A Draft Report to the Citizens of the Bay Region

For Public Review and Comments

www.chesapeakebay.net/assess

Chesapeake Bay Program
A Watershed Partnership

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March 2006

Chesapeake Bay 2005 Health and Restoration Assessment

Part Two: Restoration Efforts

Bay states and the federal government have developed partnerships and science-based plans to improve the waters, habitats and fisheries of the Chesapeake. On-the-ground efforts are taking place throughout the 64,000-square-mile watershed and new initiatives are being implemented to accelerate progress. As *Part One: Ecosystem Health* makes clear, however, a great deal of work remains in our collective effort to restore the Bay.

Chesapeake Bay Program
A Watershed Partnership

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

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

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

Chesapeake Bay Program
410 Severn Avenue, Suite 109
Annapolis, MD 21403
(800) YOUR BAY
www.chesapeakebay.net

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Restoration Summary

Restoration of a complex ecosystem requires a multi-pronged approach. The Chesapeake Bay Program has divided its restoration efforts into five broad areas.

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

Restoring Habitats work is being measured against a series of goals established by the Program. Most of the goals have a 2010 deadline. Overall, habitat restoration efforts are collectively about 40% toward their goals and steady progress is occurring in several goal areas.

Managing Fisheries focuses on changing from a traditional management approach that looks solely at a key species (single species) to one that recognizes interactions between species (multi-species) and environmental stressors such as low dissolved oxygen levels (ecosystem based). Progress toward this goal ranges from 40-67% for five key Bay fisheries. NOTE: this index does not gauge the health of fisheries, which is covered in *Part One: Ecosystem Health.*

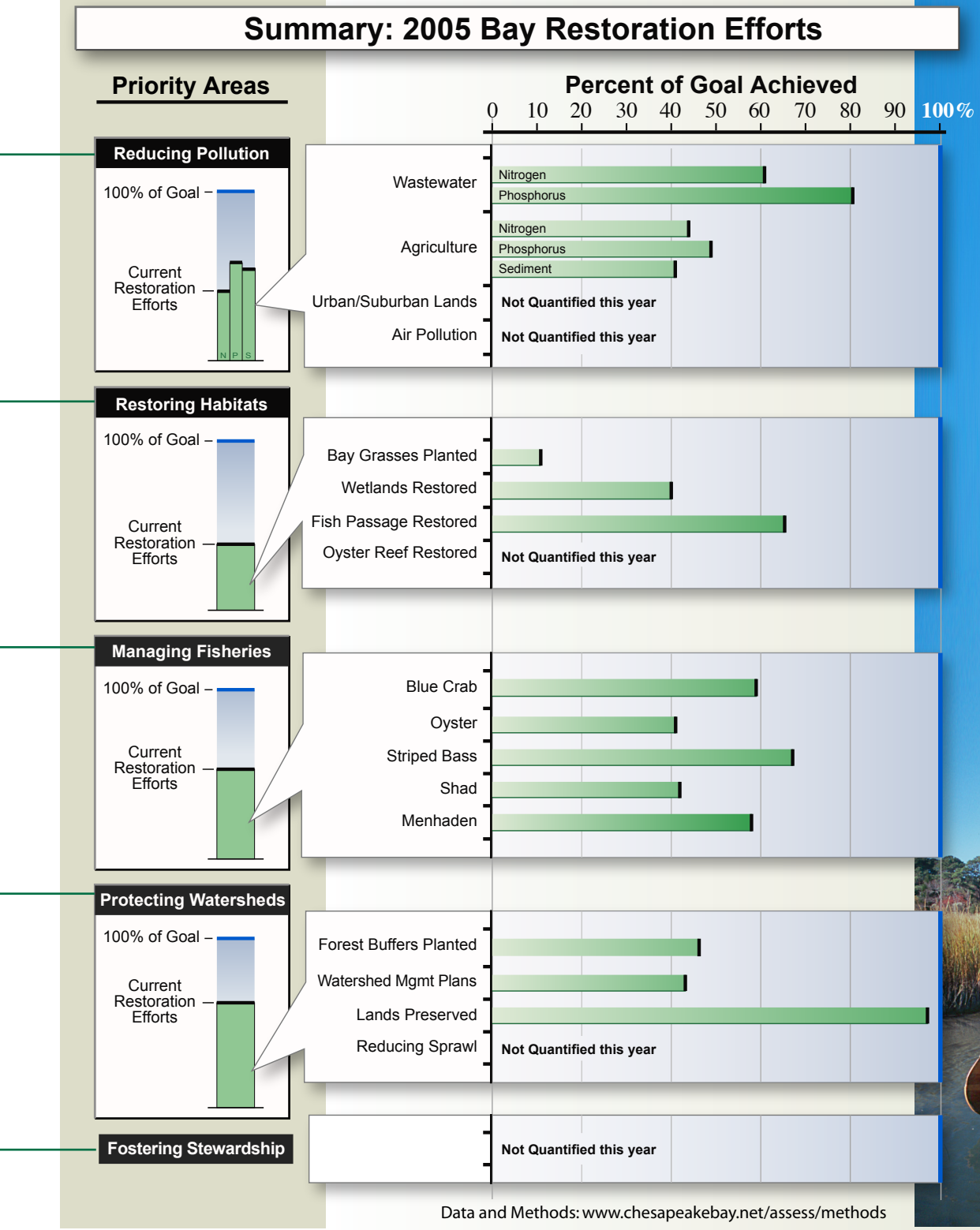
Protecting Watersheds efforts are also measured against Program goals. Many of these efforts help slow the rate of new pollution associated with population increases in the watershed as well as reduce current pollution levels. Overall, watershed protection efforts show good progress, but the critical measure of reducing harmful sprawl has not been quantified for this year's report.

