Executive Order 13508

Strategy for Protecting and Restoring the Chesapeake Bay Watershed

May 12, 2010

Source: Adrian Jones/IAN Image Library

Developed by the Federal Leadership Committee for the Chesapeake Bay

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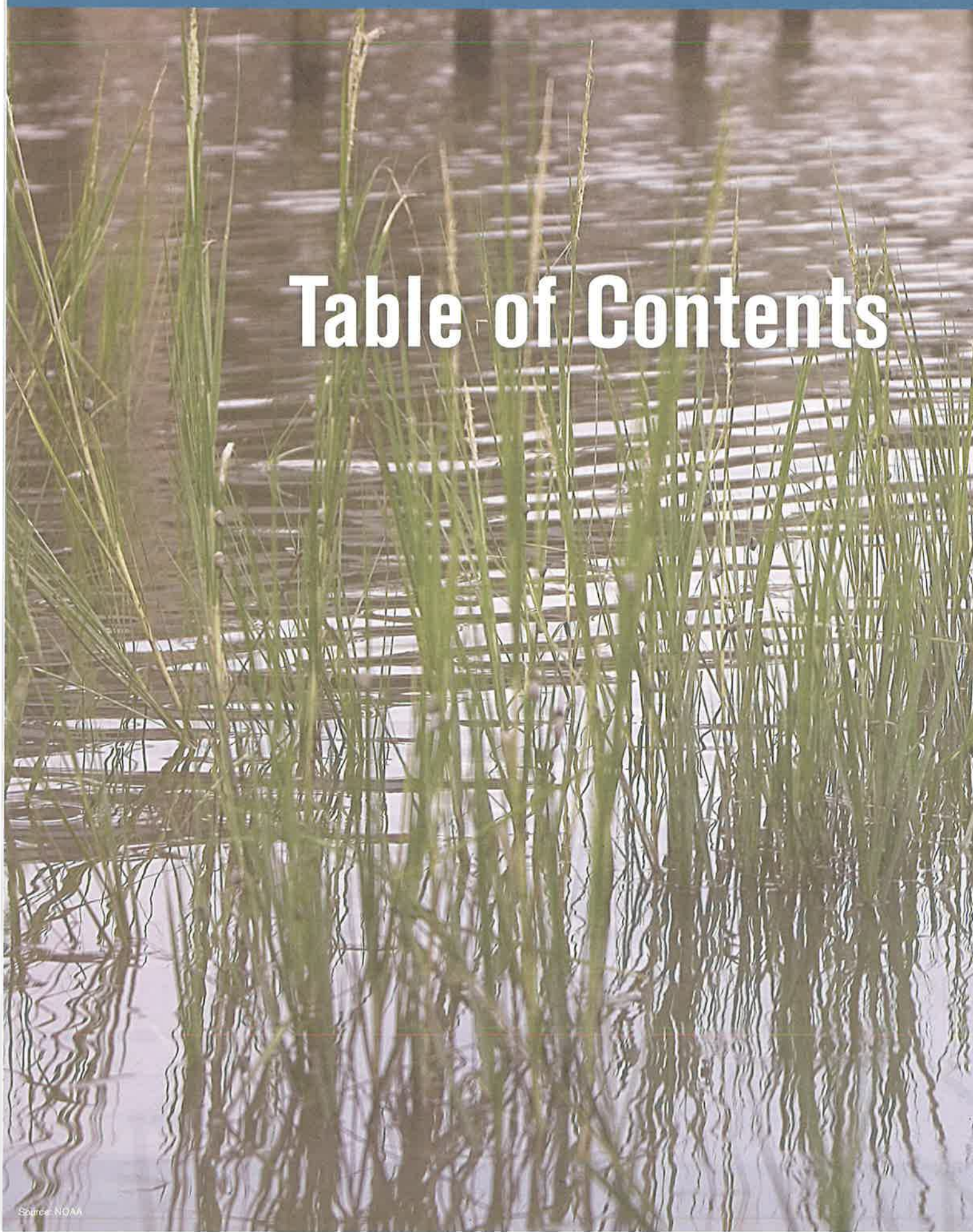

Source: NOAA

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Executive Summary

In the Executive Order, President Obama declared the Chesapeake Bay a "national treasure" and ushered in a new era of federal leadership, action and accountability.

