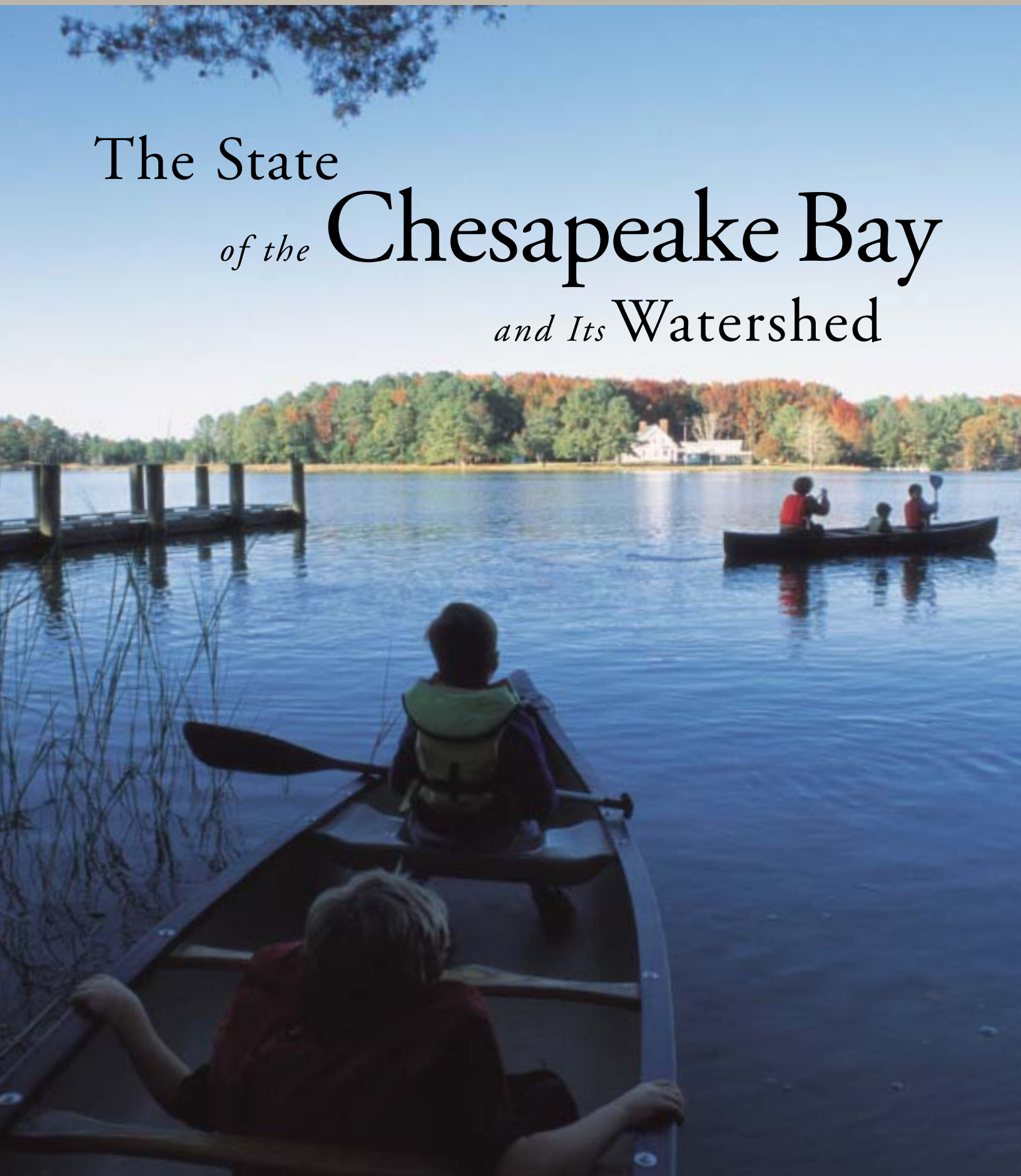


# The State *of the* Chesapeake Bay *and Its* Watershed





Chesapeake Bay Program  
A Watershed Partnership

The Chesapeake Bay Program, formed in 1983 by the first Chesapeake Bay agreement, is a unique regional partnership guiding the restoration of the Chesapeake Bay and its tributaries. The Bay Program partners include the states of Maryland, Pennsylvania and Virginia; the District of Columbia; the Chesapeake Bay Commission, a tri-state legislative body; the U.S. Environmental Protection Agency (EPA), which represents the federal government; and participating advisory groups. Delaware, New York and West Virginia, representing the Bay's headwaters, also participate in Bay Program water quality restoration activities.

