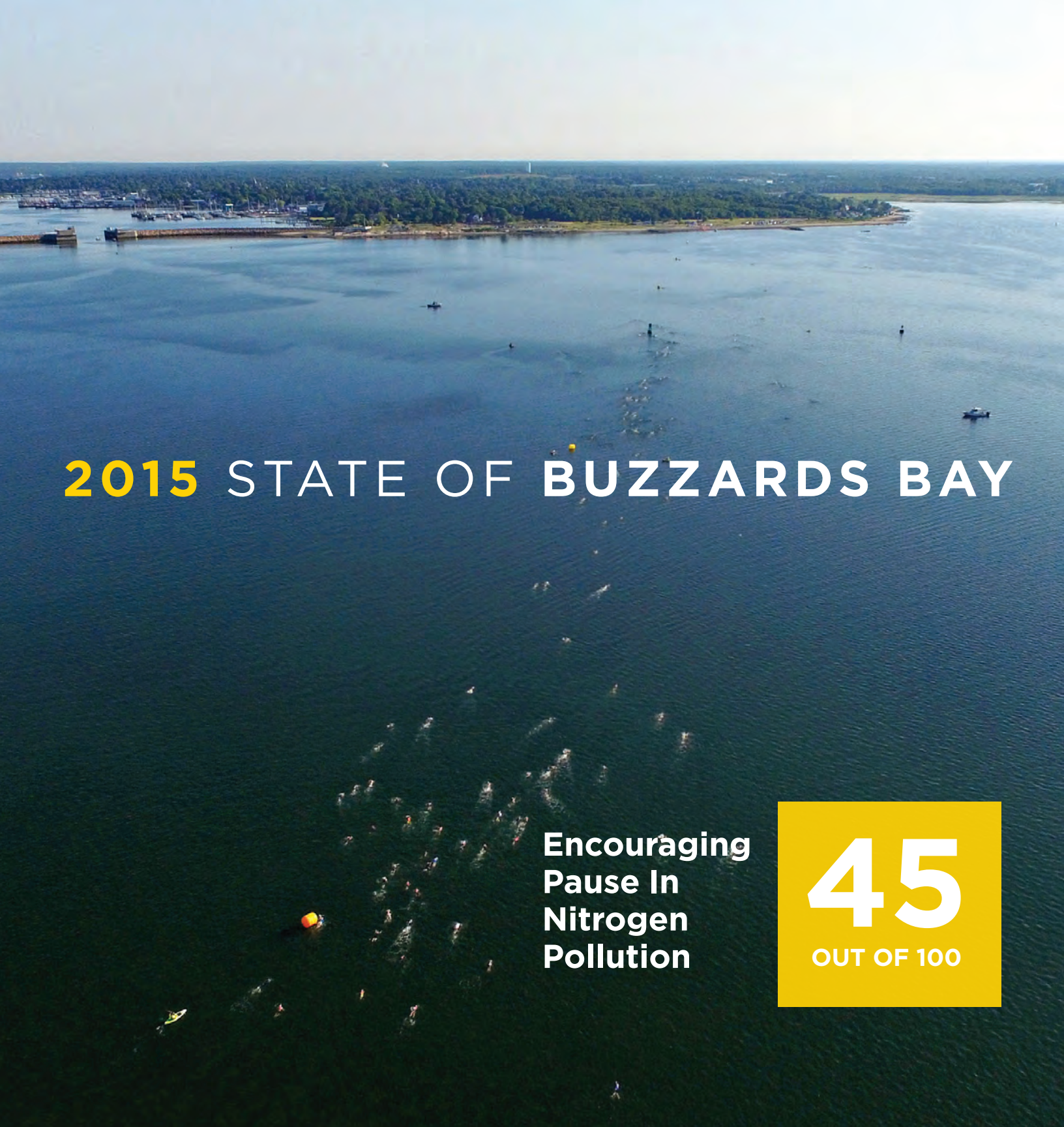


2015 STATE OF BUZZARDS BAY

Encouraging Pause In Nitrogen Pollution

45
OUT OF 100

ON THE COVER

Swimmers participating in the 23rd Buzzards Bay Swim race across outer New Bedford Harbor in celebration of significant water quality improvements there over the past two decades. (Photo: Paul Curado)

buzzards BAY COALITION

The Buzzards Bay Coalition is a membership-supported non profit organization dedicated to the restoration, protection and sustainable use and enjoyment of Buzzards Bay and its watershed. Founded in 1987, the Coalition works to improve the health of the Bay ecosystem for all through education, conservation, research and advocacy.