Source: NOAA

The Chesapeake Bay watershed is one of the most extraordinary places in America. The nation's largest estuary and its network of streams, creeks and rivers hold tremendous ecological, cultural, economic, historic and recreational value for the region and its citizens. But the Bay and its tributaries remain in poor health, with polluted water, low populations of fish and shellfish, degraded habitats and landscapes lost to development.

May 12, 2009 was a historic day for the Chesapeake Bay and its watershed. On that date, President Obama issued Executive Order 13508 on Chesapeake Bay Protection and Restoration. In the Executive Order, President Obama declared the Chesapeake Bay a "national treasure" and ushered in a new era of federal leadership, action and accountability. The purpose of the Executive Order is "to protect and restore the health, heritage, natural resources, and social and economic value of the nation's largest estuarine ecosystem and the natural sustainability of its watershed."

To bring the full weight of the federal government to address the Chesapeake's challenges, the Executive Order established the Federal Leadership Committee (FLC) for the Chesapeake Bay, which is chaired by the Administrator of the U.S. Environmental Protection Agency and includes senior representatives from the departments of Agriculture, Commerce, Defense, Homeland Security, Interior and Transportation. The Executive Order charged the FLC with developing and implementing a new strategy for protection and restoration of the Chesapeake region.

The Executive Order acknowledges that although the federal government should assume a strong leadership role in the restoration of the Bay, success depends on a collaborative effort involving state and local governments, businesses, non-governmental organizations and the region's residents. To develop the strategy, federal agencies consulted with the six Bay watershed states, the District of Columbia and the Chesapeake Bay Commission, engaged key stakeholders and held public meetings.

Vision for the Chesapeake

As a guiding foundation for the strategy, federal agencies drafted a vision statement that describes the desired conditions of the Chesapeake Bay and its watershed. Achieving this vision is an important commitment to the citizens of today and generations of tomorrow:

A Chesapeake watershed with

- clean water that is swimmable and fishable in streams, rivers and the Bay
- sustainable, healthy populations of blue crabs, oysters, fish and other wildlife
- a broad network of land and water habitats that support life and are resilient to the impacts of development and climate change
- abundant forests and thriving farms that benefit both the economy and environment
- extensive areas of conserved lands that protect nature and the region's heritage
- ample access to provide for public enjoyment
- cities, towns and neighborhoods where citizens are stewards of nature

Focus of the Strategy

The progress of the past several decades has not been sufficient to fully restore and protect the Chesapeake Bay watershed. Federal agencies recognize the need to fundamentally shift efforts, take bold action and increase accountability. The strategy includes several areas of focus that will lead to greater success.

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Launching major initiatives & accounting for progress:

- **Launching major environmental initiatives:**
  - Establish rigorous new regulation and enforcement to implement all pollution controls for clean water.
  - Put new agricultural conservation practices on 4 million acres of farms.
  - Protect 2 million acres of land important to environment, farms, forests and people.
  - Restore oysters in 20 tributaries.
- **Short-term action:** To accelerate the pace of restoration and protection, many actions occur in the next few years, and many of the actions are "on-the-ground" and "in-the-water" throughout the Chesapeake watershed.
- **Two-year milestones:** To increase accountability, federal agencies will establish milestones every two years for actions to meet environmental goals. These will support and complement the states' two-year milestones for water quality.
- **Measureable environmental goals:** Actions are designed to accomplish specific and measureable improvements in water quality, habitat recovery, fish and wildlife protection and land conservation.

