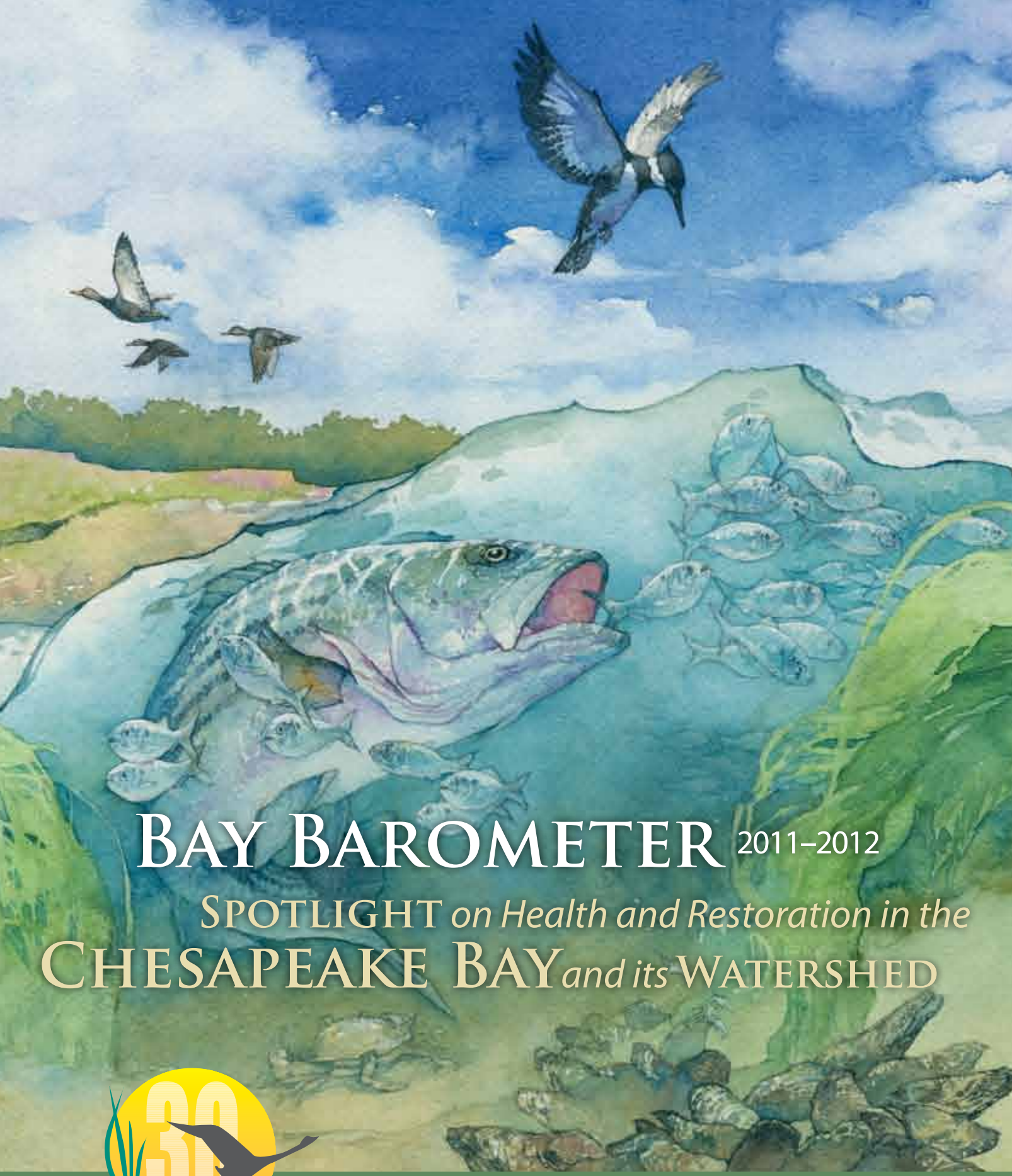


Bay Barometer 2011–2012

Spotlight *on Health and Restoration in the* Chesapeake Bay *and its* Watershed

30 YEARS

Chesapeake Bay Program

Science. Restoration. Partnership.

From the Bay Program Director

Resilience; the term is defined as the ability to recover quickly from setbacks.

Though we don't measure it, resilience is an indication of the state of the ecosystem; and it's one that gives me hope for our efforts to restore the Bay and its watershed. Over the years, in any number of ways, we've seen evidence that when we make the right decisions and take the right actions, the ecosystem is resilient enough to come back. We've restored rockfish populations, improved crab management and numbers and, more recently, have seen restored grass beds survive and new ones emerge despite heavy rains and sediment-laden runoff. These signs of resilience are indicators that we are on the right track. They mean our collective work to restore, protect and engage people in Bay issues can have an impact.

However, the Chesapeake Bay is a complex, sensitive and dynamic ecosystem and it is impossible to define the current state of the Chesapeake Bay in short, simple terms. No single chart can tell the whole story. And each piece reflects our understanding of that element of the Bay watershed ecology. To understand the health of the Bay watershed, we must consider all of these indicators and their long-term trends.

In the end, however you interpret the science, one thing is clear: our actions can bring balance to the Bay ecosystem, and clearly, our work is not yet done. Only by further reducing our impacts on the land and increasing our on-the-ground and in-the-water restoration will we have a Bay ecosystem that is healthy and resilient enough to fully withstand variations in weather and climate.

