A Report to the Citizens of the Bay Region

www.chesapeakebay.net

Chesapeake Bay Program
A Watershed Partnership

CBP/TRS 283/07
EPA 903R-07001
April 2007

CHESAPEAKE BAY

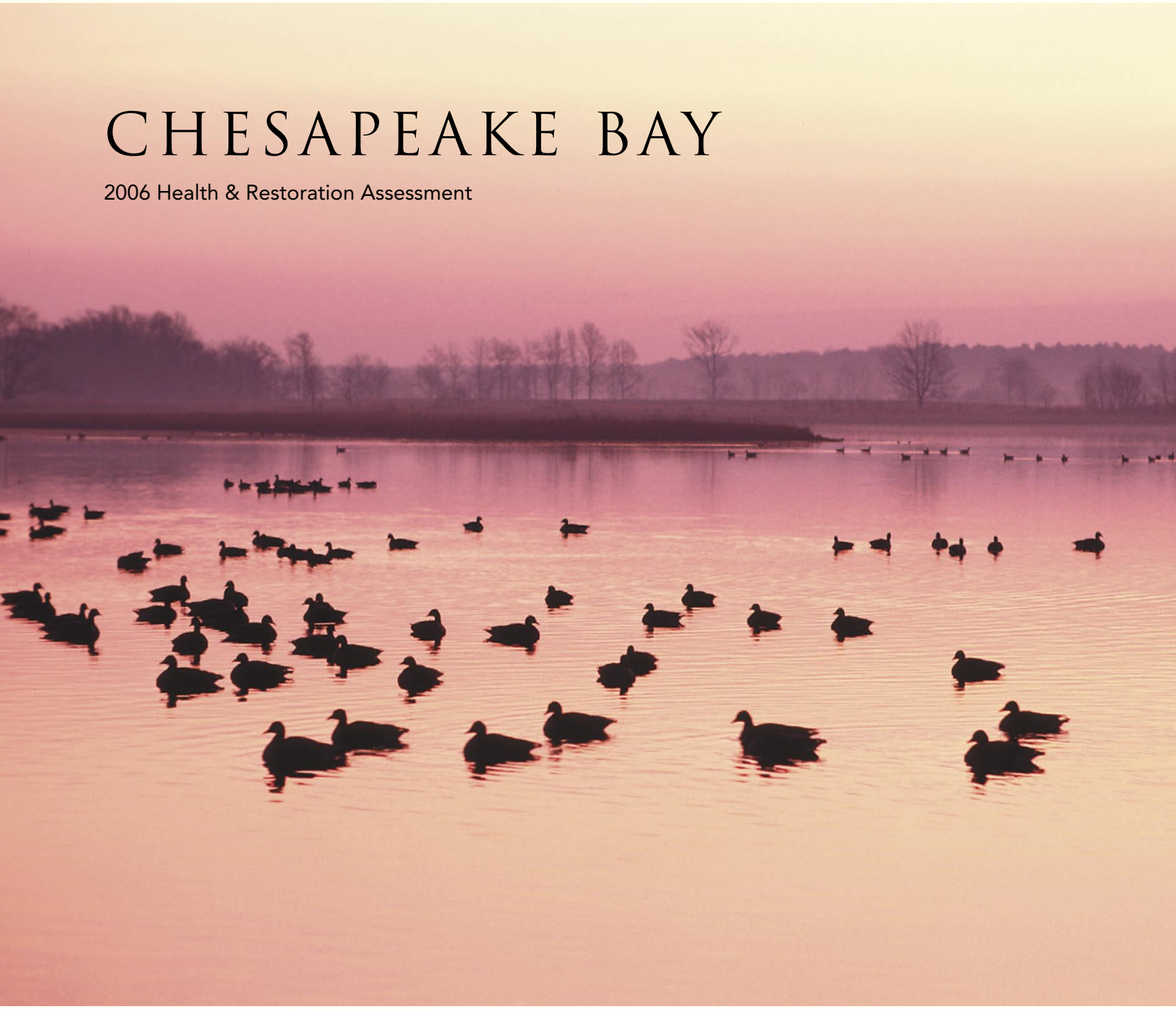
2006 Health & Restoration Assessment

PART ONE: **Ecosystem Health**

Chesapeake Bay Program
A Watershed Partnership

CHESAPEAKE BAY

2006 Health & Restoration Assessment



The Chesapeake Bay Program is a unique regional partnership that directs and conducts the restoration of the Chesapeake Bay by bringing together local, state and federal governments, non-profit organizations, watershed residents and the region's leading academic institutions in a partnership effort to protect and restore the Bay.

The Chesapeake Bay Program signatories – the state of Maryland; the commonwealths of Pennsylvania and Virginia; the District of Columbia; the U.S. Environmental Protection Agency representing the federal government; and the Chesapeake Bay Commission representing Bay state legislators – have committed to reducing pollution, restoring habitat and sustainably managing fisheries since signing the Chesapeake Bay Agreement of 1983.

Subsequent agreements have augmented the original program, and most recently culminated in signing Chesapeake 2000, an agreement intended to guide restoration activities throughout the Bay watershed through 2010. Chesapeake 2000 also provided an opportunity for the headwater states of Delaware, New York and West Virginia to join in regional efforts to improve water quality of the Bay and its tributaries.

To learn more and find out how you can help, visit the Chesapeake Bay Program website at www.chesapeakebay.net

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ABOUT THIS REPORT

The Chesapeake 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 a productive ecosystem and is the largest estuary in North America, home to more than 3,700 species of plants and animals.

A healthy Bay requires balancing the needs of the region's people and economy with the needs of the Bay for clean waters and ample habitat for aquatic life. The goal of Bay restoration is to restore this balance by reducing pollution, protecting critical habitat and ensuring sustainable populations of fish and shellfish.

The *Chesapeake Bay 2006 Health and Restoration Assessment* is presented this year in two parts. *Part One: Ecosystem Health* draws on the most up-to-date monitoring data gathered by Bay Program partners to assess the overall health of the Bay ecosystem last year.

Progress toward a restored Bay is tracked with 13 indicators grouped in three priority areas that represent major components of the Bay ecosystem. Quantitative restoration goals have been set for most of these indicators. For each indicator, a chart shows, as a percent of the goal, current status and a history of progress toward achieving the goal. A summary bar chart shows the current status of each indicator with respect to its restoration goal.

Although there are a number of smaller-scale success stories, the overall ecosystem health of the Chesapeake Bay remains degraded. For more than twenty years, restoration efforts have managed to offset the impact of the region's growing population while making modest ecological gains in some areas. Major pollution reduction, habitat restoration, fisheries management and watershed protection actions taken to date have not yet been sufficient to restore the health of the Bay.

In *Part Two: Restoration Efforts*, key restoration actions are measured against long-term goals.

We hope that, by presenting data in this manner, watershed residents can better understand the health of the Bay relative to what is needed for a balanced ecosystem.

Electronic versions of the *Chesapeake Bay 2006 Health and Restoration Assessment* reports can be found at www.chesapeakebay.net/press.htm. For more information about the data, methodology and restoration goals discussed in this report, please visit www.chesapeakebay.net.

HEALTH ASSESSMENT SUMMARY

INTRODUCTION

The human population in the Chesapeake watershed is now growing by more than 170,000 residents annually. The cumulative impact of centuries of population growth (currently over 16 million) and landscape changes has taken its toll. For over 20 years, restoration efforts have been underway to reverse the decline of the Chesapeake Bay's health. Progress is not calculated on a day-to-day basis, but by using detailed scientific data that have been carefully analyzed and interpreted; we can see changes in the health of the Bay over time. Change is occurring, but slowly.

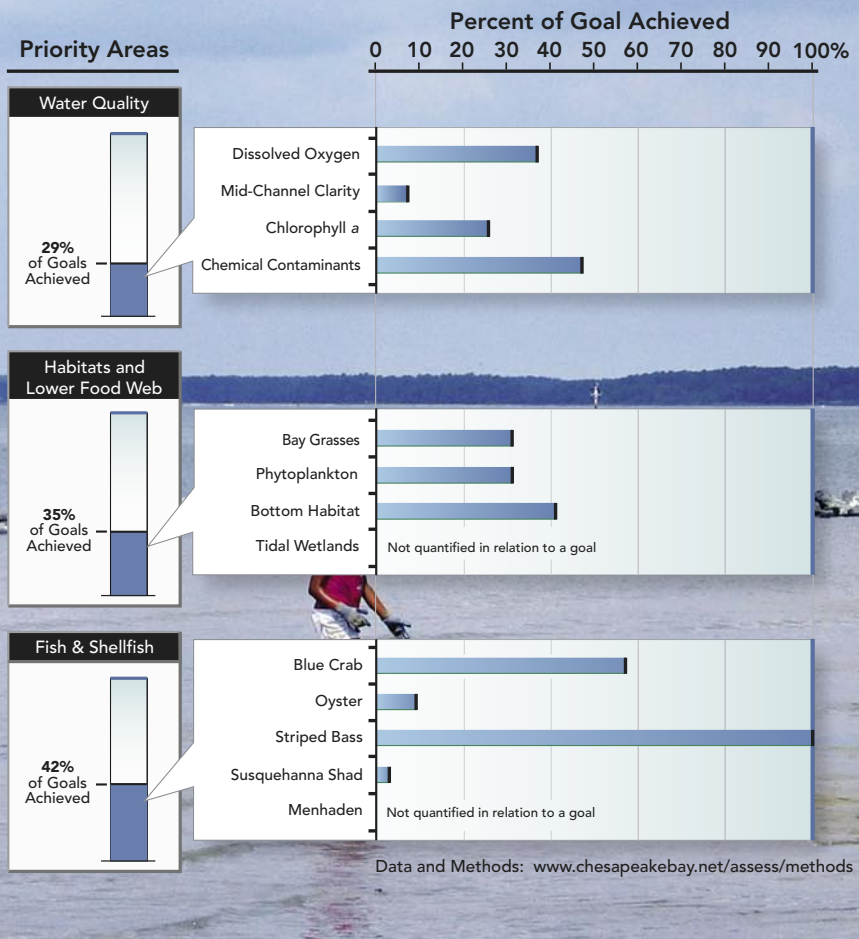
Water Quality – Most of the Bay's waters are degraded. Algal blooms fed by nutrient pollution block sunlight from reaching underwater bay grasses and can lead to low oxygen levels in the water and fish kills in some areas. Sediment from urban development, agricultural lands, as well as some natural sources, is carried into the Bay and clouds its waters. Portions of Chesapeake Bay tidal tributaries are contaminated with chemical pollutants that can be found in fish tissue. In 2006, less than one-third of Bay water quality goals were met.

Habitats and Lower Food Web – The Bay's critical habitats and food web continue to be at risk. Nutrient and sediment runoff have harmed bay grasses and bottom habitat, while disproportionate algae growth has pushed the Bay food web out of balance. Currently, the Bay's habitats and lower food web are at about one-third of desired levels.

Fish and Shellfish - Many of the Bay's fish and shellfish populations are below historic levels. Blue crab abundance has been below management targets for the past ten years. American shad are recovering slowly, while other species like striped bass (rockfish) show mixed signals. The striped bass population has increased over the past decade in the Chesapeake Bay. Scientists attribute the increase to responsible fisheries management. While biomass remains high, scientists are concerned about the species' health.

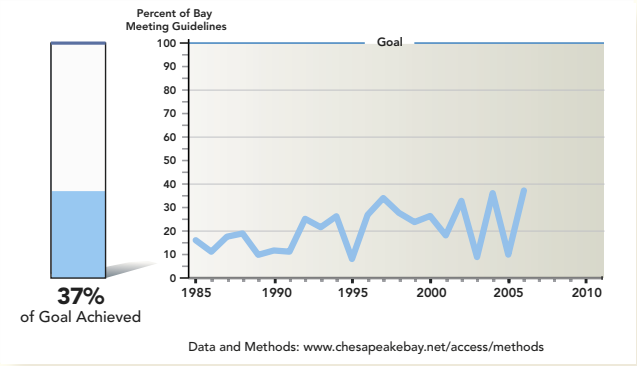
As ecosystem-based goals are not yet developed for menhaden, those data are not included in the average this year. Currently, the Bay's fish and shellfish are at about two-fifths of desired levels.