Learn more at:

www.savebuzzardsbay.org

Unchanged 2015 State of the Bay score reflects encouraging pause in nitrogen-related declines

There's an adage, "To get out of a hole, first stop digging." Since the beginning of our quadrennial State of the Bay reports in 2003, we have documented troubling trends in the overall health of Buzzards Bay. To fix any problem, you first need to arrest what got you in that situation. Only then can you begin to actually get yourself out of the hole you've found yourself in.

The data analyzed for the 2015 State of the Bay suggests that we could be at just such a turning point in the ongoing effort to save Buzzards Bay. For the second time (2011 and 2015), the State of the Bay score has remained level at 45.

The most significant finding in this 2015 State of the Bay report is the levelling off of the nitrogen pollution indicator score at 53, after falling at a dramatic rate of three points every four years since 2003. No factor has continued to suppress Bay health and restoration efforts more than nitrogen pollution. But local efforts to clean up septic system and sewer plant sources and prevent new inputs of pollution may be beginning to contain these declines.

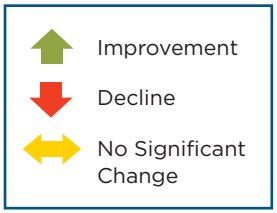
Something else is also happening with regard to pollution in the Bay. In recent years, ongoing improvements in bacteria and toxic pollution have served to offset losses due to nitrogen. Simply put, good news regarding the cleanup of raw sewage and reductions in industrial wastes have masked the impact of expanding nitrogen pollution. But that trade-off disappeared when we looked at the data in 2015. Bacteria and toxics got no worse, but they hardly got better either, leading to stagnation in their scores.

On land, proactive land conservation and permitting at the local level has led to another year of stability in our forest, stream buffer, and wetland scores. As a region, we are holding level the critical role the Bay's watershed plays in its resiliency to change. When people ask why we believe we can Save Buzzards Bay when so many other Bays are failing, the answer lies in our protection of these watershed forests and wetlands. This is our Bay's most distinguishing feature when compared to other East Coast waterways and we are largely succeeding at protecting that uniqueness.

While we celebrate the pause in Bay decline documented in this report, let us not lose sight of just how much more work lies ahead to reclaim the Buzzards Bay of our parents' childhoods – a Bay of sparkling, clear water and abundant fish and shellfish. The formula for pulling the Bay out of the hole we created is clear – continued vigilance to protect our most critical watershed lands and bold action to clean up nitrogen pollution from septic systems. And it's working.

Mark Rasmussen
President

2015 STATE OF **BUZZARDS BAY**



	2003	2007	**2011**	**2015**	
POLLUTION					
Nitrogen	59	56	**53**	**53**	↔
Bacteria	59	57	**62**	**62**	↔
Toxics	45	47	**52**	**52**	↔
WATERSHED HEALTH					
Forests	76	75	**79**	**77**	↔
Streams	68	67	**71**	**71**	↔
Wetlands	60	60	**60**	**60**	↔
LIVING RESOURCES					
Eelgrass	34	25	**23**	**23**	↔
Bay Scallops	12	10	**3**	**2**	↓
River Herring	5	1	**1**	**2**	↑
OVERALL SCORE (100 = EXCELLENT)	48	45	**45**	**45**	