Fostering Stewardship efforts range from formal outdoor environmental education experiences for school-age children to informal adult learning opportunities. While critical to the eventual success of the restoration effort, this priority area has not been quantified this year.

About This Report

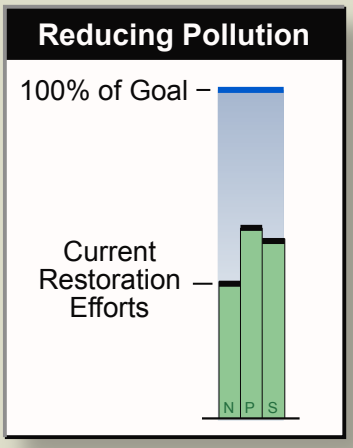
The Chesapeake Bay 2005 Health and Restoration Assessment is presented in two parts. *Part Two: Restoration Efforts* is divided into five sections. In Reducing Pollution, efforts are compared to goals defined by the Bay states' river-specific cleanup plans. Monitoring data, tracking information, and computer simulations are used in this section. In the remaining parts, restoration efforts are compared to goals adopted by the Bay Program. Monitoring and tracking data are used in these sections.

Summary: 2005 Bay Restoration Efforts



Most summary graphs are calculated by averaging the "percent of goal achieved" for each measure within the priority area. For Reducing Pollution, all data are used in developing the summary chart even though the Urban/Suburban Land and Air Pollution sections could not be reported individually this year. Expanded analysis and interpretation of data as well as the methods used to compile the graphs can be found at **www.chesapeakebay.net/assess/methods.**

The public may comment on this report through May 31, 2006 by visiting www.chesapeakebay.net/assess. An independent science panel also will review this report. Recommendations will be incorporated into future efforts.



Clear, oxygen-rich waters are the foundation of the Chesapeake Bay restoration. The Bay and its rivers are currently receiving one and a half times the nutrients and sediments that a healthy ecosystem can handle.

Moderate progress has been made in installing pollution control equipment at wastewater treatment plants, with somewhat lower achievement levels in putting pollution reduction practices on agricultural lands. Future reports will also depict summary measures of management efforts to control stormwater pollution washing off urban and suburban lands, as well as from air pollution sources.

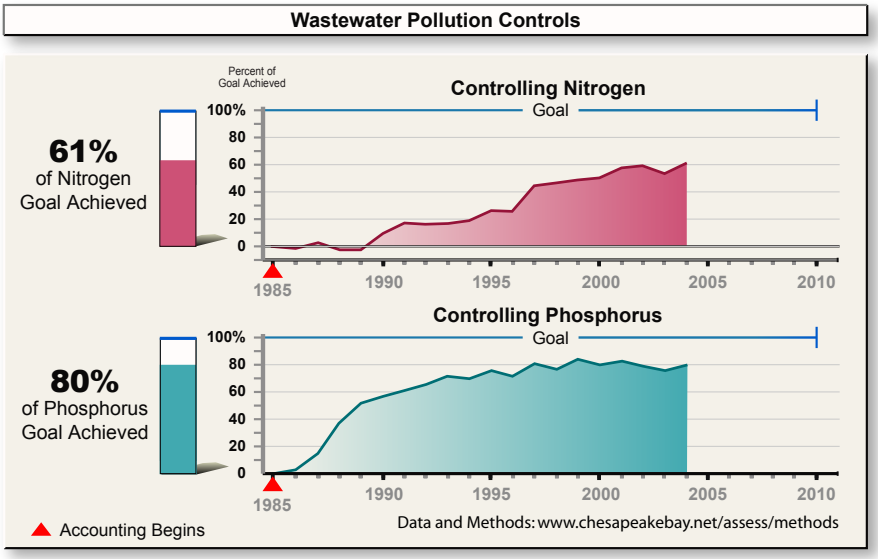
From 1995-2004 state and federal government partners invested $2.5 billion in their efforts to cut nutrient and sediment pollution into the Bay and its tributaries.

Reducing Pollution

Wastewater

Decreases in the amount of nutrients discharged from wastewater treatment plants account for a large portion of the estimated nutrient reductions in the watershed to date.

As the region's population continues to grow (an estimated 100,000 people annually in the 1990s), the volume of waste requiring treatment grows. In 2005 the Bay states and the District of Columbia began putting into place a new regulatory program that requires hundreds of wastewater treatment plants to install a new generation of nutrient reduction technology equipment. Bay jurisdictions are relying on future reductions from wastewater treatment plants for achieving about 20 percent of their nutrient reduction goals. Since 1985 the partners have achieved three-fifths of their wastewater nitrogen reduction goal and four-fifths of their wastewater phosphorus reduction goal.