**Chesapeake Bay Program**  
410 Severn Avenue, Suite 109  
Annapolis, Maryland 21403  
(800) YOUR BAY

To read this report online and link to more information on the State of the Chesapeake Bay and Its Watershed, visit [www.chesapeakebay.net/SOTB04](http://www.chesapeakebay.net/SOTB04)



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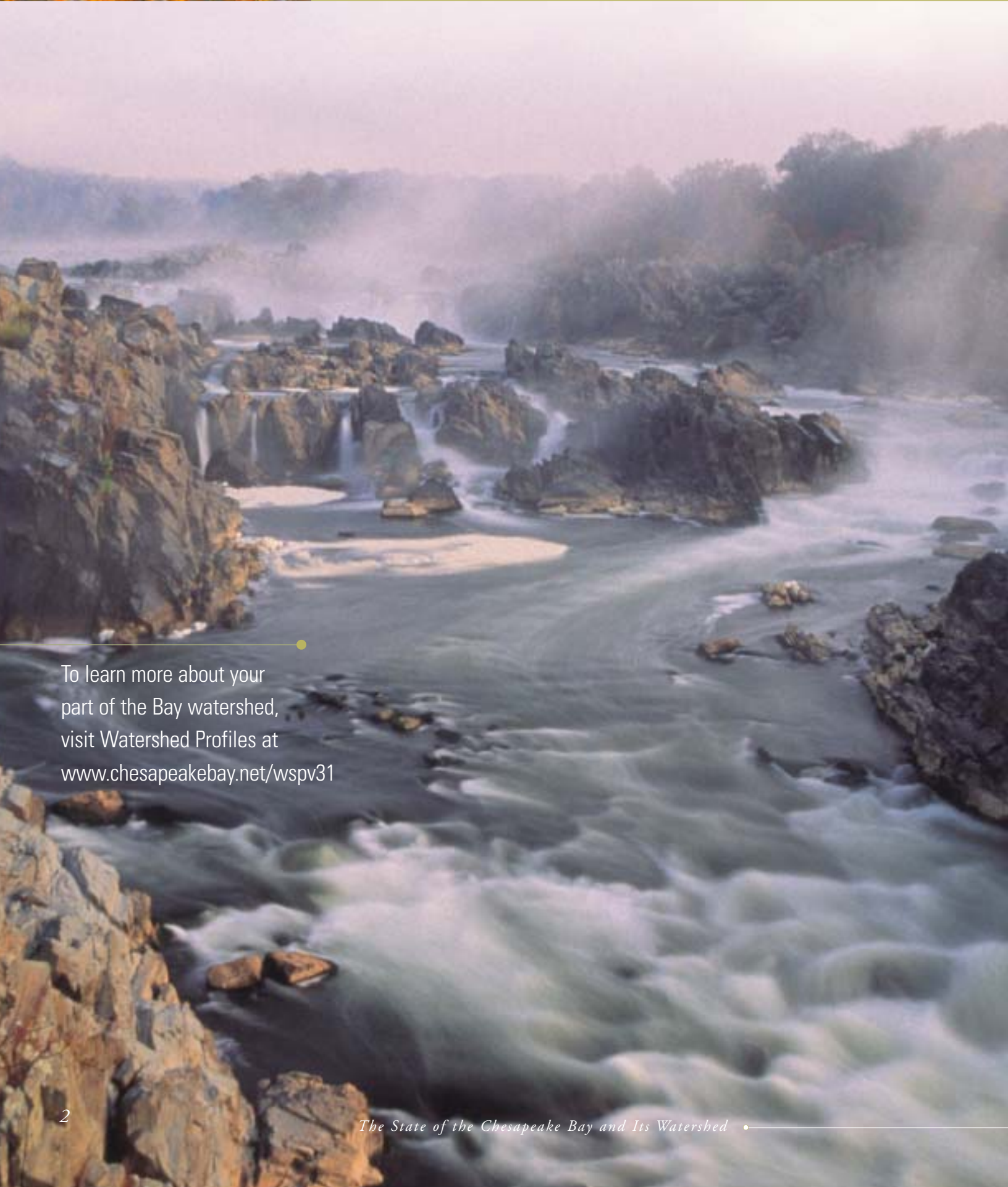
# Your Bay

## *and Its* Watershed

The majestic Chesapeake Bay is the heart of the mid-Atlantic region. From early Native Americans to today's visitors and residents, people have stood in awe of the astonishing beauty and plentiful resources provided by the Chesapeake and its surrounding lands. Today, however, the Bay and its watershed are in peril and require immediate attention. This report on the health of the Bay watershed presents current efforts to restore what the U.S. Congress has called our “national treasure.”







To learn more about your  
part of the Bay watershed,  
visit Watershed Profiles at  
[www.chesapeakebay.net/wspv31](http://www.chesapeakebay.net/wspv31)