POLLUTION

Nitrogen 53 ⟷ no change

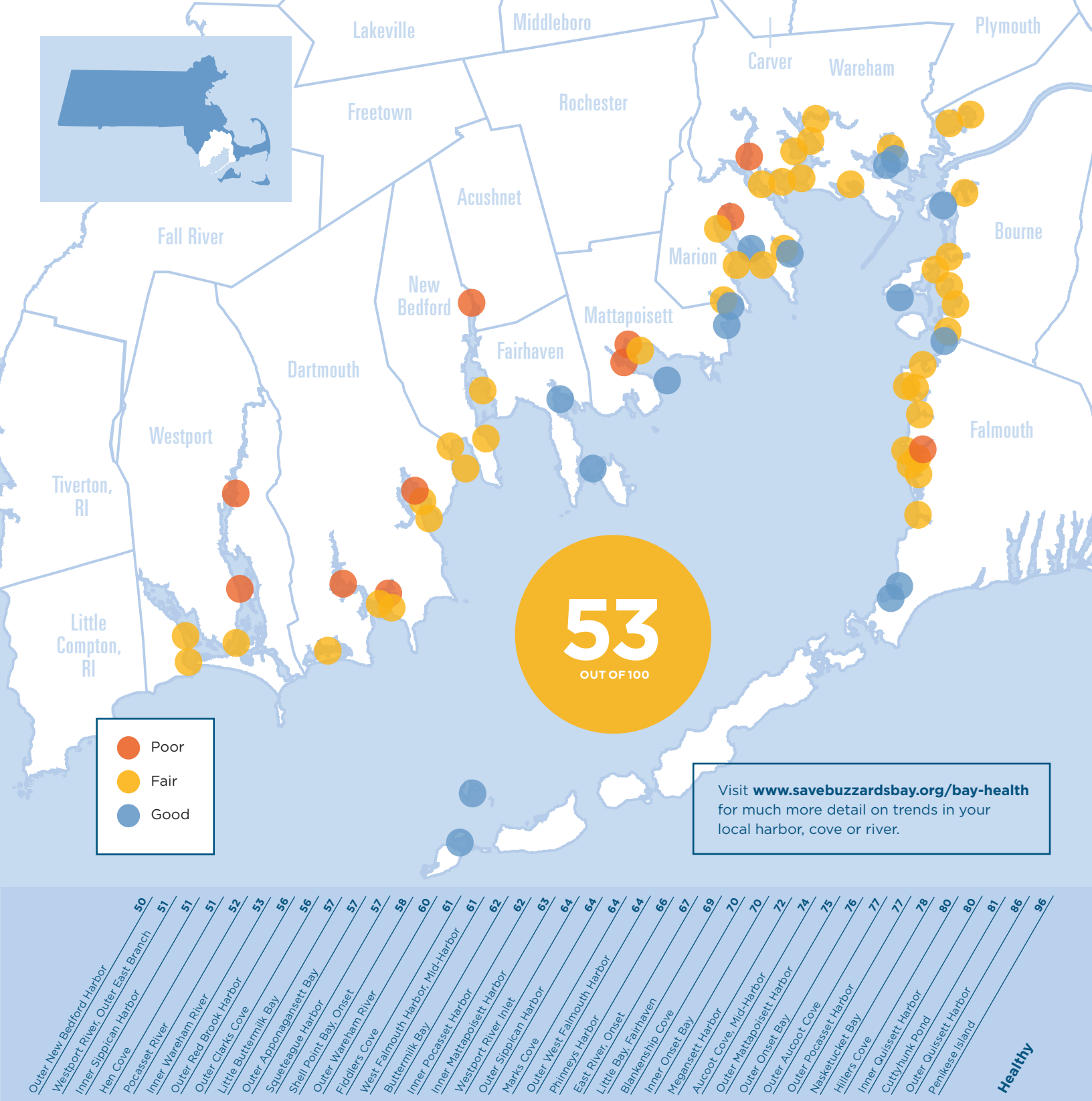
The 2015 nitrogen score of *53* is the same as it was in 2011 – the first time since 2003 that the score has not declined. Towns across the Bay are taking steps to reduce nitrogen pollution, and those actions are working to stop the Bay's decline.

The nitrogen score is based on the five-year running average (2011-2015) of Bay Health Index scores from the Bay's major harbors, coves, and tidal rivers, collected through the Coalition's Baywatchers program. During this period, we saw improvements in places like the Wareham River, where the town of Wareham has worked to reduce nitrogen through sewer connections and improvements to its wastewater treatment plant. But decreases in water quality in many other areas have offset these improvements.

By far the largest source of nitrogen to most Buzzards Bay harbors and coves is residential septic systems. Even new, properly functioning Title 5 septic systems do little to prevent nitrogen pollution. Other sources of nitrogen include wastewater treatment plants, stormwater runoff, and lawns and agricultural fertilizers. Nitrogen from far away fossil fuel power plants and automobiles also falls on the Bay, but this source has been decreasing due to improved federal Clean Air Act requirements.

A new challenge is emerging as climate change adds pressure on the Bay's health. New research shows that the Bay's summertime water temperatures are getting warmer, which causes more algae to grow even if nitrogen doesn't increase any further.

ABOVE *Nitrogen pollution is the greatest long-term threat to the health of Buzzards Bay. More than half of the Bay's major harbors, coves, and tidal rivers suffer from the effects of nitrogen pollution: cloudy, murky water, slimy algae growth, and declining fish and shellfish populations. (Photo: West Falmouth Harbor, June 2016)*


