Bay Barometer

A Health and Restoration Assessment of the Chesapeake Bay and Watershed in 2008

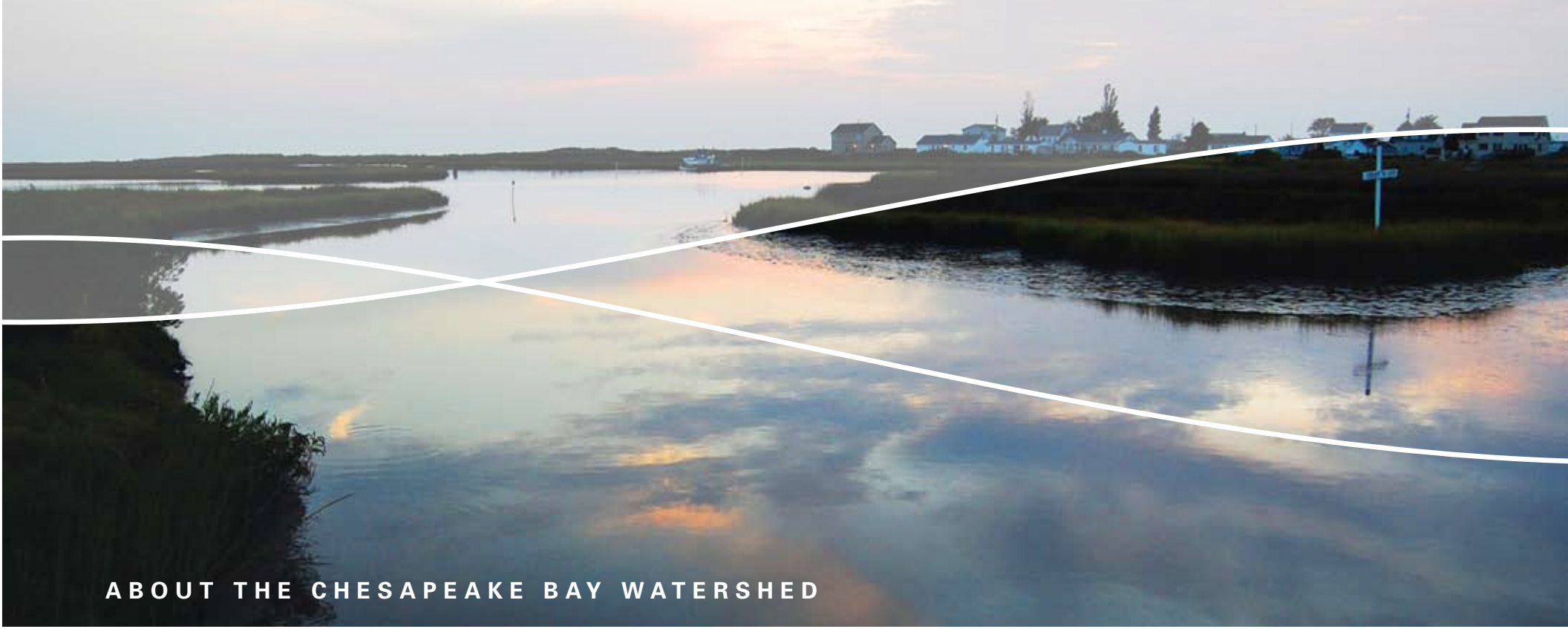
CBP/TRS 293-09 EPA-903-R-09-001 March 2009

Chesapeake Bay Program
A Watershed Partnership

www.chesapeakebay.net

ABOUT THE CHESAPEAKE BAY

The Chesapeake Bay is an estuary, a body of water where fresh and salt water mix. It is **the largest estuary** in the United States and the **third largest in the world.** The Bay is **about 200 miles long,** stretching from Havre de Grace, Maryland, to Virginia Beach, Virginia. The Bay's **width ranges from 3.4 miles** near Aberdeen, Maryland, **to 35 miles** near the mouth of the Potomac River. The Bay holds more than **15 trillion gallons of water.** The Bay is surprisingly shallow. Its average depth, including all tidal tributaries, is **about 21 feet.** A person who is six feet tall could wade through more than 700,000 acres of the Bay and never get his or her hat wet. A few deep troughs running along much of the Bay's length reach up to **174 feet in depth.** These troughs are remnants of the ancient Susquehanna River. The Bay and its tidal tributaries have **11,684 miles of shoreline** – more than the entire U.S. West Coast. The surface area of the Bay and its tidal tributaries is **125 billion square feet,** or around **4,480 square miles.** The Bay supports more than **3,600 species of plants, fish and other animals,** including 348 species of finfish, 173 species of shellfish and more than 2,700 plant species. The Chesapeake is home to **29 species of waterfowl** and is a major resting ground along the Atlantic Flyway. Every year, about **1 million waterfowl** winter in the Bay region. The Bay produces about **500 million pounds of seafood** per year.



ABOUT THE CHESAPEAKE BAY WATERSHED

About half the water in the Chesapeake Bay is from the Atlantic Ocean. The rest drains into the Bay from an enormous 64,000-square-mile watershed. The Chesapeake Bay watershed includes parts of six states – Delaware, Maryland, New York, Pennsylvania, Virginia and West Virginia – and the entire District of Columbia. The Chesapeake's land-to-water ratio is 14:1, the highest of any coastal water body in the world. The Bay watershed is home to almost 17 million people. About 150,000 people move to the area each year. Experts predict that the population will increase to nearly 20 million by 2030. Everyone in the watershed lives just a few minutes from one of the 100,000 streams and rivers that drain into the Bay. Each of these waterways is a pipeline from communities to the Bay. Of the 50 largest tributaries that flow into the Bay, just three deliver about 80 percent of Bay's fresh water: the Susquehanna River (48 percent), the Potomac River (19 percent) and the James River (14 percent). During the 1600s, 95 percent of the watershed was forested. Now about 58 percent is forest. The rest of the land has been developed for other uses, such as agriculture and urban and suburban lands.

A NOTE FROM CHESAPEAKE BAY PROGRAM DIRECTOR JEFFREY LAPE

Chesapeake Bay Program
A Watershed Partnership

The Chesapeake Bay Program is a unique regional partnership that has coordinated and conducted the restoration of the Chesapeake Bay since 1983. Partners of the Chesapeake Bay Program include the states of Delaware, Maryland, New York, Pennsylvania, Virginia and West Virginia; the District of Columbia; the Chesapeake Bay Commission, a tristate legislative body; the Environmental Protection Agency, representing the federal government; the U.S. Department of Agriculture; and advisory groups of citizens, scientists and local government officials.

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At the Chesapeake Bay Program, we are fortunate to have the talented people and the remarkable science to provide an intimate look at our nation's largest estuary. This assessment's rich reporting on ecosystem conditions and restoration actions reveals where we are and, more important, how far we have to go.

While there are many individual success stories behind the collective numbers – work that in most cases will take time to influence water quality – the sobering data in this report mostly reflect only marginal shifts from last year's results. This affirms the need to take bolder actions and involve a wider network to achieve sharp improvements in our Bay Barometer readings.

We all are understandably impatient for more rapid progress.

Among the steps being taken by the program, its partners and its Executive Council are:

- Setting tough pollution caps throughout the watershed with accompanying action plans
- Reorganizing the program to make it more strategic, effective and accountable for meeting its goals
- Continuing partner initiatives as "champions" for innovation and implementation
- Setting two-year milestones to better gauge and motivate progress toward an overall deadline
- Enlisting an external evaluator to critically assess program operations and improve efficency

And that's just a start. From the White House to statehouses to town halls, commitments are being made to take strong actions to stem pollution impacting the Chesapeake Bay and its tributaries.

We all have a role in restoring the beauty and bounty of this treasured resource. This report features a new chapter that shows how we can all help. Together, we can and will speed the day when the wonders of the Bay are fully enjoyed by this and future generations.

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EXECUTIVE SUMMARY

The Chesapeake Bay is one of the most extraordinary places in America. The unique estuary and its 64,000-square-mile watershed have tremendous ecological, historic, cultural, economic and recreational value to the region and the entire country.

For more than 25 years, the partners of the Chesapeake Bay Program have worked to protect and restore the Bay and its watershed. Goals are set for the health of the Bay and the restoration measures needed to return the ecosystem to a healthy state. *Bay Barometer: A Health and Restoration Assessment of the Chesapeake Bay and Watershed in 2008* is the annual review of the partnership's progress.

The Chesapeake Bay and its tributaries are unhealthy primarily because of pollution from excess nitrogen, phosphorus and sediment entering the water. The main sources of these pollutants are agriculture, urban and suburban runoff, wastewater, and airborne contaminants.

Despite small successes in certain parts of the ecosystem and specific geographic areas, the overall health of the Chesapeake Bay did not improve in 2008. The Bay continues to have poor water quality, degraded habitats and low populations of many species of fish and shellfish. Based on these three areas, the overall health averaged 38 percent, with 100 percent representing a fully restored ecosystem.

New restoration programs and projects were put in place in 2008, but resulted in only incremental gains toward goals. The indicators for restoration averaged 61 percent, with 100 percent meaning that all measures needed for a restored Bay have been implemented.

One of the greatest challenges to restoration is continued population growth and development, which destroys forests, wetlands and other natural areas. The impact of human activity is overwhelming nature and offsetting cleanup efforts.

Because the watershed's 17 million residents have a tremendous impact on its health, a section called "How You Can Help" was added to this report. It shows simple actions that people can take to help protect nature and reduce pollution. The Chesapeake Bay will only be restored through this type of collective effort.

HEALTH 38%

RESTORATION 61%

FACTORS IMPACTING THE BAY AND WATERSHED

Annual rain and snowfall affect how much water flows in rivers. The levels of pollution entering the Bay each year generally correspond with the volume of water that flows from its tributaries.

River Flow: Total river flow to the Bay during the 2008 water year (October 2007-September 2008) was 37.5 billion gallons per day (BGD). This is 3.5 BGD less than 2007 and 10 BGD less than the 47.2 BGD average flow from 1938-2008.

Nitrogen: Preliminary estimates indicate that 291 million pounds of nitrogen reached the Bay during 2008. This is 13 million pounds less than 2007 and 54 million pounds less than the 345 million pound average load from 1990-2008.

Phosphorus: Preliminary estimates indicate that 13.8 million pounds of phosphorus reached the Bay during 2008. This is similar to 2007 and 7.5 million pounds less than the 21.3 million pound average load from 1990-2008.

Sediment: Preliminary estimates indicate that 3.3 million tons of sediment reached the Bay during 2008. This is 700,000 tons more than 2007 and 800,000 tons less than the 4.1 million ton average load from 1990-2008.

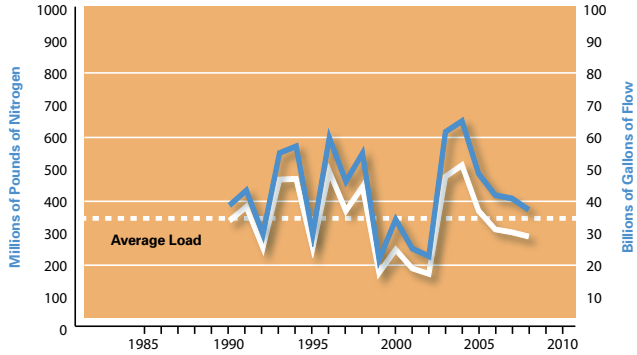
HOW YOU CAN HELP

Almost 17 million people live in the Chesapeake Bay watershed. The actions that residents take everyday affect nature and impact the health of local creeks, streams and rivers, and ultimately the Bay. The effort to create clean water in communities and restore the Chesapeake cannot be successful without the active involvement of citizens throughout the watershed. Here are some key ways to help:

- Pick up after your pet.
- Volunteer for a watershed group.
- Don't fertilize your lawn.
- Install a rain barrel and rain garden.
- Use phosphorus-free dish detergent.
- Drive your car less.
- Plant native trees and shrubs.

For more details and ideas, visit www.chesapeakebay.net/helpthebay.aspx.

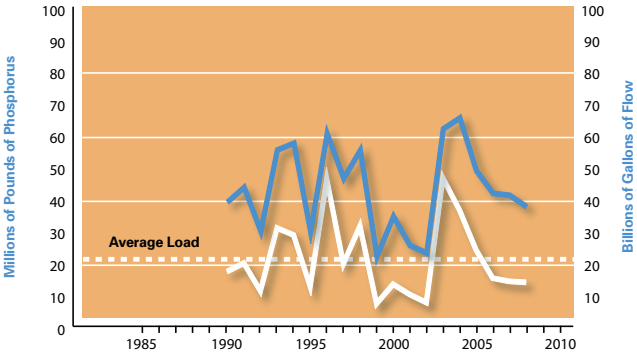
Nitrogen Loads Reaching Chesapeake Bay*



*Preliminary Data River Flow Nitrogen Load

Data and methods: www.chesapeakebay.net/status_nitrogen.aspx

Phosphorus Loads Reaching Chesapeake Bay*



*Preliminary Data River Flow Phosphorus Load

Data and methods: www.chesapeakebay.net/status_phosphorus.aspx

HEALTH – 38 PERCENT

The Chesapeake Bay ecosystem remains severely degraded. The Bay's health is measured by studying water quality, habitats, the lower food web and fish and shellfish. When all the goals for these areas are reached, it should mean a restored Bay. In 2008, the Chesapeake Bay was only at 38 percent of the desired health, which was the same as 2007. An increase in tidal tributary segments impaired due to chemical contaminants and a drop in the blue crab population were primary reasons for a lower score.