Partnering with communities:

- **For the entire region:** The strategy is about much more than the Chesapeake Bay. It is about restoration and protection needed in communities around the 64,000-square-mile watershed, across the landscape and in thousands of streams, creeks and rivers. The natural resources of the Chesapeake region are important to the lives and livelihood of 17 million people.
- **Supporting local efforts:** Local communities have the greatest interest in and ability

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to impact conservation of their local environment. The strategy is designed to directly support the restoration activities of local governments, watershed groups, county conservation districts, landowners and citizens.

- **Benefiting economies and jobs:** Many federal actions will provide economic benefits for communities, citizens and the region, including conservation of working farms and forests, expanded oyster aquaculture, support for conservation corps programs and green jobs, and development of an innovative environmental marketplace for selling, buying and trading credits for pollution reductions.

Deepening the federal commitment:

- **Unprecedented level of activity:** The strategy reflects an unprecedented depth and breadth of federal actions and resources dedicated to the Chesapeake region. The federal government will truly be deepening its commitment.
- **Targeting of resources:** Agencies will be aggressively targeting resources where they can have the most impact – areas with the most pollution and potential for runoff, with the highest potential for restoring fish and wildlife, and with habitats and lands most in need of protection.
- **Federal leadership by example:** The federal government is one of the largest landowners in the region (owning 5.3 percent of land in the watershed). The federal government will lead by example by restoring water quality, habitats, fish and wildlife, conserving lands, and increasing public access on its properties.
- **A comprehensive approach:** The Chesapeake Bay watershed is an ecosystem – a network that includes people, plants, fish and wildlife and the places they live, each one related to and connected to the other. The strategy recognizes this interdependence, and the actions included in the strategy are designed to benefit the entire ecosystem.

Regional Strategy Reflects National Initiatives

In developing the Chesapeake strategy, federal agencies have incorporated cornerstone principles from several major national initiatives that are guiding overall environmental improvement in the United States, including the Ocean Policy Task Force, the America's Great Outdoors Initiative, and the Interagency Climate Change Adaptation Task Force. Reflecting national policy in a regional strategy further illustrates that solutions in the Chesapeake Bay watershed can serve as a model for restoring ecosystems elsewhere in the country. Federal agencies will be able to share the lessons learned in the Chesapeake with partners on other national initiatives.

Presidential actions that have also shaped this strategy include the Executive Order on Federal Leadership in Environmental, Energy and Economic Performance; the memorandum on Transparency and Open Government; and the Executive Order on Environmental Justice, which focuses federal attention on the environmental and human health conditions in minority low-income, and tribal communities with the goal of achieving environmental justice.

Ecosystem-based management is also among the most significant cross-cutting principles included in this strategy. This approach recognizes the interdependence of all aspects of an ecosystem, including water, fish and wildlife, habitats and land-use. Management actions are guided by this scientific understanding and aim to protect, maintain and restore overall environmental functioning to achieve long-term sustainability of ecosystems and the human communities that depend on them.

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Structure of the Strategy

The Executive Order directed federal agencies to "define environmental goals for the Chesapeake Bay and describe milestones for making progress toward attainment of these goals." For the strategy, federal agencies have focused on achieving the most essential priorities for a healthy Chesapeake ecosystem:

- Restore Clean Water
- Recover Habitat
- Sustain Fish and Wildlife
- Conserve Land and Increase Public Access

Federal agencies also developed 12 key environmental outcomes that will be achieved through federal actions described in the strategy and ongoing state activities, and will reflect progress toward attainment of the overall goals.

Restore Clean Water

Clean water is one of the most precious resources to people and communities throughout the region and is essential for healthy habitats, wildlife and fish, from the most remote streams in the watershed to the depths of the Chesapeake Bay. It is vital to have water that is not polluted, has enough oxygen to support fish, crabs and other aquatic life, and is clear enough for sunlight to reach underwater grasses. In 2009, however, water quality in the Bay was extremely poor, meeting only 24 percent of goals established by the Chesapeake Bay Program. Stream quality in the watershed was also degraded, with 52 percent of the streams having a rating of poor or very poor (based on the index of biological integrity). The strategy aims to reduce nitrogen, phosphorus, sediment and other pollutants to meet Bay water quality goals for dissolved oxygen, clarity, chlorophyll-a and toxic contaminants.