Air Pollution

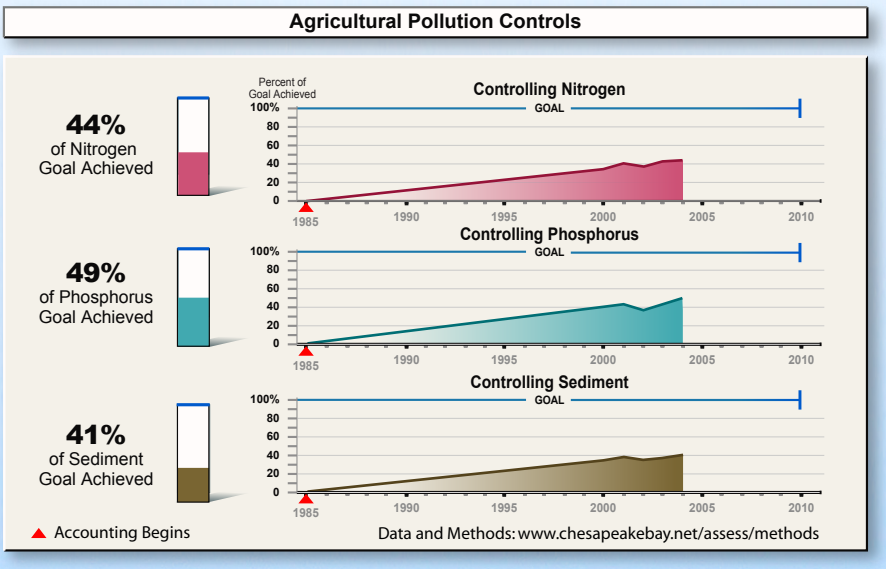
Scientists estimate that one-quarter to one-third of the nitrogen reaching the Bay and its rivers comes through the air. Pollutants are emitted into the air primarily from power plants, automobiles, agriculture and other industries. These pollutants eventually fall onto water surfaces and the land where they can be washed into local waterways.

Federal and state air pollution control programs are being relied upon to reduce airborne nitrogen emissions significantly by 2010. Techniques to track these reductions are still under development and are not reported in the Reducing Pollution section this year.

Agriculture

The agricultural community is using dozens of different types of "best management practices" to reduce the amount of pollution reaching local waters and the Bay. Computer simulations and water monitoring data indicate that these nutrient and sediment reduction efforts have been effective. Since 1985 the partners have achieved about two-fifths of their agricultural nitrogen reduction goal and about half of their agricultural phosphorus reduction goal.

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

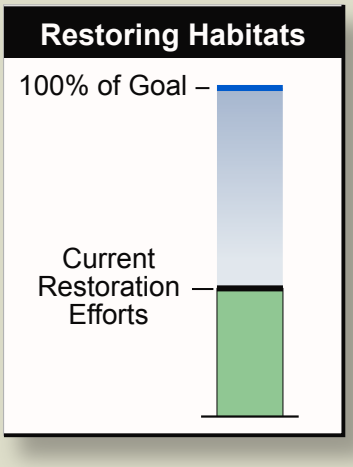


Urban/Suburban Lands and Septic Systems

Stormwater that runs across roads, rooftops and other hardened surfaces carries harmful pollution to local streams and into the Chesapeake. The rapid rate of residential and commercial development has made stormwater the fastest growing segment of pollution in the Bay watershed. About a quarter of the nutrient reductions called for in the states' cleanup plans are expected to come from efforts to treat pollution from urban/suburban lands and septic systems.

"Green infrastructure" is used to naturally filter polluted water before it reaches local streams. These practices include rain gardens, green roofs, and buffer strips, and they can be relatively cost-effective. Repairing and upgrading stormwater sewer systems, on the other hand, is extremely expensive. Installing nitrogen-removing septic systems is also much cheaper at the time of construction than upgrading them later. Preventing pollution is more effective and less expensive than efforts to correct stormwater problems. Some prevention efforts are tracked in the Protecting Watersheds section, pages 9-10.

Current tracking of these various efforts is not uniform throughout the Bay watershed and is not included in this year's report.



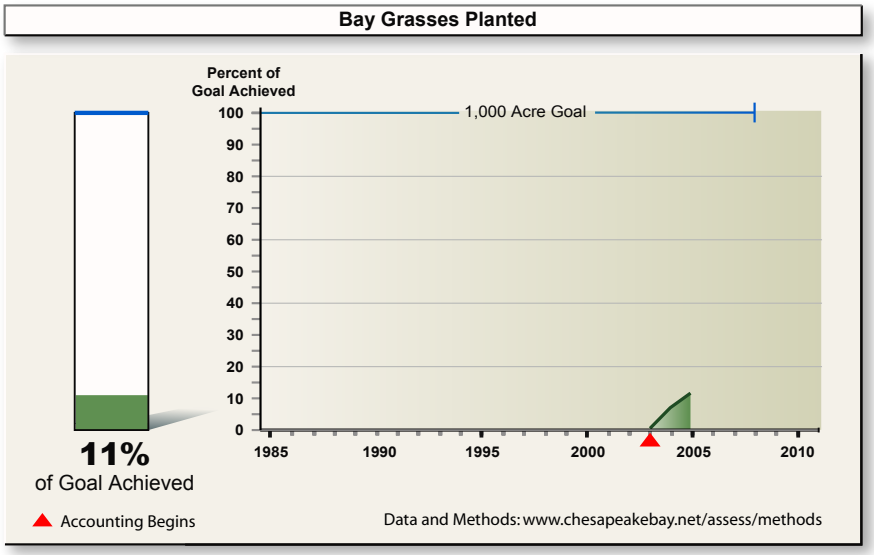
Restoring high-quality habitat is critical to bringing this ecosystem back into balance. Habitats provide access to food, shelter, and safe areas to raise young. Restoration efforts have focused on increasing four habitat types. A multi-agency effort to plant underwater grasses has seen little early success, but the Program's fish passage efforts are both long-standing and generally successful. Restoring wetlands is a major focus area, and the partners agreed to expand their goal in this area in 2005. Oyster reefs were once a vital habitat for entire underwater communities. Efforts to rebuild reefs are underway, but not quantified this year.