Lakeville
Middleboro
Plymouth
Carver
Wareham
Freetown
Rochester
Acushnet
Fall River
Bourne
Marion
New Bedford
Mattapoisett
Fairhaven
Dartmouth
Westport
Falmouth
Tiverton, RI
Little Compton, RI
53
OUT OF 100
Poor
Fair
Good
Visit www.savebuzzardsbay.org/bay-health for much more detail on trends in your local harbor, cove or river.
Outer New Bedford Harbor 50
Westport River, Outer East Branch 51
Inner Sippican Harbor 51
Hen Cove 51
Pocasset River 51
Inner Wareham River 52
Outer Red Brook Harbor 53
Outer Clarks Cove 56
Little Buttermilk Bay 56
Outer Apponagansett Bay 57
Squeteague Harbor 57
Shell Point Bay, Onset 57
Outer Wareham River 57
Fiddlers Cove 58
West Falmouth Harbor, Mid-Harbor 60
Buttermilk Bay 61
Inner Pocasset Harbor 61
Inner Mattapoisett Harbor 62
Westport River Inlet 62
Outer Sippican Harbor 63
Marks Cove 64
Outer West Falmouth Harbor 64
Phinneys Harbor 64
East River, Onset 64
Little Bay, Fairhaven 64
Blankenship Cove 66
Inner Onset Bay 67
Megansett Harbor 69
Aucoot Cove, Mid-Harbor 70
Outer Mattapoisett Harbor 70
Outer Onset Bay 72
Outer Aucoot Cove 74
Outer Pocasset Harbor 75
Nasketucket Bay 76
Hillers Cove 77
Inner Quissett Harbor 77
Cuttyhunk Pond 78
Outer Quissett Harbor 80
Penikese Island 80
81
86
96
Healthy
FAIR
EXCELLENT

Bacteria

62 ⟷ **no change**

Bacterial contamination was once Buzzards Bay's biggest pollution problem. To fix this, communities have been working for decades to improve sewage treatment, identify illegal septic hookups, and tie more homes to municipal wastewater plants. As a result, our swimming beaches are much safer and more shellfish beds are open.

The 2015 bacteria score of *62* did not change from 2011. Since that year, only 12 acres of Buzzards Bay's shellfish beds have reopened to harvest. Once a near-steady source of improvement, the trend of reopened shellfish beds has leveled off over the past eight years.

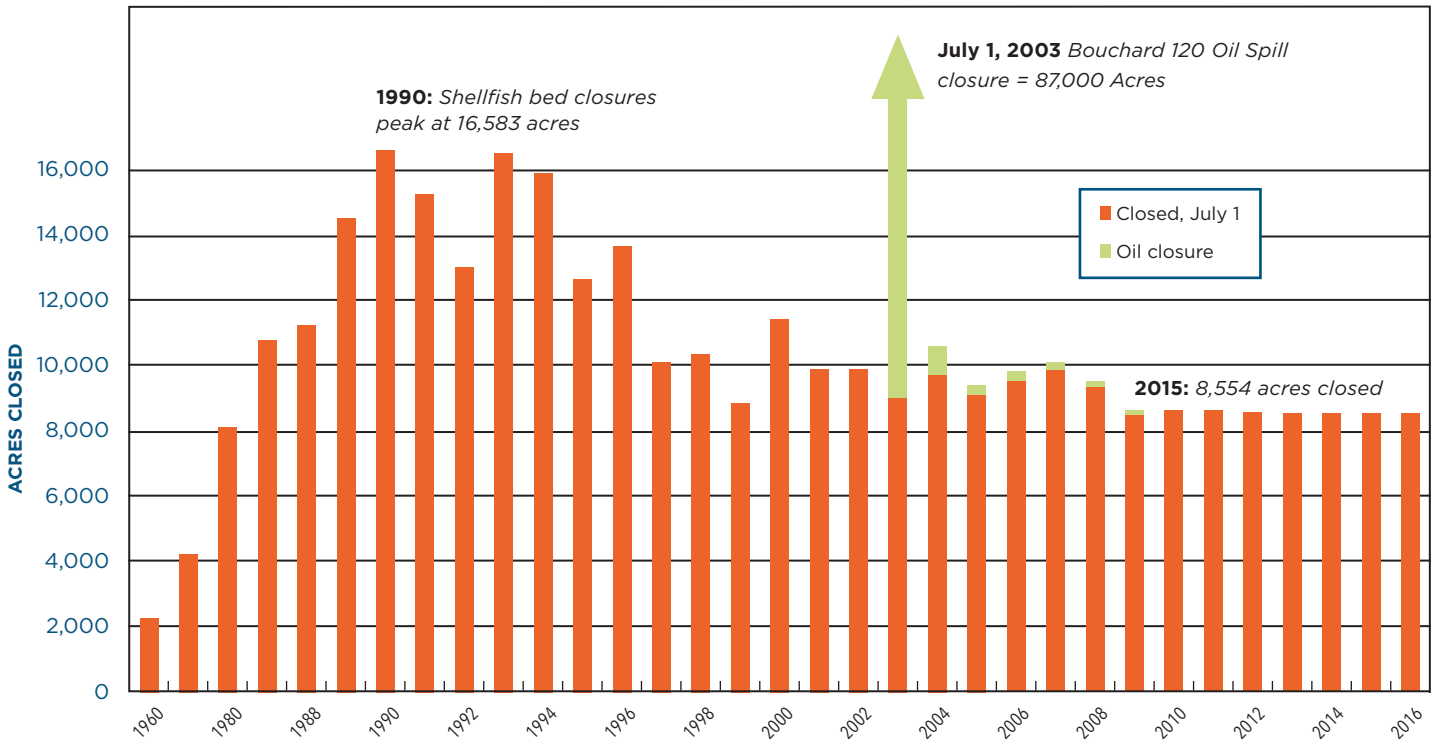
In some localized areas, we continue to see troubling declines. Places like the West Branch of the Westport River have continued to lose acres of open shellfish beds. When looked at cumulatively across the whole Bay, however, these losses are being offset by big improvements around New Bedford.