Water Quality – 21 percent

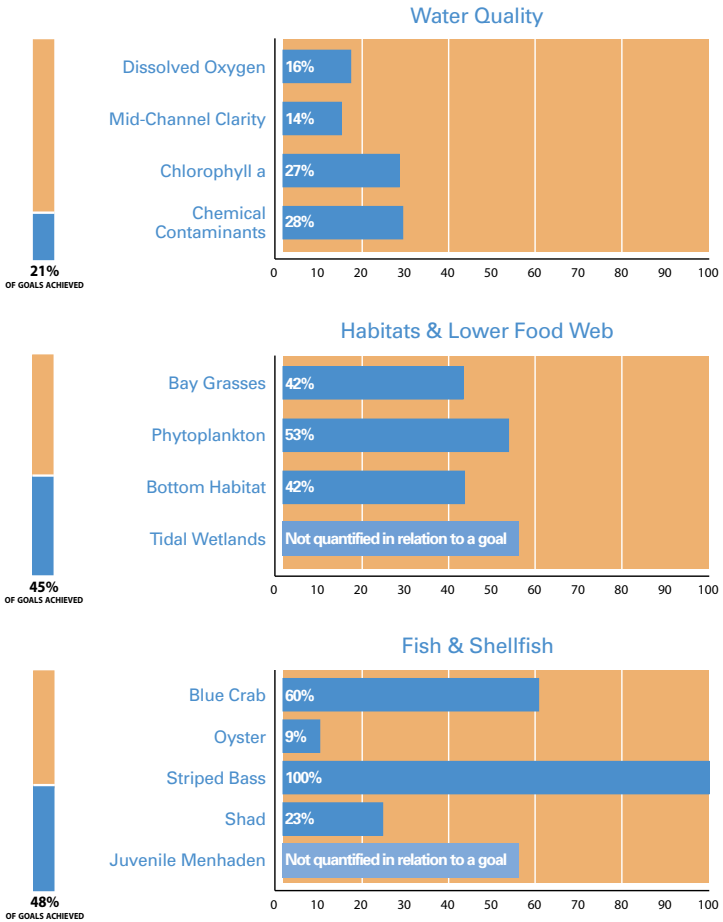
Water quality is the most important measure of the Chesapeake Bay's health. In 2008, water quality was again very poor, meeting only 21 percent of the goals, the same as 2007. Pollution led to murky water and algae blooms, which blocked sunlight from reaching bay grasses and created low levels of oxygen for aquatic life. Chemical contaminants impaired more water in 2008, resulting in a 6 percent decrease in that goal area.

Habitats and Lower Food Web – 45 percent

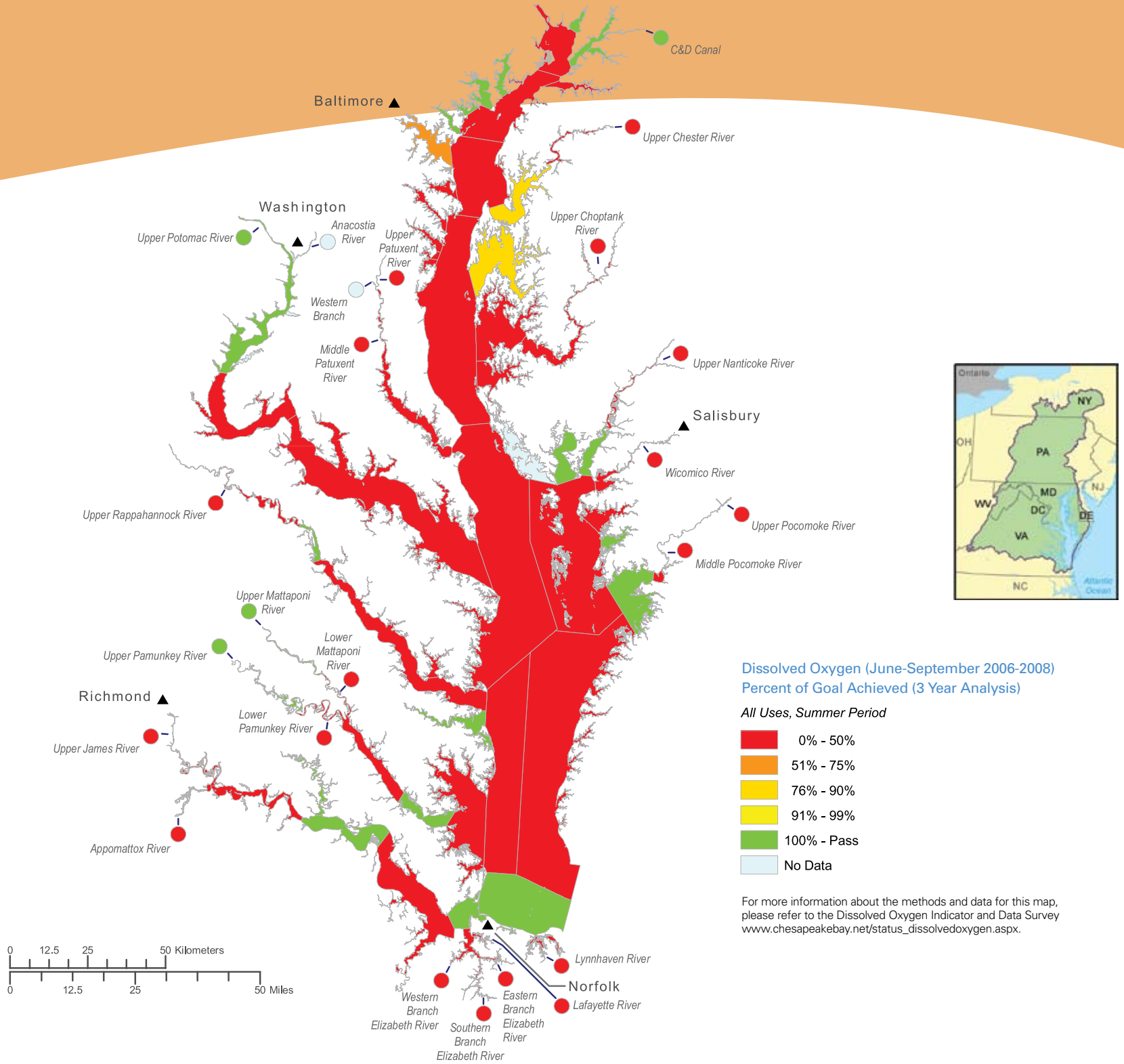
Overall, the vital habitats and lower food web that support life in the Chesapeake Bay continued to be in bad shape in 2008, meeting 45 percent of the goals, the same as 2007. The positive news is that there was a 7 percent gain toward the goal for underwater bay grasses. On the negative side, goal achievement for algae fell 3 percent.

Fish and Shellfish – 48 percent

Most fish and shellfish populations in the Bay remain far below desired levels, and 2008 brought a 2 percent decrease in this goal area. This setback was driven by a drop of 23 million in the population of spawning-age blue crabs, which lowered progress toward the species goal by 11 percent. Oyster and shad populations remained at low levels.



Data and methods: www.chesapeakebay.net/status_bayhealth.aspx



Dissolved Oxygen (June-September 2006-2008)
Percent of Goal Achieved (3 Year Analysis)

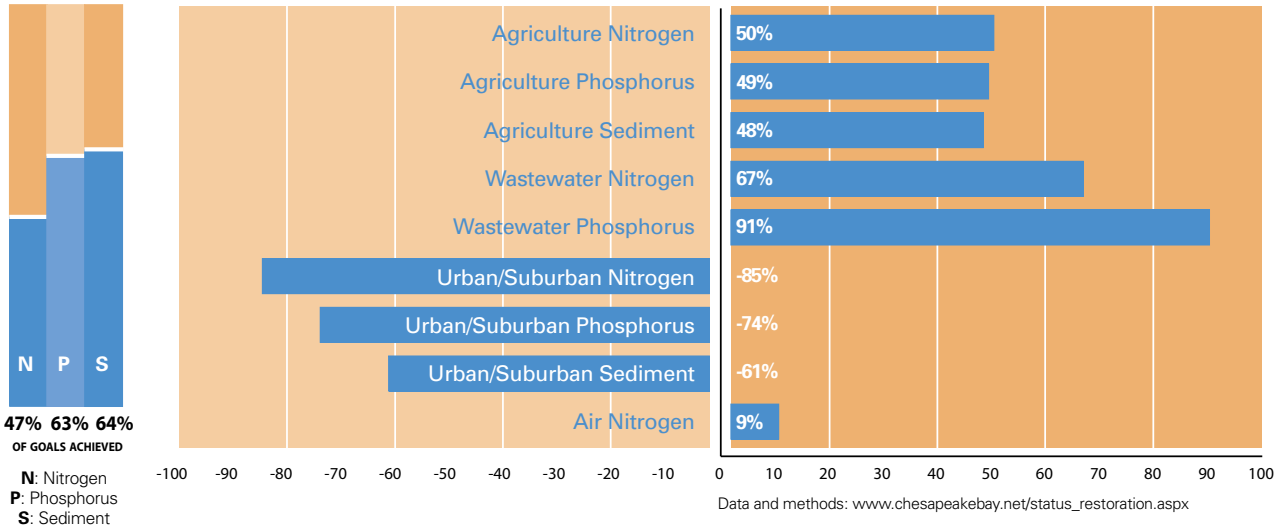
All Uses, Summer Period

- 0% - 50%
- 51% - 75%
- 76% - 90%
- 91% - 99%
- 100% - Pass
- No Data

For more information about the methods and data for this map, please refer to the Dissolved Oxygen Indicator and Data Survey www.chesapeakebay.net/status_dissolvedoxygen.aspx.

RESTORATION – 61 PERCENT

To restore the Chesapeake Bay and its watershed, many measures must be put in place to reduce pollution, restore habitats, manage fisheries, protect watersheds and foster stewardship. Progress toward putting restoration measures in place continued in 2008, with a 4 percent gain, bringing the partnership to 61 percent of its goals. Population growth and development continue to hamper pollution-reduction efforts and urban and suburban runoff remains the only source of pollution that is increasing. Steady progress was seen in several areas, and the goal for land preservation has been met.



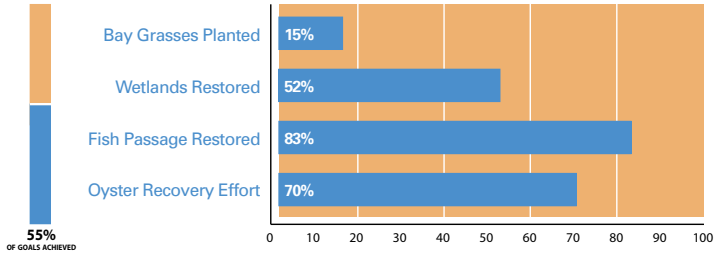
Data and methods: www.chesapeakebay.net/status_restoration.aspx

Reducing Pollution – 58 percent

Chesapeake Bay Program partners are focused on reducing pollution from the four primary sources: agriculture, wastewater, urban and suburban runoff, and air pollution. Based on available data, scientists project that 58 percent of the pollution reduction efforts needed to achieve the goals have been implemented since 1985, which is a 1 percent increase from 2007.

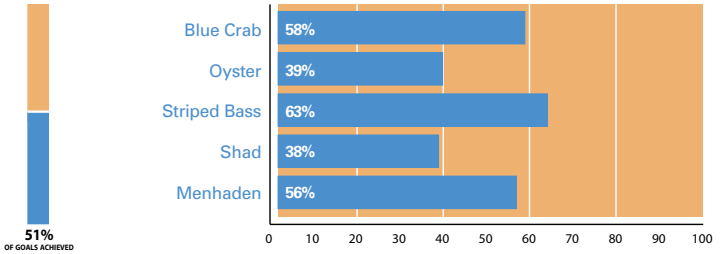
Restoring Habitats – 55 percent

Efforts to restore habitats throughout the watershed achieved modest gains in 2008, with progress toward the overall goal at 55 percent, an 11 percent increase from 2007. There were incremental gains in bay grasses planted, wetlands restored and fish passage restored. A goal was set for oyster recovery work, and achievement is at 70 percent.



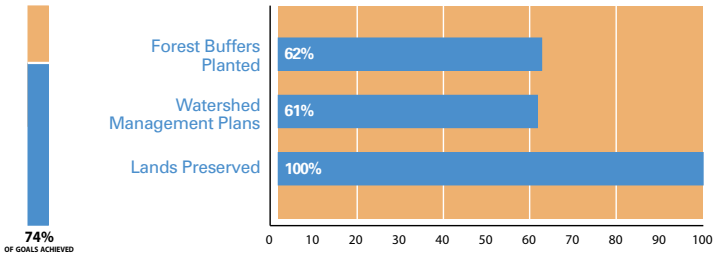
Managing Fisheries – 51 percent

Overall work to develop ecosystem-based fisheries management plans for blue crabs, oysters, striped bass, Atlantic menhaden and American shad stands at 51 percent, just a minimal gain from 2007. The score was increased by new restrictions on harvesting blue crabs and advancements in oyster research and aquaculture.



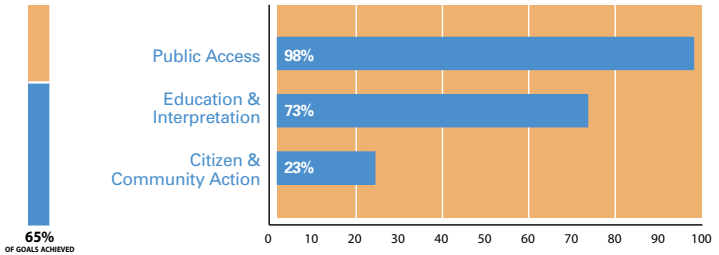
Protecting Watersheds – 74 percent

Progress was made toward protecting of the thousands of smaller watersheds in the region during 2008, with a 3 percent gain toward the overall goal. Last year, the partnership met its goal for preserving 7 million acres of land. Work to plant forest buffers and develop watershed management plans also increased the score.



Fostering Stewardship – 65 percent

Programs to foster the public's stewardship of the Chesapeake Bay and its watershed resulted in a score of 65 percent. A 13 percent gain toward the goal for education contributed to the overall increase. To gauge citizen action, an effort was launched to measure volunteerism throughout the watershed.



Data and methods: www.chesapeakebay.net/status_restoration.aspx

FACTORS

Everything that happens on land has an impact on the water. The man-made pressures on the Chesapeake Bay and its watershed began more than 400 years ago, when the first European colony was founded at Jamestown, Virginia, and Captain John Smith led expeditions around the estuary. During the four centuries that followed, the human population swelled, forests were chopped down, industrial activity ensued, fish and shellfish were harvested, towns and cities were built, and toxic chemicals were released into the environment. These factors disrupted the natural functioning of the entire ecosystem and led to a tremendous decline in the Bay's health. Today, human activity continues to drive the primary sources of pollution, which are agriculture, urban and suburban lands, wastewater, and air pollution.

AGRICULTURE

Agriculture covers about 25 percent of the watershed, representing the largest intensively managed land use. There are an estimated 87,000 farms covering about 8.5 million acres. Agriculture is the number one source of pollution to the Bay. Improperly applied fertilizers and pesticides flow into creeks, streams and rivers, carrying excess nitrogen, phosphorus and chemicals into the Chesapeake Bay. Tilling cropland and irrigating fields can cause major erosion. Additionally, the nutrients and bacteria found in animal manure can seep into groundwater and runoff into waterways.

URBAN AND SUBURBAN LANDS

Human development, ranging from small subdivisions to large cities, is a major source of pollution for the Chesapeake. In fact, because of the region's continued population growth and related construction, runoff from urban and suburban lands is the only source of pollution that is increasing. These areas are covered by impervious surfaces – such as roads, rooftops and parking lots – that are hard and don't let water penetrate. As a result, water runs off into waterways instead of filtering into the ground. This runoff carries pollutants including lawn fertilizer, pet waste, chemicals and trash. Septic systems release pollution that eventually ends up in the water. Developed areas also split up forests, decreasing their filtering capacity.