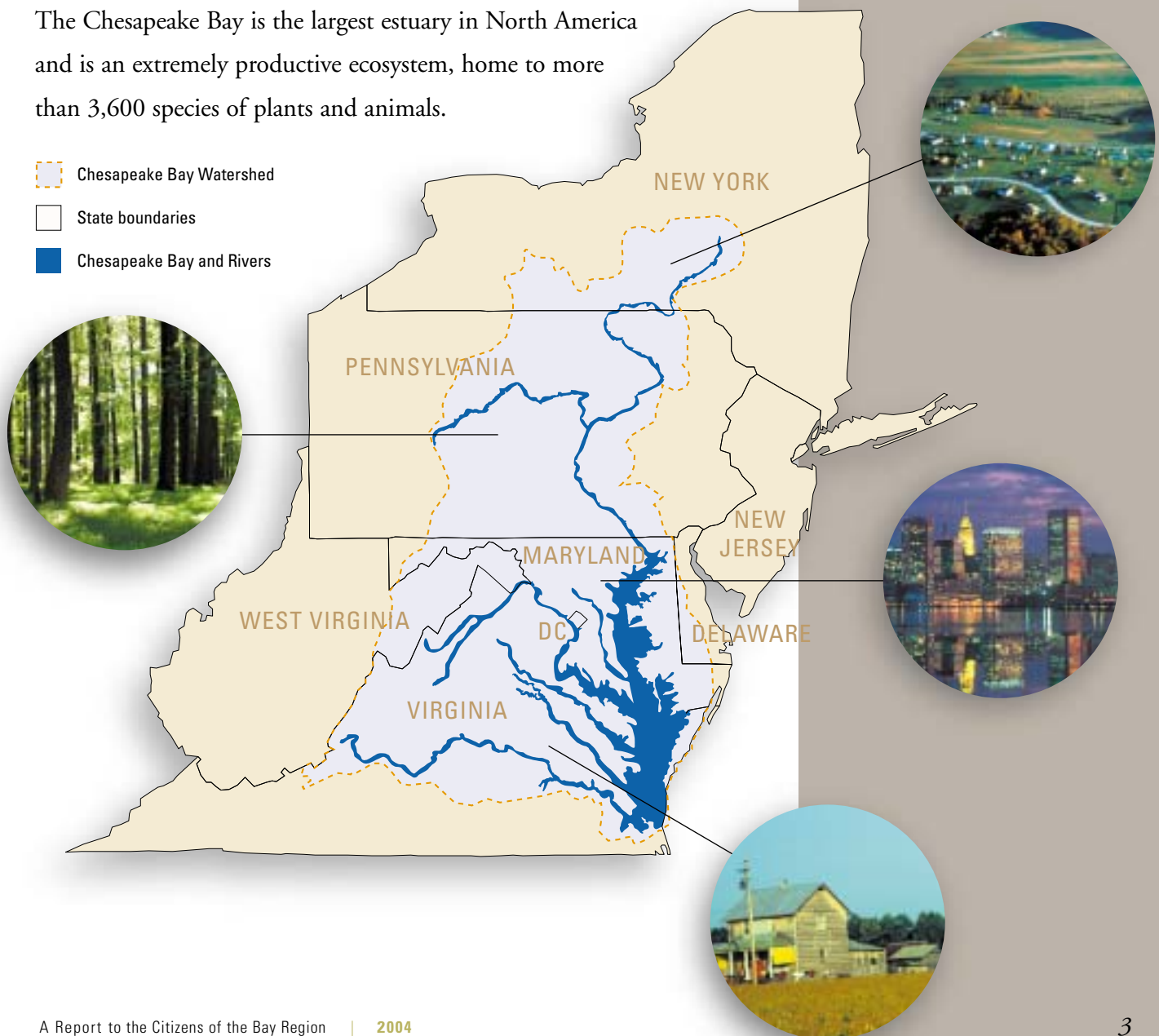
# The Chesapeake Bay watershed covers an enormous 64,000-square-mile area

that includes 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 is an estuary — a place of transition between the land and the sea, where incoming fresh water mixes with salty ocean water.

The Chesapeake Bay is the largest estuary in North America and is an extremely productive ecosystem, home to more than 3,600 species of plants and animals.

**A Watershed Defined:** 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. Human activities in a watershed eventually affect the water quality downstream.







## A Stressed Ecosystem

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 people have taken advantage of these resources, they have forever changed the Bay.

Today, the Chesapeake Bay and its watershed are in danger. Although it has provided for us for hundreds of years, the Bay now needs help from every citizen in the watershed.

Each small part of the Bay region is interconnected. Streams flowing through the Chesapeake's headwaters are linked to the blue crab hiding among underwater grasses in its shallows. Natural corridors throughout the watershed connecting wetlands, forests and streams provide important habitat. These forests and wetlands hold nutrients and sediment in place and reduce the amount of runoff flowing into small creeks and streams. As they are destroyed to make room for roads and buildings, their ability to hold back pollutants and the important habitat they offer are lost as well.

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.









# Bay Program

## Partnership

### *Working to Restore the Chesapeake*

Bay restoration partners know that we have forever changed the watershed's landscape. Now, in the face of a growing population, we must work to manage the natural systems of the Bay and its watershed to bring them back into balance.

The Chesapeake Bay region states have joined forces with the federal government to restore and protect the Bay and its watershed. This partnership, called the Chesapeake Bay Program, was created in 1983 to help coordinate restoration efforts across state boundaries. Over the



past 20 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.









# The State *of the* Chesapeake Bay *and Its* Watershed

*The State of the Chesapeake Bay and its Watershed* provides a snapshot of the Bay's health. This section of the report gives a brief overview of some of the key indicators Bay experts rely on to assess the health of the Bay and its watershed. Where possible, this report shows how these indicators are interrelated and interconnected within the watershed.



## Want to Learn More?

For more information on each indicator, we include a direct link to the Chesapeake Bay Program website. By following the links, visitors to the website can explore issues in depth and access the data used to compile the report. Many of the indicators included in the following pages are updated and posted on the Bay Program website as new data are available throughout the year.