SUMMARY: 2006 BAY HEALTH ASSESSMENT



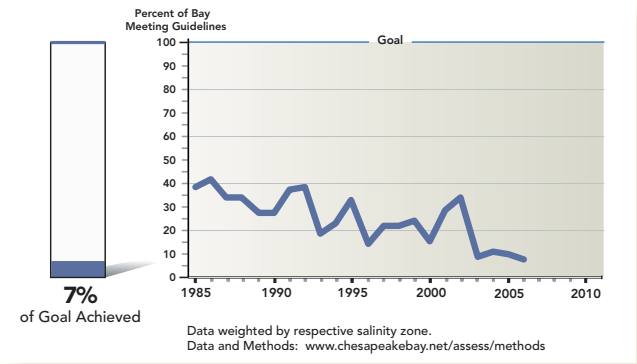
Data and Methods: www.chesapeakebay.net/assess/methods

DISSOLVED OXYGEN

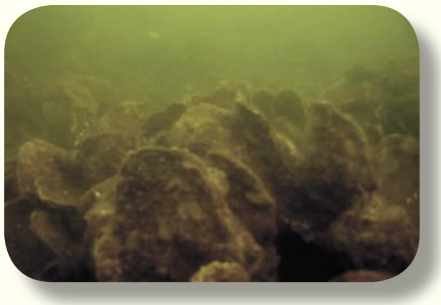


Data and Methods: www.chesapeakebay.net/access/methods

MID-CHANNEL WATER CLARITY



Data weighted by respective salinity zone.
Data and Methods: www.chesapeakebay.net/assess/methods



WATER QUALITY

To support a vibrant Chesapeake Bay ecosystem, waters must become clearer, oxygen levels higher, and the amount of algae and chemical contaminants in its waters must be reduced. Water Quality goals in this section are based on published water quality criteria designed to protect aquatic life in the Bay. Rain in the winter and spring washes pollutant loads into the Bay, largely determining summer water quality conditions. Summer weather plays a role as summer storm intensity leads to greater erosion and nutrient load. The health of the Bay in the critical summer season will improve as actions are taken year-round to reduce the level of pollutants in the watershed.

DISSOLVED OXYGEN

Like terrestrial animals, the Bay's fish and shellfish need oxygen to survive. During summer months, some of the Bay's waters still do not hold enough oxygen to support aquatic life. Throughout summer 2006, scientists estimate about 37 percent of the Bay met dissolved oxygen restoration goals designed to protect resident aquatic life.

Over time, large-scale reductions in the amount of nutrients flowing into the Bay will help improve low oxygen conditions.

MID-CHANNEL WATER CLARITY

Good water clarity is important for the growth of underwater bay grasses. Because bay grasses provide vital habitat for a number of living resources in the Bay, it is essential to maintain good water clarity and restore bay grasses to historical levels.

In 2006, scientists estimate that only 7 percent of the Bay's waters had acceptable water clarity. Measurements for this indicator are from fixed stations located in open water areas of the Bay and do not necessarily reflect water clarity in shallow water areas where bay grasses are most abundant.

Clarity will always fluctuate annually, as it is greatly impacted by weather events; however, reduced nutrient and sediment loads, abundant bay grasses and healthy Bay life will help improve annual conditions.

DISSOLVED OXYGEN:

The amount of oxygen dissolved in a stream, river, lake or bay is an indication of the degree of health of the water and its ability to support a balanced aquatic ecosystem.
Source: EPA

CHLORPHYLL *a*

Scientists measure the amount of chlorophyll *a* in the Bay's waters to assess the amount of algae present. The Bay needs the right amount of algae to maintain a balanced food web. Excess algae can cause large-scale algal blooms that block sunlight from reaching bay grasses, reducing available habitat for Bay life. Lower algal levels promote better water quality, more available habitat and fewer harmful bloom effects.

Every year harmful algal blooms cover a portion of the Bay and its tributaries. In 2006, scientists estimate that about 26 percent of the Bay's waters had acceptable chlorophyll *a* concentrations.

CHEMICAL CONTAMINANTS

Portions of Chesapeake Bay tidal tributaries are contaminated with chemical pollutants that can be found in fish tissue. The states and the District of Columbia use this information to develop risk assessments and fish consumption advisories to protect the health of recreational fishermen and their families. Listings for all toxic contaminants in fish tissue were considered. Ultimately this indicator is comprised of impairments due to PCB tissue concentrations in Maryland and Virginia and mercury tissue concentrations in Virginia, as these are currently the only contaminants responsible for listings fitting criteria for inclusion in this indicator.

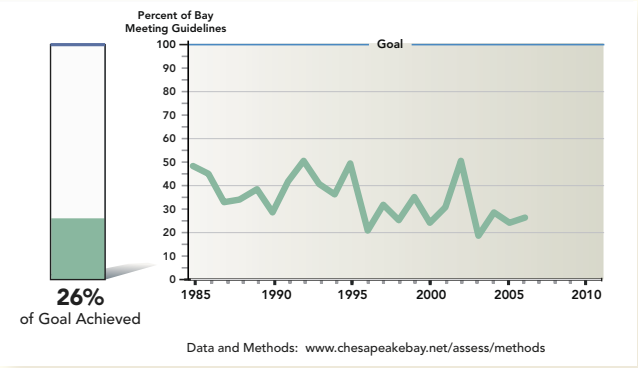
Surveys indicate that in 47 percent of monitored tidal rivers of the Bay, levels of bio-accumulative contaminants in fish tissue are low enough for unlimited fish consumption. The remaining 53 percent of the monitored tidal rivers contain elevated contaminant levels that warrant advisories limiting the consumption of fish from those waters.

The data used in this indicator was also used by the states of Virginia and Maryland to determine fish tissue impairments for the 2006 impairment listing. Some of the 2006 listings were first determined during the 2002 listing cycle, which used data beginning in 1996. Therefore, an eight year period is reflected in the data. Prior to the 2006 listing year, there were insufficient spatial data to allow the indicator to be developed, resulting in the single point on the graph.

CHEMICAL CONTAMINANTS:

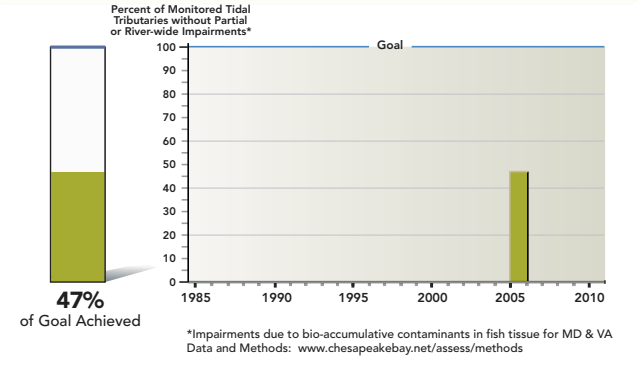
Substances, elements, or compounds that may harm humans or other forms of life if released into the environment. Refers to concentrations that are above acceptable levels and/or are in a location where they should not be found.
Source: www.answers.com

CHLOROPHYLL *a*



Data and Methods: www.chesapeakebay.net/assess/methods

CHEMICAL CONTAMINANTS



*Impairments due to bio-accumulative contaminants in fish tissue for MD & VA
Data and Methods: www.chesapeakebay.net/assess/methods

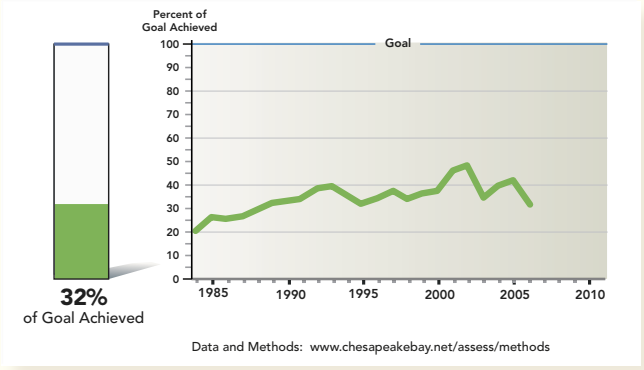
CHLOROPHYLL *a*:

The pigment that makes plants and algae green. Measurement of chlorophyll a is an indicator of the quantity of algae in the water.
Source: EPA

BOTTOM HABITAT:

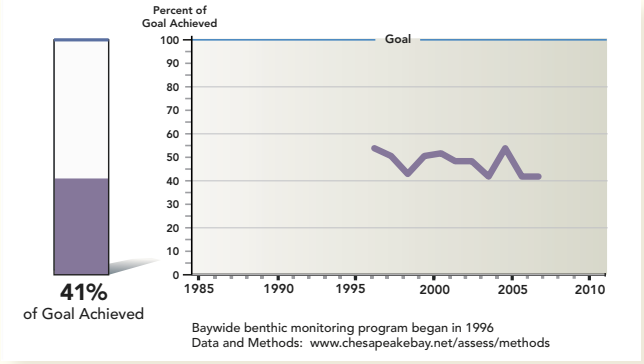
The bottom of the Bay is home to bacteria, clams, worms and other creatures that serve as a key food source for higher levels of aquatic life, such as white perch, spot, croaker and crabs.
Source: Chesapeake Bay Program

BAY GRASS ABUNDANCE



Data and Methods: www.chesapeakebay.net/assess/methods

BOTTOM HABITAT (Benthic Index of Biotic Integrity)



Baywide benthic monitoring program began in 1996
Data and Methods: www.chesapeakebay.net/assess/methods

HABITATS AND LOWER FOOD WEB

Life in the Bay needs high-quality food and habitat to thrive. From the clams and worms that live within the Bay's bottom sediments, to the rockfish that prowl its open waters, to the juvenile fish and crabs darting among underwater grasses and wetlands, healthy and abundant habitat is critical for supporting the Bay's aquatic life. When healthy habitat is supported by a balanced food web, healthy aquatic communities can flourish. As both of these key environmental elements improve, the ecosystem's potential to support larger and more diverse populations of aquatic life expands as well.

BAY GRASSES

Aside from the water itself, underwater bay grasses are one of the most important habitats in the Chesapeake Bay. As their health is closely related to the quality of local waters, grasses serve as an excellent barometer for the overall health of the estuary. Bay grass abundance has a profound effect on the Bay and its aquatic life, as it provides critical habitat to key species such as striped bass and blue crabs while improving the clarity of local waters.

The most recent baywide data from 2006 show bay grasses covering 59,090 acres – or about 32 percent of the 185,000-acre restoration goal.

The total Bay grass abundance goal has also been broken down by 3 zones. Bay grasses in the Upper Bay in 2006 covered 15,510 acres or 66% of the 23,630-acre goal. Middle Bay grasses covered 30,659 acres or 27% of the 115,229-acre goal, while grasses in the Lower Bay covered 12,922 acres or 28% of the 46,030-acre goal.

As water clarity improves from nutrient and sediment pollution reductions, bay grass acreage should expand.

BOTTOM HABITAT

The health of the Bay's bottom dwelling – or benthic – communities is greatly reduced when pollution levels increase and oxygen levels drop. Benthic habitats serve as a good indicator of long-term environmental conditions, as the inhabiting worms and clams are long-lived, have limited mobility and their responses to stress are well documented.

In 2006, about 41 percent of the Bay's benthic habitat was considered healthy as measured by the composite Benthic Index of Biotic Integrity. Scientists attribute the decline from 2004 to persistent low dissolved oxygen levels during the summer. Reduced amounts of nutrients, sediment and chemical contaminants flowing into the Bay will help these bottom dwelling communities improve.

PHYTOPLANKTON

Phytoplankton are an excellent indicator of the health of the Bay's surface waters, as they are especially sensitive to changes in nutrient pollution, water clarity, day length, temperature, salinity and grazer communities. Phytoplankton are primary producers capable of converting sunlight and nutrients into food for the base of the food web.

While increased populations provide more food to organisms further up the food web, too much or the wrong type of algae can harm the overall health of the Bay. In some cases, harmful algal blooms can impact human health.

Scientists assess microscopic algal community health with a Phytoplankton Index of Biotic Integrity. Data from Spring 2006 show that about 31 percent of the Bay's phytoplankton communities were considered healthy.

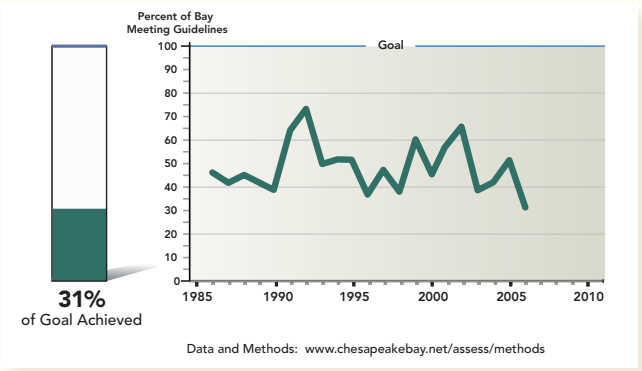
TIDAL WETLANDS

Wetlands link land to the water. In both tidal and non-tidal parts of the Bay, they serve as critical habitat to terrestrial and aquatic life, and act as natural filters and sponges by absorbing runoff and removing pollutants from water before they can reach local streams and the Bay.