WASTEWATER

There is a tremendous volume of sewage that must be processed in the watershed. The technology used by the 483 major municipal and industrial wastewater treatment plants has not removed enough pollution, particularly nitrogen and phosphorus. Upgrading these facilities so they can remove more pollution from the water is extremely expensive and takes time. While there has been significant progress in improving treatment at many wastewater plants, numerous facilities still use old technology. Also, population growth is increasing the need for wastewater treatment, causing some facilities to be expanded.

AIR POLLUTION

When pollution is released into the air, it eventually falls onto land and water. Even larger than the Chesapeake Bay's watershed is its airshed, the area from which pollution in the atmosphere settles into the region. This airshed is about 570,000 square miles, or seven times the size of the watershed. Nitrogen and chemical contaminants – such as mercury and PCBs – from air pollution contribute to poor water quality in the region, and about half of these pollutants come from outside the watershed. Air pollution is generated by a variety of sources, including power plants, industrial facilities, farming operations and automobiles and other gas-powered vehicles.

OTHER

There are several other factors that impact the overall health of the ecosystem. These include:

- **Climate Change:** The Chesapeake region has already begun to see the effects of global climate change in the form of sea level rise and higher water temperatures. Scientists predict that climate change could also cause a decrease in underwater grasses, more "dead zones" of low oxygen, more annual precipitation and a resulting increase in the flow of pollution, fewer wintering waterfowl, and a change in the types of plants and animals that live in the area.
- **Invasive Species:** Invasive species are animals and plants that are not native to their habitat and negatively affect the invaded ecosystem. Once an invasive species population is established it is unlikely to be completely eradicated. In the Bay region there are more than 200 invasive species thought to cause serious problems – the mute swan, nutria, phragmites, purple loosestrife, water chestnut and zebra mussels are the species that pose the greatest threats.
- **Fisheries Harvest:** The Chesapeake Bay and its tributaries have historically been rich grounds for commercial and recreational fisheries. Demand for seafood has driven these commercial fisheries, and crabbing and angling have long been popular activities for residents. But these fisheries have put tremendous pressure on the population of key Chesapeake species, such as blue crabs and oysters.

RIVER FLOW AND POLLUTANT LOADS

Importance: Each day, billions of gallons of fresh water flow through thousands of streams and rivers that eventually empty into the Chesapeake Bay. That water also carries polluted runoff from throughout the watershed. The amount of water flowing into the Bay from its tributaries has a direct impact on how much pollution is in the estuary – generally as river flow increases, it brings more nitrogen and phosphorus to the Bay. The volume of river water flowing into the Bay also affects the saltiness (salinity) of Bay waters. In addition, fast-moving and turbulent river flow mixes in oxygen from the air, which is beneficial for aquatic life. Years with low or high amounts of precipitation can result in changes to pollution levels in the Bay, but not mean the health of the watershed is improving or declining.

To calculate the loads of nitrogen and phosphorus flowing to the Bay, scientists use a combination of water samples and computer modeling. Whenever possible and practical, samples from rivers and wastewater pipes are used to measure pollution levels. Using this technique, pollution loads can be calculated for almost 80 percent of the watershed. For the remaining area, computer modeling is used to calculate pollution loads.

Status: River Flow: Total river flow to the Bay during the 2008 water year (October 2007-September 2008) was 37.5 billion gallons per day (BGD). This is 3.5 BGD less than 2007 and 10 BGD less than the 47.2 BGD average flow from 1938-2008.

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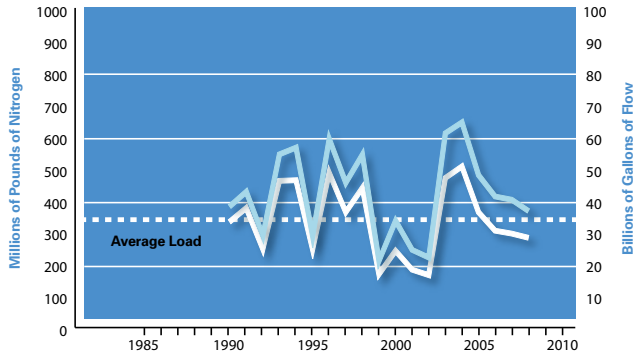
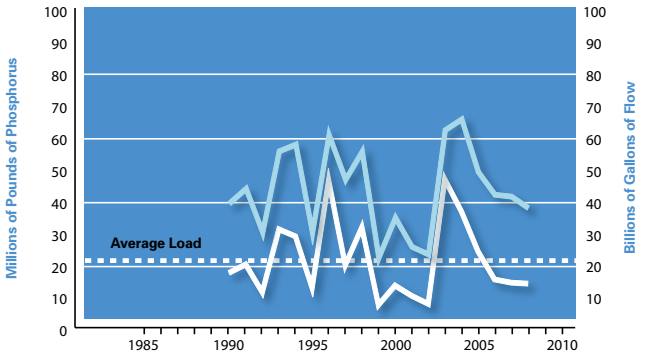
Nitrogen Loads Reaching Chesapeake Bay*



*Preliminary Data River Flow Nitrogen Load

Data and methods: www.chesapeakebay.net/status_nitrogen.aspx

Phosphorus Loads Reaching Chesapeake Bay*



*Preliminary Data River Flow Phosphorus Load

Data and methods: www.chesapeakebay.net/status_phosphorus.aspx

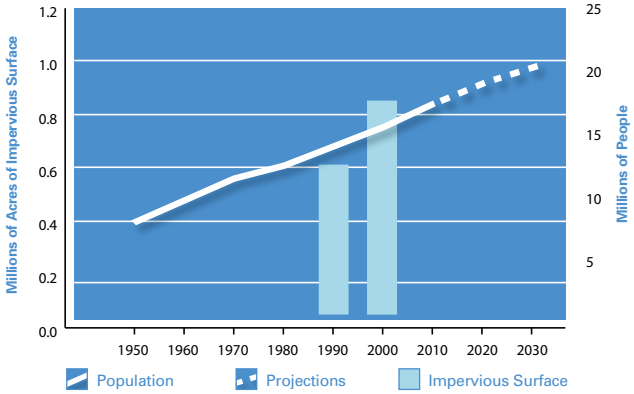
LAND USE

How humans use the land has the greatest impact on the Chesapeake Bay and local waterways. Natural areas like forests and wetlands have a positive effect on water quality, while areas developed for farming or cities generally have a negative impact. The decline of the Chesapeake Bay is directly linked to the rise in population of the watershed – since 1950 the number of residents has doubled. Projections through 2030 show continued population growth, loss of natural areas and increases in urban development, all of which are challenges to protecting and restoring the Chesapeake.

Even more influential than population growth is the corresponding development. People are moving into sprawling suburbs and living in bigger houses on larger lots, causing forests, farms and other valuable lands to be transformed into subdivisions, shopping centers and parking lots. This land conversion severely impacts the health of streams, rivers and the Bay. Impervious surfaces such as roads and rooftops do not allow water to filter into the ground. Instead, rainfall runs off, picking up pollution and quickly carrying it into waterways. From 1990 to 2000, impervious surfaces increased by 41 percent – a rate five times greater than the 8 percent rate of population growth during that time.

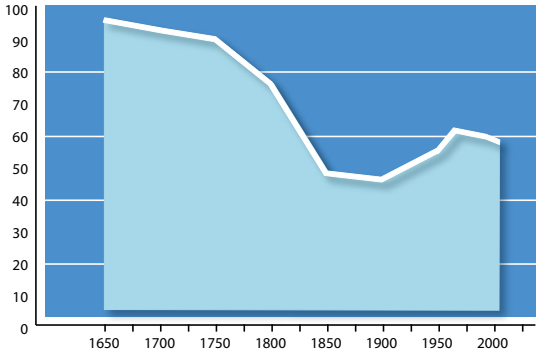
Forests are the most beneficial use of land for Bay water quality. They capture, filter and retain water, thereby reducing pollution and improving water quality. Forests also absorb air pollution and retain up to 85 percent of the nitrogen from sources such as automobiles and power plants. Forested areas reduce erosion, control flooding and provide habitat for wildlife. In the 1600s, forests covered 95 percent of the watershed. Now only 58 percent of the watershed is forested, and development is reducing forests at the rate of 100 acres per day. Also because of development, forested areas are being split into smaller parcels, which reduces their ability to improve water quality and provide wildlife habitat.

Population and Impervious Surface



Data and methods: www.chesapeakebay.net/status_population.aspx

Percent of Watershed with Forest



Data and methods: www.chesapeakebay.net/status_watershedforests.aspx

HEALTHY BAY

- Clean water flows into the Bay
- Wetlands act as natural buffer
- Water clarity and oxygen levels are good
- Sunlight provides energy for grasses to grow
- Fish and shellfish have adequate habitat and food
- Oysters are plentiful and filter the water
- The ecosystem is in balance

UNHEALTHY BAY

- Pollution flows to the Bay
- Development removes natural areas
- Pollution causes algae blooms and murky water
- Algae blooms decompose, lowering oxygen levels
- Sunlight doesn't properly penetrate the water
- Underwater grasses struggle to grow
- The health of fish and other life suffer

WATER QUALITY

For the Chesapeake Bay to be healthy and productive, the water must be safe for people and must support aquatic life, such as fish, crabs and oysters. The water should be fairly clear, have enough oxygen, contain the proper amount of algae and be free from chemical contamination.

However, the indicators in this section show that water quality in the Bay remains extremely poor because of pollution from nitrogen, phosphorus, sediment and chemicals. Rain causes these pollutants to runoff into local streams, creeks and rivers and the Bay itself. To improve water quality, the flow of pollution must continue to be reduced. This will increase water clarity and oxygen levels in the Bay, and will decrease harmful algae blooms and chemical contaminants.

Overall, Bay water quality is at 21 percent of the goal.

For more information, visit www.chesapeakebay.net/waterquality.aspx.

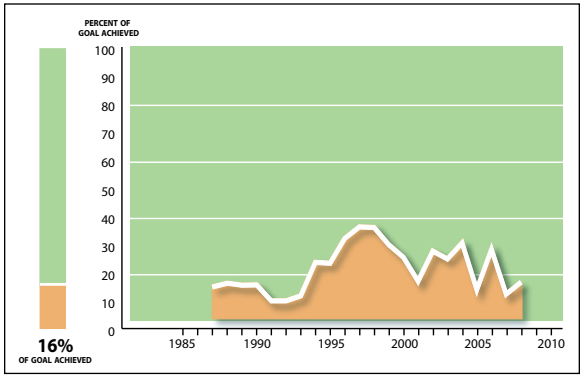
To improve water quality, the flow of pollution must continue to be reduced.

DISSOLVED OXYGEN

Importance: When oxygen is in water, it is in a dissolved form. The Chesapeake Bay's fish and shellfish need certain levels of oxygen to survive and thrive. The necessary amount of dissolved oxygen varies by species, season and location in the Bay. Generally, higher levels of oxygen are needed in shallow waters during the spring, when aquatic animals spawn. Slightly lower levels of oxygen are acceptable at other times of the year, particularly in deeper waters.

Status: The goal is for 100 percent of the tidal tributaries and the Chesapeake Bay to meet Clean Water Act standards for dissolved oxygen. When assessing water quality, regulators examine conditions from the past three years to adjust for annual weather-driven fluctuations. Data gathered from 2006 to 2008 indicate that about 16 percent of the combined volume of open-water, deep-water and deep-channel water of the Bay and its tidal tributaries met dissolved oxygen standards during the summer months. This is an increase of 4 percent from last year's assessment (also see dissolved oxygen map on page 7).

Dissolved Oxygen



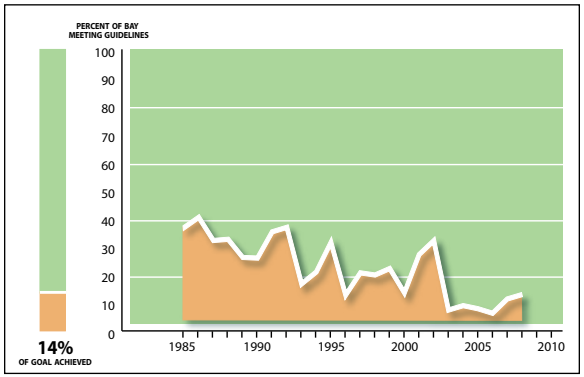
Standards attainment: data represent 3 year period (data year and preceding 2 years).
Data and methods: www.chesapeakebay.net/status_dissolvedoxygen.aspx

WATER CLARITY

Importance: Clear water is a characteristic of a healthy Chesapeake Bay. Good water clarity is one of the most important factors in the growth of underwater grasses. These grasses provide vital habitat for a number of aquatic animals. Clear water allows sunlight to reach the plants, providing energy for them to grow, and enables fish to see prey and avoid predators. Currently, the flow of pollution into the Bay causes light-blocking algae to grow and clouds the water with particles of dirt.

Status: The goal is for 100 percent of the Chesapeake Bay to meet guidelines for water clarity. A device called a Secchi disk is used to measure water clarity and the depth to which light penetrates the water column during the growing season for underwater bay grasses. Last year, 14 percent of tidal waters met or exceeded thresholds for water clarity. This was a slight increase from 2007, when about 12 percent met guidelines.

Water Clarity



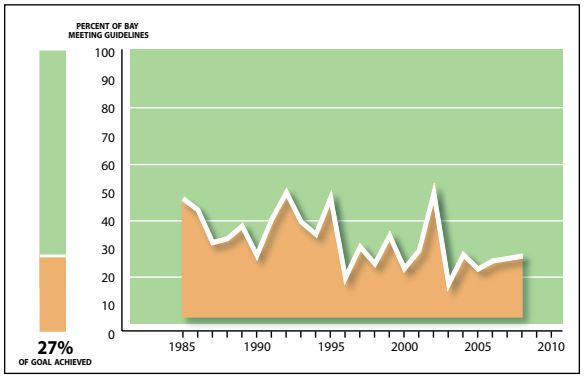
Data weighed by respective salinity zone.
Data and methods: www.chesapeakebay.net/status_clarity.aspx

CHLOROPHYLL *A*

Importance: Scientists study chlorophyll *a* to determine the amount of algae present in the Chesapeake Bay. Algae make up the foundation of the food chain, supporting most aquatic animals including oysters and fish. The right amount of algae is needed for balance in the ecosystem. Too much nitrogen and phosphorus pollution can cause algae blooms that block sunlight from reaching underwater grasses, reducing habitat and the oxygen necessary for life. Harmful algae blooms are an annual problem in the Bay and its tributaries.