We now know what needs to be done to help our waters, we simply must do more, and right now.

Nick DiPasquale

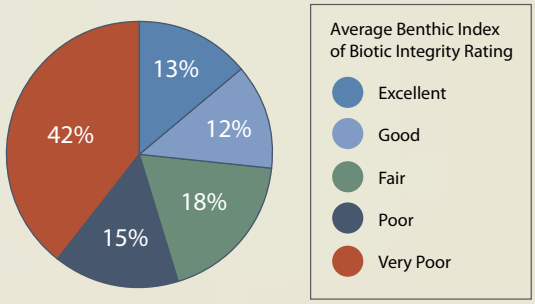
Watershed Health: What We are Seeing

Nutrient and Sediment Pollution Edging Down

Monitoring data collected throughout the watershed show that, in some of the Bay's major tributaries, the concentrations of nitrogen, phosphorous and sediment flowing into the Bay are decreasing. By studying the flow adjusted trends, which remove the effects of seasonal and year-to-year variability in weather patterns, resource managers can better assess the effectiveness of land-based pollution reduction actions such as improved wastewater treatment plants, better use of pollution-reducing practices on farms and suburban lands, and other efforts to curb erosion and runoff. Long-term trends in nitrogen and phosphorus pollution have decreased at most monitored sites while sediment pollution trends are split with one-third showing decreases, one third showing increases and the remainder staying relatively unchanged.

Freshwater Streams

The abundance, diversity and health of tiny creatures—snails, mussels, insects—in freshwater streams are good indicators of stream health. Between 2000 and 2010, 43 percent of sampled stream sites were fair, good or excellent while 57 percent were in very poor or poor condition. Generally speaking, the health of a stream or creek is directly related to how the lands around the stream are used.



Nutrient Pollution—Too Much of a Good Thing

When too many nutrients reach the Bay, they fuel large algae blooms that, in turn, block sunlight and deplete the oxygen in the water as the algae die and decompose.

Without sunlight, underwater bay grasses cannot grow. Without oxygen, blue crabs and fish cannot live. As underwater bay grasses die off, important habitat for fish and shellfish is lost. As menhaden populations decline, larger fish, such as rockfish, have fewer food sources. Each small part of the Bay ecosystem is connected. If one part is out of balance, the entire system suffers.

Bay Program Partnership: Working to Restore the Chesapeake

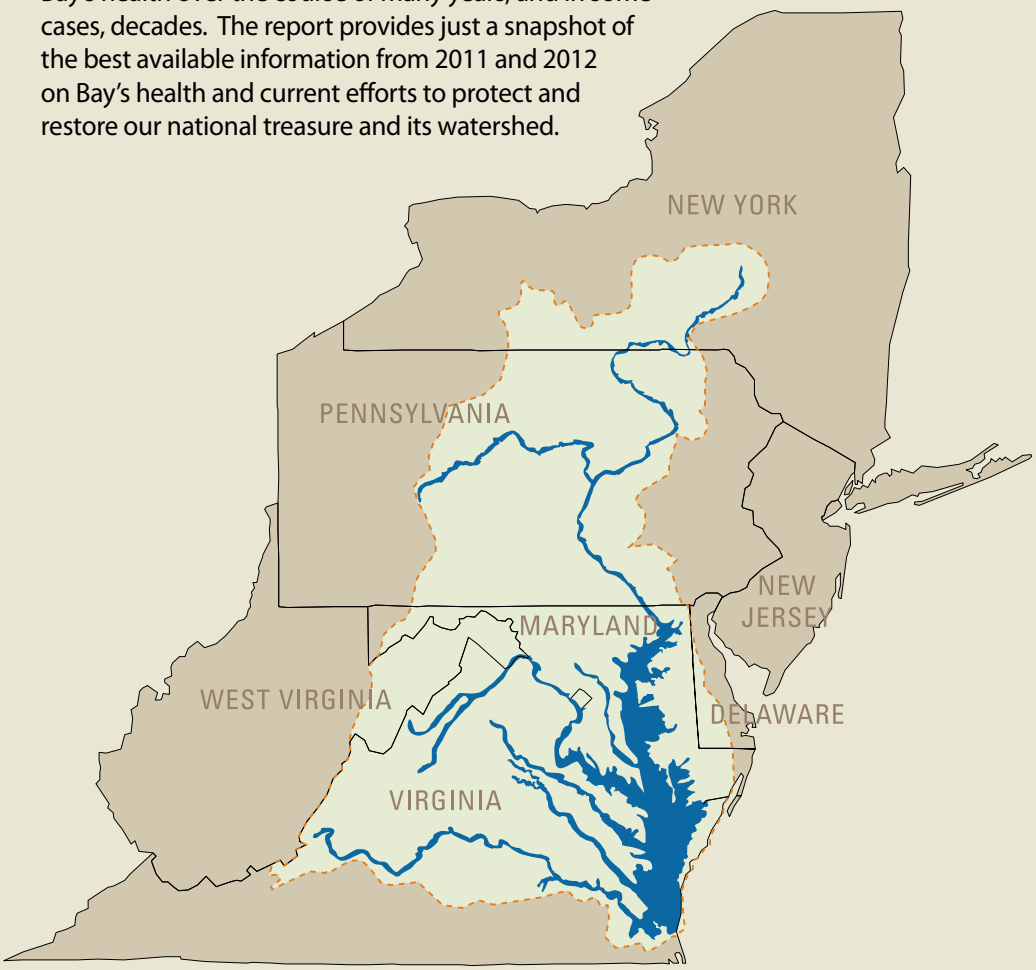
In 1983, the Chesapeake Bay region states, the District of Columbia and the Chesapeake Bay Commission joined forces with the federal government to restore and protect the Bay and its watershed. This partnership, called the Chesapeake Bay Program, was created to help coordinate restoration efforts across state boundaries.