Many researchers believe Chesapeake Bay tidal wetlands are threatened by sea level rise, storms, shoreline development and invasive species. As of 1993, there were approximately 282,000 acres of tidal wetlands in the Bay. Assessments of acreage in 2001 and 2005 are pending data analysis.

For more information about wetland improvement efforts, see page 7 of *Part Two: Restoration Efforts*.

PHYTOPLANKTON (Index of Biotic Integrity)



PHYTOPLANKTON:

Microscopic plants such as algae are capable of making food via photosynthesis. They float and cannot move independent of water currents.
Source: EPA

TIDAL WETLANDS:

Wetlands that are tidally flooded by salt or brackish water and are found chiefly along the shores of Chesapeake Bay and its tidal rivers.
Source: Chesapeake Bay Program

STRIPED BASS:

A North American food and game fish (Morone saxatilis) *chiefly of coastal waters, having dark longitudinal stripes along its sides. Striped bass, which swim up the Chesapeake Bay to spawn, are occasionally found in landlocked bodies of water. Also called rockfish, striper.*
Source: Chesapeake Bay Program

FISH AND SHELLFISH

The long-term health and sustainability of the Bay's fish and shellfish is critical to restoring ecosystem health. Ample aquatic habitat, clean water and well-managed fisheries are key components to restoring abundant fish and shellfish populations to the Bay.

Scientists and natural resource managers are working to develop ecosystem-based fisheries management strategies which take into account numerous factors when setting harvest targets, including the species' role in the food web and other water quality, habitat and climatic considerations. As these strategies are further developed and ecosystem goals are defined, the Bay Program will compare annual data to population targets for a balanced Bay system.

BLUE CRAB

It is estimated that more than one-third of the nation's blue crab catch comes from the Chesapeake Bay. Commercial harvest from the Bay between 1968 and 2005 averaged around 73 million pounds. The most recent harvests have been approximately 60 million pounds, or below the time series average. The low harvest corresponds to low exploitable stock abundance and also reflects restrictive management measures in place since 2001 and 2002.

In 2006, the abundance of adult crabs in the Chesapeake Bay remained well below the restoration goal. Scientists estimate that the population of blue crabs in the Chesapeake Bay in 2006 is about 57 percent of the 232 million crab interim goal. Blue crab abundance has been below the target for the past ten years.

These numbers are estimated through winter dredge and summer trawl surveys. The blue crab fishery is vulnerable to exploitation; therefore, harvest restrictions will continue to remain in place. Proper management of the crab harvest, improved water quality and habitat restoration efforts will help restore the Bay's blue crab populations.

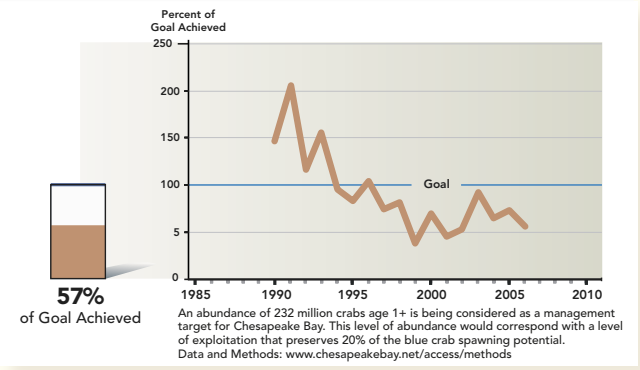
STRIPED BASS

The striped bass population has dramatically increased over the past decade in the Chesapeake Bay. Scientists attribute this increase to a late 1980s fishing moratorium and responsible fisheries management since the lifting of the fishing ban. Striped bass are one of the top predators in the Chesapeake Bay food web and prey availability is an important factor affecting abundance and growth. In 1995, populations had increased to the point where the species was considered restored. While biomass remains high, scientists are particularly concerned with the high prevalence of disease (mycobacteriosis) and the ability of the prey base to adequately support the population.

Research is underway to better understand the disease's impact on the Bay's striped bass population. The current status of Bay striped bass – high abundance but uncertain health – illustrates the need for an ecosystem-based fisheries management approach in Chesapeake Bay. The next assessment of striped bass will take place during 2007.

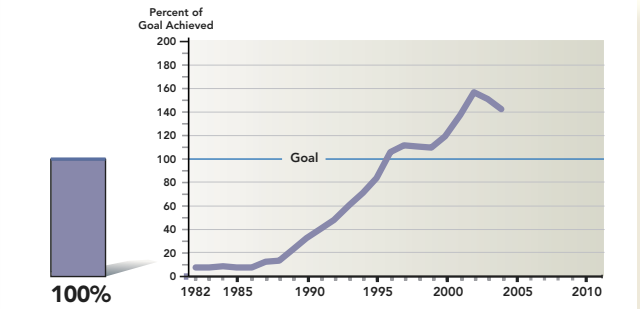
For more information, see page 8 of *Part Two: Restoration Efforts*.

BLUE CRAB ABUNDANCE (Age 1 and Older)



An abundance of 232 million crabs age 1+ is being considered as a management target for Chesapeake Bay. This level of abundance would correspond with a level of exploitation that preserves 20% of the blue crab spawning potential.
Data and Methods: www.chesapeakebay.net/access/methods

STRIPED BASS ABUNDANCE (Spawning Female Biomass)



Data and Methods: www.chesapeakebay.net/assess/methods

BLUE CRAB:

An edible, bluish swimming crab (Callinectes sapidus) *that has a wide distribution in the Chesapeake Bay, and along the Atlantic and Gulf coasts of North America.*
Source: Chesapeake Bay Program

OYSTERS:

An edible bivalve mollusk of the family Ostreidae, *species* Crassostrea virginica, *which lives in a wide range of depths and salinities of the Chesapeake Bay.*
Source: Chesapeake Bay Program

OYSTERS

For more than a century, oysters constituted one of the Bay's most valuable commercial fisheries. Over-harvesting, pollution and the diseases Dermo and MSX have caused a severe decline in their numbers throughout the Chesapeake Bay. Scientists estimate that the population of native oysters in the Chesapeake Bay in 2005 was about 9 percent of current restoration goals.

SHAD

The introduction of hatchery raised fish, a moratorium on shad fishing, the removal of dams, and installation of fish passages on key Bay tributaries have helped to increase the number of shad in the Bay.

One of the ways scientists currently estimate spawning shad populations is by counting the number of fish annually lifted over Conowingo Dam near the mouth of the Susquehanna River, via the fish passageway installed in 1991. Annual estimates have increased from several hundred per year in the early 1980s to 56,899 in 2006. In spite of the increasing abundance, the Susquehanna River population is far below the long-term restoration goal of two million fish per year.

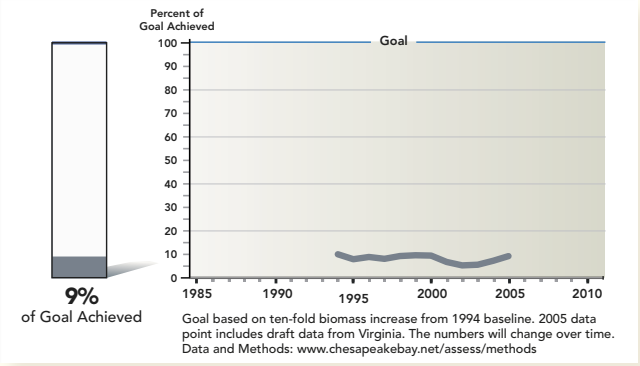
Assessing annual baywide spawning populations is difficult as each river stock is unique. To provide better baywide estimates, scientists are developing new monitoring methods to estimate populations in other key Bay tributaries including the James and Potomac rivers. An updated assessment is expected in 2007.

ATLANTIC MENHADEN

Scientists currently do not produce Chesapeake Bay-specific population estimates of menhaden. Estimates are made on an Atlantic Coast-wide basis. Populations along the Atlantic Coast appear to be healthy, but scientists are concerned about low regional abundances in Chesapeake Bay. The number of juvenile menhaden in Chesapeake Bay has been declining in recent years, with current recruitment levels being about 50% lower than the mid-1980s.

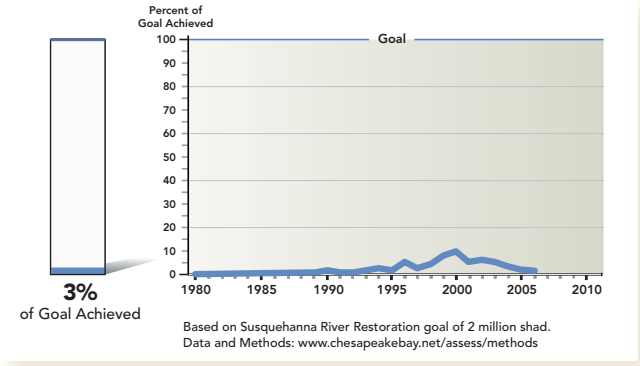
In 2006, Virginia placed a cap on the amount of menhaden that can be harvested annually from the Chesapeake Bay by the commercial fishing industry. Maryland currently prohibits the commercial industry from harvesting menhaden from Maryland waters. Since menhaden are an important forage species in the Bay food web, a number of studies are underway to assess their status in the Bay.

NATIVE OYSTER ABUNDANCE (Biomass)

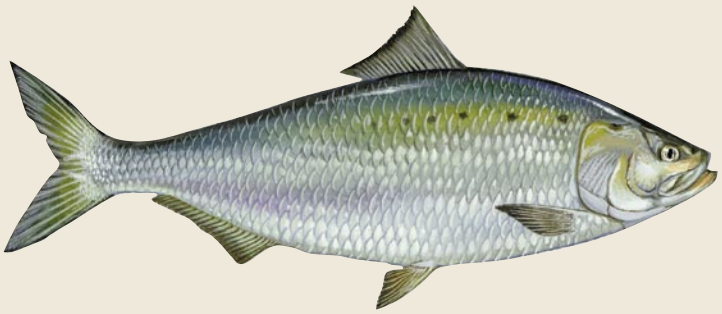


Goal based on ten-fold biomass increase from 1994 baseline. 2005 data point includes draft data from Virginia. The numbers will change over time.
Data and Methods: www.chesapeakebay.net/assess/methods

SHAD RETURNING TO THE SUSQUEHANNA RIVER



Based on Susquehanna River Restoration goal of 2 million shad.
Data and Methods: www.chesapeakebay.net/assess/methods



AMERICAN SHAD:

The American shad, Alosa sapidissima, *occurs along the Atlantic coast from southern Labrador to northern Florida. American shad undergo extensive seasonal migrations, moving into rivers for spawning beginning in January in southern rivers, and continuing until July in the northernmost portion of their range. After spawning, shad migrate north along the coast to Canada where they feed during the summer. A southward migration occurs later along the continental shelf where the fish overwinter prior to spring spawning migrations to their natal rivers.*
Source: NOAA

RIVER FLOW AND THE POLLUTANT LOADS REACHING THE BAY

The Bay's 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 thousands of streams and rivers that eventually empty into the Bay. The Bay must process runoff from a large amount of land with a relatively small body of water.

Annual Bay water quality conditions are largely determined by a combination of the amount of pollution deposited on the land and the amount of water flowing into the Bay. As the river flow increases, its potential to carry additional amounts of pollutants multiplies as well.

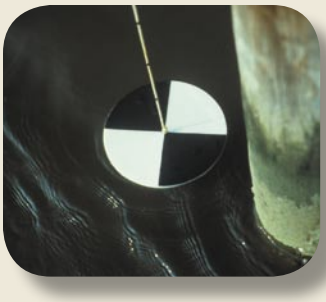
Precipitation doesn't just increase river flows by washing directly off the land. Some water seeps into the soil, carrying nutrients into groundwater. It can take years for these waters and their associated pollutants to slowly travel through underground systems until they reach the streams that drain into the Bay. Each year, pollution that may be decades old reaches the Bay.