From 1995-2004 state and federal governments invested a combined $700 million in efforts to protect and restore vital habitats in the Bay watershed.

Restoring Habitats

Planting Underwater Grasses

Restoring underwater Bay grasses relies overwhelmingly on improving water quality. Bay managers have begun to supplement pollution reduction efforts with experimental aquatic grass plantings. These new meadows, if successful, will provide seed sources to produce stronger and larger grass beds as water quality improves. In the first two years of this effort, Bay Program partners have planted about one-tenth of their initial goal of 1,000 acres by 2008.



Underwater grasses provide critical habitat to key Bay species such as striped bass and blue crabs, filter pollution, increase dissolved oxygen levels and improve water clarity.

Restoring Oyster Reefs

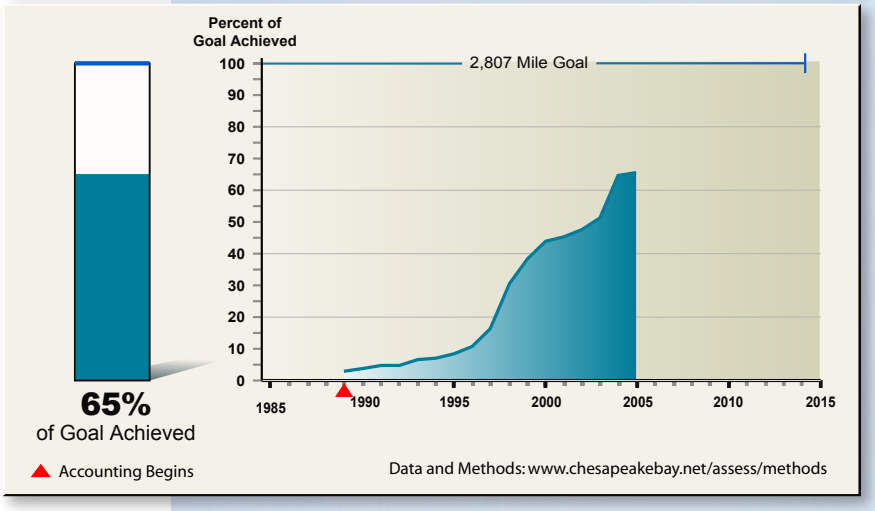
Oyster reefs were once an essential component of the Bay ecosystem, providing healthy habitat for other bottom-dwelling organisms as well as schools of fish. Reef restoration efforts include cleaning and "planting" old oyster shells, developing disease-resistant strains of native oysters, and placing baby oysters on the restored or newly built reef. These habitat restoration efforts have been limited by a number of factors including disease and the lack of suitable hard bottom surfaces to plant the reefs.

Partners in oyster reef restoration are currently developing a scientifically sound method for quantifying their efforts. For more on the status of oysters, please see the *Part One: Ecosystem Health*.