Over the past 30 years, scientists, resource managers, community organizations, local governments, farmers, watermen and other citizens have come together to work toward securing a brighter future for the Chesapeake. Restoration effort is ongoing, and we need your help. We must be diligent in protecting and restoring the Bay, so that our children and theirs—and many generations to come—will be able to enjoy the splendor of this national treasure.

Bay Barometer

As a dynamic system, conditions within the Bay fluctuate from month to month, year to year. With time, this complex system will respond to our restoration efforts.

Looking at data over time helps scientists understand natural variations as well as the long-term effects of restoration efforts. All of the data provided in this report reflect the Bay's health over the course of many years, and in some cases, decades. The report provides just a snapshot of the best available information from 2011 and 2012 on Bay's health and current efforts to protect and restore our national treasure and its watershed.



Your Bay Watershed

The Chesapeake Bay Watershed covers 64,000-square-mile area, spanning parts of six states—Delaware, Maryland, New York, Pennsylvania, Virginia and West Virginia—and all of the District of Columbia. Billions of gallons of water flow each day through our backyard streams and rivers and, eventually, into the Chesapeake Bay.

The Bay itself is an estuary — a place of transition between the land and the sea, where incoming fresh water mixes with salty ocean water. It is the largest estuary in North America and an extremely productive ecosystem, home to more than 3,600 species of plants and animals.

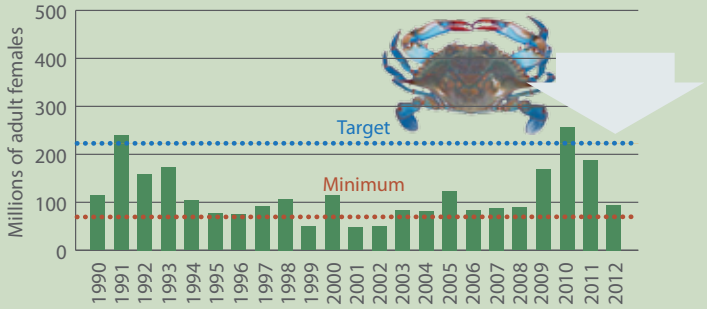
What is a "watershed"?

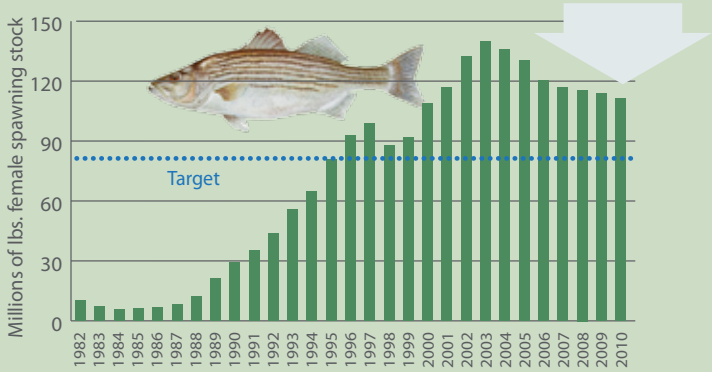
A watershed is the land area through which water flows and drains to the lowest point, into a stream, river, lake or estuary. A watershed may be large or small, may occupy sloping, mountainous or nearly flat terrain and cover many landscapes, including forests, farmland, small towns and cities. All types of human activities in a watershed eventually affect the water quality downstream.

Blue Crabs In Flux

Rockfish Stable but at Risk

Bay Health—What we are seeing





Blue crabs are one of the most resilient of Bay creatures since they are hardy, prolific and eat almost anything. Despite the 2012 figures, the adult crab population and harvest remain in the sustainable range and the 2012 juvenile population (see below) is reason to be hopeful. Still, fisheries managers are cautious about ensuring that the harvest of females is limited relative to their overall numbers.

The Bay is the primary spawning and nursery habitat for striped bass on the East Coast and supports one of the most important commercial and recreational fisheries on the Atlantic seaboard. Striped bass are managed on a coastal, rather than Bay-specific, basis. Populations have rebounded from historic lows however concerns continue over disease and whether there is enough prey to adequately support this predatory fish.

Bay Restoration— What we are doing

More Streams Open to Migratory Fish

Removing dams and blockages in rivers and streams expands the spawning grounds of migratory fish such as shad. Where dams have been removed, experts continue to see fish return to waters where they've not been seen in years.

Wetlands Restored 2010–2011

+3775 acres

Wetlands are valuable transition areas between land and water. They capture and filter pollution, provide wildlife and aquatic habitat, protect shorelines and reduce flooding. Nearly 15,000 acres were restored between 1998 and 2010.

Forest Buffers Planted

Streamside forests soak up nutrients and trap sediment in runoff and prevent them from reaching the watershed's rivers and streams. They also stabilize riverbanks and water temperatures. Most buffers are planted by rural land owners.