Scientists calculate annual pollutant loads to the Bay through a combination of monitored water samples and modeled information. Whenever practical, scientists measure pollution levels in water samples from the rivers and wastewater pipes that flow into the Bay. Model generated estimates are used where monitoring is not practical, when no data are available, or data do not meet specific requirements and/or are outdated. By capturing water samples at the point where large rivers meet the Bay, scientists can calculate pollution loads from 78 percent of the watershed land area. For the remaining area, loads from wastewater and model-generated estimates are used. This combination of monitoring and modeling data allows scientists to provide the most complete accounting of the amount of pollution reaching the Bay.

Spring 2006 weather conditions were considered extreme, with lower than average rainfall from mid-February to mid-May. The region was then deluged at the end of June with rainfall exceeding the 100-year-flood mark in some areas. The remainder of the summer weather was fairly average until August, when the remnants of Hurricane Ernesto soaked the area.

RIVER FLOW:

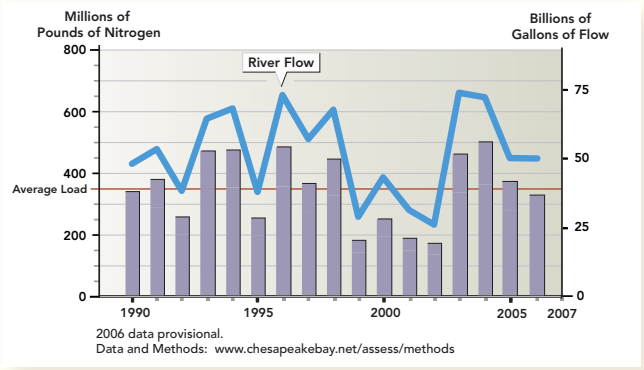
Volume of water flowing into the Bay.
Source: Chesapeake Bay Program



ATLANTIC MENHADEN:

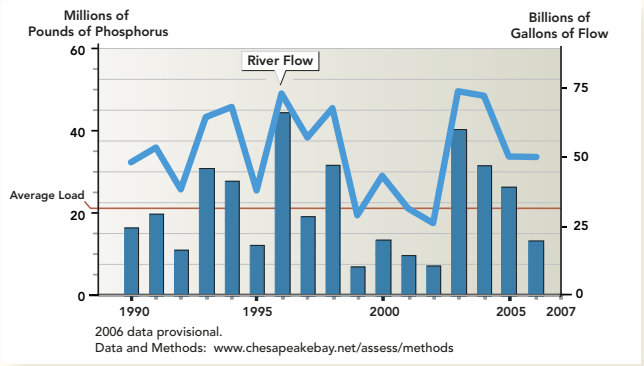
Brevoortia tyrannus *are small schooling fish related to herring, shad, and sardines. Menhaden consume large quantities of phytoplankton and zooplankton, and are themselves a favorite food of striped bass, bluefish, sea trout, tunas, sharks, and sea birds. Menhaden spawn in the ocean, in shelf waters off Chesapeake Bay from March to May, and again in September and October.*
Source: VIMS

RIVER FLOW AND NITROGEN LOADS REACHING CHESAPEAKE BAY



2006 data provisional.
Data and Methods: www.chesapeakebay.net/assess/methods

RIVER FLOW AND PHOSPHORUS LOADS REACHING CHESAPEAKE BAY



2006 data provisional.
Data and Methods: www.chesapeakebay.net/assess/methods

Total river flow to the Bay during the 2006 water year (October 2005-September 2006) was very close to the long-term average. Provisional estimates indicate that approximately 331 million pounds of nitrogen reached the Bay during the 2006 water year, which is similar to the average load for 1990-2005 and slightly lower than 2005. This amount is almost double the restoration target of 175 million pounds of nitrogen.

Additionally, provisional estimates indicate that approximately 13.4 million pounds of phosphorus reached the Bay during the 2006 water year, which is well below the 1990-2005 average and almost half of 2005. This amount is above the target level of 12.8 million pounds of phosphorus to reach the Bay.

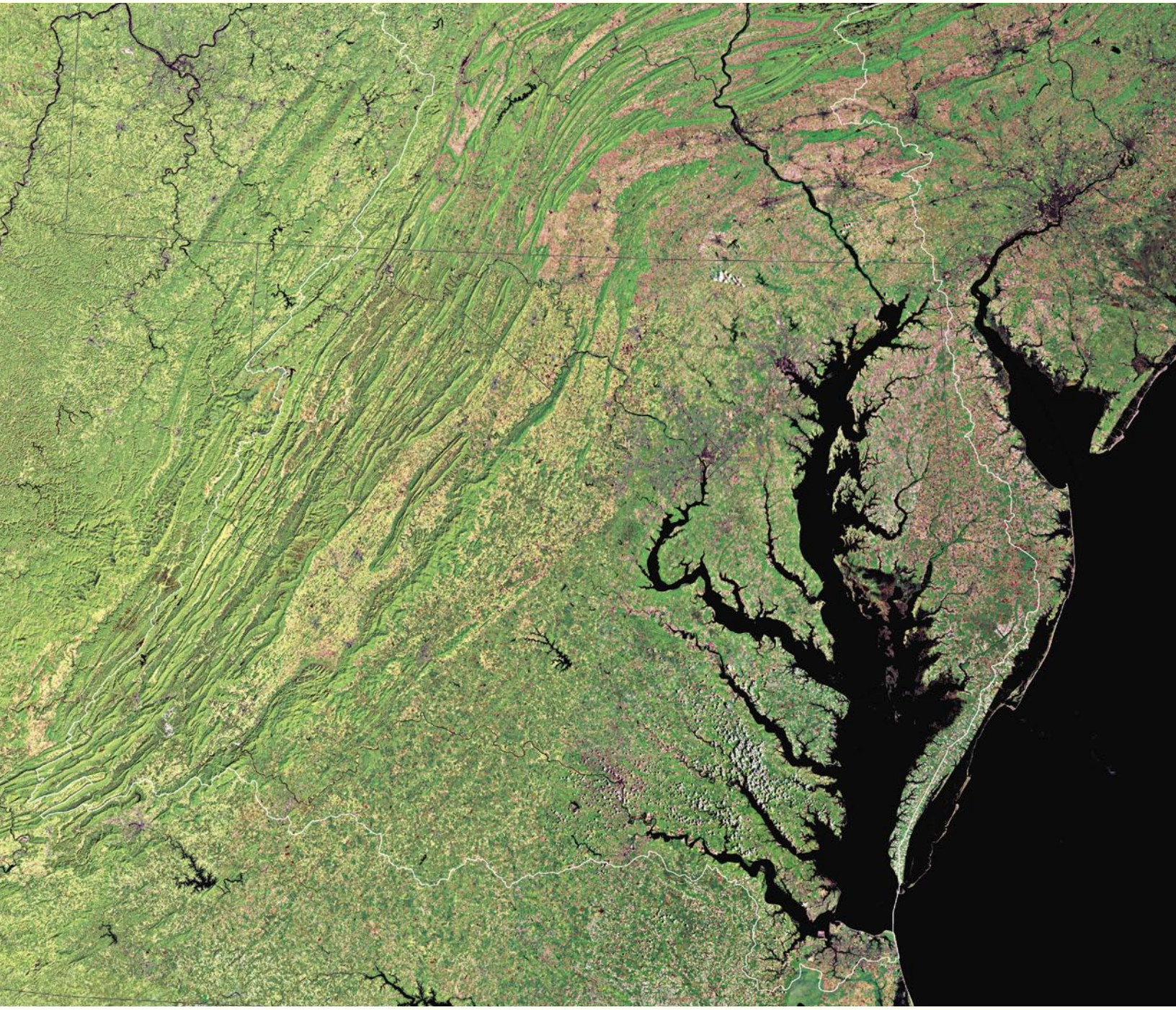
While less nitrogen and phosphorus reached the Bay during the 2006 water year, additional pollution-fighting measures are being put in place throughout the watershed to reduce total pollution loads in the future.

Based on water samples collected at the point where large rivers meet the Bay, in 2006 2.5 million tons of sediment were delivered to the Bay. This is well below the average load for 1990-2005. The sediment load estimates do not account for sediment from the coastal plain areas of the watershed. Scientists are currently developing methods to quantify the total loads of sediment to the Bay.

POLLUTANT LOAD:

The amount of stress placed upon an ecosystem by pollution, physical or chemical, released into it by man-made or natural means.

Source: General Environmental Multilingual Thesaurus (GEMET 2000)



THE CHESAPEAKE BAY WATERSHED

Images: Bruce Fritz; Chesapeake Bay Program; Chesapeake Bay Gateways Network; Mike Land; Don Merritt©IAN Image Library; Donna Morelli; National Aeronautics and Space Administration (NASA); George Grall©National Aquarium in Baltimore; National Oceanic and Atmospheric Administration (NOAA); Jane Thomas©IAN Image Library; United States Fish and Wildlife Service (USFWS); United States Department of Agriculture (USDA); Virginia Institute of Marine Science (VIMS)

This report was developed by the Chesapeake Bay Program partnership to help inform watershed residents about the health of the Bay and efforts to restore it. Staff from a large number of state and federal agencies, academic institutions and non-governmental organizations contributed data and interpretation to the report, including The Alliance for the Chesapeake Bay, Chesapeake Bay Commission, Del. Dept. of Natural Resources and Environmental Control, D.C. Dept. of Health, Interstate Commission on the Potomac River Basin, Md. Dept. of Agriculture, Md. Dept. of the Environment, Md. Dept. of Natural Resources, National Park Service, National Oceanic and Atmospheric Administration, N.Y. Dept. of Environmental Conservation Old Dominion University, Pa. Dept. of Conservation and Natural Resources, Pa. Dept. of Environmental Protection, Pa. Fish and Boat Commission, Susquehanna River Basin Commission, University of Md. Center for Environmental Science, University of Md. College Park, U.S. Army Corps of Engineers, USDA Natural Resource Conservation Service, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Va. Dept. of Environmental Quality, Va. Dept. of Conservation and Recreation, Va. Dept. of Game and Inland Fisheries, Va. Institute of Marine Science, Va. Tech, Versar, W.Va. Dept. of Agriculture and the W.Va. Dept. of Environmental Protection.

For a full list of contributing partners, visit www.chesapeakebay.net/baypartners.htm

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Printed on Recycled Paper

Printed by the
U.S. Environmental Protection Agency
for the Chesapeake Bay Program

A Report to the Citizens of the Bay Region

www.chesapeakebay.net

CBP/TRS 284/07
EPA 903R-07002
April 2007

CHESAPEAKE BAY

2006 Health & Restoration Assessment

PART TWO: **Restoration Efforts**

Chesapeake Bay Program
A Watershed Partnership

CHESAPEAKE BAY

2006 Health & Restoration Assessment

CHESAPEAKE BAY PROGRAM: A Watershed Partnership

The Chesapeake Bay Program partners have developed science-based plans to improve the waters, habitats and fisheries of the Chesapeake. On-the-ground efforts are taking place throughout the 64,000-square-mile watershed and new initiatives are being implemented to accelerate progress.

The Chesapeake Bay Program brings together state and federal governments, non-profit organizations, watershed residents and the region's leading academic institutions in a partnership effort to protect and restore the Bay.

To learn more and find out how you can help, visit the Chesapeake Bay Program website at www.chesapeakebay.net

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ABOUT THIS REPORT

The Chesapeake Bay 2006 Health and Restoration Assessment is presented this year in two parts.

Part One: Ecosystem Health draws on the most up-to-date monitoring data gathered by Bay Program partners to assess the overall health of the Bay ecosystem last year.

This report, *Part Two: Restoration Efforts*, uses 20 indicators grouped into the five priority areas described in the landmark *Chesapeake 2000* agreement that represent major elements of the Bay restoration effort. Quantitative goals have been set for most of these indicators. For each, a chart shows the current status and a history of percent of progress toward achieving the goal. All of the charts have the same time scale: 1985-2010. In cases where measurement began or a goal was agreed to after 1985, a symbol on the chart indicates when "accounting began." In the section "Reducing Pollution," efforts are compared to goals defined by the Bay jurisdictions' river-specific cleanup plans. Monitoring and tracking data and computer simulations are used in this section. In the remaining parts, restoration efforts are compared to goals adopted by the Bay Program. Monitoring and tracking data are used in these sections.