Reopening Fish Passage

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

Opening Rivers to Migratory Fish

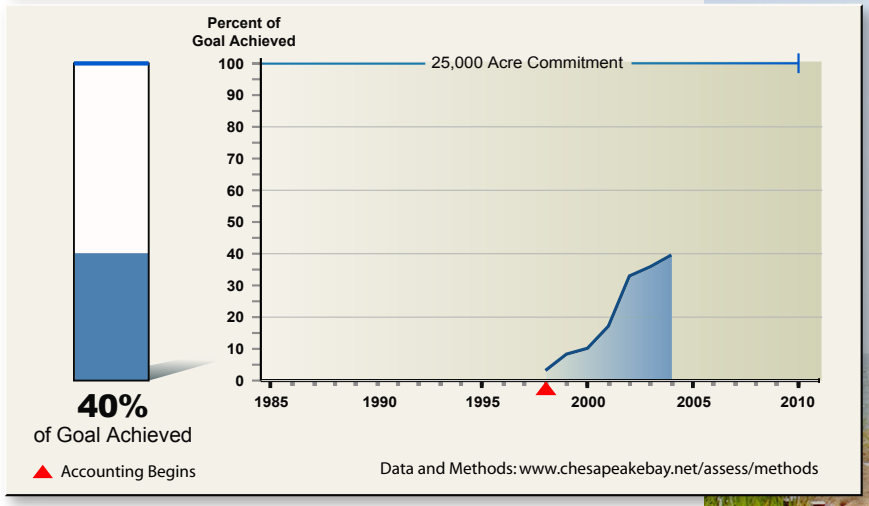


Restoring Wetlands

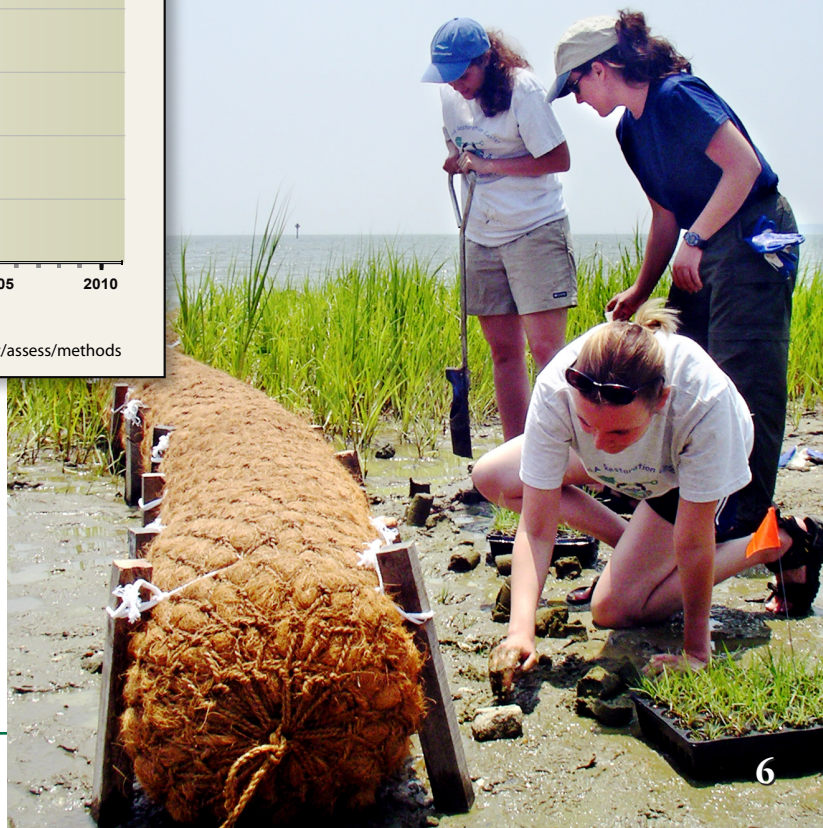
Wetlands serve multiple ecological functions. Restoring and enhancing wetlands throughout the watershed can provide critical wildlife habitat.

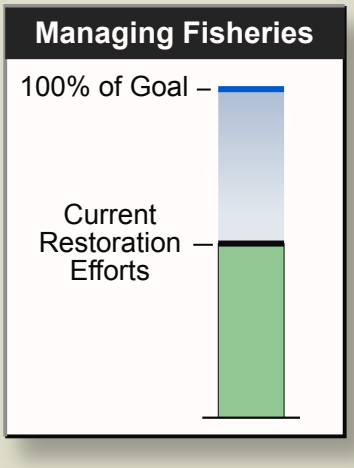
In addition to habitat, wetlands help clean the water of nutrients and sediments. To improve water quality, the Bay states call for the restoration of some 200,000 acres in their tributary cleanup plans. Progress toward this water quality goal is measured in part in the Reducing Pollution summary chart on page 2.

Wetlands Restoration



The Bay Program's current strategy commits partners to restoring 25,000 acres of wetlands by 2010, and as of 2004 they are about 40% of the way toward this goal.



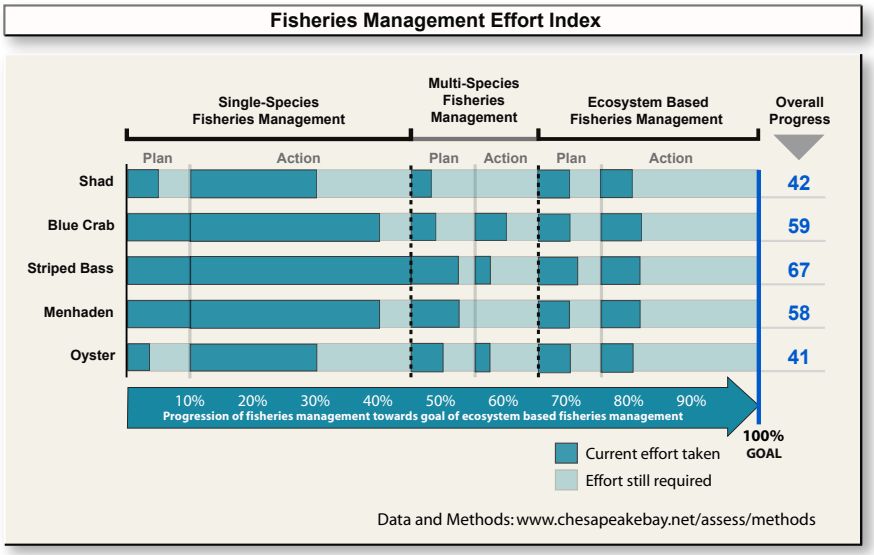


The Chesapeake Bay is a complex system of interconnected organisms and habitats. A more complete understanding of how fish interact with other organisms and with the Bay's physical and chemical environments is necessary before we can accurately assess how human-induced stressors affect the fish. Multi-species and ecosystem models are beginning to provide insights into how various management actions could benefit the Bay. However, the models require more data over longer time periods before we can accurately simulate the ecosystem's response to various management actions. Single-species management plans provide a solid basis for advancing towards a more comprehensive ecosystem-based approach.