The water quality chapter contains a comprehensive range of actions to achieve this goal, including EPA's establishment and, in partnership with the Bay jurisdictions and other federal agencies, implementation of the Chesapeake Total Maximum Daily Load or TMDL (a rigorous pollution diet for the Bay and region's waterways), rulemaking for expanded regulation of stormwater and concentrated animal feeding operations, a stronger emphasis on enforcement and compliance activities, and increased grant funding for state regulatory programs. The U.S. Department of Agriculture (USDA) will aggressively target financial resources and technical assistance to priority watersheds, help states meet two-year milestones for implementing agriculture conservation practices, accelerate the development of new conservation technologies, and develop a system for improving the reporting of conservation practices. EPA will coordinate the effort to reduce stormwater pollution from federal facilities and lands and to implement federal land management practices that protect forests, wetlands and waterways. EPA, DOI, and NOAA will work with partners to expand the understanding of the extent and seriousness of the toxic contaminant problem in the Bay and its watershed and to develop contaminant reduction outcomes by 2013 and strategies by 2015.

Water Quality Outcome: Meet water quality standards for dissolved oxygen, clarity/underwater grasses and chlorophyll-a in the Bay and tidal tributaries by implementing 100 percent of pollution reduction actions for nitrogen, phosphorus and sediment no later than 2025, with 60 percent of segments attaining water quality standards by 2025. *(Current condition: 89 of the 92 segments of the Bay and its tidal waters are impaired.)*

Stream Restoration Outcome: Improve the health of streams so that 70 percent of sampled streams throughout the Chesapeake watershed rate fair, good or excellent, as measured by the Index of Biotic Integrity, by 2025. *(Current condition: 45 percent of sampled streams are rated fair, good or excellent.)*

Agriculture Conservation Outcome: Work with producers to apply new conservation practices on four million acres of agricultural working lands in high priority watersheds by 2025 to improve water quality in the Chesapeake Bay and its tributaries. *(Current condition: Of the approximately eight million acres of agricultural working lands in high-priority watersheds, approximately four million acres are identified as having soils with the highest potential for leaching and runoff, which may affect water quality. The four-million-acre target is to apply or expand conservation treatment on virtually all of these most vulnerable agricultural lands.)*

Recover Habitat

For thousands of years, the Chesapeake's forests, marshes and waters have supported fish and wildlife, a robust regional economy and a quality of life treasured by residents. Healthy habitats are essential to sustaining fish and wildlife species and to filtering pollution before it reaches streams, rivers and the Bay. But forests continue to be permanently removed, wetlands continue to be damaged by development, and fish are blocked by man-made obstacles in streams. The strategy seeks to restore a network of land and water habitats to support priority species and to afford other public benefits, including water quality, recreational uses and scenic value across the watershed.

The habitat chapter includes a variety of actions by federal agencies including the U.S. Fish and Wildlife Service (FWS), the National Oceanic and Atmospheric Administration (NOAA), the U.S. Army Corps of Engineers (USACE) and USDA that will restore and protect habitats. For wetlands, this includes actions to sustain the most important

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marshes, increase incentives for restoration on private land, combat invasive species and strengthen federal coordination on permits with direct impacts on marshes. Efforts to restore vital island habitats in the Bay will expand. Forest buffers that benefit stream health will be expanded through increased targeting of restoration and accelerated application of the Conservation Reserve Enhancement Program. Streams will be prioritized and barriers removed to allow fish to return to historical migration routes. The U.S. Department of Transportation (DOT) will work with partner agencies to encourage ecosystem-level planning for mitigation of highway impacts on habitat.