Electronic versions of the *Chesapeake Bay 2006 Health and Restoration Assessment* reports can be found at www.chesapeakebay.net/press.htm. Because of space limitations, only brief text is included in this report. Detailed information about each indicator can be found at www.chesapeakebay.net/indicators.htm. Expanded analysis and interpretation of data as well as the methods used to compile the graphs can be found at www.chesapeakebay.net/Assess/

RESTORATION SUMMARY

Restoration of a complex ecosystem requires a multi-pronged approach. The Chesapeake Bay Program has divided its restoration efforts into five broad areas: Reducing Pollution, Restoring Habitats, Managing Fisheries, Protecting Watersheds and Fostering Stewardship.

Reducing Pollution efforts are the most far-reaching. The goal is to take the actions necessary to remove the Bay and its tidal tributaries from EPA's list of "impaired waters" by 2010. Overall, about half of the pollution reduction efforts needed to achieve the nutrient goals have been undertaken over the past two decades.

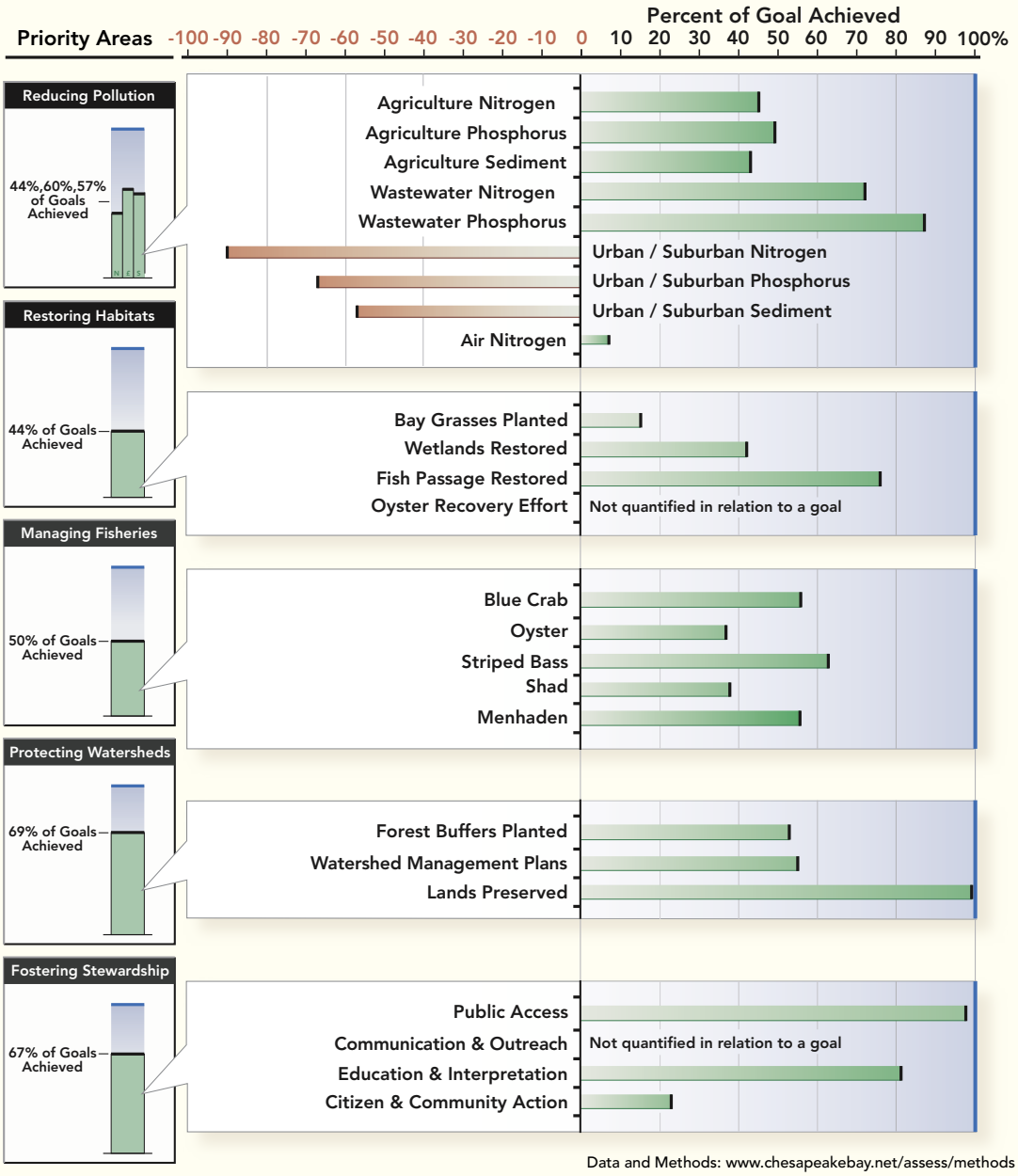
Progress toward *Restoring Habitats* is measured against a series of goals established by the Program. Most of the goals have a 2010 deadline. Overall, habitat restoration efforts are collectively less than half-way to Program goals and there is concern about the overall quality of habitats that remain.

Managing Fisheries focuses on promoting a paradigm shift from a traditional management approach that looks solely at single species to one that recognizes interactions between species (multiple species) and environmental stressors such as low dissolved oxygen levels (ecosystem based). Success is measured by milestones necessary to achieve that shift, not by an assessment of fishing stocks (found in *Part One: Ecosystem Health*.) Progress toward this new approach ranges from 37-63 percent for five key species.

Protecting Watersheds efforts are also measured against Program goals. Many of these efforts help slow the rate of new pollution associated with population increases in the watershed as well as reduce current pollution levels. Overall, watershed protection efforts show good progress and are slightly more than two-thirds of the way toward meeting current Program goals.

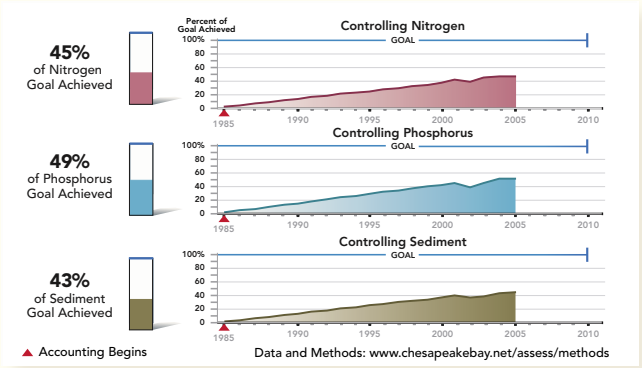
Fostering Stewardship efforts include a broad range of actions from expanding opportunities for residents to experience the Chesapeake, to formal outdoor environmental education experiences for school-age children, to engaging communities and helping move them to action. Overall the Program has reached two-thirds of its fostering stewardship goals.

SUMMARY: 2006 BAY RESTORATION EFFORTS

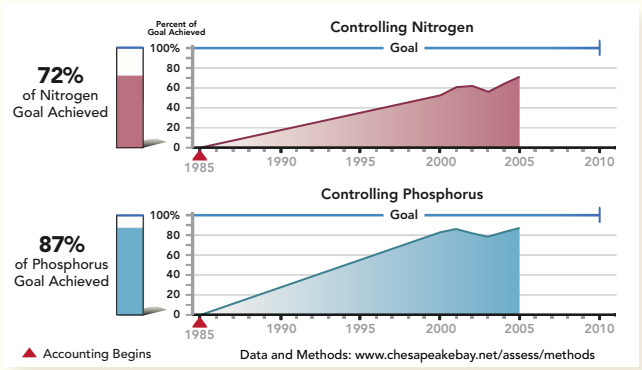


Data and Methods: www.chesapeakebay.net/assess/methods

AGRICULTURAL POLLUTION CONTROLS



WASTEWATER POLLUTION CONTROLS



REDUCING POLLUTION

Clearer, oxygen-rich waters are the foundation of Chesapeake Bay restoration. The Bay and its tidal rivers receive more nutrients and sediment than a healthy ecosystem can handle.

AGRICULTURE

Farmers employ dozens of conservation practices to reduce the amount of pollution reaching local waters and the Bay. Computer simulations and water monitoring data indicate that these nutrient and sediment reduction efforts have been moderately effective. Since 1985 the partners have achieved nearly half of the goal for agricultural nutrient reduction efforts and two-fifths of the goal for sediment reduction efforts that have been estimated as necessary to reach water quality goals.

In part because they are so cost-effective, the Bay jurisdictions are relying on future reductions from agricultural lands for more than half of the remaining nutrient reductions needed to meet restoration goals. The history and economics of agriculture require that significant funding and technical assistance will be needed for this sector to meet its restoration goals.

WASTEWATER

Decreases in the amount of nutrients discharged from wastewater treatment plants account for a large portion of the estimated nutrient reductions in the watershed to date. As the Chesapeake watershed's population continues to grow (an estimated 170,000 annually since 2000), the volume of waste requiring treatment grows. In 2005, Bay jurisdictions began putting into place a new permitting approach that requires hundreds of wastewater treatment plants to install a new generation of nutrient reduction technology equipment. Bay jurisdictions are relying on additional reductions from wastewater

treatment plants for achieving about 15 percent of their nutrient reduction goals. Since 1985 the partners have achieved nearly three-quarters of wastewater nitrogen reduction goal and more than four-fifths of their wastewater phosphorus reduction goal.

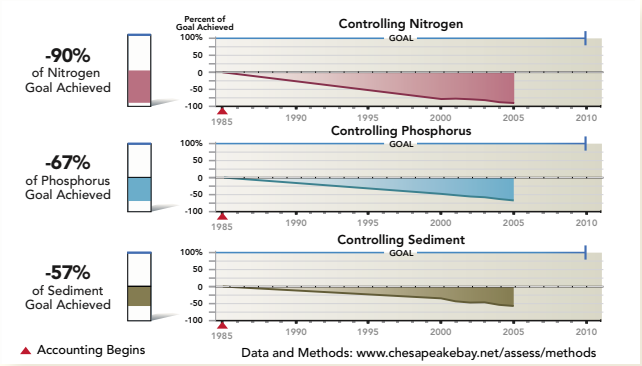
URBAN/SUBURBAN LANDS AND SEPTIC SYSTEMS

Stormwater that runs across roads, rooftops and other hardened surfaces carries harmful pollution to local streams and into the Chesapeake. These pollutants include nitrogen, phosphorus, sediment and many toxic compounds. About one-quarter of the nutrient reductions called for in the states' cleanup plans are expected to come from efforts to treat pollution from urban/suburban lands and septic systems. To date, it is estimated that the pollution increases associated with land development (e.g converting farms and forests to urban/suburban developments) have surpassed the gains achieved from improved landscape design and stormwater management practices, although some jurisdictions may be underreporting past stormwater management practices. The rapid rate of population growth and related residential and commercial development has made this pollution sector the only one in the Bay watershed to still be growing, and thus "progress" is negative.

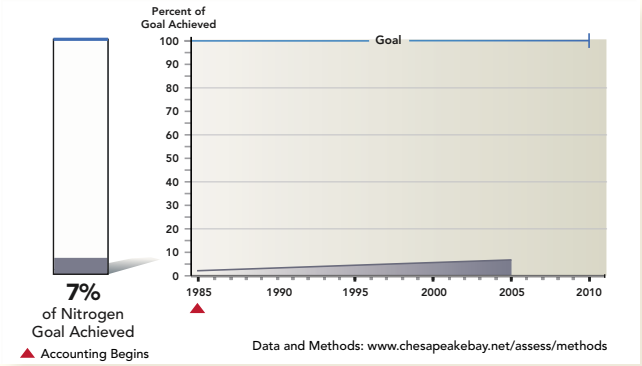
AIR POLLUTION

Scientists estimate that one-quarter to one-third of the nitrogen reaching the Bay and its rivers comes through the air. Pollutants are emitted into the air primarily from vehicles, power plants, agriculture and other industries. These pollutants eventually fall onto water surfaces and the land where they can be washed into local waterways. Reducing the release of airborne nitrogen pollution is likely to have the additional benefit of reducing the release of toxic chemicals. The Bay jurisdictions are relying upon federal and state air pollution control programs to reduce airborne nitrogen emissions significantly by 2010.