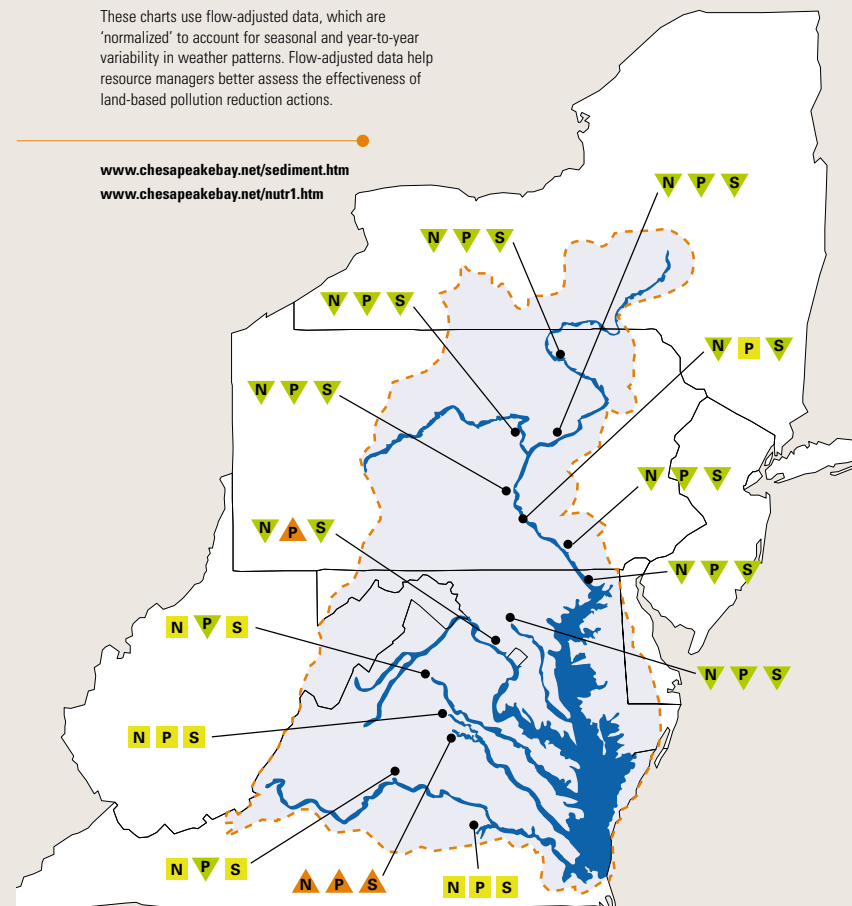
For a full list of the indicators used in this report, visit the *State of the Chesapeake Bay and its Watershed* section of the Chesapeake Bay Program's website, at [www.chesapeakebay.net/SOTB04](http://www.chesapeakebay.net/SOTB04)

## 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.

These charts use flow-adjusted data, which are 'normalized' to account for seasonal and year-to-year variability in weather patterns. Flow-adjusted data help resource managers better assess the effectiveness of land-based pollution reduction actions.

[www.chesapeakebay.net/sediment.htm](http://www.chesapeakebay.net/sediment.htm)  
[www.chesapeakebay.net/nutr1.htm](http://www.chesapeakebay.net/nutr1.htm)

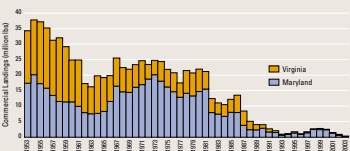


1980s – 2003

| Nitrogen | Phosphorus | Sediment |                      |
|----------|------------|----------|----------------------|
| N        | P          | S        | Decreasing trend     |
| N        | P          | S        | No significant trend |
| N        | P          | S        | Increasing trend     |

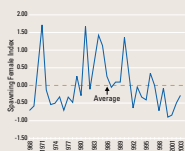


#### Oysters at Historic Lows



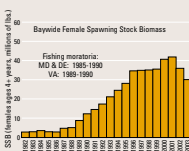
Oyster populations in the Chesapeake have been decimated by disease, intense harvest pressure and poor water quality. [www.chesapeakebay.net/american\\_oyster.htm](http://www.chesapeakebay.net/american_oyster.htm)

#### Blue Crabs at Risk



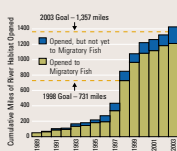
Improved water quality and habitat restoration efforts along with proper management of the crab harvest are needed to restore the Bay's blue crab populations. [www.chesapeakebay.net/blue\\_crab.htm](http://www.chesapeakebay.net/blue_crab.htm)

#### Rockfish Population Stable



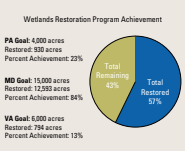
Rockfish have rebounded but concerns remain over disease, food sources and availability of spawning habitat. [www.chesapeakebay.net/striped\\_bass.htm](http://www.chesapeakebay.net/striped_bass.htm)