Throughout the Bay region, more than 2,500 stormwater pipes discharge polluted runoff into our harbors, coves, and rivers. And with failing home septic systems and remnant cesspools scattered around the Bay's shores, untreated sewage continues to seep into our waters.

Cleaning up these remaining sources of bacterial contamination will be slow, hard work – but it's critical to the continued improvement of Buzzards Bay's health. As we continue to clean up nitrogen pollution in the years ahead, that will also likely help improve the bacteria score as nutrient-enriched waters help bacteria persist.

BELOW *The number of acres of open shellfish beds in Buzzards Bay has largely leveled off in the past eight years. It's still a major improvement from the 1990s, when twice as many shellfish beds were closed. Unfortunately, 38% of the Bay's most productive nearshore shellfishing areas remain closed due to a variety of pollution concerns as of July 1, 2015.*

Buzzards Bay Shellfish Closures, July 1



Toxics 52 ⟷ no change

The 2015 toxics score of *52* did not change from 2011. Thanks to stricter laws and better enforcement, toxic pollution in Buzzards Bay has decreased dramatically. But in certain places around the Bay, toxic contamination still presents a problem for both people and marine life.

Sources of toxic pollution to Buzzards Bay include oil spills, discharges from wastewater treatment plants, household hazardous wastes, agricultural pesticides, and stormwater runoff. In addition, "legacy" contaminants – pollution from past practices that remain in need of cleanup – continue to demand attention and funding.

The majority of our toxics score (80%) is derived from "Mussel Watch" data collected by the National Oceanic and Atmospheric Administration (NOAA) from outer Buzzards Bay. Mussels are an excellent indicator of contamination because they absorb and accumulate toxics in their bodies. This data tracks 36 different chemical compounds that fall into three classes: pesticides, heavy metals, and polyaromatic hydrocarbons (PAHs).

The remaining 20% of the toxics score uses data on the extent of persistent polychlorinated biphenyls (PCBs) in New Bedford Harbor. The U.S. EPA also tests mussel tissue to track PCBs, which were dumped into the harbor in the mid-20th century and still linger there today. This portion of the score has improved significantly due to dredging and disposal of PCB-contaminated sediment from the harbor. There's still a long way to go, but this trend is heading in the right direction.

BELOW *In assessing the state of toxic contamination in the Bay, the Coalition uses NOAA Mussel Watch data from sampling stations located at Gooseberry Neck, the Cape Cod Canal, and West Falmouth. These three stations have the longest record of mussel tissue data.*

Wetlands

60 ⟷ **no change**

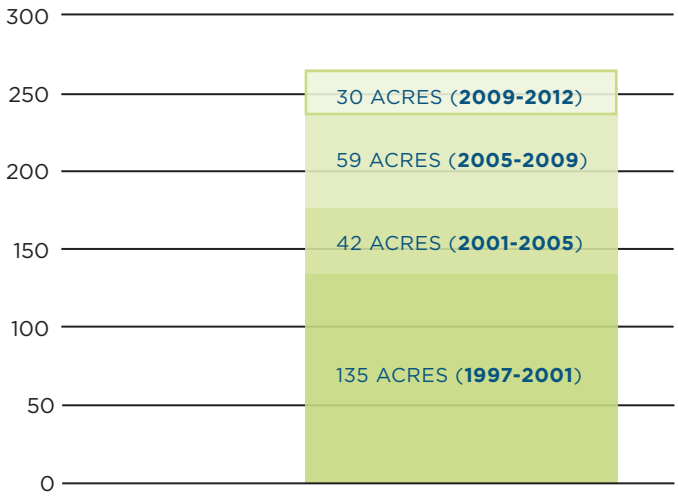
Despite layers of laws designed to protect wetlands, Buzzards Bay lost 265 acres of salt marshes, wooded swamps, and freshwater wetlands to development over the 15 years spanning 1997-2012. Eleven percent of that destruction occurred since our last State of the Bay report in 2011.