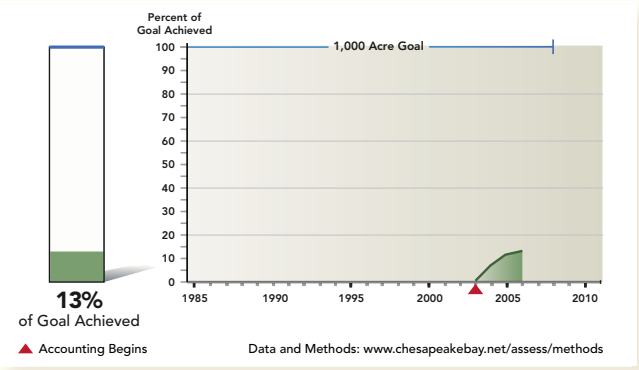
URBAN/SUBURBAN POLLUTION CONTROLS



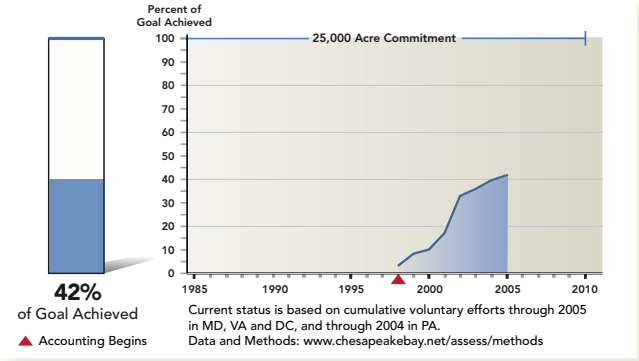
AIR POLLUTION CONTROLS



BAY GRASSES PLANTED



WETLANDS RESTORATION



RESTORING HABITATS

Restoring high-quality habitat is critical to bringing the Bay ecosystem back into balance. Healthy habitats provide animals with access to food, shelter and safe areas to raise young.

Restoration efforts have focused on increasing four habitat types. An effort to plant underwater grasses has seen little early success, but the Program's fish passage efforts are both long-standing and generally successful. Restoring wetlands is a major focus area, and in 2005 the partners agreed to expand their goal in this area. Oyster reefs were once a vital habitat for entire underwater communities. Oyster restoration efforts have focused on increasing the number of healthy oysters in the Bay. Some efforts have resulted in restoring reefs, but these programs are still in their infancy.

PLANTING UNDERWATER GRASSES

Restoring underwater Bay grasses relies overwhelmingly on the natural expansion of beds that comes with improving water quality. Bay managers have begun to supplement pollution reduction efforts with experimental Bay grass plantings. These new meadows, if successful, will provide seed sources to produce grass beds as water quality improves. In the first four years of this effort, Bay Program partners have planted about 13 percent of their initial goal of 1,000 acres by 2008. Not only do bay grasses filter the water, they also provide food and habitat for waterfowl, fish and shellfish. For more on the status of underwater grasses, please see *Part One: Ecosystem Health*.

RESTORING WETLANDS

Wetlands serve multiple ecological functions. Restoring and enhancing wetlands throughout the watershed can provide critical wildlife habitat. The Bay Program's current strategy commits partners to restoring 25,000 acres of wetlands by 2010, and as of 2005 they are about 42 percent of the way toward this goal. In addition to habitat, wetlands also help clean the water of nutrients and sediments. To improve water quality, the Bay states call for the restoration of some 200,000 acres in their tributary cleanup plans. Progress toward this water quality goal is measured in part in the Reducing Pollution summary chart on page 3.

REOPENING FISH PASSAGE

Dams, culverts and other obstructions block the movement of fish in many of the rivers and streams of the Bay watershed. By removing physical obstacles, key species like American shad are able to return to their native spawning grounds and increased habitat is available for resident fish. From 1988 through 2005 the partners had opened 1,838 miles of fish passage, surpassing their original 1,357-mile restoration goal. In early 2005 Bay Program partners committed to increasing the restoration goal to 2,807 miles by 2014, and an additional 305 miles were opened in 2006, bringing the cumulative total to 2,144.

RESTORING OYSTER REEFS

Oyster reefs are an essential component of the Bay ecosystem, providing healthy habitat for other bottom-dwelling organisms as well as schools of fish. Reef restoration efforts include cleaning and placing oyster shells, planting hatchery-produced spat (juvenile) oysters, setting aside permanent sanctuaries, and placing alternate substrate materials. Thousands of acres have been treated in this way, sometimes with multiple efforts. The success of these habitat restoration techniques has been limited by numerous factors including disease, fishing pressure and resulting habitat destruction, and poor water quality caused by human population growth and land use changes. For more information on oysters, please see *Part One: Ecosystem Health*.

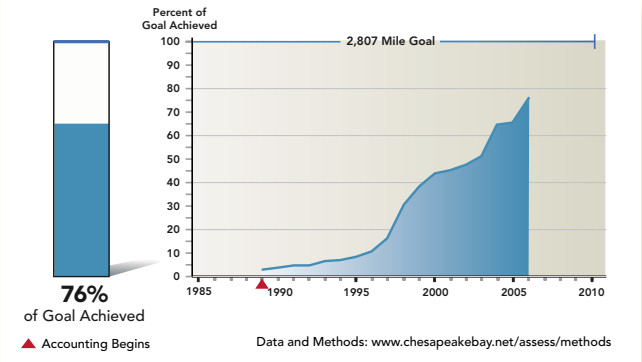
MANAGING FISHERIES

While some significant effort was undertaken to improve the management of Chesapeake Bay fisheries this year, very few of these efforts resulted in changes to fisheries management plans or the implementation of these plans. As a result, the index values for all the fisheries assessed, with the exception of Atlantic menhaden, remained unchanged. A small increase in Atlantic menhaden was recorded due to the adoption of a commercial harvest cap in Virginia waters. Progress toward fisheries management goals ranges from 37-63 percent for the five key Bay fisheries. Note: The index does not gauge the health of the fisheries which is covered in *Part One: Ecosystem Health*.

ECOSYSTEM-BASED FISHERIES PLANS

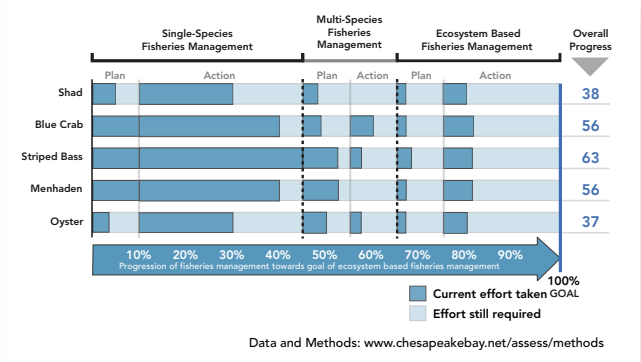
Chesapeake Bay ecosystem-based fishery management plans are being developed for five key species — oysters, blue crabs, American shad, striped bass and Atlantic menhaden. The index shows plans and actions that are single species specific, others that are directed toward multiple species, and still others that are ecosystem-based. Many of these plans are being implemented concurrently. The ultimate goal is to have fully implemented ecosystem-based fisheries management. Note: This year there was a slight change in the methods used to score progress of

OPENING RIVERS TO MIGRATORY FISH



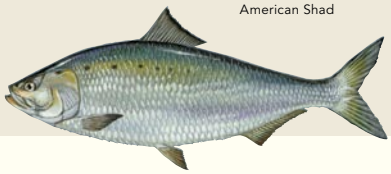
Data and Methods: www.chesapeakebay.net/assess/methods

FISHERIES MANAGEMENT EFFORT INDEX



Data and Methods: www.chesapeakebay.net/assess/methods


Striped Bass


American Shad

plan development. Due to this change, scores allocated for each fishery were slightly less than those allocated last year. The low scores reflect a change in methods (to give a more accurate assessment) and do not indicate that less management effort has taken place.

OYSTERS

Although oysters are important in their own right, oyster reefs provide habitat to many species as well as being a food source for others and as such should be managed in conjunction with these interdependent species. Oysters are effective water filters. Management plans should capture this important ecosystem function, too. Oysters are currently managed as a single species using minimum size limits, gear restrictions, seasonal and geographic closings and bushel limits. Fisheries targets and thresholds are not established in the current plan. Restoration efforts include expanding the amount of clean, hard surfaces for oyster spat (juvenile oysters) to settle, increasing the number of breeding adult oysters, establishing sanctuaries and combating oyster diseases.

BLUE CRABS

Blue crabs are currently managed as a single species using minimum catch size and seasonal limits on harvests to achieve target levels of fishing pressure. Annual reviews of blue crab stock are conducted to determine if target levels have been exceeded. Under this strategy, fishing pressure is set to levels that should allow for increased abundance. Blue crabs play an important role as both predator and prey in the Bay ecosystem. Interactions between blue crabs and striped bass, their predators, have been examined. In addition, some management recommendations have been implemented such as special openings in traps to allow the escape of non-targeted species.

AMERICAN SHAD

By the mid-1970's, American shad stocks had been greatly diminished by overfishing, water pollution and spawning migration obstructions (e.g. dams). In 1980, Maryland implemented an American shad fishing moratorium and in 1994 Virginia followed, thus effectively banning direct harvest throughout the Bay. Current restoration efforts focus on reopening native spawning habitat through dam removal or the installation of fishways, supplemented with hatchery stocking programs and efforts to improve water quality. Before the fishery is reopened, a new fisheries management plan, including catch limits (thresholds) and safe restoration levels (targets) will need to be developed.

STRIPED BASS

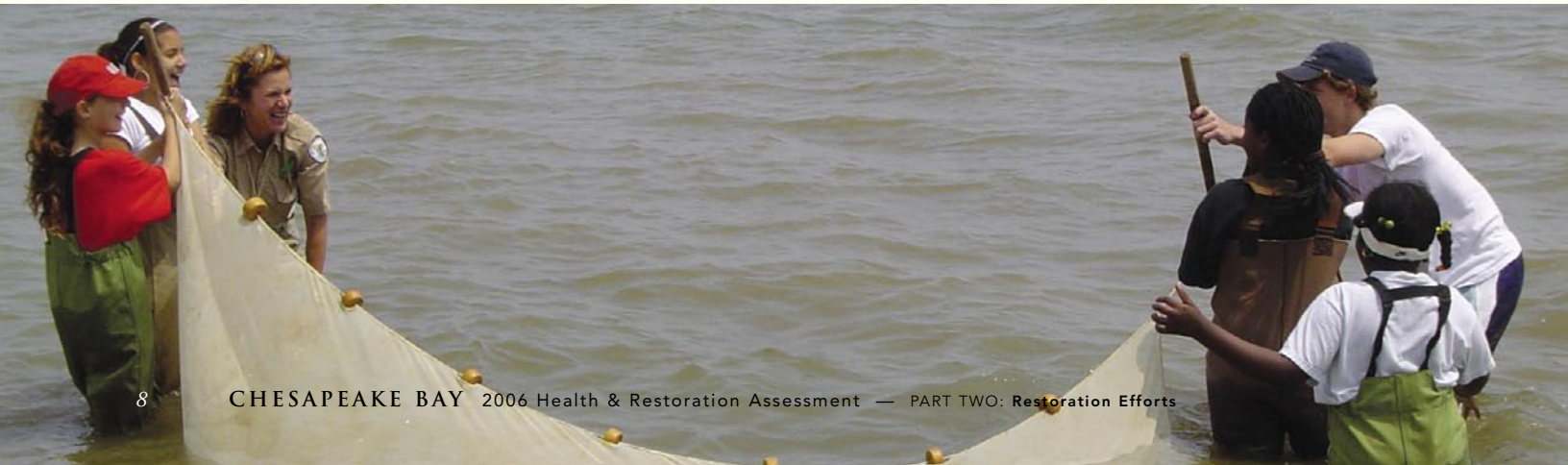
Maryland and Delaware instituted a moratorium on all striped bass fishing in 1985 in response to actions by the Congress and the Atlantic States Marine Fisheries Commission following the collapse of the fishery during the early 1980s. Virginia and the Potomac River Fisheries Commission did so in 1989. Since the moratorium was lifted in 1990, the stock has been rebuilt and maintained through an adaptive management approach, based upon constant monitoring and the use of catch quotas and seasonal closings. Striped bass are recognized as one of the top predators in the Chesapeake Bay and impact forage species such as Atlantic menhaden. The recently proposed annual cap on the commercial harvest of Atlantic menhaden was adopted in part due to the dietary importance of menhaden to the striped bass population.

ATLANTIC MENHADEN

Atlantic menhaden are managed as a coastal population under a single species approach.

Menhaden are a significant part of the aquatic food chain and as such, multi-species management is critical. Currently, predator-prey and by-catch interactions are relatively well defined. Menhaden feed primarily on plankton and are prey for top predators such as striped bass and bluefish. There is concern over the steady decline in the number of young menhaden produced in Chesapeake Bay. This decline, and other concerns with the fishery, prompted Virginia's adoption of a five-year cap on the commercial harvest of menhaden starting in 2006. Critical research will be performed while the harvest cap is in effect.