#### Migratory Fish Habitat Expanding



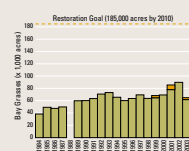
Removing blockages in the watershed's rivers allows migratory fish to return upstream to spawn. Slowly, migratory fish are returning. [www.chesapeakebay.net/fishpass.htm](http://www.chesapeakebay.net/fishpass.htm)

#### Wetlands Being Restored



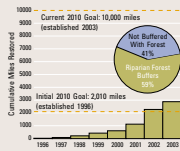
Wetlands are a valuable piece of the Bay's ecosystem. They filter and capture pollutants, provide wildlife habitat, protect shorelines and reduce fishery flooding. [www.chesapeakebay.net/wetlands.htm](http://www.chesapeakebay.net/wetlands.htm)

#### Bay Grasses Show Annual Variation



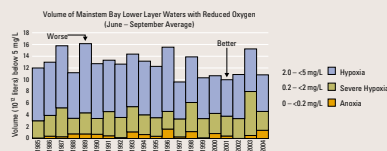
Reductions in the pollutants flowing into the Bay are needed to help underwater bay grasses. Annual variations in bay grasses show the sensitivity of the Bay ecosystem. Note: Orange area of bar includes estimated additional acreage. No survey in 1988. [www.chesapeakebay.net/baygrasses.htm](http://www.chesapeakebay.net/baygrasses.htm)

#### Forest Buffers Sprouting Up



Streamside forests prevent pollutants from entering the rivers of the watershed by soaking up nutrients and trapping sediments. [www.chesapeakebay.net/forestbuff.htm](http://www.chesapeakebay.net/forestbuff.htm)

#### Dissolved Oxygen Levels Dangerously Low in Summer



The extent and duration of low oxygen levels in the deeper waters of the Bay vary widely depending on the amount of rainfall, temperature and pollution levels. [www.chesapeakebay.net/lo.htm](http://www.chesapeakebay.net/lo.htm)



## Water Clarity Improvements Needed In Key Habitat Areas

Water clarity is critical to the health of underwater grasses that provide important habitat for many Bay animals.

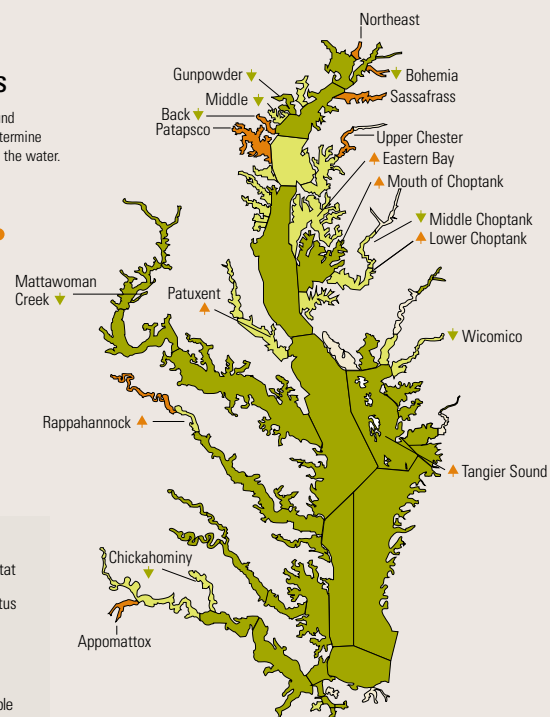
[www.chesapeakebay.net/status.cfm?sid=80](http://www.chesapeakebay.net/status.cfm?sid=80)