Status: The goal is for 100 percent of Chesapeake Bay tidal waters to be below certain threshold concentrations of chlorophyll *a* that are acceptable to underwater bay grasses. Because pollution, weather and water temperature all affect chlorophyll *a*, levels vary greatly by year, season and location. Last year, 27 percent of tidal waters had chlorophyll *a* concentrations below the threshold. This is an increase of 1 percent from 2007.

Cholorophyll *A*



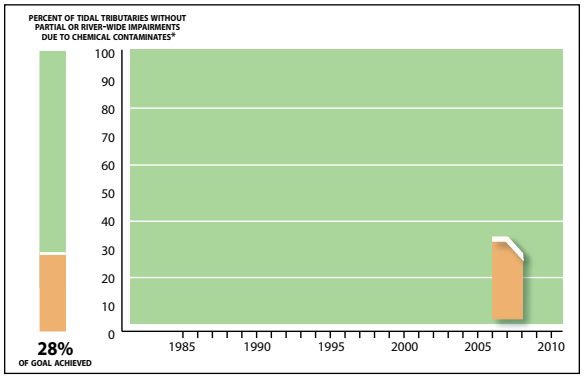
Data and methods: www.chesapeakebay.net/status_chlorophylla.aspx

CHEMICAL CONTAMINANTS

Importance: Toxic chemicals found in the water, sediment and fish of the Chesapeake Bay's tidal tributaries can have adverse effects on the ecosystem and human health. Chemical contaminants such as polychlorinated biphenyls (PCBs) can accumulate in the tissues of fish and this can provide an indication of the overall presence of these substances in the ecosystem. These chemicals can build up in certain species of fish to levels that can potentially be harmful to humans who consume them.

Status: The Chesapeake Bay Program's goal is for 100 percent of tidal tributaries to be unimpaired by chemical contaminants such as metals, PCBs and tributyltin. Last year, 25 of the 89 monitored tidal segments (28 percent) were unimpaired by chemicals. This represents a 6 percent decrease from 2007. The other 64 segments contained a partial or full impairment. There may be little positive change seen in the short term since a majority of impaired waterways have persistent problems with PCBs in fish tissues.

Chemical Contaminants



*Impairments as determined by Virginia, Maryland and the District of Columbia under Clean Water Act Requirements.
Data and methods: www.chesapeakebay.net/status_chemicalcontaminants.aspx

HABITATS AND THE LOWER FOOD WEB

For life to thrive in the Chesapeake Bay, high-quality food sources and habitats are required. Clams and worms need an unpolluted environment at the bottom of the Bay. Abundant underwater grasses and wetlands are vital to juvenile fish and crabs. For all aquatic life to flourish, the algae that make up the foundation of the food web must be of the proper type and in the right amounts. The health and abundance of these animals and habitats are gauges of the Bay's health.

The indicators in this section show that more underwater grasses and wetlands are needed both for habitats and for their ability to filter pollution. Bottom habitat in the Bay and the health of algae must improve.

Overall, 45 percent of the goals for Bay habitats and the lower food web have been achieved.

For more, visit www.chesapeakebay.net/habitats.aspx and www.chesapeakebay.net/lowerfoodweb.aspx.

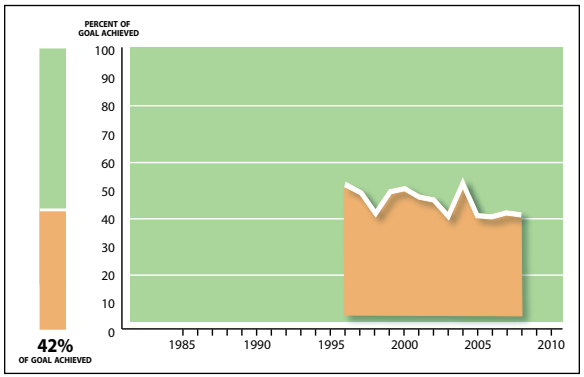
For life to thrive in the Chesapeake Bay, high-quality sources of food and types of habitat are required.

BOTTOM HABITAT

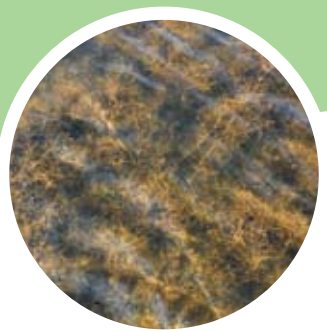
Importance: The Bay's bottom is home to many species including worms, small fish and shellfish such as clams, oysters and mussels. These bottom-dwelling creatures are especially sensitive to increased pollution and decreased oxygen. These species serve as food for bottom-feeding fish and crabs. The health of these creatures is a good indicator of long-term conditions in the bottom habitat and the Bay overall, because they do not move great distances and have certain predictable responses to environmental stresses.

Status: A measurement called the Index of Biotic Integrity is used to rate the health of bottom habitats on a scale of 1 to 5. Each year, 250 random samples are collected throughout the Bay and its tributaries. The goal is for all scores to be at least a 3. In 2008, 42 percent of the area of the Bay and its tidal tributaries met the restoration goals, which is the same as the previous year. Low levels of dissolved oxygen are the primary cause of bottom habitat degradation.

Bottom Habitat



Data and methods: www.chesapeakebay.net/status_bottomhabitat.aspx

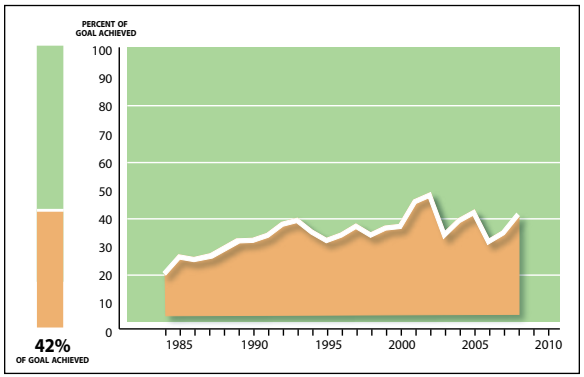


BAY GRASSES

Importance: Underwater bay grasses serve many essential ecological functions and are among the most closely monitored habitats in the Bay. Grasses provide critical shelter to many key species such as young striped bass and blue crabs, improve water clarity by helping sediment settle to the bottom, add oxygen to the water and reduce shoreline erosion. Bay grass abundance is an excellent barometer of the health of the Bay because these grasses depend on good local water quality and provide significant benefits to aquatic life.

Status: The goal is to have 185,000 acres of underwater bay grasses in the Chesapeake Bay by 2010, which represents the documented acreage found from the 1930s until the present. Last year, there were 76,861 acres of bay grasses throughout the Bay, which was 42 percent of the goal and an increase of 11,984 acres from 2007. In 2008, grasses in the Upper Bay covered about 22,954 acres (97 percent of the area's 23,630-acre goal). Middle Bay grasses covered 34,521 acres (30 percent of the 115,229-acre goal for the area), and grasses in the Lower Bay covered 19,386 acres (42 percent of the area's 46,030-acre goal).

Bay Grasses



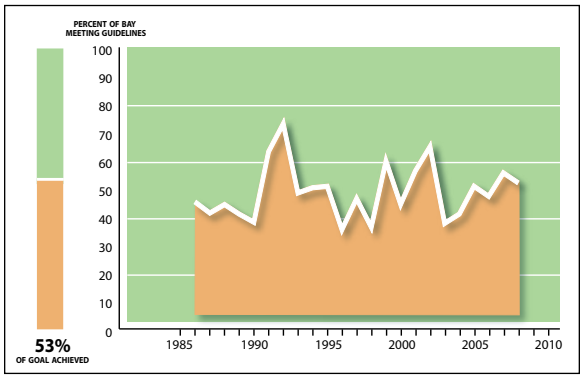
Data and methods: www.chesapeakebay.net/status_baygrasses.aspx

PHYTOPLANKTON

Importance: Algae, or phytoplankton, are especially sensitive to changes in pollution levels, water clarity, temperature and salinity, and therefore serve as an excellent indicator of the health of the Bay's surface waters. While algae also make up the base of the food web in the Bay ecosystem, too much or the wrong type of algae can be detrimental to the overall health of the Bay by decreasing oxygen, blocking sunlight and harming aquatic life. In some cases, algae blooms can negatively impact human health as well.

Status: A measurement called the Index of Biotic Integrity is used to rate the health of phytoplankton on a scale of 1 to 5. Scores are generated using monthly samples taken from 31 stations during the spring and summer. The goal is for all scores to be at least a 3. Last year, 53 percent of the Bay's surface waters met the goal, a decrease of about 3 percent from 2007. Water clarity is currently too poor and pollution levels too high to consistently support healthy phytoplankton communities. Algae blooms are still frequent, harmful algae species are often abundant and algal cells exhibit signs of stress.

Phytoplankton



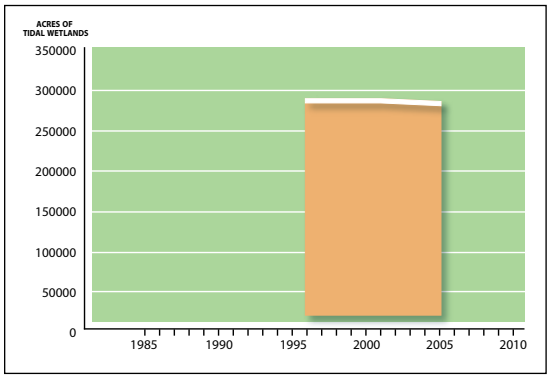
Data and methods: www.chesapeakebay.net/status_phytoplakton.aspx

WETLANDS

Importance: In addition to being places of tremendous beauty, wetlands connect the land to the water. Throughout the Chesapeake Bay, these areas of transition provide unique habitats for a rich diversity of land animals and aquatic life. Wetlands also act as sponges and natural filters by absorbing runoff and removing pollution from water before it enters streams, creeks, rivers and the Bay. But the Chesapeake's wetlands are fragile and threatened by shoreline development, sea level rise and invasive species.

Status: This indicator is used not to track progress toward a goal, but to measure how many acres of tidal wetlands are in the Bay and identify trends. As of 2005, there were approximately 283,946 acres of tidal wetlands. There was a 2,600-acre loss between 1996 and 2005. While the decline is not significant on a baywide scale, certain areas are suffering the losses. For example, at Blackwater National Wildlife Refuge on Maryland's Eastern Shore, scientists have documented losses in wetlands due to sea level rise, land subsidence, coastal erosion and the invasive species nutria.

Wetlands



1984 & 1992 data to be analyzed; expected completion by 2009.
Data and methods: www.chesapeakebay.net/status_tidalwetlands.aspx

FISH AND SHELLFISH

For the Chesapeake Bay to be considered restored, there must be healthy and abundant fish and shellfish. Blue crab, oyster, striped bass, shad and menhaden are some of the Bay's most iconic species. These fish and shellfish are an essential part of the region's commercial fisheries, recreational activities, and cultural and culinary identity. They also play critical roles in the Bay's ecosystem and require clean water, ample aquatic habitat and properly managed fisheries to be healthy and reproduce.

However, the indicators in this section reflect that the Chesapeake's fish and shellfish suffer from polluted water, lack of habitat and disease. They also face other challenges, such as overharvesting pressures and reduced food sources.

Overall, 48 percent of the goals have been met for fish and shellfish.

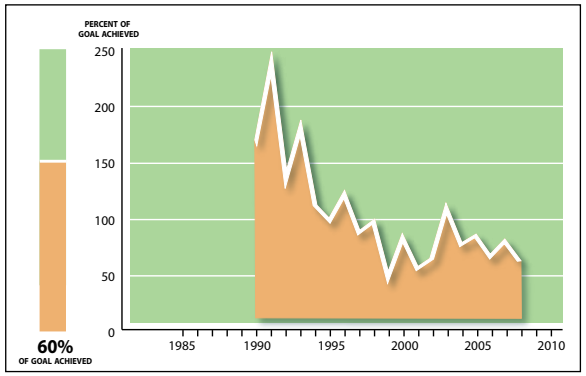
For more, visit www.chesapeakebay.net/fish.aspx and www.chesapeakebay.net/crabsandshellfish.aspx.

BLUE CRAB

Importance: Perhaps no species is more closely associated with the Chesapeake Bay than the blue crab. It is estimated that one-third of the nation's blue crab catch comes from the Bay. Good water quality and adequate habitat, particularly of underwater grasses that provide shelter and food, are essential for the crabs' health and population growth. Harvest restrictions are also required to prevent removal of too large a segment of the population. The species has been impacted by overexploitation, pollution and reduced habitat.

Status: The goal is to have 200 million blue crabs that are at least one year old in the Bay. This abundance of crabs can result in a harvest of 60 million to 65 million pounds each year while still preserving 20 percent of the spawning population. Last year, the population of spawning-age blue crabs in the Bay was 120 million, or 60 percent of the goal. This is a substantial decrease from 143 million in 2007, which was 71 percent of the goal.

Blue Crab Abundance



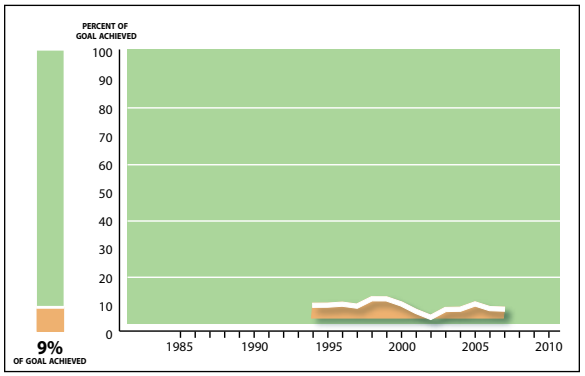
Data and methods: www.chesapeakebay.net/status_bluecrab.aspx

OYSTERS

Importance: Oysters join blue crabs as one of the most valuable species in the Chesapeake Bay. These bivalves have an incredible ability to filter water, which increases water clarity. It has been estimated that at their historic population peak, oysters filtered all of the Bay's water in less than one week – it takes about one year for the current population to do so. Oysters have also constituted one of the Bay's most valuable commercial fisheries for more than a century. But historic overharvesting, pollution and the diseases Dermo and MSX have caused a severe decline in oyster numbers.

Status: The goal is to achieve at least a tenfold increase in native oysters in the Chesapeake Bay by 2010, based on 1994 levels, which would equal 31.6 billion grams of oyster biomass. Based on the most recent data from 2007, there are 2.73 billion grams of oyster biomass, or about 9 percent of the goal. The 2007 level of oyster abundance was not a significant change from 2006 and is near the baywide average of 9.6 percent from 1994–2007.