Atlantic Menhaden



PROTECTING WATERSHEDS

The human population in the Chesapeake watershed is now growing by more than 170,000 residents annually. Managing growth is especially critical in this watershed because of the vast amount of land that drains into the relatively shallow Chesapeake. Restoration efforts center on reforesting streamside buffers, developing watershed management plans and preserving open space. Partners appear to be on track with many of their watershed protection efforts and are two-thirds of the way toward meeting current Program goals, but these efforts appear to be inadequate in stemming the decline in water quality associated with population growth.

CONSERVING FOREST BUFFERS

Streamside forest buffers provide habitat for wildlife, stabilize banks from erosion and keep river waters cool, an important factor for many fish. Program partners achieved their original 2010 buffer restoration goal of 2,010 miles well ahead of schedule and in 2003 raised that target to 10,000 miles. Partners are roughly on track to meet this goal with 5,337 miles restored through August 2006.

Also in 2006, Bay Program partners produced a report entitled *"The State of Chesapeake Forests,"* which was the impetus for an Executive Council Directive Protecting the Forests of the Chesapeake Watershed. The Directive seeks to protect riparian forest buffers and other forests important to water quality.

In addition to preserving the watershed, well-maintained forest buffers also naturally absorb nutrients and sediments, thus improving water quality in neighboring streams. To improve water quality, the Bay states call for the restoration of some 50,000 miles in their tributary cleanup plans. Progress toward this water quality goal is measured in part in the Reducing Pollution summary chart on page 3.

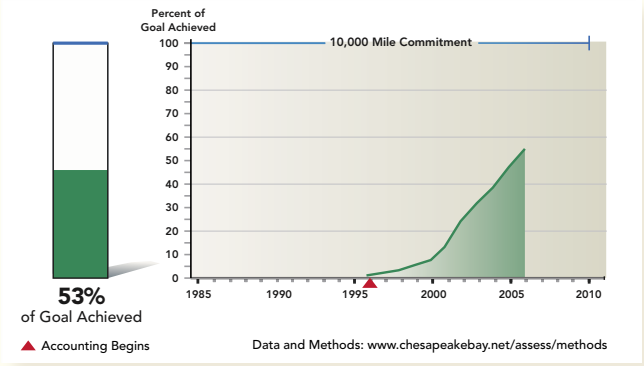
PRESERVING LANDS

Maryland, Pennsylvania, Virginia and District of Columbia committed to permanently protect from development 20 percent of their combined 34.6 million acres by 2010. Parks, wildlife refuges and private lands protected through conservation easements are counted in this measure. By July 2006 a total of 6.83 million acres had been permanently preserved. The partners are very likely to meet the 2010 goal of 6.92 million acres preserved.

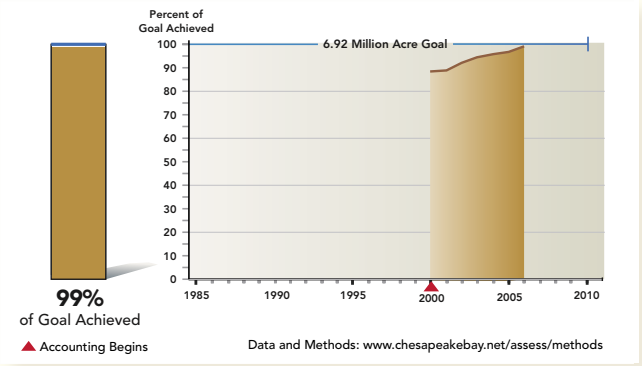
DEVELOPING WATERSHED MANAGEMENT PLANS

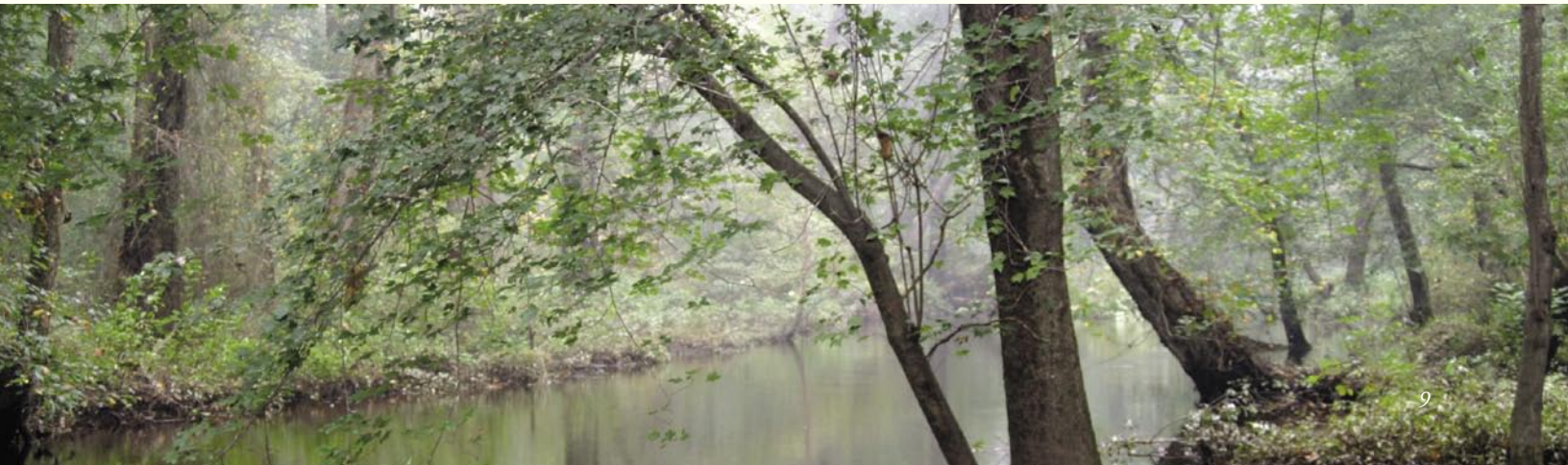
Watershed management plans address the protection, conservation and restoration of stream corridors, riparian forest buffers, wetlands, parklands and other open space for the purposes of preserving watershed health while enhancing the quality of life in local communities. The Bay Program has a goal of developing and implementing locally supported watershed management plans in two-thirds of the Bay watershed. By the end of 2006

RIPARIAN FOREST BUFFERS PLANTED

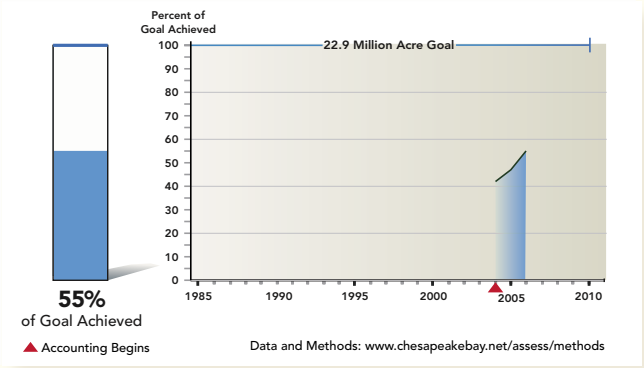


WATERSHED LAND PRESERVATION

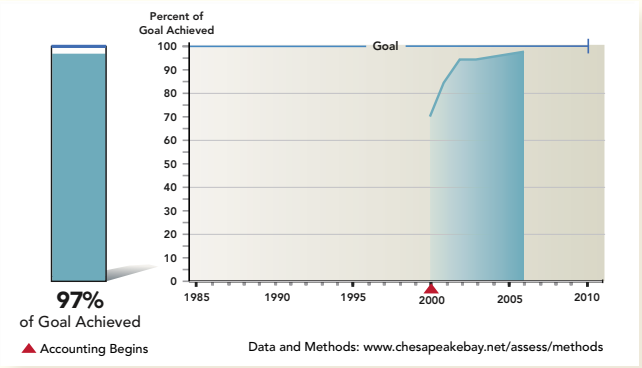




WATERSHED MANAGEMENT PLANS DEVELOPED



PUBLIC ACCESS



plans were in place for 12.6 million acres, more than half of the 22.9 million acres that should be covered under such plans by 2010. Translating these plans into action will be essential to restoring water quality (see *Part One: Ecosystem Health*).

FOSTERING CHESAPEAKE STEWARDSHIP

Accomplishing a comprehensive restoration plan for an ecosystem as complex as the Chesapeake Bay requires the full engagement of restoration leaders, citizens and all stakeholder groups throughout the watershed. All of the Bay's stakeholders require a base of information and motivation to take action. By providing an array of opportunities we optimize our chance to connect with people in the context of their interests, values and current level of understanding or motivation.

PUBLIC ACCESS

Personal interaction with the Chesapeake Bay can help the public recognize the connection between the value of the Chesapeake and their own interests. The Chesapeake Bay must matter to people in order to gain their support for restoration efforts. Since 2000, the Bay jurisdictions have acquired, developed or enhanced more than 100 public access points and in 2006 Virginia, Maryland and Pennsylvania added or enhanced 42 sites. A public access guide (call 1-800-YOUR-BAY to order) catalogs over 600 major public access sites in the Bay area, listing opportunities for boating, fishing, wildlife observation and beach use.

The Chesapeake Bay Gateways Network enhances place-based interpretation of Bay-related resources and stimulates volunteer involvement in resource restoration and conservation. Six new Gateway sites were added to the network in 2006, bringing the total to more than 150.

A mix of water trails managed by state, local and non-profit organizations has blossomed since 2000. The trails exist throughout the Bay and its tributaries and offer a variety of low-impact paddling experiences, connecting people to the natural, cultural and historic resources of the Bay. Last year 53 new water trail miles were developed, bringing the total to more than 1,800 miles.

Overall, the partners have achieved 97 percent of established goals to enhance public access, create Gateways and establish water trails.

COMMUNICATIONS AND OUTREACH

The partners believe that comprehensive and authoritative public information is essential to engage all stakeholders in the restoration effort. The Program has established a number of methods to meet this stewardship need. The *Bay Journal* newspaper reaches more than 50,000 print subscribers monthly, informing people about issues and events that affect the Chesapeake Bay. The monthly e-newsletter *Chesapeake Currents* is distributed to more than 850 subscribers, while the daily

electronic "Bay News" service goes out to more than 1,100 users. The Program's combined websites were accessed by more than 4.6 million different users in 2006. Publications, press releases, presentations, events, and other communication and outreach efforts are also essential elements of the on-going effort to inform the public about the Bay and its watershed.

EDUCATION AND INTERPRETATION

Formal environmental education opportunities allow for in-depth investigation and analysis that enhance a deeper understanding of ecological concepts, environmental interrelationships and human implications. All signatory jurisdictions' school districts have incorporated curriculum that provides a meaningful outdoor watershed educational experience. Through 2006, the NOAA B-WET grants program has funded training opportunities for more than 8,000 teachers. Nearly 3 million Bay watershed students have participated in a field experience during their K-12 education.

Overall, the partners have achieved 81 percent of the current goal of providing a meaningful outdoor watershed educational experience to every student, starting with the class of 2005.

CITIZEN AND COMMUNITY ACTION

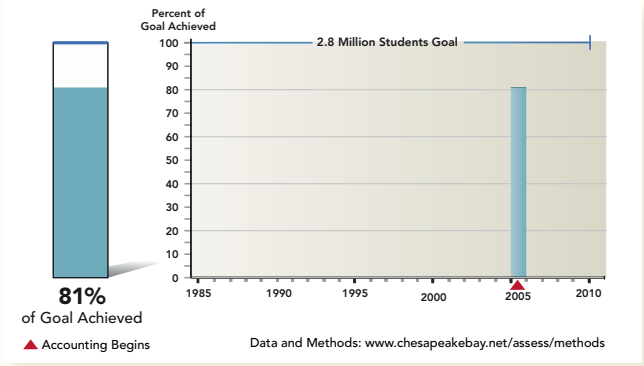
Often, our ability to influence the public rests with the success we have connecting personal and local issues to the well-being of the Bay. By successfully making these connections, we can encourage people to take part in restoration programs as individuals or with their families; at home, at work and in their communities. An essential part of our work is to convert detailed technical information and teach skills to stakeholders groups who can implement best management practices in arenas such as watershed planning or habitat restoration.

Businesses for the Bay is a voluntary effort by businesses committed to implementing pollution prevention in daily operations and reducing releases of chemical contaminants and other wastes to the Chesapeake Bay.