## Mixed Trends in Algae Levels

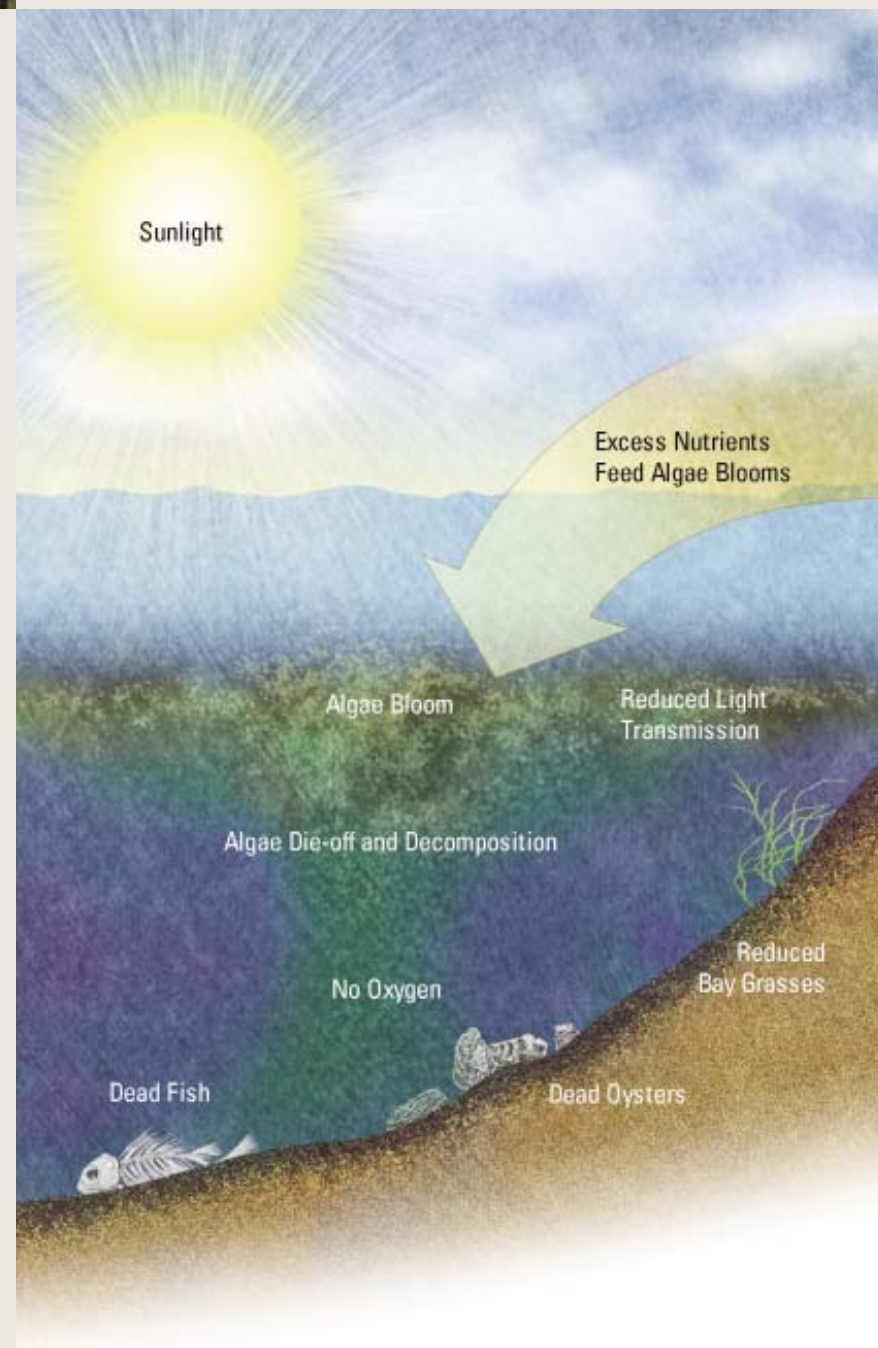
Chlorophyll *a* — a pigment found in plants — is measured to determine the amount of algae present in the water.

[www.chesapeakebay.net/status.cfm?sid=119](http://www.chesapeakebay.net/status.cfm?sid=119)



## 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 blue crab 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.



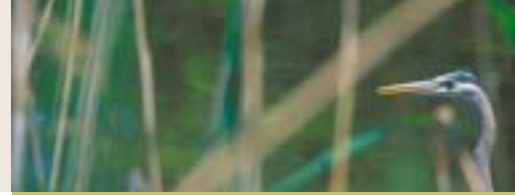
## Nutrients and Sediment Harming the Bay

Nutrients, particularly nitrogen and phosphorous, are the key pollutants harming the Chesapeake Bay. In small quantities, nutrients aren't harmful. In fact, a healthy ecosystem needs nutrients for plants to grow and animals to flourish. But too many nutrients have disastrous effects.

Nutrients enter waterways through numerous paths. Rainwater carries fertilizer from lawns and farm fields. It washes small particles of dirt and oil from roadways and sidewalks, and erodes unprotected stream banks. Nutrients come from many sources, such as lawn fertilizer, sewage treatment plants and septic systems, farm fields and even the air. The largest contributors of nutrients to the Bay are agriculture, atmospheric deposition (nutrients entering the Bay from the air), wastewater treatment plants and runoff from developed, urban lands.

Sediment, what many of us refer to as dirt, also is harmful to the Bay. It is carried into waterways by stream bank and shoreline erosion and rainwater runoff. Sediment clouds the Bay's water and limits the light needed for underwater bay grasses to grow.

The amount of nutrients and sediment flowing into the Bay must be reduced to restore healthy water quality for the Bay's living resources. Bay Program partners are working together to develop comprehensive solutions, referred to as tributary strategies, for reducing nutrient pollution.



For more information on the impacts of nutrients on the Bay ecosystem, visit [www.chesapeakebay.net/nutr1.htm](http://www.chesapeakebay.net/nutr1.htm)





## Examining the Bay's Health over the Long Term

The Chesapeake Bay is a dynamic system, and conditions within the Bay fluctuate from year to year, month to month and even day to day. With time, this complex system will respond to our restoration efforts, from pollution reductions and fisheries management to habitat restoration.

Examining 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.







## Assessing a Vast 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, as well as their relationship to the rest of the Bay ecosystem, requires a complex set of tools. As a result, Bay scientists rely heavily on a collection of water quality monitoring data and computer modeling.

Bay Program partners regularly collect water samples throughout the Bay's mainstem as well as from its rivers and streams. Scientists analyze these samples to understand the current and long-term health of the Bay and its rivers.

These data are then combined with other information, such as historic hydrologic conditions and management actions, and used to create computer models of the Chesapeake and its watershed. These computer models help scientists better understand the likely effects of management actions on the Bay's health. They also help scientists gain a better understanding of how the Bay works.