State and federal governments have invested $305 million from 1995-2004 in efforts to protect and restore living resources, including fisheries, in the Bay watershed.

Managing Fisheries

Current fisheries management is largely based on the traditional single-species approach. Species interactions and human activities other than fishing, however, can strongly influence the status of fished populations. Therefore the Chesapeake Bay Program has adopted a goal of defining and implementing ecosystem based fisheries management for five key species. This transition involves a number of steps from establishing single species plans and incorporating multi-species considerations (such as predator-prey interactions) in these plans, to full ecosystem based fisheries management.



American Shad

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

Blue Crabs

Blue crabs are currently managed as a single species using minimum catch size and seasonal limits on harvests to achieve target levels of fishing pressure. Annual reviews of blue crab stock are conducted to determine if target levels have been exceeded. Under the current strategy, fishing pressure is set to levels that should allow for increased abundance.

Blue crabs play an important role as both predator and prey in the Bay ecosystem. Interactions between blue crabs and striped bass have been examined. In addition, some management recommendations have been implemented such as special openings in crab traps to prevent the capture of non-targeted species.

Striped Bass

Maryland instituted a moratorium on all striped bass fishing in 1985 in response to the collapse of the fishery during the early 1980s. Virginia followed suit in 1989. Since the moratorium was lifted in 1990, the stock has been rebuilt and maintained through an adaptive management approach, based upon monitoring and the strategic use of quotas and seasonal closings.

Striped bass are recognized as one of the top predators in the Chesapeake Bay and impact forage species such as Atlantic menhaden. The recently proposed annual cap on Atlantic menhaden harvests was based in part upon the dietary importance of menhaden to the striped bass population.

Atlantic Menhaden

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

Menhaden are a significant part of the aquatic food chain and as such, multi-species management is critical. Currently, predator-prey and by-catch interactions are relatively well defined. Menhaden feed primarily on plankton and are prey for top predators such as striped bass and bluefish. There is concern over the steady decline in the number of young menhaden produced in Chesapeake Bay. This decline has prompted the current proposal for five-year cap on the commercial harvest of menhaden starting in 2006.

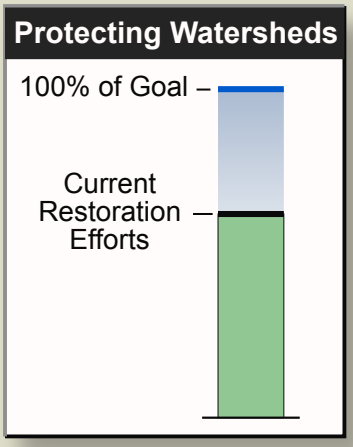
Oysters

Oysters are currently managed as a single species using minimum size limits, seasonal and geographic closings, and bushel limits. Fisheries targets and thresholds are not established in the current plan but designating sanctuaries has been a strategy for protecting the stock. The Bay Program has a 2010 goal of attaining a 10 - fold increase in biomass relative to 1994. Restoration efforts for oysters focus on expanding the amount of clean, hard surfaces for oyster spat (juvenile oysters) to settle, increasing the number of breeding adult oysters and strategies for coping with oyster diseases.

As disease and harvest have combined to reduce available oyster habitat, concern for the organisms that depend upon oyster reefs and for the diminished role oysters play in filtering Bay waters have been important factors for managing and restoring the oyster population.

Ecosystem Based Fisheries Plans

Chesapeake Bay ecosystem-based fishery management plans are being developed for American shad, blue crabs, striped bass, Atlantic menhaden and oysters. These plans will build on the single and multi-species approaches. In the index, points for ecosystem-based management were given for ongoing restoration efforts, such as nutrient reduction strategies that decrease dissolved oxygen problems. All of the ecosystem plans call for improved water quality as an essential element of species restoration.



The human population in the Chesapeake watershed grew by 100,000 residents annually during the 1990s and that rate has increased. Managing growth is especially difficult in this watershed because of the vast amount of land that drains into the relatively shallow Chesapeake. Restoration efforts center on reforesting streamside buffers, developing watershed management plans, preserving open space, and reducing harmful sprawl. Partners appear to be on track with many of their Protecting Watershed efforts, but they have not been able to measure the most important effort of all: the growth of sprawl development across the watershed.

