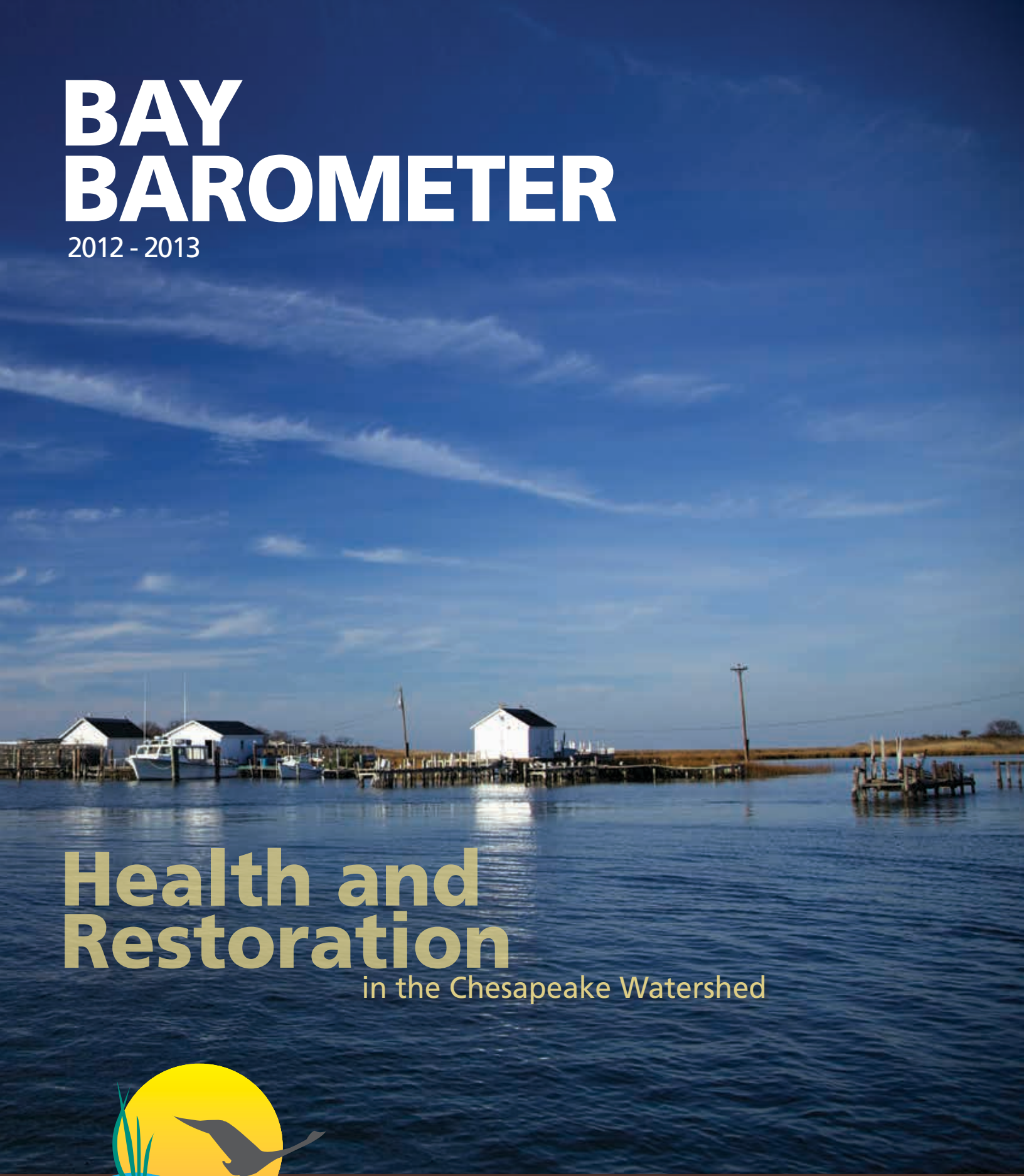
BAY BAROMETER

2012 - 2013



Health and Restoration

in the Chesapeake Watershed

Chesapeake Bay Program

Science. Restoration. Partnership.