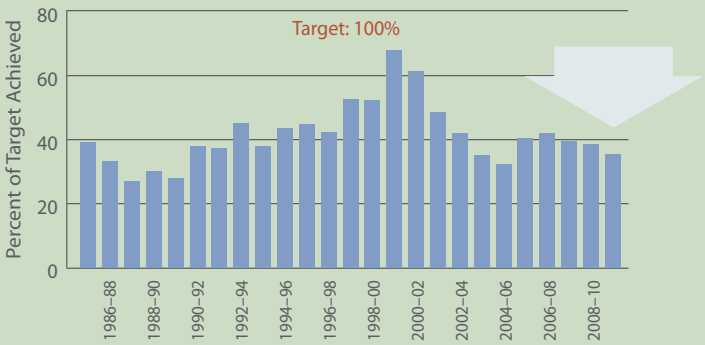
In 2012, 587 million juvenile crabs–the highest number since 1993–matured into adults in the fall and will be seen into 2013.

Dissolved Oxygen Levels Lower in Summer

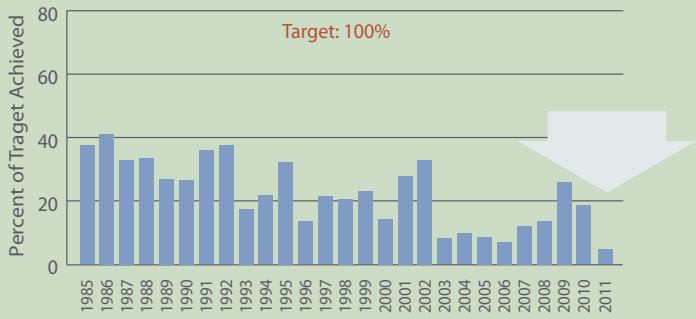
Water Clarity Murky

Bay Health

Early indications suggest the 2012 dead zone was second smallest since 1985.

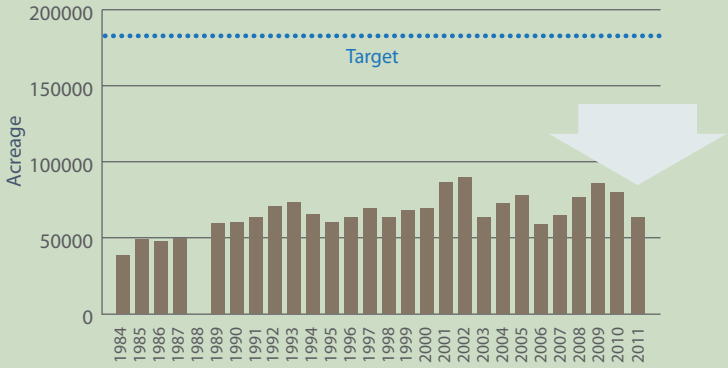


The extent and duration of low oxygen levels in deeper Bay waters varies widely depending on the amount of rainfall, temperature and nutrient levels. Vast areas of water with no oxygen, called "dead zones", are usually seen in the Bay in hot, dry summer months.



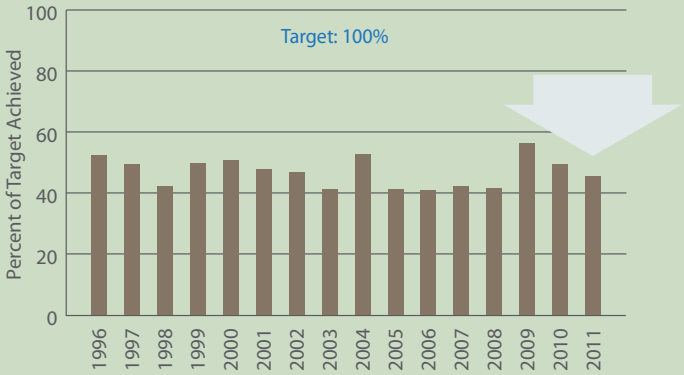
Water clarity measures the depth to which light can penetrate into the water. It is routinely hindered by the amount of fine sediment, plankton and other debris suspended in the water. Greater water clarity generally leads to a healthier Bay.