Oysters Abundance



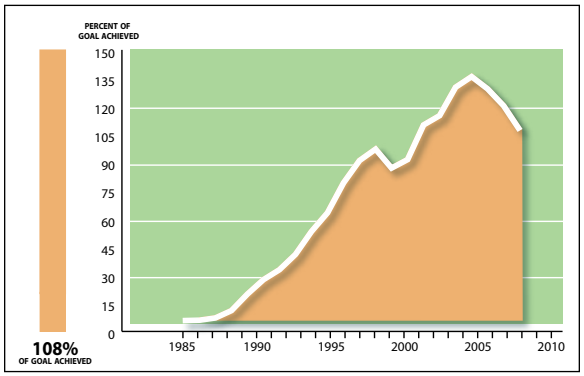
Data and methods: www.chesapeakebay.net/status_oyster.aspx

STRIPED BASS

Importance: The Chesapeake Bay is a primary spawning and nursery habitat for striped bass on the Atlantic Coast. Striped bass support one of the most important commercial and recreational fisheries on the Atlantic seaboard. A fishing moratorium during the late 1980s and commercial quotas and recreational harvest limits set since 1990 have restored the stock. However, scientists are concerned about the high prevalence of disease (mycobacteriosis) in the fish and continue to research the problem. Because striped bass are among the Bay's top predators, scientists are also concerned about whether there is enough prey to adequately support the population.

Status: The goal for a restored population of striped bass is to have a spawning stock biomass equal to the averages from 1960-1971, which is 82.7 million pounds of the females. The goal for striped bass has been met: 89.6 million pounds of spawning stock in 2006 is 108 percent of the goal. This is less than the peak of 113 million pounds in 2003 and a measure of 100.2 million pounds in 2005.

Striped Bass Abundance



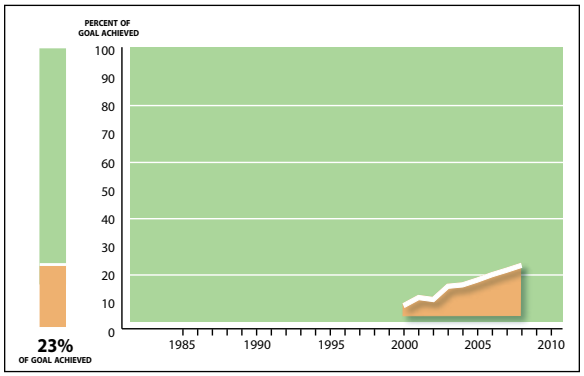
Data and methods: www.chesapeakebay.net/status_stripedbass.aspx

AMERICAN SHAD

Importance: American shad form an important link in the Chesapeake Bay food web. Shad feed on plankton and small fishes. In turn, they are preyed upon by larger fish, including bluefish, weakfish and striped bass. Historically, local economies flourished from the annual shad run in the spring, when the fishes' upriver migration begins. But shad populations were decimated in the 1970s by overfishing, pollution and dams and other blockages that prevent the fish from spawning in upstream habitats.

Status: The goal for American shad is based on an estimate of the spawning shad stock in major river systems, some with fish passage systems in place to bypass existing blockages by dams and other barriers. Based on the most recent data from the James, Potomac, Susquehanna and York rivers, the estimates of baywide shad abundance is 23 percent of goal achieved, which is an increase of almost 2 percent from 2007.

American Shad Abundance



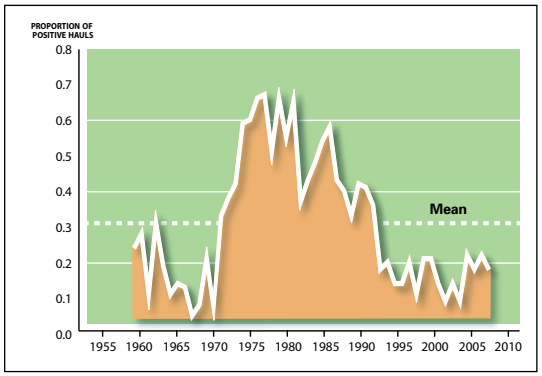
Data and methods: www.chesapeakebay.net/status_shad.aspx

MENHADEN

Importance: Menhaden play a key ecological role in the Chesapeake Bay because they are food for top predators such as striped bass and have a great ability to filter the water. The menhaden fishery is also one of the most productive on the Atlantic Coast, providing fish meal, fish oil and bait. Menhaden that inhabit the Chesapeake Bay are part of a coastal Atlantic stock, and while populations along the Atlantic Coast are healthy, some scientists are worried about low abundance in the Chesapeake.

Status: There is no goal for this indicator because there is no estimate of menhaden population in the Chesapeake Bay. At this time, it is not technically possible to set specific targets or goals. However, researchers track juvenile menhaden abundance by casting nets and recording the number of hauls where menhaden are present. Last year, the proportion of positive hauls was 18 percent, which was a 4 percent decrease from 2007.

Menhaden Abundance



Data and methods: www.chesapeakebay.net/status_menhaden.aspx

HEALTH OF FRESHWATER STREAMS AND RIVERS

Importance: Healthy freshwater streams and rivers have local and regional importance. Clean waterways are a benefit to residents who use them for recreation, drinking water, business and other purposes. The watershed's streams, creeks and rivers also eventually flow into the Chesapeake Bay, so their water quality has a direct impact on the health of the estuary.

An effective way to measure the health of freshwater streams and rivers is to study the many tiny creatures that live in these waters. The abundance and diversity of snails, mussels, insects and other bottom-dwelling organisms – known as benthic macroinvertebrates – are good indicators of the health of streams. Because the communities of these creatures can't move very far and they respond in certain predictable ways to pollution and stresses in the environment, they provide valuable information about the health of the water.

There are many different causes of polluted streams and rivers across the Chesapeake Bay watershed. Benthic macroinvertebrates are generally harmed by pollutants such as metals, acidity, sediment, pesticides, nitrogen and phosphorus. These pollutants come from sources such as mining, agriculture, urban and suburban runoff, automobile and power plant exhaust, and wastewater treatment facilities.

Status: The health of streams varies from very poor to excellent throughout the Bay watershed (see results on the map). Although sampling densities differ, some generalizations about the health of the watershed's streams can be made. For instance, streams tend to be in very poor to fair condition around large urban areas such as metropolitan Washington, D.C. (see map inset). Streams in heavily farmed or mined areas are also often in very poor to fair condition. In contrast, streams tend to be in good to excellent condition in forested areas with ample natural habitat and low levels of pollution, such as in the southwestern Pennsylvania region of the watershed (see map inset).

Overall, the analysis showed that out of 3,291 sampling sites in the watershed, 1,632 were in very poor or poor condition and 1,056 were in good or excellent condition. The results from this indicator will help managers and watershed groups focus their efforts to restore streams in need of improvement and protect the quality of the healthiest streams.

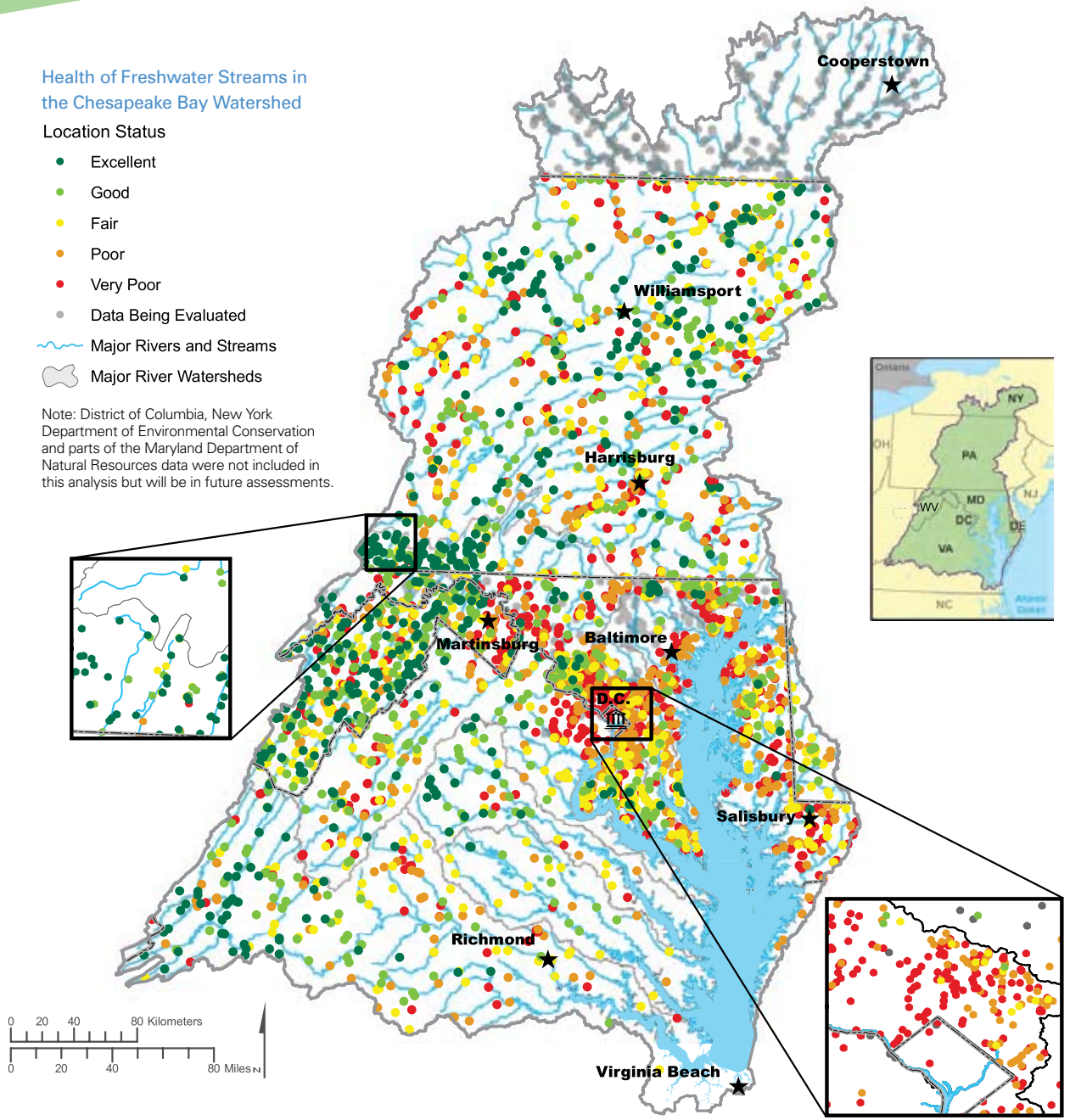
The watershed's streams, creeks and rivers eventually flow into the Bay, so their water quality has a direct impact on the estuary.

Health of Freshwater Streams in the Chesapeake Bay Watershed

Location Status

- Excellent
- Good
- Fair
- Poor
- Very Poor
- Data Being Evaluated
- Major Rivers and Streams
- Major River Watersheds

Note: District of Columbia, New York Department of Environmental Conservation and parts of the Maryland Department of Natural Resources data were not included in this analysis but will be in future assessments.

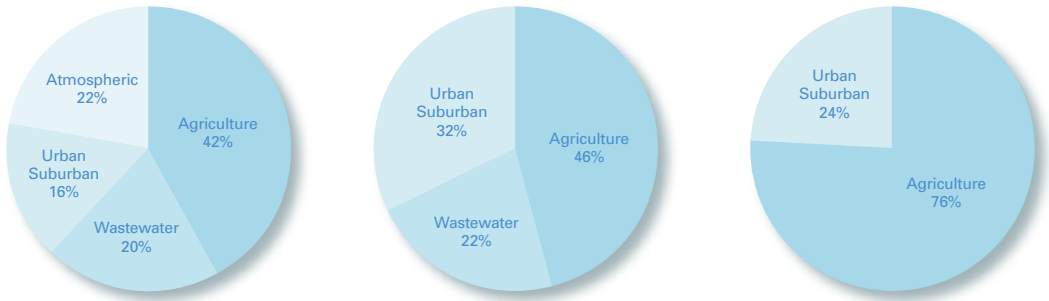


REDUCING POLLUTION

The Chesapeake Bay cannot be restored without water that is clean, clear and rich in oxygen. Currently the Bay and its rivers receive too much pollution for the ecosystem to remain healthy. The primary sources of pollution are agricultural land, wastewater treatment plants, urban and suburban runoff, and air pollution.

The Chesapeake Bay must meet a "pollution diet" to reduce pollution and restore the estuary. The indicators in this section show progress toward putting pollution reduction controls in place. The states in the Chesapeake Bay watershed and the District of Columbia have developed strategies for reducing pollution in their jurisdictions. Progress is measured by using data from monitoring and computer simulations.

Relative Responsibility for Pollution Loads to the Bay

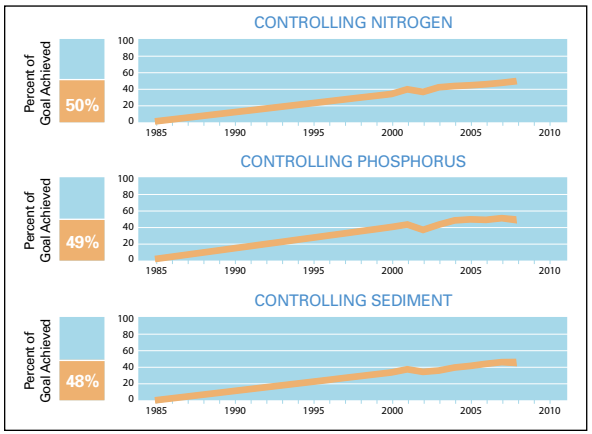


AGRICULTURE

Importance: About 25 percent of the land in the Chesapeake Bay watershed is dedicated to agriculture. While fertilizers, pesticides, manure and tilled soil are beneficial to crops, they become pollutants when water from irrigation and precipitation washes them into local waterways. Chesapeake Bay Program partners are working with farmers to help control pollution from the watershed's 8.5 million acres of farmland. Farmers are utilizing conservation practices such as nutrient management plans, cover crops, vegetative buffers, conservation tillage and animal manure and poultry litter controls.

Status: The partners have achieved 50 percent of the goal for agricultural nitrogen control efforts, a 2 percent increase from 2007. About 49 percent of the goal for agricultural phosphorus control efforts has been met, a 2 percent decline from the previous year. Partners have achieved 48 percent of the goal for sediment pollution control efforts, the same as 2007. These estimates do not account for all of the best management practices installed voluntarily by private landowners without the use of public funds.