From the Bay Program Director

Lag times…an exercise in patience

In today's society, we have come to expect quick responses, from fast food, email and text messages to immediate solutions to a host of problems that befall us. In the world of Bay restoration, sometimes our desire for speedy results is fulfilled, as when upgrades to a wastewater treatment plant improve the health of local waters in the matter of weeks. But more often, we are disappointed when our efforts to restore the Bay are not immediately obvious, because the Bay responds in its own way and time…sometimes over decades.

The time interval between our restoration work and visible results in water quality, fisheries and habitats is called "lag time." Many factors affect a lag time's duration and influence on the Bay ecosystem. Therefore the Bay Program's long-term scientific information is an invaluable resource for understanding what activities can have greatest impacts, how rain and temperature can cause Bay grasses to wax and wane over the years, when management actions can change fish and crab populations, and how planting trees along streams can reduce water temperature and stabilize fish habitat.

As we come to a close on our 30th year as a partnership, we draw our hope for the future from the solid foundation of our past science. Our commitment to continue this work is as strong as it has ever been because we know that our reward will come, as the Bay ecosystem's resilience rebuilds over time.

Join us in this commitment to the future; one in which we must all take part, so that generations to come can enjoy the splendor of the nation's largest estuary.

AT A GLANCE 2012-13

BAY HEALTH

Water Quality
29 percent of the Bay and its tidal rivers met overall conditions for healthy waters, measured by amounts of oxygen, algae, water clarity/underwater grass abundance

Underwater Grasses
48,195 acres of underwater grasses found in the Bay and shallows of tidal rivers

Bottom Habitat
45 percent of the surveyed locations in the Bay had healthy populations of bottom-dwelling worms, clams and creatures that are the foundation of the food web

Blue Crabs
147 million spawning-age female blue crabs in the Bay

American Shad
Rise in spawning shad in the rivers of the watershed

Striped Bass
128 million pounds of female, striped bass spawning stock coast-wide

Chemical Contaminants
74 percent of tidal segments analyzed were partially or fully impaired by chemical contaminants

RESTORATION

Wetlands
2,231 acres of wetlands established or reestablished in the watershed

Forest Buffers
285 miles of forests added along the edges of streams and rivers in the watershed

Fish Passage
34 miles of rivers and streams reopened to migratory and resident fish across the Bay watershed

Public Access
18 new sites offer people access to local waters for boating, fishing, sight-seeing and enjoying natural beauty and resources

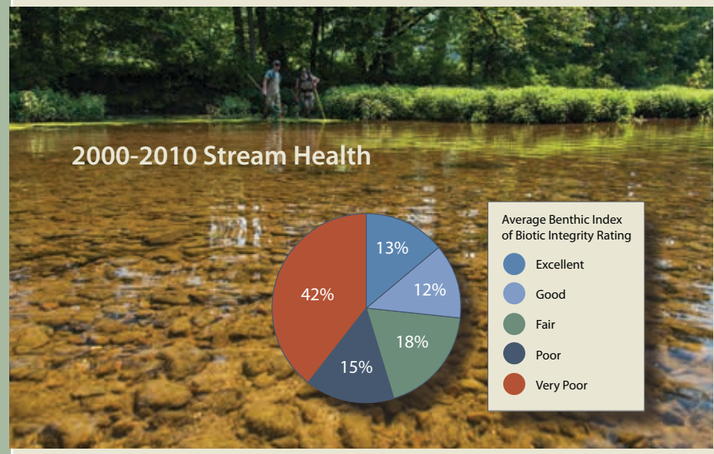
Reducing Pollution to the Bay and its Tidal Rivers
Since 2009, pollution loads are estimated to have been reduced by:
- Nitrogen - 18.5 million pounds
- Phosphorus - 1.3 million pounds
- Sediment - 431 million pounds

For more detailed information go to chesapeakebay.net

Bay Barometer

The Chesapeake Bay is a dynamic system. Across the watershed, rainfall, temperature and other conditions can fluctuate from month to month and year to year, impacting the surrounding environment. But tracking changes in ecological health over time allows scientists to understand these natural variations as well as the long-term effects of restoration work.

