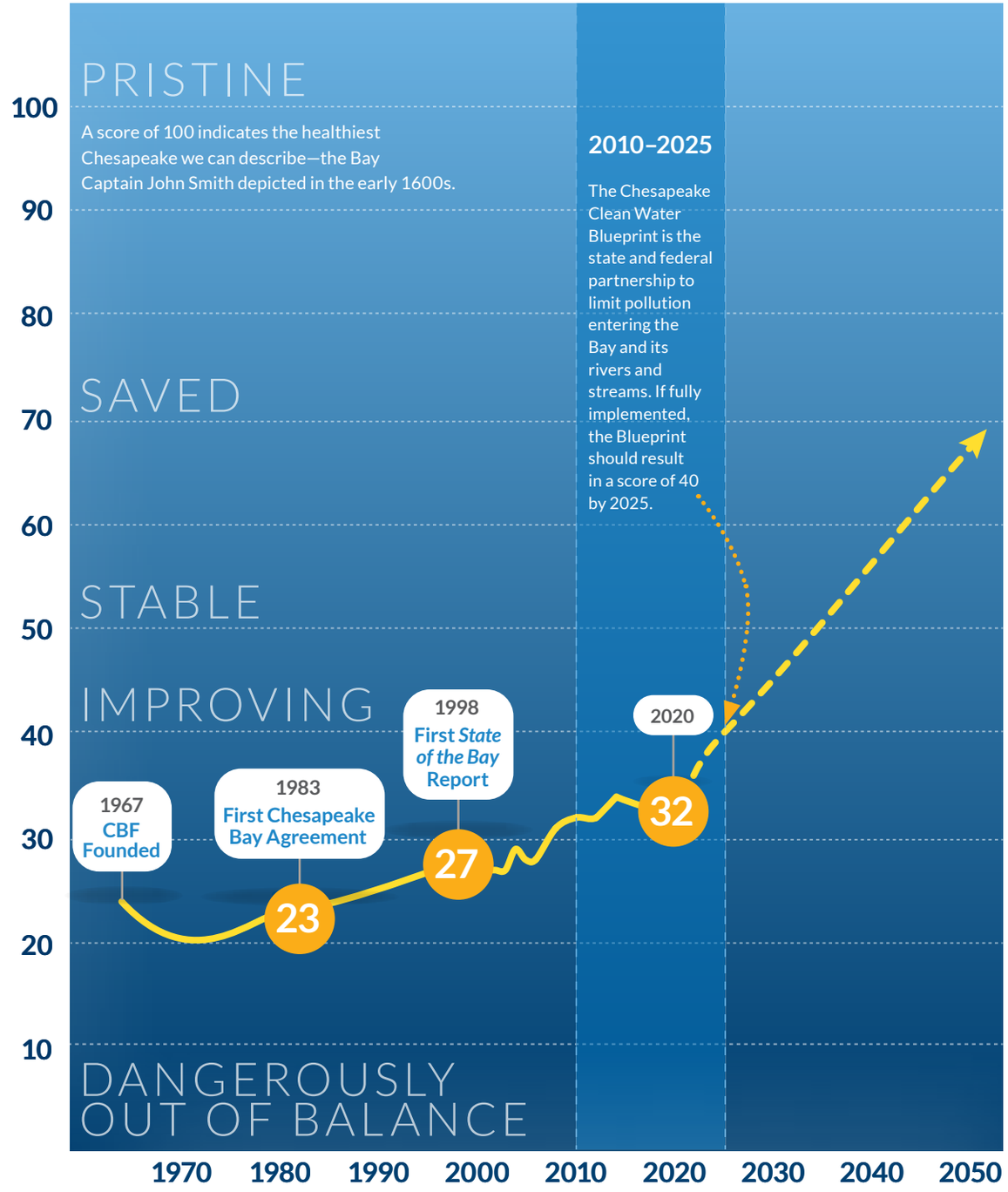
Moving Forward: Follow the Science

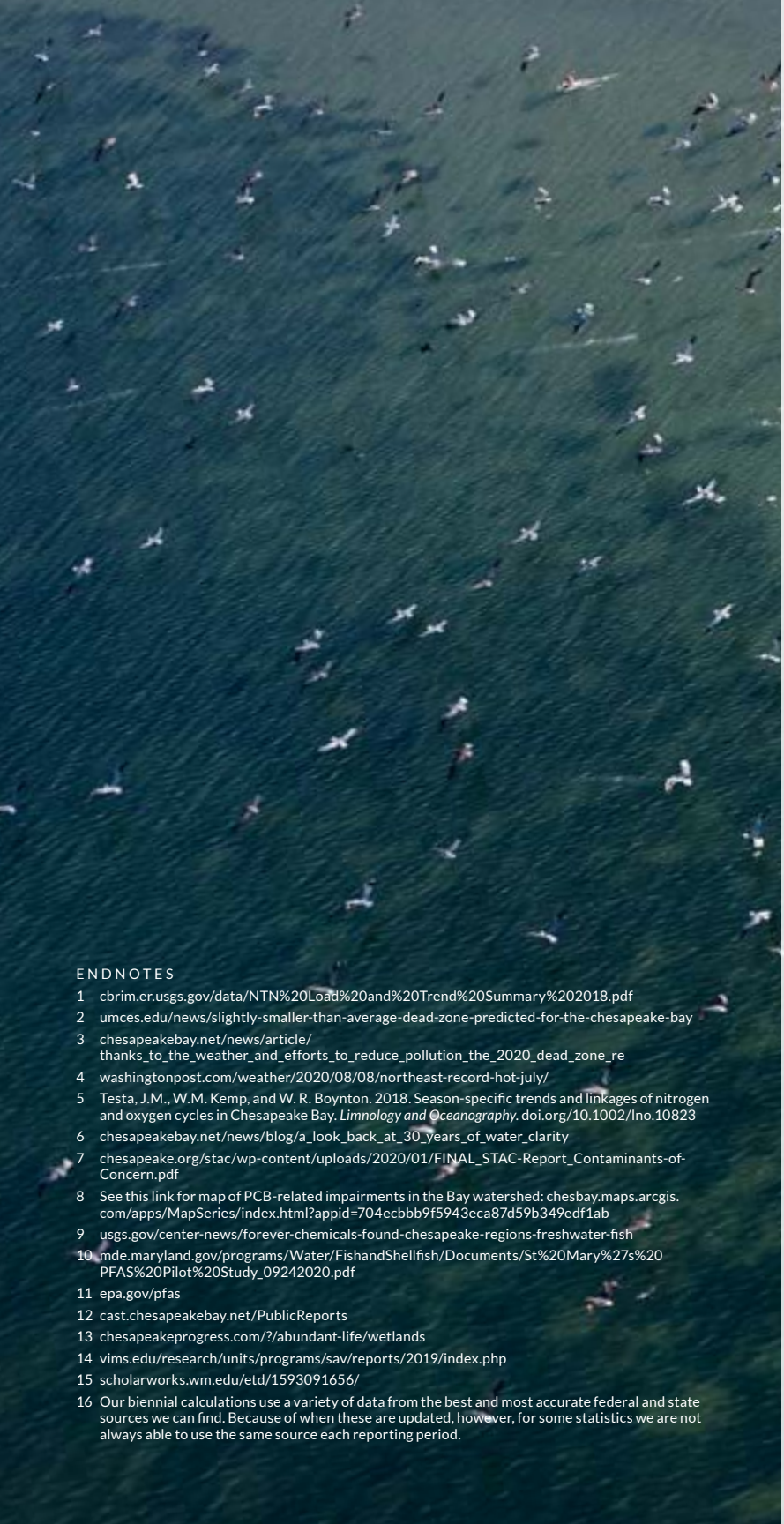
The Chesapeake Bay restoration effort is unprecedented in scale and scope. A saved Bay will provide an estimated $130 billion annually in natural resource benefits to the region and model a path for national and global environmental restoration.

Indicators of the Bay's health show that substantial challenges remain. Climate change. Regulatory rollbacks. Legacy pollution. Population growth. There is no panacea, but the science remains clear: collective action is essential.

We launched the Making History Campaign to build partnerships and accelerate efforts to restore two of the Bay's most effective natural filters—trees and oysters—to improve water quality, engage new advocates, and drive economic benefits across the region.

The Chesapeake Clean Water Blueprint calls for the six Bay states and the District of Columbia to have practices in place by 2025 to meet pollution-reduction targets. The Bay's resiliency in the face of mounting pressures shows the Blueprint works . But the lack of improvement in the State of the Bay score reaffirms the need to reinvigorate public and political will. We can deliver a clean, vibrant Bay to the next generation, but only if our elected officials follow the science, redouble their clean water commitments, and invest in finishing the job.





ENDNOTES

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15 scholarworks.wm.edu/etd/1593091656/
16 Our biennial calculations use a variety of data from the best and most accurate federal and state sources we can find. Because of when these are updated, however, for some statistics we are not always able to use the same source each reporting period.

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