Wetland Outcome: Restore 30,000 acres of tidal and non-tidal wetlands and enhance the function of an additional 150,000 acres of degraded wetlands by 2025. *(Current condition: one million acres of tidal and non-tidal wetlands estimated to be available in the Chesapeake watershed for restoration or enhancement. Between 1998 and 2008, 18,217 acres of wetlands were restored and 97,738 acres were enhanced.)*

Forest Buffers Outcome: Restore riparian forest buffers to 63 percent, or 181,440 miles, of the total riparian miles (stream bank and shoreline miles) in the Bay watershed by 2025. *(Current condition: 58 percent of the 288,000 total riparian miles in the Bay watershed has forest buffers in place.)*

Fish Passage Outcome: Restore historical fish migratory routes by opening an additional 1,000 stream miles by 2025, with restoration success indicated by the presence of River herring, American shad and/or American eel. *(Current condition: Approximately 1,924 stream miles in the Chesapeake Bay watershed have been opened and are accessible for fish migration. Projects are currently being ranked and prioritized through a collaborative federal and state process designed to strategically target priority projects.)*

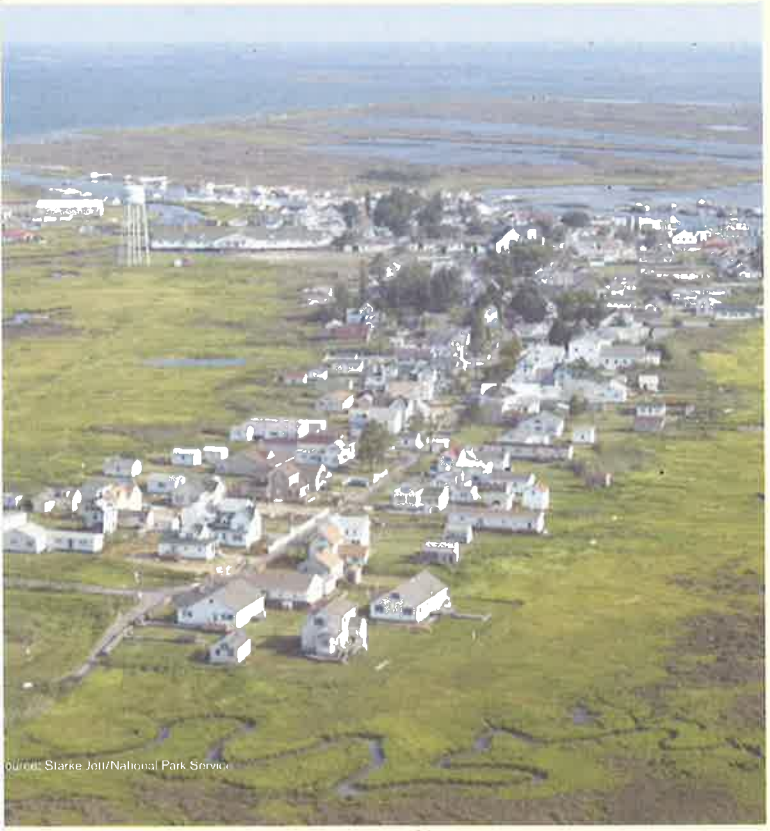
Sustain Fish and Wildlife

Wetlands, forests, fields, streams, underwater grasses and mudflats in the Chesapeake watershed provide several thousands of species of plants, fish and wildlife with the places they need to find food, shelter, reproduce, and rear their young. Chesapeake habitats a lso provide 'habitat highways' for Atlantic Coast fish populations and birds migrating along the Atlantic Flyway. These habitats also play an important role in filtering nitrogen, phosphorus and se diment pollution before it enters local waterways and ultimately the Chesapeake Bay. Wetlands in tidal and non-tidal areas serve as holding tanks and water filters for coastal storm surge and heavy rainfall and help prevent costly flood damage. Forest buffers along streams and shorelines provide shade to keep streams cool, food for aquatic organisms and corridors for wildlife movement. Streams are the 'arteries' that connect the upper and lower parts of the watershed and provide not only passage for fish but also a physical connection from every local community to the Bay. The goal is to sustain healthy populations of fish and wildlife, which contribute to a resilient ecosystem and vibrant economy.