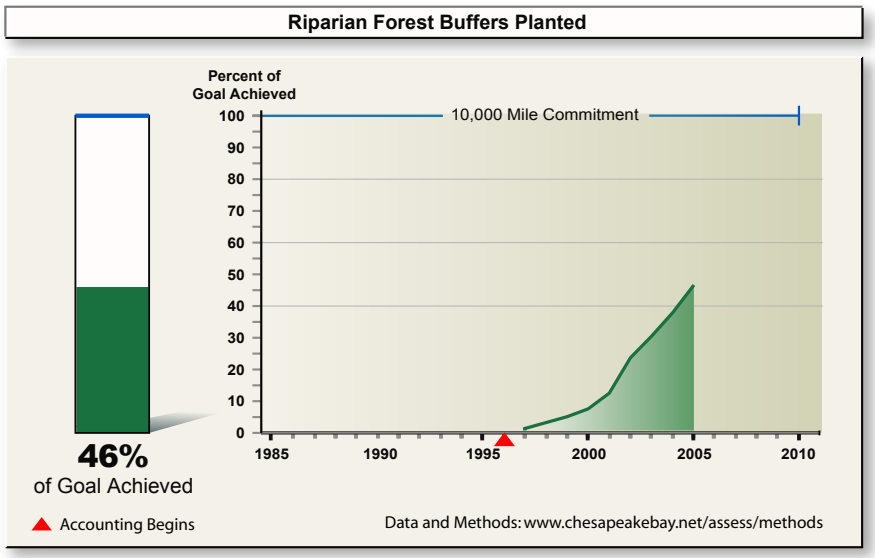
From 1995-2004 the Bay program partners invested $1.8 billion on Protecting Watersheds efforts, primarily on land preservation and acquisition throughout the Bay basin.

Protecting Watersheds

Restoring Forest Buffers

Streamside forest buffers provide habitat for wildlife, stabilize banks from erosion, and keep river waters cool, an important factor for many fish. Program partners achieved their original 2010 buffer restoration goal of 2,010 miles ahead of schedule and in 2003 raised that target to 10,000 miles. They are roughly on track to meet this 2010 goal with 4,606 miles restored through August 2005.

In addition to preserving the watershed, forest buffers also naturally absorb nutrients and sediments, thus improving water quality in neighboring streams. To improve water quality, the Bay states call for the restoration of some 50,000 miles in their tributary cleanup plans. Progress toward this water quality goal is measured in part in the Reducing Pollution summary chart on page 2.



Preserving Lands

Maryland, Pennsylvania, Virginia and District of Columbia committed to permanently protect from development 20 percent of the 34.6 million acres by 2010. Parks, wildlife refuges, and private lands protected through conservation easements are counted in this measure. By July 2005 a total of 6.7 million acres had been permanently preserved and the partners are likely to meet the watershed goal of 6.9 million acres.

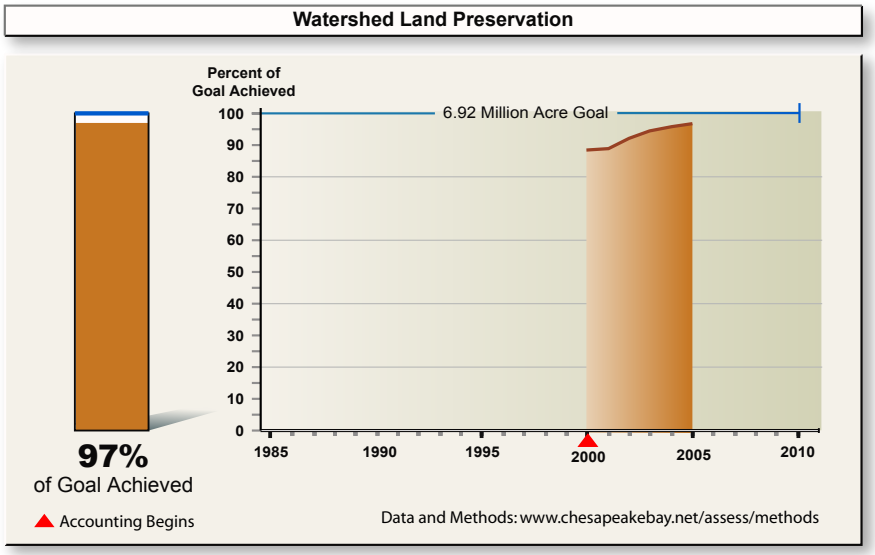
Reducing Harmful Sprawl

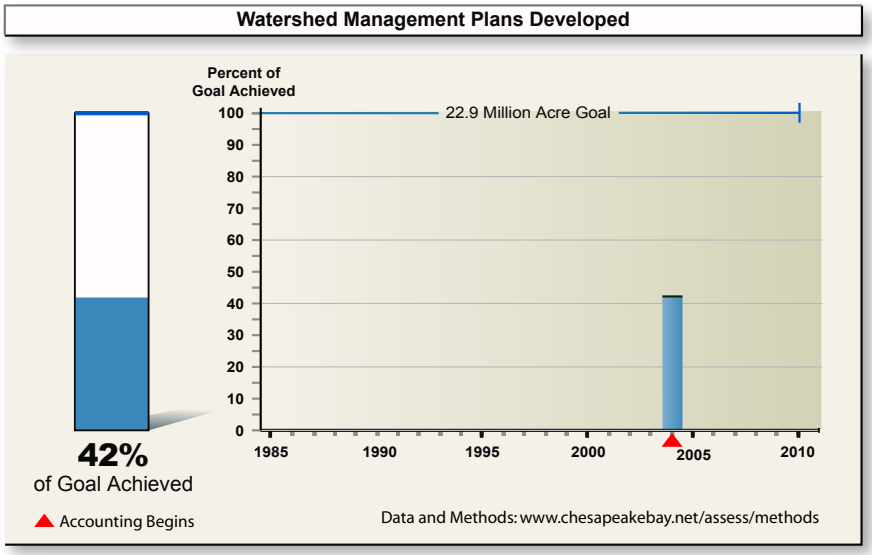
Directing development toward areas with proper infrastructure and services and away from important resource lands is a major effort involving state, regional and local planning officials.