Grasses Down but Resilient

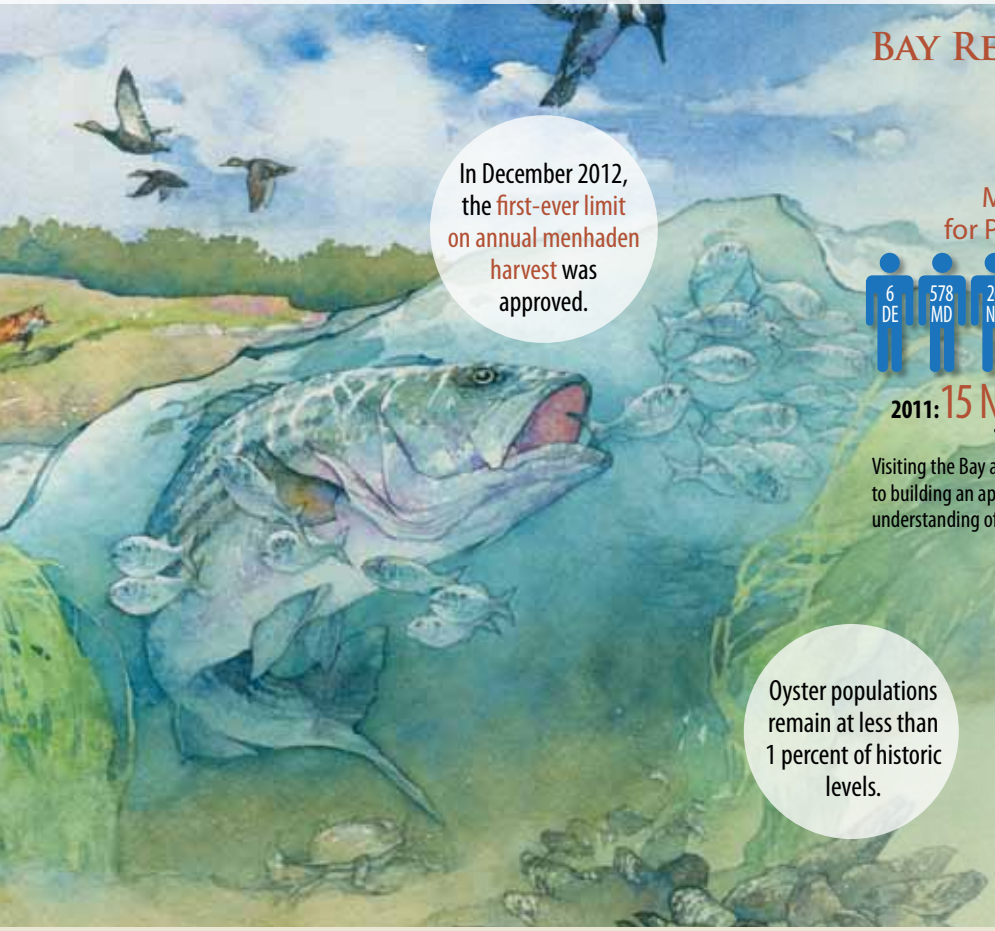


Underwater bay grasses provide shelter to many species, add oxygen to the water and reduce shoreline erosion. Their abundance is a sign of local water quality. Though grasses declined overall in 2011, scientists discovered new grass beds in various rivers and found the large Susquehanna Flats grass bed survived the deluge accompanying Tropical Storm Lee.

Bottom Habitat Shows Little Change



The Bay's bottom-dwelling creatures are especially sensitive to toxics and oxygen levels since they cannot move away from poor environmental conditions.



Bay Restoration

In December 2012, the first-ever limit on annual menhaden harvest was approved.

More Sites for Public Access

2011: 15 NEW Public Access Sites

TOTAL: 1,144

Visiting the Bay and its watershed is essential to building an appreciation of its beauty and an understanding of its value in our lives.

Lands Preserved Since 2000

+8,013,132 acres

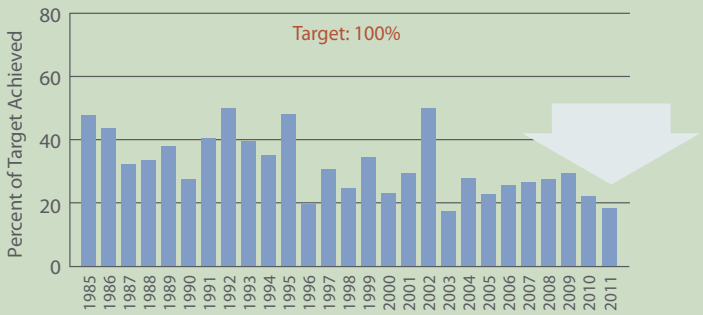
Preserving and protecting lands from development builds habitat corridors for wildlife and keeps natural filters in place. Approximately 20% of the land in the Chesapeake Bay watershed is protected.

Oyster Reef Work Continues

Oyster reefs are communities of many creatures valuable to the ecosystem. In early 2012, Bay Program partners agreed upon a Bay-wide standard for measuring the success of reef restoration and selected four initial tributaries for restoration work: Harris Creek and Little Choptank River in Maryland and the Lafayette and Lynnhaven Rivers in Virginia. Active in-water restoration in these tributaries began in 2012. New figures on oyster reef restoration are expected in 2013. Federal and state partners have agreed to a goal to restore oysters in 20 tributaries by 2025.

Oyster populations remain at less than 1 percent of historic levels.

Chlorophyll *a* Out of Balance



Algae are the foundation of the food web and are necessary for a balanced ecosystem. However, too much algae can block sunlight from reaching underwater grasses, reducing habitat. Algae blooms can deplete levels of oxygen that underwater life needs to survive. The range of acceptable algae levels, measured by chlorophyll a concentrations, varies by seasons and salinity. The closer we are to meeting our target, the more balanced the algae levels are in the Bay.