This loss wasn't large enough to trigger a drop in the 2015 wetlands score, which remains steady at *60*. But this downward trend in wetland acreage can't continue if we want to reverse the Bay's decline.

An estimated 40% of the Bay's original wetlands have been filled, drained, or built upon. These rich habitats are powerful pollution filters that can absorb as much as 90% of the nitrogen flowing across the land from nearby development. They are, in effect, the Bay's kidneys – and we can't afford to lose any more of them.

Any loss of wetlands is bad news for Bay health. But there is some positive news in this data. For the first time, no wetlands were destroyed in two Bay communities: Bourne and Falmouth. And loss figures were small in most Bay towns. The largest wetland losses continue to take place in communities with high densities of cranberry agriculture, where alteration of wetlands around bogs is often exempt from state wetlands laws.

Destruction of Bay Wetlands (1997-2012)



SOURCE *Massachusetts Department of Environmental Protection Wetlands Change Project (most recent data available, 2012)*

ABOVE *The 29.7 acres of wetlands lost from 2009-2012 was the lowest four-year loss since data was first collected in 1997. Although this is good news, it is partially due to the economic downturn and resulting decline in residential, commercial, and agricultural development that took place during this period.*

Forests

77 ⟷ **no change**

Compared to other East Coast estuaries like Narragansett Bay, the Chesapeake Bay, and Long Island Sound, Buzzards Bay has one important difference: large areas of watershed forests. That's one of the key secrets behind the Bay's relative good health compared to these other waterways.

The 2015 forests score finds that 77% of the Bay watershed's forest coverage remains. This represents an improvement in the precision of available data and not a significant decrease in actual forest area from 2011, even though the score declined by two points.

Forests protect clean water in countless ways. The rich soil in forests captures rainfall, filtering out harmful pollution before slowly releasing it into streams and groundwater. Tree roots hold soil in place, which prevents erosion. Plus, forests help keep our air clean and cool, and they also shade coldwater streams where native brook trout live (see Stream Buffers below).

The Woods Hole Research Center analyzes available land use data and satellite imagery to determine the percentage of forest coverage remaining in the Buzzards Bay watershed. For this report, the WHRC took a fresh look at the Bay's forests and found that due to a much finer level of detail in today's photo imagery, *77* is a more accurate estimate of forest cover. As the WHRC continues to fine-tune its analysis of satellite imagery, we can now better distinguish forest coverage from residential backyards.

Stream Buffers

71 ⟷ **no change**

There's a particular type of forest that works hardest at protecting clean water: stream buffers, which are the forested areas that grow along streams. The first 200 feet of trees and plants along either side of a stream are the most important to protect.

The 2015 stream buffers score remains steady at *71*. Unfortunately, that means that 29% of the Bay watershed's stream buffers – nearly 9,000 acres – have been lost to poorly planned development.

It's in those critical 200 feet where many people want to live and work. As homes, farms, and commercial buildings have replaced natural stream buffers, the health of our water has suffered. Without forested buffers to protect our streams, polluted stormwater runoff rushes into streams and rivers.

Twenty years ago, Massachusetts passed the Rivers Protection Act, which has made an important difference to protect these 200 feet along our streams. Under the law, the first 100 feet along streams are usually protected. Based on local permitting decisions however, the second 100 feet often continues to face development pressure.

ABOVE *More than 700 miles of streams flow through our watershed into Buzzards Bay. The forests that grow along these streams capture, absorb, and remove an amazing amount of pollution before it can reach our streams, rivers, and the Bay – places where river herring swim, where quahogs grow, and where our children play.*

LIVING RESOURCES

Eelgrass | 23 | no change

If you want to track the spread of nitrogen pollution in your own corner of Buzzards Bay, watch the eelgrass. This rooted underwater plant grows in meadows along the bottom of harbors, coves, and tidal rivers that have clear, shallow waters.

But when nitrogen pollution increases, it fuels the growth of algae that reduces water clarity. Without enough sunlight reaching the bottom, eelgrass dies. And those species that depend on eelgrass – young fish, blue crabs, and bay scallops – begin to vanish, too.

In 2015, the eelgrass score did not change from its 2011 score of *23*. This score is based on the extent of eelgrass meadows in the Bay in 2015 compared with the Bay's maximum historical potential eelgrass coverage (estimated by the Buzzards Bay National Estuary Program).

Along with inputs of nitrogen pollution, eelgrass losses in Buzzards Bay have leveled off as a whole. The good news is that when we reduce nitrogen pollution and water clarity improves, eelgrass can recover on its own. For instance, in the Wareham River and outer New Bedford Harbor, recent wastewater and stormwater upgrades have led to increases in eelgrass acreage.