For the purpose of tracking progress in the Bay and headwaters, this strategy focuses on four species (oysters, blue crab, brook trout and black duck) because they reflect the overall health of their habitat and hold great ecological, commercial and recreational significance. The importance of other species is clearly recognized, and a prioritization framework is described (Appendix C). For oysters, NOAA and U. S. Army Corps of Engineers will launch a Bay-wide restoration strategy in collaboration with Maryland, Virginia and the Potomac River Fisheries Commission that focuses on priority tributaries, supports expansion of commercial aquaculture and bolsters research on oyster stock, habitat and restoration progress. For blue crabs, NOAA will enhance the science used to support interjurisdictional management

and restoration. Along with partners, NOAA will revise the blue crab population target to support interjurisdictional management and restoration. For brook trout, FWS will restore key stream habitats, establish a monitoring program in the watershed and consider the impact of climate change in selecting stream habitats for restoration.

Oysters Outcome: Restore native oyster habitat and populations in 20 out of 35 to 40 candidate tributaries by 2025. *(Current condition: 0 tributaries with fully restored oyster populations; several tributaries with successful living oyster reef habitat.)*



Residents of the Chesapeake Bay watershed treasure their landscapes and waterviews. But many of these special places are threatened by development and other man-made pressures.

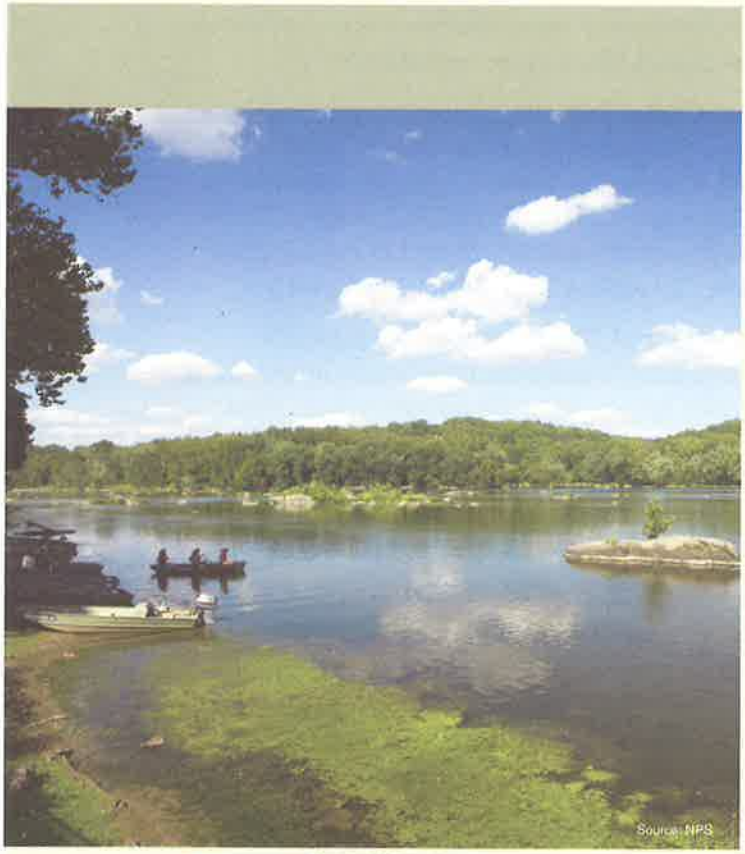
Blue Crabs Outcome: Maintain sustainable blue crab interim rebuilding target of 200 million adults (1+ years old) in 2011 and develop a new population target for 2012 through 2025. *(Current condition: 2007-2008: 131 million; 2008-2009: 223 million; 2009-2010: 315 million.)*

Brook Trout Outcome: Restore naturally reproducing brook trout populations in headwater streams by improving 58 sub-watersheds from "reduced" classification (10-50 percent of habitat loss) to "healthy" (less than 10 percent of habitat loss) by 2025. *(Current condition: 388 of 1,294 sub-watersheds in the Chesapeake Bay currently classified as "reduced" for brook trout.)*