Agricultural Pollution Controls



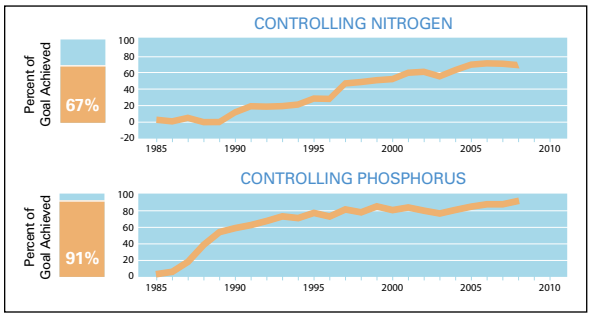
Data and methods: www.chesapeakebay.net/status_agriculture.aspx

WASTEWATER

Importance: There are 483 major wastewater treatment plants in the Chesapeake Bay watershed. Historically, the high amounts of nitrogen and phosphorus discharged by these facilities have degraded local waterways and the Bay. And as the population of the watershed continues to grow, so does the volume of water requiring treatment. Bay jurisdictions have reduced the pollution in wastewater through a new permitting process that requires plants to upgrade the processes and technology they use for treatment.

Status: The partnership has achieved 67 percent of the wastewater nitrogen reduction goal, which is a 2 percent decrease from 2007. Progress toward the wastewater phosphorus reduction goal stands at 91 percent, which is a 4 percent increase from the previous year. These 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.

Wastewater Pollution Controls



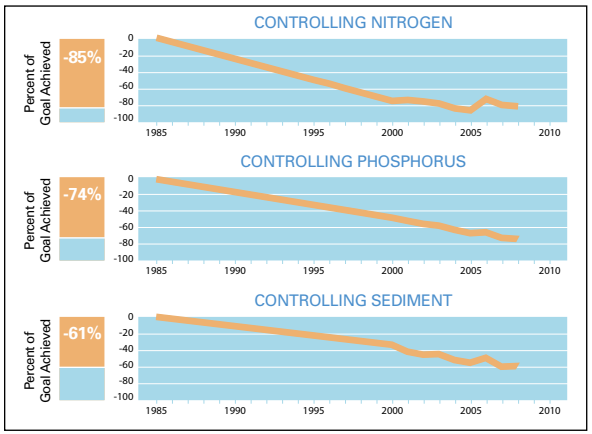
Data and methods: www.chesapeakebay.net/status_wastewater.aspx

URBAN/SUBURBAN LANDS AND SEPTIC SYSTEMS

Importance: When water from storms runs off roads, parking lots, rooftops and other hard surfaces, it carries pollution to local waterways and the Chesapeake Bay. Runoff from urban and suburban land is currently the only source of pollution that is increasing. This is due to continued population growth and related development. To address this problem, state and local governments are strengthening stormwater regulations and working to manage growth in a sustainable way. This includes an emphasis on using green infrastructure in the construction and retrofitting of buildings, including homes.

Status: Population growth and development are offsetting the Chesapeake Bay Program's efforts to reduce pollution from urban and suburban land and septic systems. The increases in population and construction have also surpassed the gains achieved from improved landscape design and stormwater practices. Additionally, it is still challenging to comprehensively account for on-the-ground control practices.

Urban/Suburban Pollution Controls



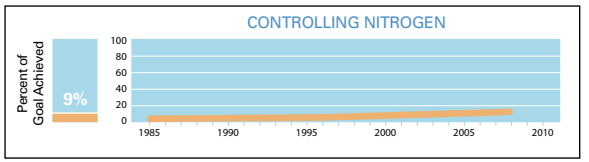
Data and methods: www.chesapeakebay.net/status_urbansuburban.aspx

AIR POLLUTION

Importance: About one-third of the nitrogen that reaches the Chesapeake Bay comes from emissions into the air from automobiles, industries, power plants and similar sources. This pollution eventually falls onto water surfaces and land where it can be washed into waterways. About half of the air pollution comes from outside the Chesapeake Bay watershed, including places such as Ohio, South Carolina and Canada. The partnership is relying on federal and state laws that regulate emissions to significantly reduce airborne nitrogen.

Status: The Chesapeake Bay Program has met 9 percent of the goal for air pollution controls necessary to reduce nitrogen, which is a 1 percent increase from the previous year. While progress in this area is limited, it is expected to accelerate over the next several years as recently approved air pollution control measures take effect.

Air Pollution Controls



Data and methods: www.chesapeakebay.net/status_airpollution.aspx

RESTORING HABITATS

High-quality habitats are required for the overall balance of the Chesapeake Bay ecosystem and the health of fish, crabs, birds and other wildlife. Habitats provide the food, shelter and spawning areas needed for animals to survive. The restoration of habitats throughout the watershed is also beneficial for other reasons, from improving water quality to reducing erosion to increasing recreational opportunities.

Partners of the Chesapeake Bay Program have focused their habitat restoration efforts on four key areas. Planting of underwater grasses is critical because these areas are used by crabs, fish and waterfowl. Work to restore oyster reefs continues since they can provide habitat for communities of fish and bottom-dwelling organisms. Streams and rivers are being reopened to allow migratory fish to swim upstream to spawn and to increase habitat for local fish populations. While wetlands play many vital roles, they are especially valuable places for a diverse array of land and aquatic species.

Overall, the partnership is 55 percent of the way toward its goal for restoring habitats.

For more, visit www.chesapeakebay.net/habitatrestoration.aspx.

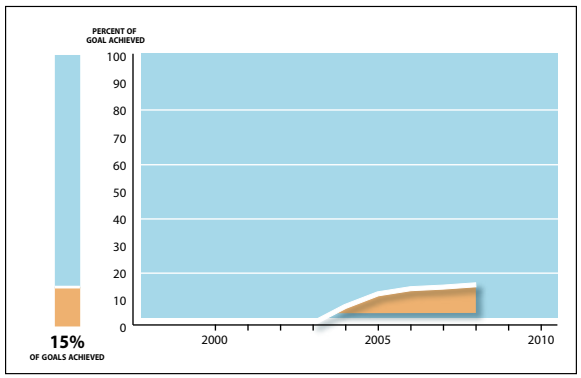
Habitats provide the food, shelter and spawning areas needed for animals to survive.

PLANTING BAY GRASSES

Importance: Underwater bay grasses depend on good water quality to grow and so that grass beds can naturally expand. For this reason, efforts to reduce pollution in the water can have a positive influence on restoring bay grasses. In addition to pollution reduction measures, there are a number of programs to collect seeds and plant bay grasses in the Bay and its tributaries. These plantings are located in areas without bay grasses but where water quality should support growth. These newly established grass beds then produce seeds, allowing for natural revegetation of adjacent areas.

Status: In 2003, Chesapeake Bay Program partners set a goal to plant 1,000 acres by 2008. Last year, 8.5 acres of bay grasses were planted, bringing the total to 148 acres. This represents 15 percent of the goal and a 1 percent increase from 2007. Future plantings are dependent on available funding.

Planting Bay Grasses



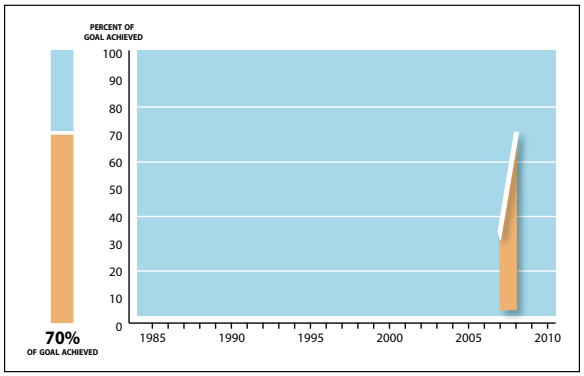
Data and methods: www.chesapeakebay.net/status_baygrassesplanted.aspx

RESTORING OYSTER REEFS

Importance: Restoring oyster reefs throughout the Chesapeake Bay is a primary part of the strategy for increasing the native oyster population. To rebuild reefs, both oyster shells and alternate materials for oysters to grow on are planted in the Bay. Also, oysters are grown in hatcheries and then planted in natural and man-made habitats. Restoring reefs could increase the population of spawning adult oysters and, in turn, larval production. Many of these rebuilt reefs are designated as oyster sanctuaries and protected from harvest.

Status: The Chesapeake Bay Program has a goal of implementing restoration practices on 2,466 acres of oyster bar and reef habitat between 2007 and 2010. Last year, restoration efforts took place on 943 acres. This brings the total acreage to 1,719, or 70 percent of the goal. The success of these habitat restoration techniques has been limited by numerous factors, including disease, poor water quality, habitat degredation and fishing pressure. It should be noted that before this goal was set, a total of 15,648 acres were rehabilitated between 1994 and 2006.

Restoring Oyster Reefs



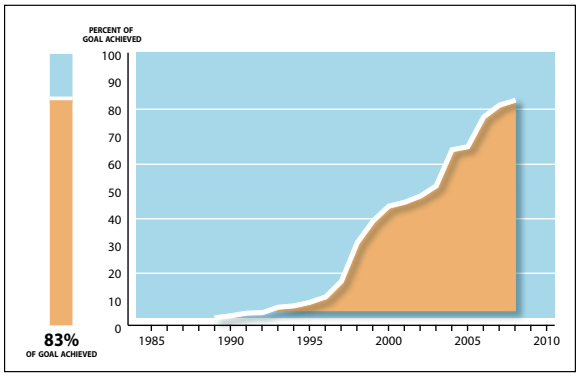
Data and methods: www.chesapeakebay.net/status_oysterrecovery.aspx

REOPENING FISH PASSAGE

Importance: Dams, culverts and other barriers currently block the movement of migratory fish to spawning grounds and reduce the habitat of local fish species in streams, creeks and rivers. Throughout the Chesapeake Bay watershed, these barriers are being removed or new lifts, ladders and passageways are being installed to allow the fish to swim upstream. Priority is given to fish passage restoration projects that open large stretches of habitat, remove dams, enhance the passage of migratory fish and remove impediments in streams that were previously impaired by acid mine drainage. Many of these projects also restore the flow of waterways and reduce the accumulation of sediment.

Status: The Chesapeake Bay Program's fish passage efforts are long-standing and generally successful. From 1988 through 2005, the partners opened 1,838 miles of fish passage, surpassing their original 1,357-mile restoration goal. In early 2005, Chesapeake Bay Program partners committed to increasing the restoration goal to 2,807 miles by 2014. Last year, 51 miles of fish passage were restored. This brings the total to 2,317 miles, or 83 percent of the goal, a 2 percent increase from 2007.

Reopening Fish Passage



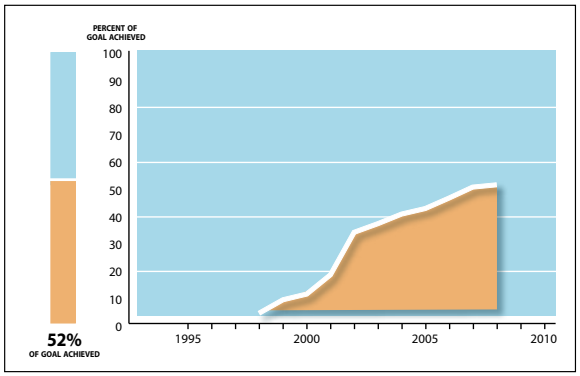
Data and methods: www.chesapeakebay.net/status_fishpassage.aspx

RESTORING WETLANDS

Importance: Because of the many benefits of wetlands – providing habitat, filtering water, preventing erosion – work is ongoing to increase the acreage of these areas. This involves establishing wetlands where they did not exist or reestablishing former wetlands to their natural state. Removing invasive species is also a way to rehabilitate that degraded wetlands. Additionally, these critical habitats are often protected through land purchases or conservation easements.

Status: Chesapeake Bay Program partners have a goal of restoring 25,000 acres of wetlands by 2010. Last year, 472 acres of wetlands were established or reestablished in Maryland, Pennsylvania, Virginia and the District of Columbia. The restored total stands at 13,005 acres, or 52 percent of the goal.

Restoring Wetlands



Data and methods: www.chesapeakebay.net/status_wetlandsrestored.aspx

MANAGING FISHERIES

Importance: The Chesapeake Bay fishing industry holds tremendous commercial, cultural and historical value. Managing the fisheries for blue crabs, oysters, striped bass, shad and menhaden is also critical to restoring and protecting the population of these species and their important place in the ecosystem. To improve fisheries management, the partners of the Chesapeake Bay Program are developing ecosystem-based plans. This type of comprehensive approach involves three components: actions that address a single species, a focus on multispecies interactions and consideration of the entire ecosystem. Improving water quality and restoring habitats are also part of this management approach.

Status: While significant effort went toward improving the management of Chesapeake Bay fisheries this year, very few of these efforts resulted in the implementation of ecosystem-based actions or the completion of new plans.

Overall, the partnership has achieved 51 percent of its goal for developing ecosystem-based management for fisheries.

For more, visit www.chesapeakebay.net/status_managingfisheries.aspx.

OYSTERS

Importance: Managing the oyster fishery requires a multi-pronged approach. Currently, there are minimum size limits, bushel limits, gear restrictions and seasonal and geographical closings. Additionally, sanctuaries are used to protect oysters from harvest and increase the population of spawning adult oysters. Restoration efforts that focus on rebuilding reefs and planting oysters also benefit the fishery. It continues to be challenging to identify the level of harvest that supports the fishery but does not compromise restoration efforts.

Status: The score for oyster fishery management increased by 2 percent, from 37 to 39 percent, because of three actions taken during 2008. First, a Programmatic Environmental Impact Statement that evaluates alternatives for restoring the oyster population was released for public comment. Second, Maryland completed the first year of a pilot study on how best to measure the oyster biomass, which will improve population assessment and management. Finally, development of oyster aquaculture is progressing, which could reduce harvest pressure on wild oysters and provide a viable product for the industry.

ATLANTIC MENHADEN

Importance: Atlantic menhaden have a unique role in the ecosystem as filter feeders and prey for top predators such as striped bass, which requires a multi-species management plan. Menhaden migrate into Chesapeake Bay and are part of a larger stock along the Atlantic Coast. The coastal population is healthy, but there are concerns about declining numbers of young menhaden in the Bay. In response, a five-year cap on commercial harvest within the Bay was put in place in 2006. During this time, a variety of projects will occur.

Status: The score for Atlantic menhaden fishery management did not change. Some research projects were completed but did not lead to any changes to management; other projects are still underway. Additional research is needed, including linking changes in the environment to recruitment and growth, using remote sensing technology to determine menhaden distribution and abundance, understanding larval movement into the Bay from the mid-Atlantic spawning areas, and determining the level of removal of menhaden by predators such as striped bass. A menhaden team was organized to begin developing an ecosystem-based fishery management plan and background briefs will be ready by March 2009.