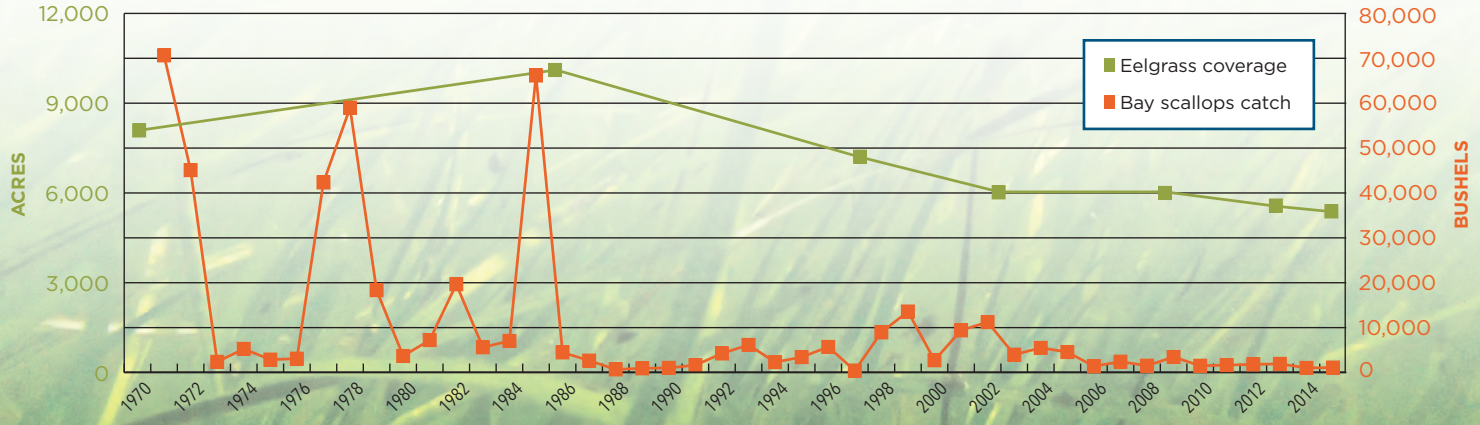
Bay Scallops | 2 | Down 1 from 2011

Bay scallops were to Buzzards Bay what oysters historically were to Long Island and the Chesapeake Bay. But today, our once-abundant and highly-valuable bay scallops have all but disappeared from most parts of Buzzards Bay.

The bay scallop score fell to *2* in 2015, down one point from 2011. The Massachusetts Division of Marine Fisheries reported an average catch of roughly 1,500 bushels per year between 2011-2015. It's a stunning decline from 1985, when nearly 70,000 bushels of bay scallops were harvested in Buzzards Bay.

This drop in bay scallop harvest is linked to the effects of nitrogen pollution. Bay scallops live and grow among the shelter of eelgrass; as these underwater meadows have disappeared, so have bay scallops. The graph below shows the relationship between these two independent, but closely related, indicators. As we reduce nitrogen pollution and restore clean water, the Bay's signature shellfish can begin to return to health.

45 Years of Eelgrass and Bay Scallop Abundance in Buzzards Bay (1970-2015)



River Herring

2 Up 1 from 2011

River herring (alewives and blueback herring) are anadromous fish that live in the ocean and migrate upstream to freshwater to spawn. They're considered a "foundation" fish in the Bay ecosystem because they provide a vital source of food for sport fish, such as striped bass, and water birds.

Today, only a fraction of the historic populations of river herring still make the journey up the Bay into local streams and ponds. The 2015 score increased to *2*, up one point from 2011 and 2007. Although populations have increased slightly over the past decade, they remain dangerously low.