Computer models are used to evaluate management strategies and projected long-term progress toward restoring a healthy Bay, while monitoring data help us determine whether we're successful. Bay Program partners track more than 100 indicators of restoration progress and Bay watershed health; 89 of these use monitoring and tracking data, and the rest rely on computer modeling.



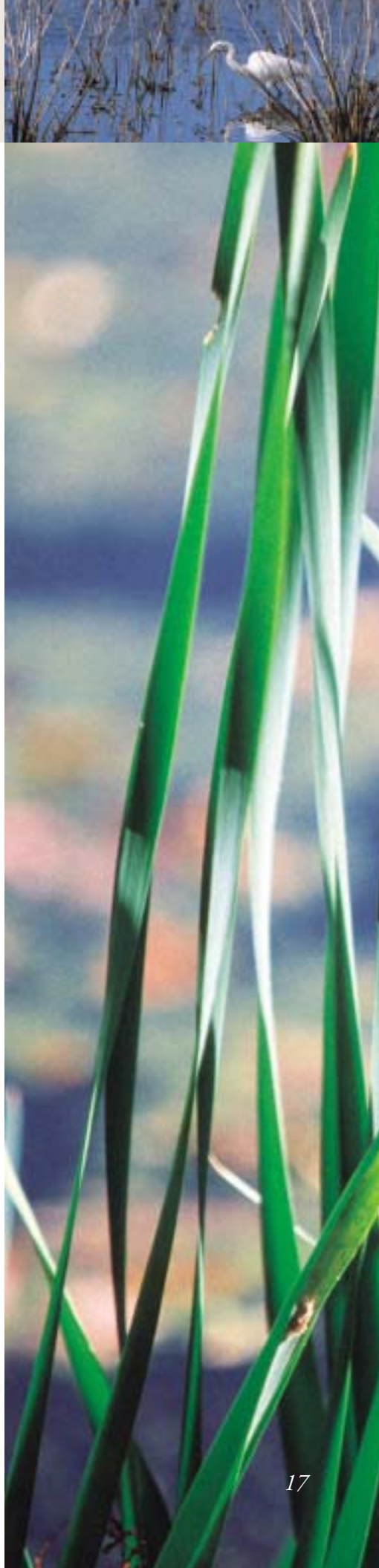
# Restoring the Bay

## *A Work in Progress*

When viewed together, what do all of these data and analyses tell Bay scientists about the health of the Chesapeake and its watershed? The Chesapeake Bay is a complex, sensitive and dynamic ecosystem. As a result, it is impossible to define the current state of the Chesapeake Bay in short, simple terms. No single chart tells the whole story.

Some areas of the Chesapeake and its watershed are improving. For instance, the number of streams with restored forested buffers – a vital management practice that slows the flow of harmful nutrients and sediment into streams and the Bay – is increasing. Rockfish are common in many areas of the Bay during summer months. On the other hand, critical species such as oysters and blue crabs are at or near historically low levels because of disease, harvest pressures, degraded habitat and poor water quality conditions.

Long-term monitoring data trends indicate that some progress has been made in stemming the flow of harmful nutrients into the Bay. Nearly 100 wastewater treatment plants have been upgraded to limit nutrient pollution. Similarly, more than three million acres of cropland have pollution-fighting nutrient management plans in place. But while we are making some progress, we still have a very long way to go. In 2003, near-record rains washed massive amounts of pollution into local waters and the Bay, resulting in record losses of Bay grasses and a huge increase in the volume of low-oxygen waters during the middle of the summer. Only after we have slashed nutrient and sediment levels far below current levels will we have a Bay ecosystem healthy and resilient enough to withstand these natural variations in weather.





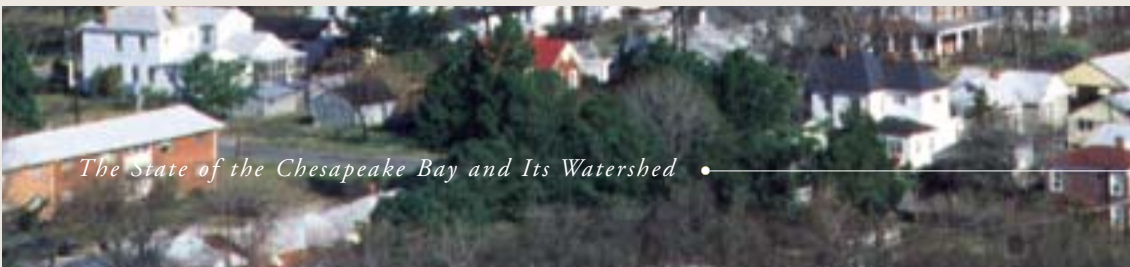
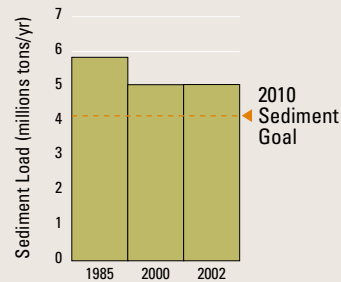
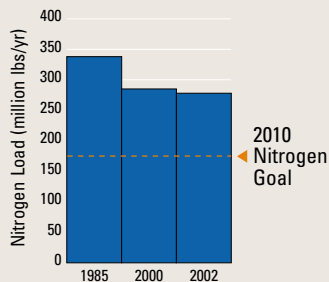
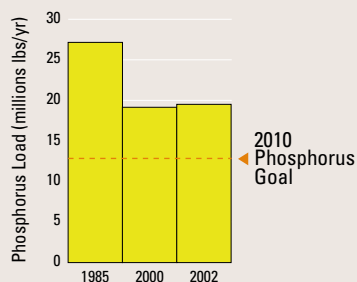