AMERICAN SHAD

Importance: Overfishing, water pollution and dams that prevented access to spawning areas led to a greatly diminished stock of American shad in the 1970s. This led two states to implement a fishing moratorium: Maryland in 1980 and Virginia in 1994. In addition to the shad fishing moratorium, researchers and managers are currently stocking hatchery-raised fish, removing dams and installing fish passage on key Bay tributaries to restore this species. Catch limits and safe levels of harvest must be developed before the Bay fishery can be reopened. Also, because shad spend much of their lives in coastal Atlantic waters, continued management by the Atlantic States Marine Fisheries Commission is crucial.

Status: The score for American shad fishery management has not changed. However, new coastal management measures are under development. In response to the 2007 coastal stock assessment, the Atlantic States Marine Fisheries Commission is developing biological reference points for managing the stocks, developing stock restoration goals, decreasing and restricting fisheries, and planning to develop new management strategies in 2009.

STRIPED BASS

Importance: The Chesapeake Bay is the primary spawning and nursery habitat for up to 90 percent of the Atlantic Coast's striped bass population. The Bay's fishery for striped bass collapsed during the 1970s and 1980s as the population of this species plummeted. But fishing moratoriums and management led to a rebound and the moratorium was lifted in 1990. Fishery management currently involves monitoring, catch quotas and seasonal closings. Ecosystem-based fisheries management is especially important for striped bass because they are among the Bay's top predators, feeding on Atlantic menhaden. An annual cap on the commercial harvest of menhaden is in place from 2006 to 2010.

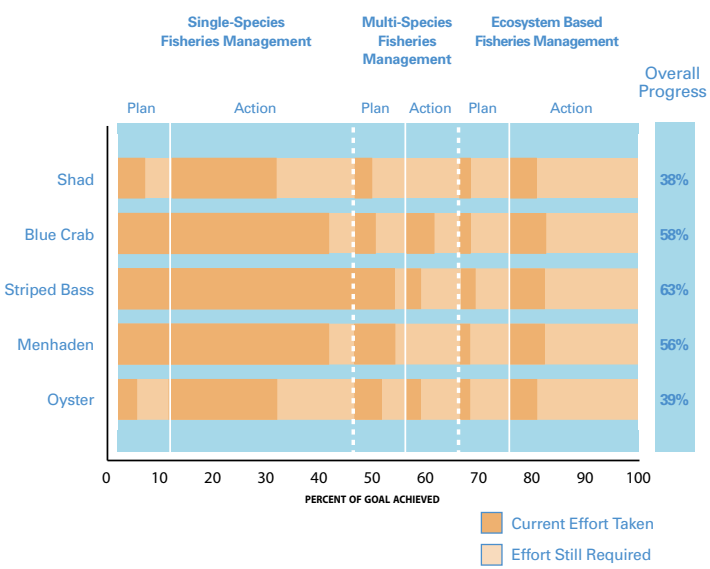
Status: The score for striped bass fishery management did not change. While some important research occurred last year, it has not yet been included into an ecosystem-based fishery management plan. During 2008, biological briefs and background information for such plans were completed. Research continued on the disease mycobacteriosis. Modeling results provided the first evidence of mycobacteriosis-associated mortality in the striped bass population in the Bay. Scientists also identified priority areas for protection and restoration based on the location of striped bass spawning and larval distribution and water quality conditions.

BLUE CRABS

Importance: Blue crabs make up the most valuable commercial fishery in the Chesapeake Bay. To both protect the fishery and restore the spawning stock, the harvest is regulated through a minimum catch size, gear restrictions and seasonal harvest limits. An annual winter dredge survey provides estimates of the percentage of the crab population that is removed by harvest. Additionally, because blue crabs play important roles as both predator and prey, scientists have studied their interactions with striped bass, their predators.

Status: The score for blue crab fishery management increased by 2 percent, from 56 to 58 percent, because of several actions during 2008. Commercial harvest regulations were developed by Maryland and Virginia to reduce the harvest of mature female blue crabs by 34 percent. New Maryland regulations include an early seasonal closure, increased size limits for peeler crabs and commercial catch limits. The recreational fishery was prohibited from harvesting any female crabs. New Virginia regulations include an extended closure of the sanctuary, elimination of the winter dredge fishery, increased size limits for peeler crabs and a gear reduction plan. Also, the commercial blue crab fishery was declared a state of disaster by the U.S. Department of Commerce. Each state will receive $10 million over the next three years for watermen projects such as habitat restoration, fishery monitoring, industry diversification and aquaculture.

Fisheries Management Effort Index



Data and methods: www.chesapeakebay.net/status_fisheriesmanagementindex.aspx

PROTECTING WATERSHEDS

A watershed is an area of land that drains to a particular river, lake, bay or other body of water. Within the Chesapeake Bay watershed, there are tens of thousands of smaller watersheds that drain into local waterways, which all eventually flow into the Bay. Protecting the region's watersheds is critical because what happens on land has a direct impact on the water. This effort is also important because the human population in the Chesapeake Bay watershed is increasing, bringing construction and suburban sprawl. This growth and development reduce natural areas such as forests and wetlands.

To protect watersheds, Chesapeake Bay Program partners continue to plant buffers of trees, bushes and other vegetation along waterways. Efforts also involve permanently preserving land from development throughout the watershed and preventing sprawl through the use of statewide smart growth programs. Management plans are development to guide the protection and restoration of nature in watersheds of all sizes.

Overall, the partnership is 74 percent of the way toward its goals for protecting watersheds.

For more, visit www.chesapeakebay.net/status_protectingwatersheds.aspx.

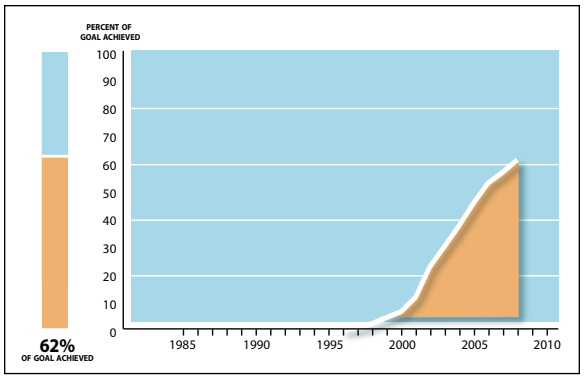
A watershed is an area of land that drains to a particular river, lake, bay or other body of water.

RESTORING FOREST BUFFERS

Importance: Trees, bushes and other plants that line the banks of waterways are called forest buffers. This vegetation provides habitat for wildlife, stabilizes stream banks from erosion and keeps river waters cool, an important factor for many fish. Well-maintained forest buffers also naturally absorb pollution, helping to improve water quality in neighboring streams and rivers as well as downstream. Work is ongoing to plant buffers along thousands of miles of streams, creeks and rivers in the Chesapeake Bay watershed.

Status: Chesapeake Bay Program partners achieved their original 2010 buffer restoration goal of 2,010 miles well ahead of schedule and in 2003 set a new goal to conserve and restore forests along at least 70 percent of all streams and shoreline in the watershed, with a near-term goal of at least 10,000 miles by 2010. From September 2007 to August 2008, about 449 miles of forest buffer was planted for a total of 6,172 miles. This is 62 percent of the goal, a 5 percent increase from last year.

Restoring Forest Buffers



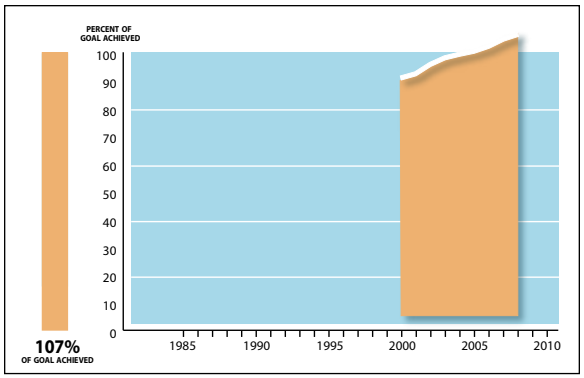
Data and methods: www.chesapeakebay.net/status_forestbuffers.aspx

PRESERVING LANDS

Importance: Land in the watershed is a finite and fragile resource, and what happens on land has an enormous impact on local waterways. Population growth and construction have increased the need to preserve natural places such as forests. Parks, wildlife refuges and other preserved lands provide habitat for animals and filter pollution before it reaches the Bay and its tributaries. Chesapeake Bay Program partners have pursued land preservation by buying property, accepting donations, arranging for easements and purchasing development rights.

Status: Maryland, Pennsylvania, Virginia and the District of Columbia have a commitment to permanently protect from development 20 percent of their combined 34 million acres by 2010. Last year, 115,613 acres were preserved. This brings the total land protected to 7.32 million acres, which surpasses the goal two years before the deadline. Preservation efforts will continue because in December 2007 the Bay states committed to permanently conserve an additional 695,000 acres of forested land throughout the watershed by 2020.

Preserving Lands



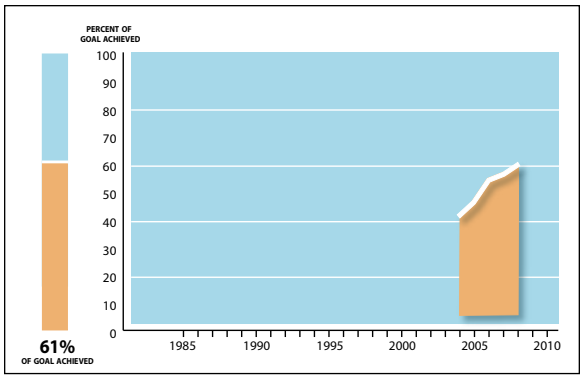
Data and methods: www.chesapeakebay.net/status_landspreserved.aspx

DEVELOPING WATERSHED MANAGEMENT PLANS

Importance: Protecting watersheds is a complicated and challenging task. To successfully protect and restore stream corridors, forest buffers, wetlands, parks and other natural spaces, watershed management plans are needed. These strategic guides preserve not only watershed health, but also the quality of life in communities. For management plans to be acceptable, they must address conservation of natural areas, aim to improve habitat and water quality, have the necessary tools and resources, and garner local support.

Status: The Chesapeake Bay Program has a goal of developing and implementing watershed management plans for two-thirds of the 34 million acres in Maryland, Pennsylvania, Virginia and the District of Columbia. Last year, watershed plans were added for 827,204 acres in these jurisdictions, bringing the total to 13.9 million acres. This represents 61 percent of the goal, which is a 4 percent increase from 2007.

Developing Watershed Management Plans



Data and methods: www.chesapeakebay.net/status_watershedmanagement.aspx

FOSTERING STEWARDSHIP

For the Chesapeake Bay to be restored and protected, the region's citizens, communities and other stakeholders must be actively involved. Fostering stewardship of the Bay and its watershed is a top priority for Chesapeake Bay Program partners. Public access is vital to building personal connections to nature. There are also various communication and outreach programs underway to provide information that engages people in the restoration effort. Environmental education opportunities for students and teachers are another area of emphasis. The ultimate measure of stewardship, however, is citizen and community action.

The indicators in this section reflect steady progress in providing public access and enhancing environmental education. But programs to increase the number of communities and businesses engaged in restoration have stalled. At the same time, a new project to measure citizen action has been launched.

Overall, the partnership is 65 percent of the way to its goal for fostering stewardship.

For more, visit www.chesapeakebay.net/stewardshipanded.aspx.

COMMUNICATIONS AND OUTREACH

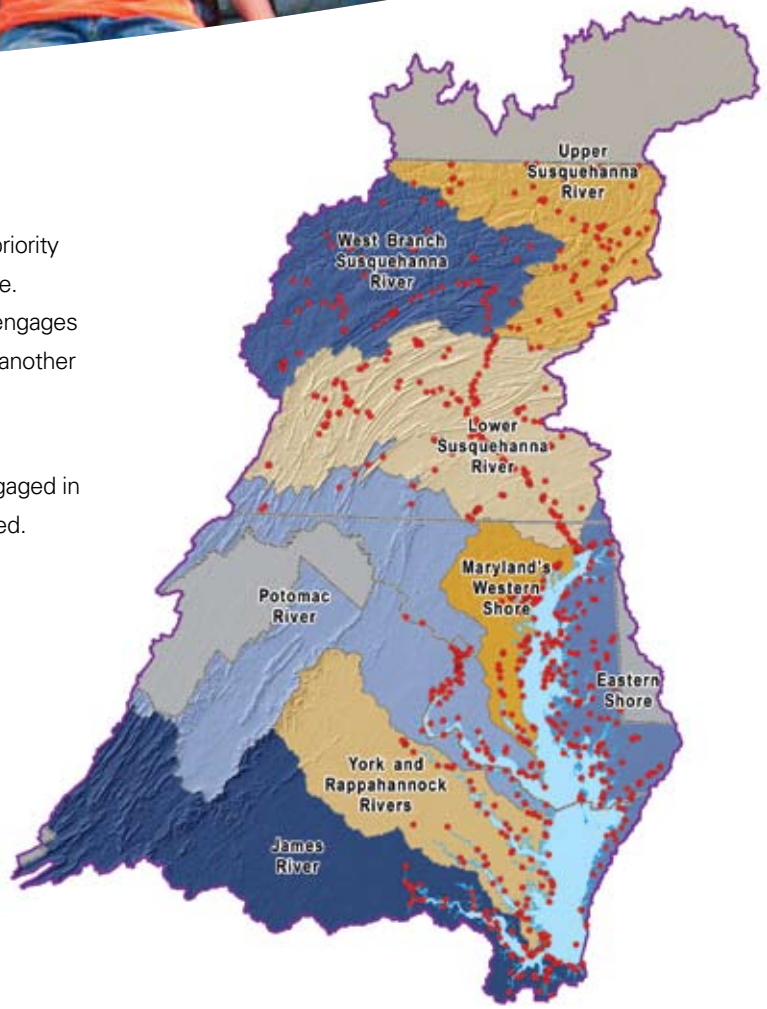
Sharing the most current information about the health of the Chesapeake Bay and restoration work is an important part of fostering stewardship. Partners of the Chesapeake Bay Program believe that knowledge empowers citizens and enables them to help protect nature. There are many ways the Chesapeake Bay Program communicates with the public, including its website, email updates and a new blog. Outreach efforts are also ongoing and involve giving public presentations, participating in environmental events and conferences, and distributing news releases and publications. Members of the public are encouraged to sign up to receive regular updates and to visit the websites often for the latest news.

Bay News: This daily email provides links to media coverage from around the watershed. To sign up, visit www.chesapeakebay.net/thebayinthenews.aspx.

Chesapeake Currents: This monthly e-newsletter contains the Bay Program's news on health and restoration. To sign up, visit www.chesapeakebay.net/enewsletter.aspx.