Understanding the effects of our management actions and our progress toward meeting our health and restoration goals requires a complex set of tools, from monitoring stations to computer simulations of the Bay watershed. These and other tracking tools helped produce the data in this report, which reflect changes in the Bay over the course of many years. Water quality, pollution loads and "indicators" of ecological health provide a snapshot of the Bay and its watershed and our efforts to restore it.



Stream conditions still need to improve

The abundance, diversity and health of tiny, bottom-dwelling creatures in a stream are good indicators of its overall health. Just over half of sites surveyed between 2000-2010 scored lower than a 3 on a 1 to 5 scale measuring the health of bottom habitat. Overall, almost 60 percent of non-tidal streams remain in poor or very poor condition. They are affected by excess sediment, chemical contaminants, tree loss and polluted runoff from surrounding landscapes.

This does not mean our pollution-reduction efforts aren't working. In fact, there is often a lag time between when restoration or pollution-reducing actions are done and when visible improvements in water quality can be seen. As restoration work continues, scientists expect to see responses in local waters and eventually the Bay.

Nutrient levels improving in most streams but sediment lags behind

Partners in the watershed are working to reduce nutrient and sediment pollution to improve water quality in the Bay. Over the long-term, about 70 percent of the river monitoring sites in the watershed show improvements in concentrations of nitrogen and phosphorus, while 28 percent of the sites show improvements in sediment.

Restoration

What we are doing

The Chesapeake Bay Program and the Bay Watershed

The Chesapeake Bay is the largest estuary in North America. Its 64,000-square-mile watershed spans parts of Delaware, Maryland, New York, Pennsylvania, Virginia and West Virginia, and all of the District of Columbia. This productive estuary is home to more than 3,600 species of plants and animals and has played an important role in the region's culture, economy and history. Today, it remains an important recreational and economic resource.

The Chesapeake Bay Program works to advance science, policy and restoration across the watershed. Bay Program partners have reduced pollution, restored land and water habitats and improved the management and recovery of critical Bay fisheries. Partners have also supported the federally established Total Maximum Daily Load: a pollution diet that sets limits on the amount of nutrients and sediment that can run into the Bay each year.

Learn the Issues: Wastewater

Wastewater treatment plants remove nutrients and bacteria from the wastewater coming from homes, businesses and industries. Technological upgrades at these plants can remove more pollutants from wastewater before it is discharged into local rivers and streams. As of 2012, 45 percent of the watershed's 467 wastewater treatment plants had pollution limits in place to meet the Bay's water quality standards. One plant under construction in West Virginia will remove 90,000 pounds of nitrogen and 93,000 pounds of phosphorous from its wastewater each year.

NEWS: Restoring Fish Passage

Soon, more than 40 miles of the Patapsco River will be reopened to herring, alewife and American shad, as the waterway's lowermost dam is set to be removed.

2,231 acres

Wetlands Restored

2012: 2,231 acres established or re-established on agricultural lands watershed-wide

Total since 2010: 5,503

Because wetlands filter water, prevent erosion and provide habitat to a number of Bay critters, boosting their acreage through restoration and new plantings is as important as protecting them through land purchases or conservation easements.

285 miles

Forest Buffers Planted

2012: 285 miles planted

Total since 1996: 7, 764

Streamside forests stabilize shorelines, remove pollutants from runoff and offer valuable shade for local fish, such as brook trout, and other creatures that thrive in cool temperatures and clean waters.

34 miles

More Miles of Streams Open to Fish

2012: 34 miles reopened

Total since 1988: 2,543

Removing dams, culverts and other barriers or the installation of lifts, ladders and other passageways allow migratory fish to reach their upstream spawning grounds. By 2014, partners expect 2,807 total miles of waterways to be re-opened for fish passage.

18 sites

More Sites for Public Access

2012: 18 new sites established

Total: 1,171

These new boat launches, boardwalks and other locations give people across the region more places to walk, play, swim, fish and boat or paddle.

Looking Toward the Future

A New Watershed Agreement

In 1983, the first Chesapeake Bay Agreement was signed. Thirty years later, Bay Program partners are working to guide the continued evolution of the Bay ecosystem with a new Chesapeake Bay Watershed Agreement. This new plan for collaboration will further our goal to protect and restore the living resources of the Bay and its tributaries and take a forward-facing approach to our efforts into the future.