Black Duck Outcome: Restore a three-year average wintering black duck population in the Chesapeake Bay watershed of 100,000 birds by 2025. *(Current condition: Recent mid-winter aerial surveys estimate the 2007-2009 rolling three-year average at 37,158 black ducks in the Chesapeake Bay.)*

Conserve Land and Increase Public Access

At the heart of the Chesapeake region are the landscapes alongside the Bay and its major tributaries. These treasured landscapes are the special places we revere as individuals, as communities and as a people for their ecological, cultural, historical, economic and recreational values. Yet many of the Chesapeake's treasured landscapes are threatened. Poorly planned development increasingly pressures both natural and cultural lands. Forests in the region are converted to other land uses at the rate of 100 acres each day. Cropland and pasture land in the Chesapeake Bay watershed have also been influenced by alternative land



The Chesapeake Bay Program provides a partnership in which federal agencies, states, local governments and citizens work together to identify and address the most critical challenges facing Bay protection and restoration.

uses, with approximately 100 acres per day lost to development between 1982 and 2003. Public access to the Bay and its tributaries is also limited. The strategy aims to conserve landscapes to maintain water quality, habitat, sustainable working forests, farms and maritime communities; and cultural, community and indigenous values. It will also expand public access to the Bay and its tributaries through existing and new federal, state and local parks, refuges, reserves, trails and partner sites.

The land conservation chapter contains numerous actions to achieve this goal, including DOI's plans to launch a Chesapeake Treasured Landscape Initiative, expand land conservation through coordinating federal funding and community assistance, and use strategic geographic information systems in setting conservation priorities. USDA will contribute in collaboration with states and federal partners through a watershed-wide strategy to reduce the loss of farms and forests. NPS will develop a plan and prioritize funding for expanding public access. NOAA will support exploration of land-water conservation priorities. All of these actions will involve a high degree of collaboration, directly engaging state and local government, communities, non-governmental organizations and other federal agencies. DOT, working through its Partnership for Sustainable Communities with EPA and the Department of Housing and Urban Development, will provide technical assistance to communities that undertake development of integrated transportation, housing and water infrastructure plans.

Land Conservation Outcome: Protect an additional two million acres of lands throughout the watershed currently identified as high conservation priorities at the federal, state or local level by 2025, including 695,000 acres of forest land of highest value for maintaining water quality. *(Current condition: 7.8 million acres protected watershed-wide.)*

Public Access Outcome: Increase public access to the Bay and its tributaries by adding 300 new public access sites by 2025. *(Current condition: 761 public access sites providing access to Bay and its tributaries exist in DC, MD, PA and VA.; data on existing access sites in NY, DE and WV to be collected in the future.)*

Supporting Strategies

The strategy also features four chapters on supporting strategies that provide invaluable cross-cutting support to achieving environmental goals or are critical complementary efforts in the restoration and protection of the Chesapeake Bay and watershed. The supporting strategy chapters are:

- Expand Citizen Stewardship
- Develop Environmental Markets
- Respond to Climate Change
- Strengthen Science

Expand Citizen Stewardship

People tend to protect the places they understand and care about. Regional residents increasingly seek opportunities to reconnect with the outdoors. For citizens of the watershed, the places where people experience the Chesapeake – parks, waterways, refuges, nature centers, museums, etc. – and the places where people spend most of their time – their homes, schools and neighborhoods – provide venues for further engagement and action. The actions in the strategy will foster a dramatic increase in the number of citizen stewards of every age who support and carry out local conservation and restoration.

The citizen stewardship chapter presents a multi-pronged approach that begins with engaging adults through an expansion of Chesapeake conservation corps workforces and the master watershed stewards program, as well as prioritization of citizen stewardship programs in awarding of grants. DOI will also build stewardship by enhancing visitor experiences and messaging at Chesapeake sites and trails and by building partnerships with communities and citizens. NOAA will develop stewards of the next generation by expanding hands-on experiences and creating a more robust and comprehensive elementary and secondary school environmental literacy initiative.