## Progress toward Meeting Nutrient and Sediment Goals Limited

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 abatement 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 limited progress has been made toward meeting watershed-wide nutrient and sediment reduction goals. However, much more needs to be done. To meet the dramatically tougher pollution reduction goals set in 2003, we must slash nearly twice as much nitrogen from the waters flowing into the Bay as has been eliminated since 1985, according to model estimates. Steep reductions in the amount of phosphorus and sediment flowing into the Bay also are needed.

While model estimates allow us to assess restoration actions, the ultimate success of Bay restoration will be measured by the health of the Bay's living resources. (For more information on the Bay Watershed Model, see “Assessing a Vast Watershed”, page 16.)





## Confronting the Bay's Challenges

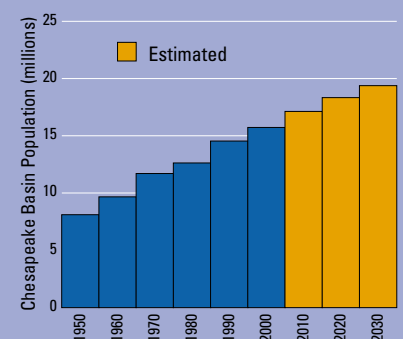
While important advances have been made over the past few decades in understanding the Chesapeake and implementing restoration programs, much more work remains to be done. The Bay watershed's population grows by 100,000 each year, and development pressure is intensifying. We must make many difficult decisions, right now. Communities must decide how to stem the tide of nutrients and other pollutants flowing into the Bay as their populations grow and the demand for housing, roads and other development increases. Finding innovative ways to install best management practices on city streets, in wastewater treatment plants and on farms continues to be a challenge. In addition to improving the way we manage our lands, we must improve the way we manage our living resources and take into account the way they interact with the entire Bay ecosystem.



### Chesapeake Bay Watershed Population Increasing

Since 1950, the Bay watershed's population has doubled to about 16 million people. As the population of the watershed grows, so does our footprint on the landscape. In the past decade, population increased by about 8 percent, while the amount of impervious surface increased by 41 percent, representing an area five times the size of the nation's capital. Managing future growth will be critical to preserving gains made during the first two decades of Bay restoration efforts.

[www.chesapeakebay.net/land.htm](http://www.chesapeakebay.net/land.htm)







# You Can Help.

*Each citizen in the Bay watershed plays a part in this effort.*

Even the smallest contributions can add up to big changes for the health of your local waterways and the Chesapeake Bay. The Bay restoration partners have a clear plan for restoring and protecting the Chesapeake and its watershed – *Chesapeake 2000*. Citizens must take part in implementing this plan. Students can work with their teachers to implement schoolyard and neighborhood restoration projects. 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.



## Looking to the Future

We must remember that humans have been influencing the Bay and its watershed for hundreds of years. The Bay cannot be restored overnight. Bay scientists are helping us understand the problems facing the Chesapeake, and Bay Program partners are working on an ambitious effort to restore the watershed. But it is only through the dedicated work of everyone living in the Bay watershed, sustained over time, that we can restore the majestic beauty and bounty of the Chesapeake Bay.

### Chesapeake Bay Gateways Are Your Chesapeake Connection

Chesapeake Bay Gateways are points of entry into the Chesapeake Bay's rich life and culture, where you can experience the history that shaped our nation, from the earliest European settlements and the War of Independence, through the Industrial Revolution, the Civil War and into the 21st century. Chesapeake Bay Gateways reveal the Bay's hidden treasures and tell its stories. Through its parks, wildlife refuges, maritime museums, historic or archaeological sites and water trails, each gateway provides a place to enjoy, relax, explore and learn more about the Chesapeake Bay.

Visit [www.baygateways.net](http://www.baygateways.net) to learn more about Chesapeake Bay Gateways and to plan your own Chesapeake Bay journey.

For more information on how you can get involved in your community to help restore the Bay and its rivers, visit [www.chesapeakebay.net/involved.htm](http://www.chesapeakebay.net/involved.htm)



#### Credits/Production Notes:

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**Illustrations:** Wood Ronsaville Harlin, Inc.

**Photography:** Many of the images included in this report were provided by the National Park Service's Chesapeake Bay Gateways Network, the U.S. Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (USFWS) and the Paynter Labs. Additional photographs courtesy of Middleton Evans, Starke Jett, Mike Land, Russ Mader, Dr. Kent Mountford and Chris Spielmann.





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