Reducing Pollution

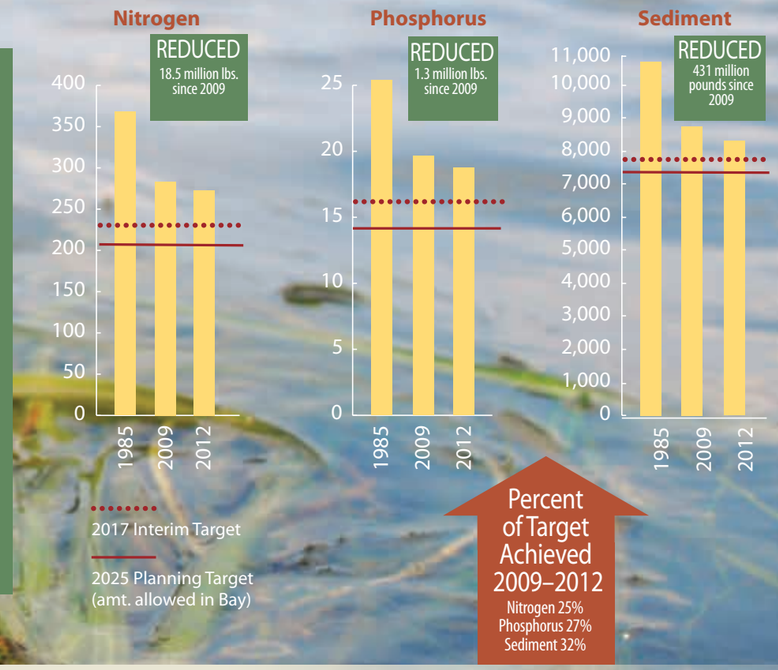
Communities and leaders across the watershed have made great strides in reducing the pollution they are sending into rivers and streams. Computer simulations of thousands of pollution control measures estimate local, state and federal Bay Program partners have achieved between a quarter and a third of their 2025 pollution reduction goals.

Pollution loads decrease when our land-based actions improve. Towns and cities can make technological upgrades to wastewater treatment plants or install "green" roofs, sidewalks and parking lots to better capture stormwater runoff. Homeowners can create rain gardens or plant big trees to boost forest cover in their neighborhoods. Farmers can protect streams from livestock, plant cover crops to hold soil in place and use just the right amounts of fertilizers to grow abundant crops.

Learn the Issues: Nutrient and Sediment Pollution

When excess nutrients reach the Bay, they fuel the growth of harmful algae blooms that block sunlight and create low-oxygen dead zones that suffocate marine life. Reducing excess nutrients and sediment is critical to a healthier Bay. Upgrades to wastewater treatment plants, improvements in managing urban, suburban and agricultural runoff and other changes in our actions on land can lower the flow of nutrients and sediment into rivers and streams. By continuing these efforts, we create healthier and clearer, oxygen-rich waters that benefit fish, wildlife and our communities.

Total Pollution Loads to the Bay in millions of pounds/year (Simulated)

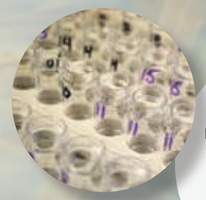


NEWS: Striped Bass

Bay Program experts work with the Atlantic States Marine Fisheries Commission (ASMFC) to manage striped bass stock coast-wide. ASMFC's recently completed 2012 assessment estimates female spawning stock biomass to be 128 million pounds; below the 159 million pound target but just above the overfishing threshold.

NEWS: Restoring Oyster Reefs

In Harris Creek, a Choptank River tributary, half of the oyster reef construction and seed planting work was completed as of October 2013. This is the first project under the new tributary-based strategy for restoring the Bay's oysters.



NEWS: Bay Pollution Diet

In September of 2013, a federal judge upheld the Chesapeake Bay pollution diet, the Total Maximum Daily Load, which has guided water quality restoration in the six Bay states and the District since 2010.