Bay Blog: This new blog features the firsthand perspectives of Bay Program staff. Visit blog.chesapeakebay.net.

Bay Journal: This free monthly newspaper reaches more than 50,000 subscribers. Visit www.bayjournal.com.



● Public Access Location

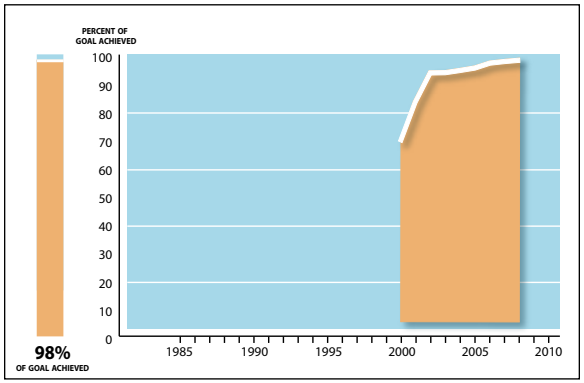
PUBLIC ACCESS

Importance: For people to deeply value the Chesapeake Bay and the thousands of streams, creeks and rivers that flow into it, they need access to nature throughout the watershed. This allows people to enjoy activities such as fishing, swimming, kayaking, hiking and picnicking, which creates a personal connection with nature and builds public support for restoration efforts. Program partners continue to increase and improve access in an environmentally sensitive manner through the Chesapeake Bay Gateways Network, water trails and the Captain John Smith Chesapeake National Historic Trail.

For more information and a map of public access locations, visit www.chesapeakebay.net/publicaccess.aspx.

Status: There are multiple goals within the larger public access goal. These include expanding by 30 percent the system of public access points to the Bay, its tributaries and related sites; developing partnerships with at least 30 sites to enhance interpretation of Bay-related resources and stimulate volunteering; and increasing designated water trails in the Bay region by 500 miles. Last year, 11 public access sites were acquired, developed or enhanced, bringing the total to 754. Six new Gateways sites were added, raising the total to 161. About 23 miles of water trails were developed, for a total of 2,184 miles. With these additions, the partnership has reached 98 percent of its public access goal.

Public Access



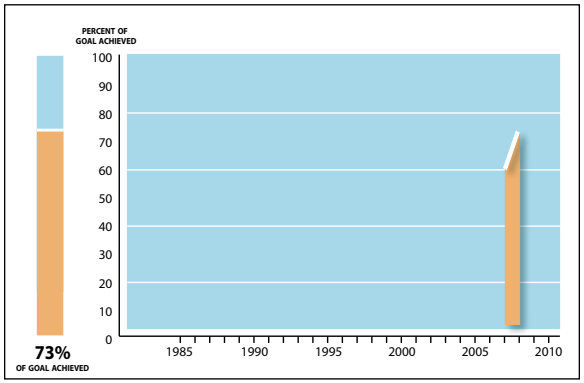
Data and methods: www.chesapeakebay.net/status_publicaccess.aspx

EDUCATION AND INTERPRETATION

Importance: Perhaps the best way to foster stewardship of the Chesapeake Bay is through education, especially for the millions of children who live in the watershed. The long-term health of the environment will depend on their interest and ability to protect nature. Chesapeake Bay Program partners continue to promote environmental education in classrooms at elementary, middle and high schools, with a focus on providing a Meaningful Watershed Educational Experience (MWEE) for all students before they graduate. Partners also provide lifelong learning opportunities for citizens of all ages, with information and interpretation at a multitude of locations in the region.

Status: In 2000, the partnership set a goal to provide a MWEE for every student in the watershed before graduation from high school. In 2008, the partnership increased the number of experiences provided for student to three, which will mean a MWEE in elementary, middle and high school. About 73 percent of the goal was achieved during the 2007-2008 school year. Also, since 2002 the NOAA Bay Watershed Education and Training Program (B-WET) grant program has funded MWEEs for more than 150,000 students and training opportunities for more than 15,000 teachers.

Education and Interpretation



Data and methods: www.chesapeakebay.net/status_education.aspx

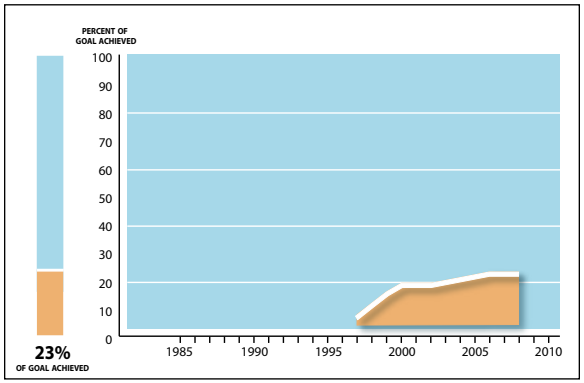
CITIZEN AND COMMUNITY ACTION

Importance: The Chesapeake Bay and its watershed will never be restored and protected without the action of its 17 million residents and the involvement of local government. That many people can surely have a tremendous impact if they are actively involved in the cleanup. A top priority for the Chesapeake Bay Program is encouraging the public to participate in activities that are positive for nature, including at home, at work and in the community. It is also important for towns and cities to put measures in place that create clean water.

Status: For community action, the partnership has a goal of establishing 330 local governments, or 20 percent of those in the watershed, as Bay Partner Communities. These are towns and cities that are implementing Bay-friendly measures. To date, 77 local governments have been awarded Bay Partner Community status, which is 23 percent of the goal. However, the program is no longer funded.

To measure citizen action, the first Chesapeake Volunteer Count was launched. This effort asked watershed organizations to report the number of volunteers for the year. Based on preliminary data collected from 73 Chesapeake Bay watershed organizations, 50,590 volunteers participated in restoration activities in 2008. The majority of the organizations reported that volunteerism rates remained the same or increased from 2007.

Citizen and Community Action



Data and methods: www.chesapeakebay.net/status_citizenaction.aspx

RESTORATION HIGHLIGHTS

At the 2007 Chesapeake Executive Council meeting, members selected topics critical to restoration to be their "champion roles." Chesapeake Bay Program partners have since made significant progress on issues such as promotion of low-impact development, support of agricultural conservation practices and improvement of wastewater treatment. The partnership will continue to take this type of targeted action on vital issues in 2009.

ACCOUNTABILITY – MARYLAND

Through the BayStat program, Maryland has secured and will award annual funding to address non-point-source pollution; appointed a scientific advisory panel; strengthened its Critical Area Program, including provisions to significantly change how coastal shorelines are stabilized; doubled annual cover crop enrollment to 400,000 acres; and targeted Program Open Space for priority conservation areas.

AGRICULTURE CONSERVATION PRACTICES – VIRGINIA

Virginia has allocated $20 million for agricultural best management practices in the commonwealth, the largest amount ever appropriated in the history of Virginia's agricultural best management practice cost-share program.

BLUE PLAINS – CHESAPEAKE BAY COMMISSION

The Chesapeake Bay Commission met with members of Congress to advocate for more federal support to upgrade the Blue Plains wastewater facility and helped arrange congressional tours and briefings on Blue Plains. These efforts resulted in congressional hearings in May, and the House and Senate appropriated $14 million and $16 million, respectively, for combined sewer overflow (CSO) upgrades.

BLUE CRAB RESTORATION – MARYLAND, VIRGINIA

To rebuild the blue crab population, Maryland and Virginia agreed to implement new bistate regulations to reduce the harvest of female crabs in the Chesapeake Bay by at least 34 percent. The two states have agreed to keep crab exploitation at a target level of 46 percent to provide a buffer against overfishing in the future.

BIOFUELS – PENNSYLVANIA, CHESAPEAKE BAY COMMISSION

Together, Pennsylvania and the Chesapeake Bay Commission convened a 22-member Biofuels Advisory Panel that met throughout the year, culminating with the release of the Next-Generation Biofuels report at the Chesapeake Bay Biofuels Summit in Harrisburg, Pennsylvania, in September. Each state has developed a State Action Plan.

CARBON SEQUESTRATION – DELAWARE

Delaware hosted a symposium entitled "Carbon Sequestration on Farm and Forest Lands: How to Make Trading/Offset Programs Work in the Chesapeake Bay Region." The symposium educated agency staff about carbon sequestration opportunities, identified necessary elements of offset and trading programs, and analyzed the water quality benefits of agriculturally based carbon offset projects.

CHESAPEAKE ACTION PLAN – EPA AND PARTNERS

The Chesapeake Action Plan (CAP), described in a report to Congress submitted by the EPA on behalf of the Chesapeake Bay Program in July, will strengthen and expand partnerships in the watershed, enhance coordination of restoration activities and improve accountability and transparency in protecting the Bay. The tools contained in the CAP – the strategic framework, dashboards, detailed activity database and adaptive management system – will help the Chesapeake Bay Program become more efficient, strategic, effective and accountable in meeting its goals.

CONOWINGO DAM/RESERVOIR – PENNSYLVANIA

To better understand the movement of sediments trapped behind Conowingo Dam on the Susquehanna River, Pennsylvania and the U.S. Geological Survey are conducting studies of the rate of sediment accumulation. The results will be available in 2009.

ENGAGING LOCAL GOVERNMENTS – MARYLAND

Through local implementation grants that are part of the Chesapeake and Atlantic Coastal Bays 2010 Trust Fund, Maryland has provided restoration funding directly to local communities in the state. To support local implementation, Maryland developed a new service to connect local governments with resources that help them accomplish their restoration goals.

ENGAGING LOCAL GOVERNMENTS ON STORMWATER – WEST VIRGINIA

To learn how to develop communication tools to engage local communities, two staff members and three stakeholders from West Virginia participated in a local government training session in July. West Virginia also organized a half-day stormwater workshop that was attended by 61 local stakeholders, planners and engineers.

GREEN INFRASTRUCTURE – DISTRICT OF COLUMBIA

To help manage growth and reduce polluted runoff, the District of Columbia implemented one of the strongest, most innovative stormwater permits in the nation, launched the RiverSmart Homes program to better manage stormwater in residential areas, developed an aggressive Anacostia Restoration Plan, and spent more than $1 million on low-impact development (LID) projects, such as green roofs.

FARM BILL – CHESAPEAKE BAY COMMISSION

With the passage of the 2008 Farm Bill, the Chesapeake Bay watershed was singled out to receive an additional $188 million for conservation programs, more than double the current funding level. Additionally, there is a potential $250 million for the Chesapeake watershed through national programs in which Bay region farmers already participate.

FOREST CONSERVATION – U.S. FOREST SERVICE

Most partners that signed the 2007 Forestry Conservation Initiative are on track to meet their 2012 forest protection goals. The Forest Service hosted a Forest Conservation Summit in May, bringing together Bay watershed foresters, land trusts and local governments for the first time. Progress is being made to develop ecosystem markets such as the Bay Bank and establish a revolving loan fund for forestland owners who do not want to sell to developers.

LOW-IMPACT DEVELOPMENT – U.S. NAVY

To help reduce polluted runoff to the Chesapeake Bay and its rivers, the U.S. Navy is evaluating the most effective low-impact development techniques to incorporate into all large development and redevelopment projects at Navy bases in the Chesapeake Bay watershed. U.S. Navy personnel are also fostering awareness about low-impact development on Navy bases.

INNOVATIVE TECHNOLOGY FUND – MARYLAND, U.S. ENVIRONMENTAL PROTECTION AGENCY

The state of Maryland and the EPA have partnered with the University of Maryland to develop an innovative program that promotes investment in new research and technologies that address water quality problems and accelerate Bay restoration. The EPA has provided funding to the university's Maryland Industrial Partnerships Program, and the state has partnered with MTECH Ventures to create a seed capital fund.

RESTORATION FUNDING – U.S. ENVIRONMENTAL PROTECTION AGENCY

The National Fish and Wildlife Foundation (NFWF) issued a request for pre-proposals for large-scale restoration projects that use innovative, sustainable and cost-effective approaches to accelerate the reduction of nutrients and sediments in targeted Chesapeake Bay sub-watersheds. Funding for these projects comes from the EPA Chesapeake Bay Program Office.

WETLANDS RESTORATION – NEW YORK

To expand a successful wetlands restoration program in New York, the Upper Susquehanna Coalition established a 501(c)(3) wetland trust to supplement grants and leverage funds, restored 175 acres of non-tidal wetlands designed to maximize ecosystem functionality, and conducted hands-on training on successful wetland design criteria.


1
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4

The effort to restore the Chesapeake Bay will never be successful without help from the watershed's 17 million residents. Everyone lives near a creek, stream, river or the Bay, and everything done on land has an impact in the nearby waterways. These simple actions can help create clean water and a healthy Chesapeake Bay.

For more details and more ways to help, visit www.chesapeakebay.net/helpthebay.aspx.

1 Pick up after your pet

It's a dirty job, but picking up after your pet makes a big difference in keeping waterways clean. Pet waste contains nitrogen, phosphorus and bacteria, which are harmful pollutants. So always pick up after pets, whether at the park, on a sidewalk or in the backyard.

2 Volunteer for a watershed group

Watershed groups work to protect the streams, creeks and rivers that flow to the Bay. These groups perform much of the restoration work around the region, but they rely on volunteers. To find your local watershed group, visit www.chesapeakebay.net/findabaygroup.aspx.

3 Don't fertilize your lawn

We all want a green, healthy lawn. But chemical fertilizers are a major source of pollution in local streams, rivers and the Bay. When rain washes fertilizers off thousands of suburban lawns in the region, the Bay receives too much nitrogen and phosphorus.

4 Install a rain barrel and rain garden

Rain barrels attach to downspouts and collect rainwater that would otherwise flow onto your lawn, driveway or street and carry pollutants. The collected water can then be used for gardens and houseplants, saving money on water bills. For more impact, add a rain garden – a depression with many plants that absorbs and filters runoff. See designs at www.lowimpactdevelopment.org/raingarden_design.

5 Use a phosphorus-free dishwasher detergent

Check the label on your dishwasher detergent – most contain phosphorus, a type of nutrient that pollutes the Bay. Switching to a phosphorus-free dishwasher detergent is an effective way to reduce the pollution.

6 Drive your car less

Yes, we're all attached to our cars for travel. But emissions from vehicles are a significant source of nitrogen pollution in waterways and the Bay. If all of us reduced our driving, we'd see positive changes in the Bay.

7 Plant native trees and shrubs

Trees and shrubs planted around the edges of your property absorb runoff, filtering out pollutants that would flow to streams or storm drains. These plants also help prevent erosion, absorb airborne pollutants, buffer noise and provide food and habitat for wildlife. Choose native plants at www.nps.gov/plants/pubs/Chesapeake/toc.htm.

www.chesapeakebay.net

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