Program partners agreed to a 30 percent reduction in the rate of harmful sprawl by 2012. The increase in the amount of hardened surfaces such as roads and rooftops, which grew five times faster than the population rate in the 1990s, may be a useful way to measure "harmful sprawl."

Developing Watershed Management Plans

Watershed management plans address the protection, conservation and restoration of stream corridors, riparian forest buffers, wetlands, parklands and other open space for the purposes of Preserving Watershed health while enhancing the quality of life in local communities. The Bay Program has a goal of developing and implementing locally supported watershed management plans in two-thirds of the Bay watershed. By the end of 2004 plans were written for 9.7 million acres with a goal of 22.9 million acres of land covered under such plans by 2010. Translating these plans into action will be essential to restoring water quality (see *Part One: Ecosystem Health*, pp. 5-8).





Fostering Chesapeake Stewardship

Fostering stewardship of the Chesapeake Bay ecosystem requires promoting environmental understanding and expanding public access and resource interpretation. The partners have committed to providing a meaningful Bay or stream outdoor experience for every student in the watershed before graduation. Every jurisdiction has incorporated this commitment into its education standards. The Chesapeake Gateways system connects 150 unique places into a watershed-wide network that promotes understanding of the ecosystem as well as its cultural and historic significance. The "Chesapeake Club" initiative promotes healthy lawn care among Washington, D.C. area residents in a humorous yet effective way. Publications promote the importance of scientific and technical information and engage the 16 million people living in the watershed in a dialog about restoration efforts.

From 1995-2004, the partners invested $258 million in Fostering Stewardship efforts across the Chesapeake watershed.

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Chesapeake Bay Program
410 Severn Avenue, Suite 109
Annapolis, Maryland 21403
(800) YOUR BAY
www.chesapeakebay.net

Looking Back at 2005

While there are many notable individual accomplishments relating to Chesapeake Bay restoration, *Part One: Ecosystem Health* makes clear that the Bay Program partners need to accelerate the pace of water quality improvement efforts. To that end, a number of specific initiatives in 2005 are worth highlighting:

In Maryland one wastewater treatment plant was fully upgraded and 19 are under construction or design. The state launched its first targeted watershed restoration effort on the Corsica River, created a partnership to raise funds for Bay restoration, and reached its goal of preserving 20% of Maryland land from development.

New York State's largest wastewater treatment plant in the watershed is in the process of being upgraded, and counties completed Agriculture Environmental Management strategies in 2005. The Upper Susquehanna Coalition reports over 20,000 acres of nutrient management plans, installation of over 200,000 feet of stream bank fencing, 22,000 feet of forested buffers and 492 new wetland acres added in 2005.

In Pennsylvania, the $625 million Growing Greener II watershed restoration bond issue and a separate $250 million bond for Sewer Infrastructure were approved. Nutrient limits are being included in operation permits for wastewater treatment facilities. The Agricultural, Communities and Rural Environment (ACRE) initiative increases the number of farms covered by regulations for nutrient and sediment management.

Virginia adopted specific nutrient caps in 2005 for 125 wastewater treatment plants, and it established a nutrient trading program for meeting and maintaining these caps. Additionally, the state now requires wastewater treatment plants to achieve technology-based nutrient concentration limits, with some exemptions for special facilities that operate nutrient removal facilities at the treatment levels for which they were designed.

This report was developed by the Chesapeake Bay Program partnership to help inform watershed residents about the health of the Bay and efforts to restore it. Staff from a large number of state and federal agencies, academic institutions and non-governmental organizations contributed data and interpretation to the report, including The Alliance for the Chesapeake Bay, Chesapeake Bay Commission, Del. Dept. of Natural Resources and Environmental Control, DC Dept. of Health, Interstate Commission on the Potomac River Basin, New York Dept. of Environmental Conservation, National Oceanic and Atmospheric Administration, Md. Dept. of Agriculture, Md. Dept. of the Environment, Md. Dept of Natural Resources, National Park Service, Pa. Dept. of Conservation and Natural Resources, Pa. Department of Environmental Protection, Pa. Fish and Boat Commission, Susquehanna River Basin Commission, University of Md. Center for Environmental Science, University of Md. College Park, Upper Susquehanna Coalition, U.S. Army Corps of Engineers, U.S. Dept. of Agriculture, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Va. Dept. of Environmental Quality, Va. Dept. of Conservation and Recreation, Va. Dept. of Game and Inland Fisheries, Va. Institute of Marine Science, Va. Tech University, WV Dept. of Agriculture and the WV Dept. of Environmental Protection. For a full list of contributing partners, visit http://www.chesapeakebay.net/baypartners.htm. Images: Chesapeake Bay Program, Chesapeake Bay Gateways Network, NOAA, Duane Raver/USFWS.