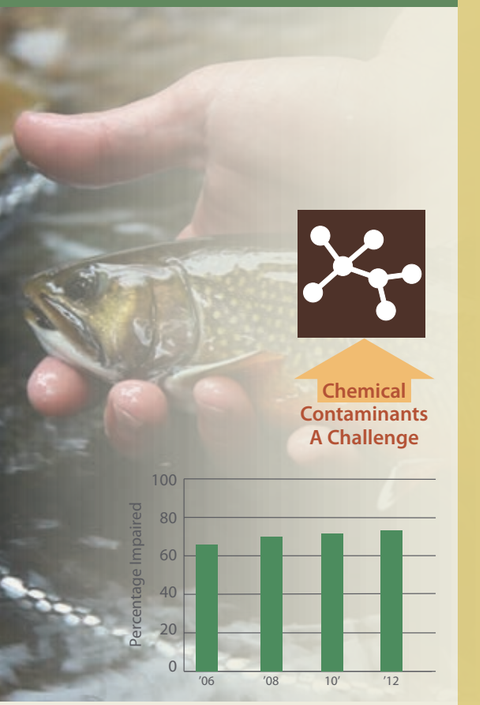
For more detailed information go to Chesapeakebay.net/track/restoration

Health

What we are seeing

Learn the Issues: Lag Times

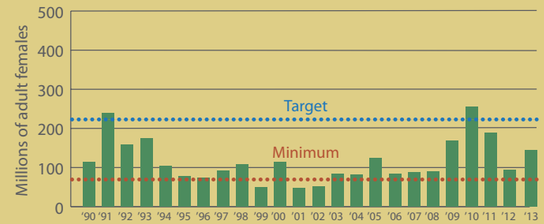
There is often a delay between when restoration is done and when visible improvements in water quality or stream conditions can be seen. These "lag times" can vary based on restoration project, site geology, distance from the waterway and many other factors. For example, the full benefits of efforts to reduce amounts of nitrogen flowing into local waters can take several decades to be seen due to the slow movement of groundwater. Phosphorus and sediment reductions can take even longer. The full benefits of a newly-planted forest buffer along a stream will only be known when the trees have reached maturity. As restoration work continues, the Bay and its watershed is expected to respond.



Chemical Contaminants A Challenge

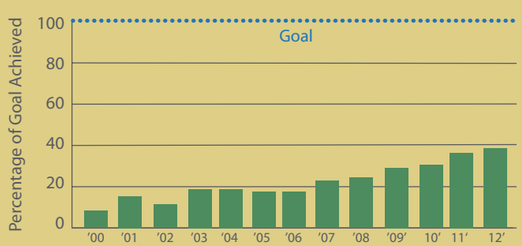
Of the 92 segments of tidal waters analyzed, 74 percent had partial or full impairments due to chemical contaminants. Such contaminants threaten fish health, contribute to fish kills in streams and rivers and lead to "consumption advisories" that limit the number of fish people should eat. The proper disposal of medicines and the correct use of pesticides can help lower toxins in our environment.

Blue Crabs Increase: Not Over Fished



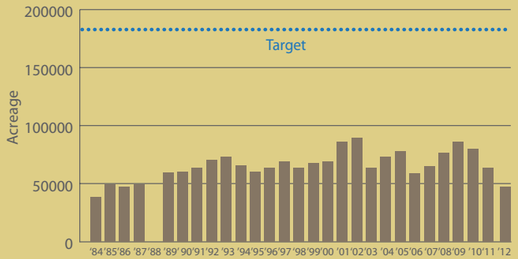
Between 2012 and 2013, the abundance of spawning-age female blue crabs in the Bay increased 51 percent. While numbers are below the 215 million target, they are above the overfished threshold. A sustainable blue crab stock means a more stable Bay economy; and an increase in blue crab abundance is a sign that management methods to conserve adult female crabs are working.

American Shad Show Positive Return



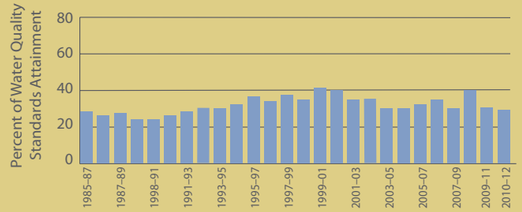
Shad data is based on information from the James, Potomac, Rappahannock, Susquehanna and York rivers, where scientists hope to continue increasing spawning stocks. Shad abundance in the Potomac River is driving the Bay-wide trend. American shad form an important link in the Bay food web.