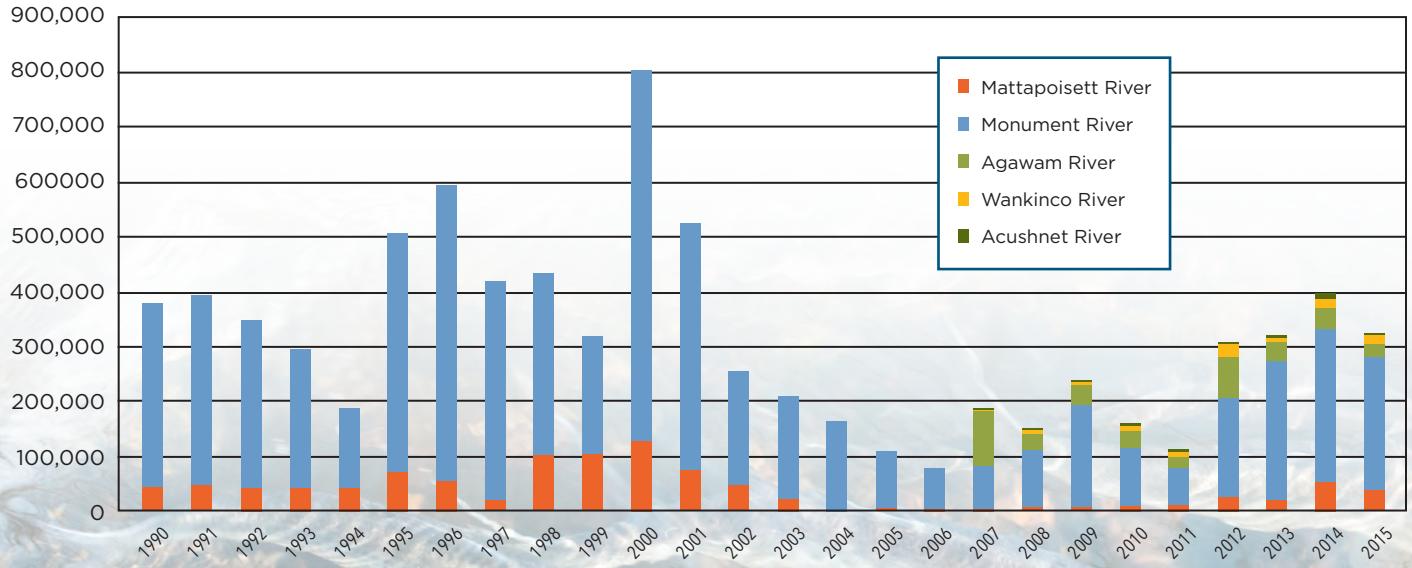
The Mattapoisett River serves as our benchmark for tracking river herring populations because of its long dataset. In 1921, 1.85 million river herring were counted in the Mattapoisett River. In 2015, just 42,332 were counted — an increase from 11,380 in 2011.

There are many reasons for this decline, including dams, pollution, alterations in river flows, and bycatch at sea. Fisheries managers believe that part of the past decade's declines can be linked to river herring being caught inadvertently as bycatch by deep-sea commercial trawlers.

In 2005, the state banned all herring catch in Massachusetts rivers due to harvest concerns. Additional actions, such as removing dams and other blockages on rivers, combined with regional steps to prevent offshore bycatch, can help bring these important fish back.

The Coalition is adding new river herring counters to important Bay rivers to get a more comprehensive view of Bay-wide populations. We're also eliminating blockages on rivers like the Acushnet and the Weweantic at Horseshoe Mill, where we're working to reopen the river to fish passage.

25 Years of River Herring Counts on Buzzards Bay Rivers (1990-2015)



1990-2006: Data only collected on Monument River (MA DMF) and Mattapoisett River (Alewives Anonymous)

2007-2015: Monitoring added to Agawam (2007), Wankinco (2008) and Acushnet (2011) by Buzzards Bay Coalition.

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HOW WE CREATE OUR REPORT

To create the State of the Bay report, the Buzzards Bay Coalition collaborates with scientists and land use experts to examine the best available current and historical information for indicators in three categories: Pollution, Watershed Health, and Living Resources. Every four years, we return to assess these same indicators as a consistent method for tracking progress or degradation over time.

The current State of the Bay is measured against the healthiest Buzzards Bay in recorded history – the natural abundance experienced by explorer Bartholomew Gosnold and his crew in 1602. The Bay Gosnold experienced was largely unspoiled by harmful human activities and rates 100 on our scale. Today, a restored, healthy Buzzards Bay would likely score a *75*.

In examining the best available information for each of the indicators in this report, we actively seek more accurate sources of information to improve on this report every four years. When such data becomes available, we can improve upon this assessment. This happened this year with the Woods Hole Research Center's acquisition of enhanced satellite imagery data which affected our forest and stream buffer scores and with new analysis of NOAA and EPA mussel tissue data to calculate the toxic pollution score.

We are grateful to the Buzzards Bay National Estuary Program for their assistance with the Bacteria and Eelgrass scores this year; to the Woods Hole Research Center for the development of the Forest and Stream Buffer score; and to the Marine Biological Laboratory's Ecosystems Center for their analysis of our Baywatchers data which serves as the foundation of the Nitrogen score. In addition, a number of agencies provided data for this report including the Massachusetts Division of Marine Fisheries, Massachusetts Department of Environmental Protection, US Environmental Protection Agency, National Oceanic and Atmospheric Administration, Alewives Anonymous, and municipal shellfish wardens along Buzzards Bay.

The Chesapeake Bay Foundation's annual State of the Bay report serves as a model for our report.