For more detailed information go to

chesapeakebay.net

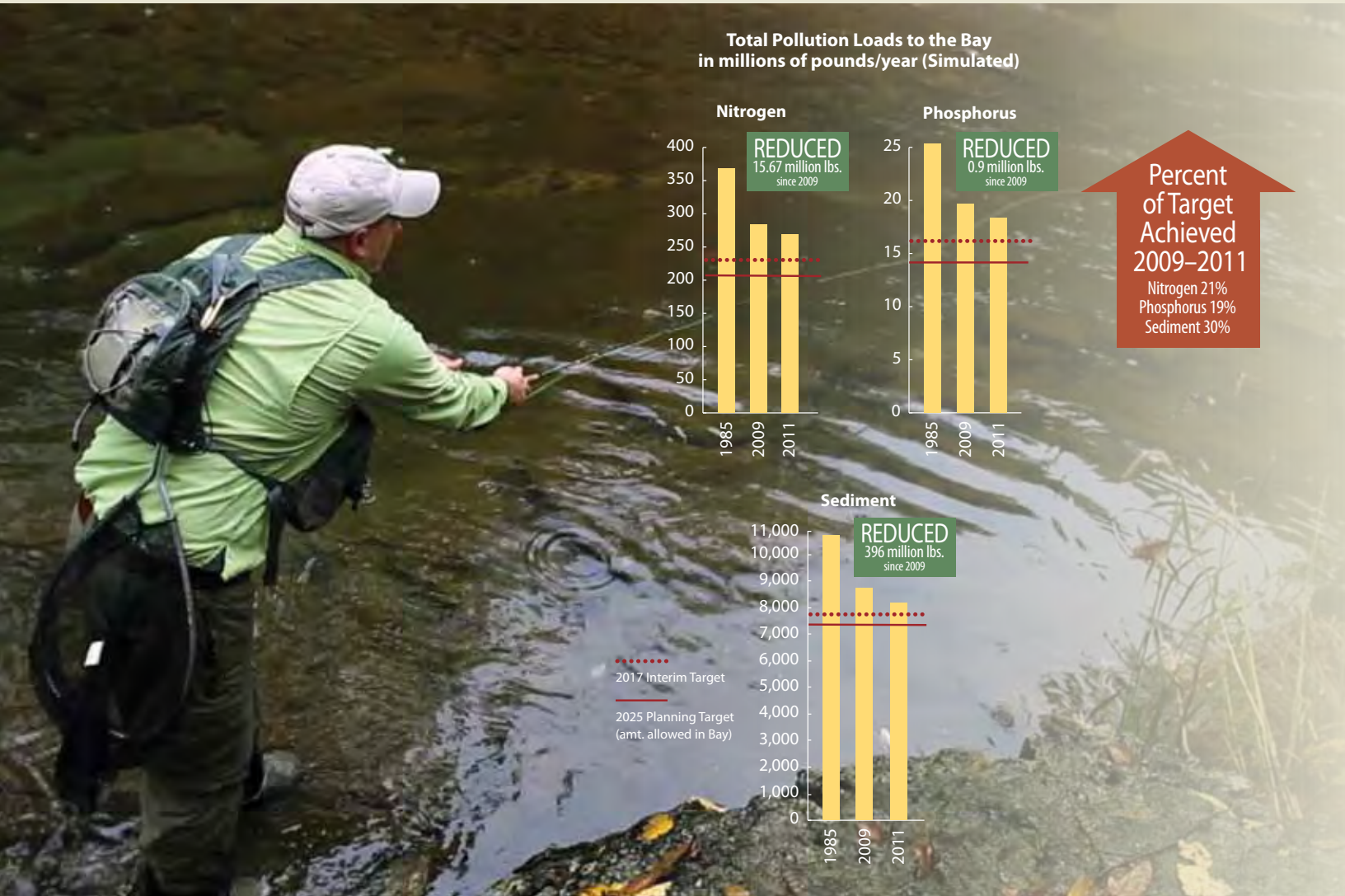
Bay Restoration: What we are doing

Progress on Reducing Nutrient and Sediment Pollution

The Chesapeake Bay Program Watershed Model provides program managers with a way to estimate the nutrient and sediment reductions that will likely occur as pollution reducing practices are implemented throughout the watershed. These reduction estimates also provide an indication of the pollutant load that would flow into the Bay in an "average year." Using the model, managers can project the future response of various management actions put in place today.

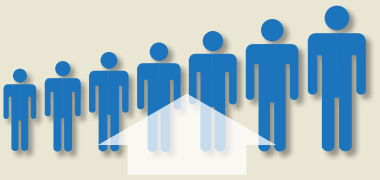
Model estimates and water quality monitoring observations both indicate some progress has been made toward meeting watershed-wide nutrient and sediment reduction goals.

However, much more needs to be done. From 1985 to 2011, model estimates show that we have reduced nitrogen by 28 percent. To meet the limits set out in the Chesapeake Bay Total Maximum Daily Load, the Bay's "pollution blueprint" established by the Environmental Protection Agency in 2010, we must slash an additional 60 million pounds, or 22 percent, of nitrogen from the waters flowing into the Bay. Similar reductions in the amount of phosphorus and sediment flowing into the Bay also are needed. While model estimates allow us to assess restoration actions for water quality, the ultimate success of restoration will be reflected in how the watershed's living resources respond to cleaner waters. *(See "Evaluating a 64,000 Square Mile Watershed" at right.)*



Factors we have to consider

Population



2011: 17.5 Million

The health of our waters is directly linked to how we use the lands on which we live. As the Bay Watershed's population grows, the impacts on lands and waters increase, too. Communities expand with homes, roads and amenities that replace natural filters. Rainwater runs over pavement, lawns and farm fields, picking up pollutants and carrying them, untreated, into local waterways and, ultimately, the Bay. Wise development practices and improved agricultural management are critical to balancing the environmental pressures of a rising population.