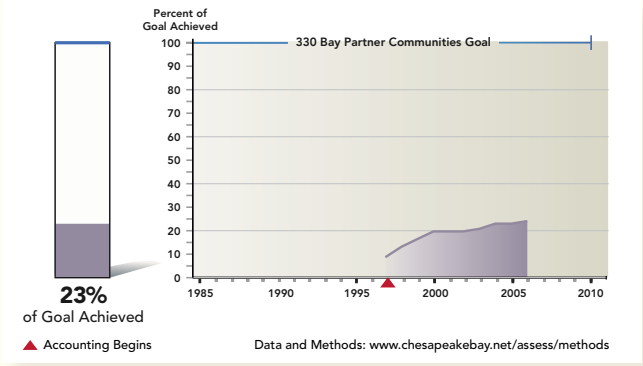
Towns and cities are implementing Bay-friendly measures aimed at making their local communities as well as the Bay a better place to live, work and recreate. In 2006, two new local governments were awarded Bay Partner Community status, and 8 previous winners were recertified, bringing the current total to 75.

Overall, the partners have achieved 23 percent of the existing goal to certify 330 Bay Partner Communities by 2005.

EDUCATIONAL FIELD EXPERIENCES PROVIDED



BAY PARTNER COMMUNITIES



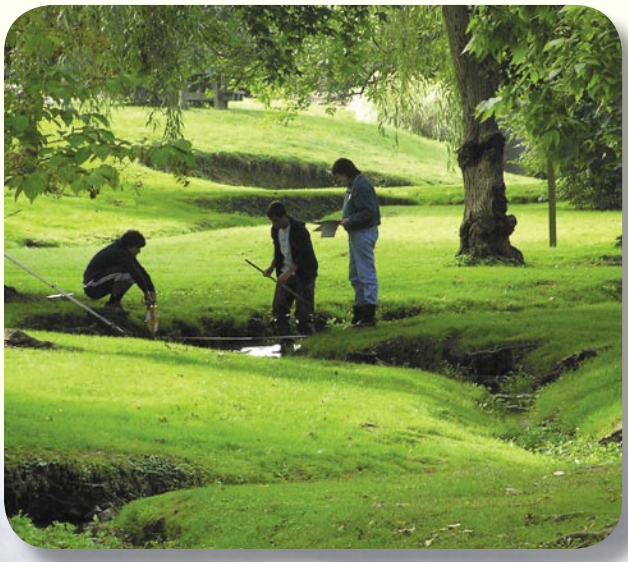
2006 RESTORATION HIGHLIGHTS

Through a series of Chesapeake Bay agreements, Bay Program signatories – the states of Maryland, the commonwealths of Pennsylvania and Virginia; the District of Columbia; the U.S. Environmental Protection Agency representing the federal government; and the Chesapeake Bay Commission representing Bay state legislators - have committed to reduce pollution, restore habitats and sustainably manage fisheries. Since 2000, the headwater states of Delaware, New York and West Virginia have joined regional efforts to improve water quality.

LOOKING BACK AT 2006

While there are many notable individual accomplishments relating to Chesapeake Bay restoration, *Part One: Ecosystem Health* makes clear that the Bay Program partners need to accelerate the pace of water quality improvement efforts. To that end, a number of specific initiatives in 2006 are worth highlighting:

Focusing on nutrient and sediment reduction, the **Chesapeake Bay Commission** garnered regional and Congressional support for Farm Bill conservation reforms benefiting both farmers and the Bay, and helped develop policy to preserve farmland, forests and open space. The Commission participated in creating our states' nutrient trading programs and other initiatives reducing nutrient pollution through forest and air policy and lowering nutrient content in lawn fertilizer. Congressional awareness was raised on Blue Plains Wastewater Treatment Plant's key role in Bay restoration.

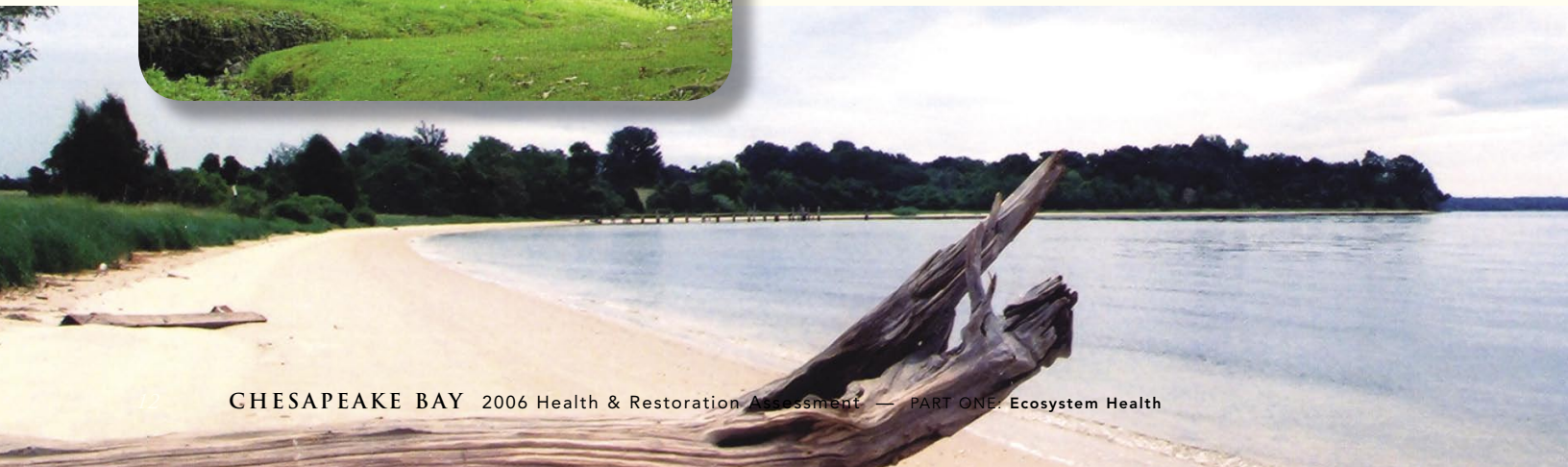


A restoration project located in the **Delaware** portion of the Choptank River Watershed was completed in a cooperative effort by the property owner, Delaware Department of Natural Resources and Environmental Control, and the Kent Conservation District. This project restored 1,700 feet of stream, installing water control structures to emulate beaver impoundments, and creating 2 acres of floodplain wetlands adjacent to the original channel. This is an innovative project that has created habitat and restored wetland function while reducing nutrient loads.

In 2006 the **District of Columbia** created 6 acres of tidal wetlands along the Anacostia River. The city is monitoring this site and a prior wetland project, where over 50 plant species have been identified since 2003. D.C. passed green building legislation in 2006 requiring that new or renovated buildings over 50,000 square feet and District government buildings over 10,000 square feet meet LEED silver accreditation. The District funded construction of several LID retrofits – showcasing alternative stormwater treatment techniques.

The **EPA**, working with funding partners the National Fish and Wildlife Foundation and the Maryland Chesapeake Bay Trust, provided $7.7 million for 10 "targeted watershed" grants. The 10 projects funded in 2006 will reduce more than nine million pounds of nitrogen and nearly seven million pounds of phosphorous annually to the Bay. The projects reduce pollution from a range of sources and explore market-based incentives to encourage more widespread implementation of pollution-fighting programs.

In 2006, **Maryland** dedicated a record $360 million in funding for land preservation, and celebrated achievement of its Chesapeake Bay Agreement goal of preserving 20 percent of the state's natural landscape. Ten wastewater treatment plant upgrades were initiated and one completed with Chesapeake Bay Restoration Fund dollars. In 2006, the first year that the Chesapeake Bay Restoration Funds were available for cover crops, 128,638 acres were planted. Maryland's Corsica River Watershed Action Strategy was named best watershed-based plan in the nation in an EPA report.



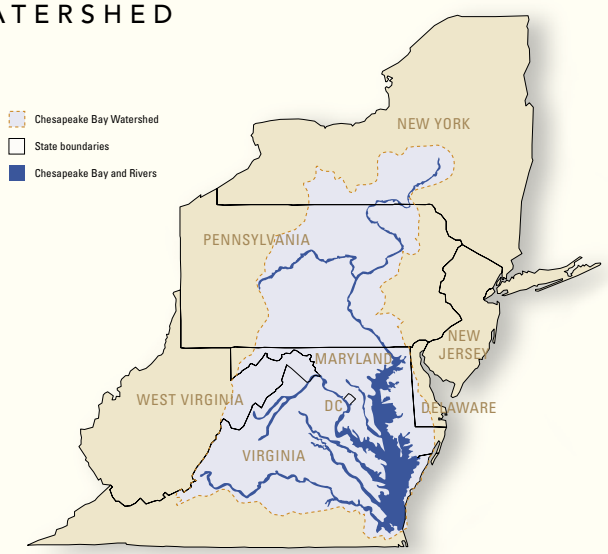
Pennsylvania supported nutrient reduction through its $625 million Growing Greener II watershed restoration bond and $250 million Sewer Infrastructure bond. A stakeholder outreach process was completed to refine Pennsylvania's Point Source Strategy and Nutrient Trading Policy. Nutrient limits are being included in permits for wastewater treatment facilities to reach compliance by 2010. Agriculture initiatives included Conservation District grants to build understanding of regulatory requirements. To address nutrient loads from developed lands, Pennsylvania issued a new Stormwater Best Management Practices Manual.

June record floods caused loss of life and substantial property and natural resource damage throughout much of the Susquehanna watershed in **New York**. Implementation priorities consider the need to effect recovery and flood damage prevention. The NYS Soil and Water Conservation Committee awarded 11 projects to Upper Susquehanna Coalition counties in 2006, totaling $3.5 million, emphasizing grass based agriculture and involving more than 100 farms. Wetlands are a priority with over 370 acres restored under various state and federal programs.

Virginia permanently protected 49,837 acres of land and created new state parks on the Potomac, York, Shenandoah and James Rivers. Agricultural Cost-Share Programs were expanded with an emphasis on five "priority practices" and a comprehensive rewrite of stormwater management regulations is underway. Virginia also adopted a Chesapeake Bay Watershed General Permit regulating the discharge of nutrients from 125 significant wastewater treatment facilities. Compliance plans, describing how each discharger will meet their nutrient load caps, are due August 1, 2007.

West Virginia gained momentum in Tributary Strategy implementation by focusing work in priority watersheds. Successful projects such as a rain barrel workshop and a rain garden demonstration resulted from partnerships between volunteers, local governments and state agencies. These partners are now exploring ways to further promote such innovative stormwater practices in the quickly-developing eastern panhandle. West Virginia's implementation team also worked with NRCS to encourage poultry litter transport and nutrient management plans and to promote the Conservation Reserve Enhancement Program.

THE CHESAPEAKE BAY WATERSHED



This report was developed by the Chesapeake Bay Program partnership to help inform watershed residents about the health of the Bay and efforts to restore it. Staff from a large number of state and federal agencies, academic institutions and non-governmental organizations contributed data and interpretation to the report, including The Alliance for the Chesapeake Bay, Chesapeake Bay Commission, Del. Dept. of Natural Resources and Environmental Control, D.C. Dept. of Health, Interstate Commission on the Potomac River Basin, Md. Dept. of Agriculture, Md. Dept. of the Environment, Md. Dept. of Natural Resources, National Park Service, National Oceanic and Atmospheric Administration, N.Y. Dept. of Environmental Conservation Old Dominion University, Pa. Dept. of Conservation and Natural Resources, Pa. Dept. of Environmental Protection, Pa. Fish and Boat Commission, Susquehanna River Basin Commission, University of Md. Center for Environmental Science, University of Md. College Park, U.S. Army Corps of Engineers, USDA Natural Resource Conservation Service, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Va. Dept. of Environmental Quality, Va. Dept. of Conservation and Recreation, Va. Dept. of Game and Inland Fisheries, Va. Institute of Marine Science, Va. Tech, Versar, W.Va. Dept. of Agriculture and the W.Va. Dept. of Environmental Protection.

For a full list of contributing partners, visit www.chesapeakebay.net/baypartners.htm

Images: Chesapeake Bay Program; Chesapeake Bay Gateways Network; Maryland Department of Natural Resources; Donna Morelli; George Grall©National Aquarium in Baltimore; National Oceanic and Atmospheric Administration (NOAA); Glenda Powell©NOAA; United States Fish and Wildlife Service (USFWS); United States Department of Agriculture (USDA); Virginia Institute of Marine Science (VIMS)

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Printed by the
U.S. Environmental Protection Agency
for the Chesapeake Bay Program