Grasses Challenged but Resilient in Spots



The abundance of underwater grasses declined 21 percent between 2011 and 2012. Scientists attribute the change to warmer-than-normal summer water temperatures in 2010 and strong storms seen in the fall of 2011. Healthy and abundant beds of bay grass improve water clarity, reduce shoreline erosion, provide food for waterfowl and offer shelter to striped bass, blue crabs and other Bay critters.

Water Quality Still Challenged



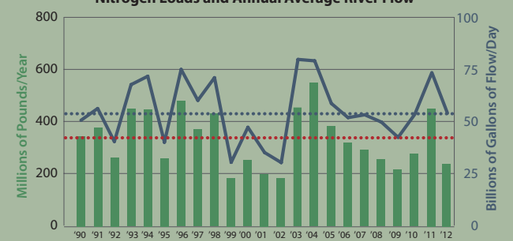
This new indicator measures progress towards the achievement of water quality standards for dissolved oxygen, water clarity/underwater bay grasses and chlorophyll a and provides a way to track improving conditions. Delaware, the District of Columbia, Maryland and Virginia evaluate their portion of the Bay's tidal waters in this manner, too.

Factors

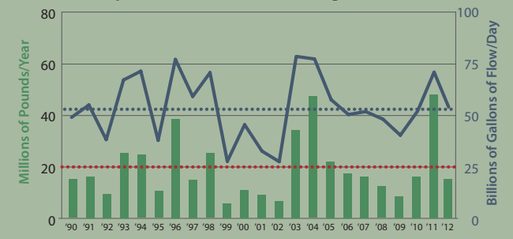
What we have to consider

Average Load •••••
Average Flow •••••
River Flow ——

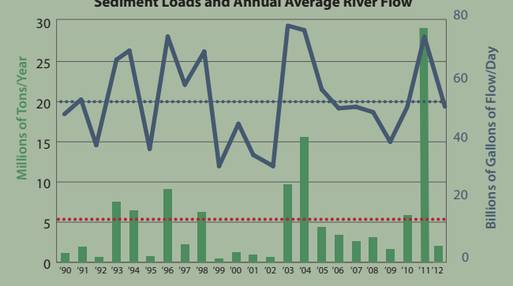
Nitrogen Loads and Annual Average River Flow



Phosphorus Loads and Annual Average River Flow



Sediment Loads and Annual Average River Flow



For more detailed information go to Chesapeakebay.net/track/health

Population - Increasing

The health of our waters is directly linked to how we live and use the land. As the watershed's population continues to rise, our homes, commercial centers and roads expand. While natural areas like forests and wetlands have a positive effect on the Bay's health, these developed lands often pollute local rivers and streams. By 2030, experts predict the watershed's population will reach 20 million. Smart growth and land conservation are critical to balancing the pressures of a rising population.

Fresh Water Flow/Nutrient and Sediment Loads

Conditions in the Bay vary each year based on the quantities of fresh water from rain and snowfall that flow down its rivers and streams. In wet years with high fresh water river flow, more pollution is carried downstream to the Bay, while dry years result in lower flow of fresh water and fewer pollutants in the waters. The charts offered this year show the dramatic difference weather conditions can have on pollutants reaching the main Bay. Still, regardless of changes in annual weather patterns, long term trends indicate that our restoration efforts are effective and will be critical to healthier waters in the future.

While 2011 was one of the five wettest years on record, 2012 was closer to average resulting in much less nitrogen, phosphorus and sediment in our waters.

Rainfall and River Flow - Near Average

Each day, billions of gallons of fresh water flow from backyards, streets and farms to rivers and streams and the Bay. Annual amounts of "river flow" has a direct impact on watershed health: as rainfall and river flow increase, more pollution is pushed into the Bay. As they decrease, pollutants can become trapped in tributaries, fueling algae blooms and reducing water clarity.

While the past decade has seen highly variable river flow—from record flooding to record droughts—2012 saw a near-average river flow of 52 billion gallons per day.

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