Flow/Nutrient Loads

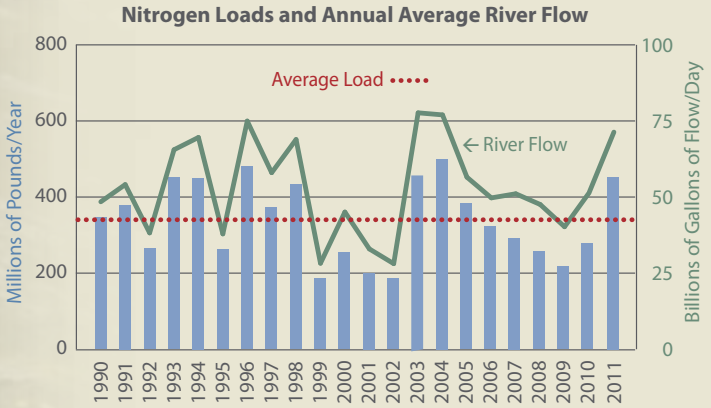
The amount of fresh water from rain and snowfall in the Bay Watershed shapes the conditions in the Bay and affects the health of all its creatures. In years of higher fresh water river flow, more pollution enters the Bay, while during dry years, fewer pollutants are washed downstream. Because 2011 was one of the five wettest years on record, with heavy spring rains and strong fall storms, river flow levels increased and resulted in more nitrogen, phosphorus and sediment reaching the Bay. Tropical Strom Lee in particular contributed several days of heavy rainfall to the Susquehanna River watershed, resulting in greater speed and quantity of river flow in the river and some scouring of reservoirs behind Conowingo Dam, a rare event only occurring a few times per decade. A 3-year study now being conducted by various federal, state and local partners will develop management options to increase the sediment storage capacity behind Conowingo Dam.

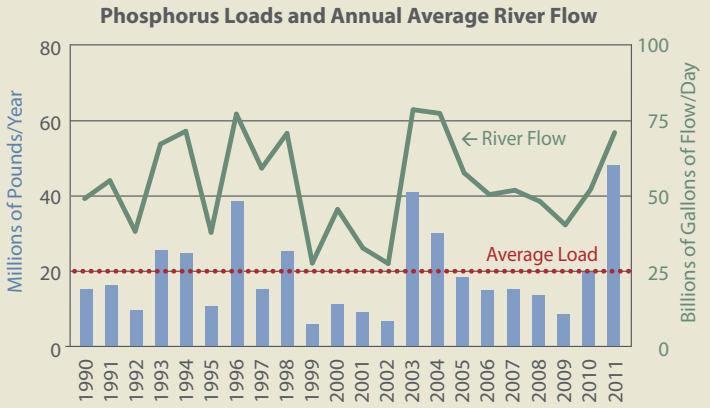
Yes! You can help!

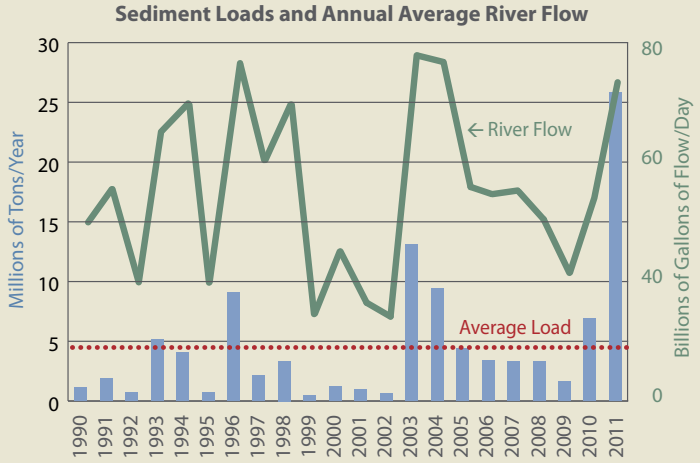
Each person in the Bay watershed has an impact on the land and local waters that ultimately drain to the Chesapeake Bay.

Healthy waters are essential to restoring almost every habitat across the region. At the local level, communities must decide how to stem the tide of nutrients and other pollutants flowing into the Bay as their populations change while also finding innovative ways to manage agricultural lands and suburban demands for housing, roads and development.

Community groups can team up with local conservation organizations to restore their local streams. Businesses can find ways to reduce their impact on their communities and can even restore key habitats on their properties. Students can work with their teachers to implement schoolyard and neighborhood restoration projects. We must also improve the way we manage our living resources and take into account the way they interact with the entire Bay ecosystem.







An Ecosystem Under Pressure

For centuries, people have settled throughout the Bay's watershed and harvested its bounty. The Bay and its rivers provide drinking water for millions, pathways for commerce, robust fish and shellfish industries, and recreation.

As we have made use of these resources, we have forever changed the region. This dynamic, sensitive natural system remains unbalanced in many ways and requires the continued efforts from every citizen in the watershed to restore it.

Each part of the Bay region is interconnected. A complex network of rivers and streams, beginning at the Chesapeake's headwaters hundreds of miles away, carries fresh water into the Bay. These waterways also carry pollution, and by the time they reach the Chesapeake, the accumulated pollution load can be enormous.

Streams flowing through the Chesapeake's watershed are linked to the blue crab hiding among underwater grasses in its shallows. Oysters in the Bay can live and die as a result of our actions to control the erosion of riverbanks far away. Natural corridors throughout the watershed connecting wetlands, forests and creeks provide important habitat. As our natural networks are altered to make room for roads and buildings, their ability to hold back pollutants and the important habitat they offer are lost as well.

Evaluating a 64,000 Square Mile Watershed

Bay scientists have found that actions on land, even hundreds of miles upstream in the headwaters, affect the Bay's living resources downstream. Understanding the effects of management actions and their relationship to the rest of the ecosystem requires a complex set of tools including in-water, on-site monitoring and computer simulations of the Bay watershed.

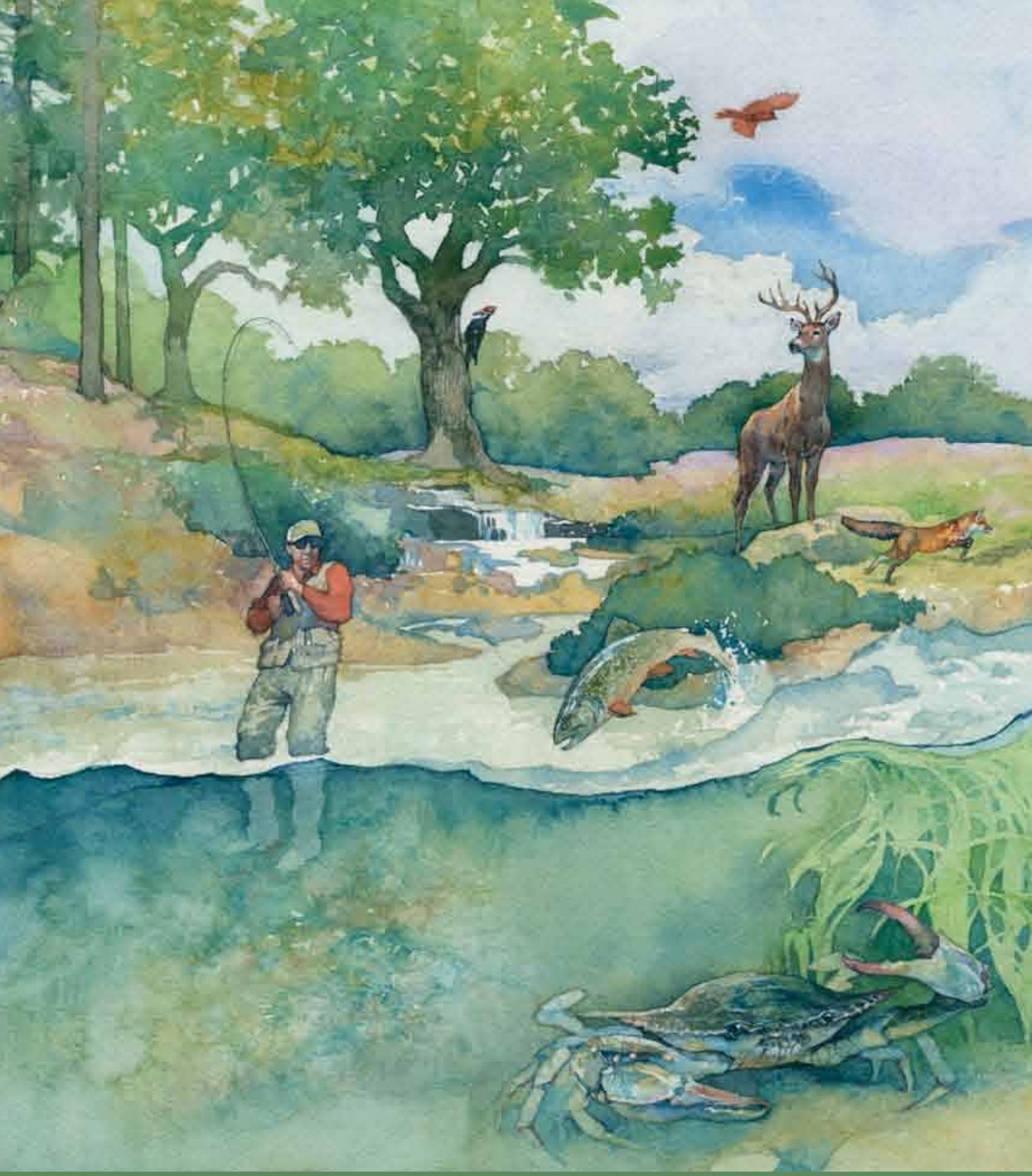
Education

The Chesapeake Bay Program's commitment to Meaningful Watershed Education Experiences (MWEE's) for students, teachers and schools gained further support in 2012 with the release of the Mid-Atlantic Elementary and Secondary Environmental Literacy Strategy. The Strategy draws on the strength of the federal government to support state's in transforming schools to help build the next generation of skilled, knowledgeable citizen stewards.

Looking to the Future

People have been influencing the Bay and its watershed for hundreds of years and the Bay cannot be restored overnight. Scientists are helping us understand the problems facing the Chesapeake, and Bay Program partners have a clear blueprint, called the Chesapeake Bay Total Maximum Daily Load (TMDL), for improving water quality in the region's waters. States and localities are taking part in implementing this plan.

♻ *Printed on recycled paper*
Photos: Chesapeake Bay Program
Design: Joanne Shipley Design
Illustration: Wood Ronsaville Harlin



410 Severn Avenue, Suite 112
Annapolis, Maryland 21403
800-YOUR BAY | chesapeakebay.net