Develop Environmental Markets

Environmental markets are an innovative approach to natural resource management that can accomplish environmental protection goals, encourage new technologies, improve efficiencies, reduce costs and help manage growth. The basic premise of environmental markets is that an entity that needs to reduce impacts to the environment buys credits representing an equivalent or greater amount of environmental improvement from a provider of that improvement. Private landowners will be a major provider of these credits because of their vast land holdings and their ability to install cost effective conservation practices that result in needed environmental improvement. These credits can be verified through standardized scientific metrics to represent a certain level of measurable environmental improvement and may be registered and traded much like any other commodity. Resulting environmental markets have the potential to increase the efficiency, reduce the cost and increase the quality of environmental solutions. The strategy will expand the current suite of environmental market potential to increase the pace and scope of conservation by coordinating, and conforming where appropriate, federal and state regulatory requirements to develop a robust market in the Chesapeake Bay watershed.

In partnership with Bay states, EPA will issue guidance concerning credits for nutrient and sediment reduction to accompany the Chesapeake Bay TMDL, which is expected to be final in December of 2010. EPA will work with the newly formed Environmental Market Team to assure that tools and protocols developed by the team are reflected in this and subsequent guidance to the greatest extent possible. On a parallel track,

USDA will lead, in coordination with EPA and other federal agencies (including DOC, DOI, DOT, DOD, USACE, CEQ, and OMB), an interdepartmental Environmental Market Team to establish the broader infrastructure for an effective environmental market in the Chesapeake Bay watershed. This team will address a wide range of issues including defining environmental performance of conservation practices; evaluating tools for measuring conservation practice performance; establishing protocols for setting baselines, developing registries and designing certification processes; creating opportunities for stacking and bundling ecosystem services; and exploring options for insurance mechanisms.

Respond to Climate Change

Climate change is one of the most significant challenges to successful restoration and protection of the Chesapeake Bay and its watershed. Although there is still some uncertainty surrounding specific climate change projections and impacts at the scale of the Chesapeake Bay, projected impacts to the Bay and watershed include sea-level rise; increases in water temperature, acidity and salinity; changing rainfall patterns and increases in rainfall intensity; and changes to freshwater flows with corresponding significant impacts to water quality and habitats. Many of the region's major cities and significant ecosystems are in low-lying areas that are particularly vulnerable to sea-level rise and storm surge. The strategy seeks to improve information on the communities, habitats and resources at risk from the impacts of climate change and to develop products to increase knowledge and capacity to plan for and implement adaptation projects.

The climate change chapter contains a host of actions to adapt to the rising challenge of the 21st century. Led by NOAA and the U.S. Geological Survey (USGS), these actions include conducting comprehensive research to identify vulnerable communities and habitats throughout the watershed and assessing the risks posed by the impacts of climate change. This work also involves prediction of changes in pollution loads and monitoring actual climate impacts in the watershed. These agencies will develop tools and training to provide states, local communities and resource managers with effective climate adaptation resources. Agencies will develop adaptation strategies to manage vulnerable habitats and public infrastructure on federal lands to increase resiliency to climate change impacts.

Strengthen Science

Restoration and protection of the Chesapeake Bay watershed requires strengthening science and implementing ecosystem-based management. This will require improved monitoring, computer models and research to enhance decision-making for all the goals in the strategy. The strategy outlines actions to strengthen science to promote ecosystem-based adaptive management – which will more effectively prioritize, implement, monitor and evaluate the actions and policies needed – and provide early warning about new threats to the health of the Chesapeake Bay and its watershed.

The science chapter and text throughout the strategy chapters outline actions to increase science support for the Chesapeake Bay restoration effort. USGS and NOAA are working with federal, state and academic partners to expand their scientific capabilities in concert with the Chesapeake Bay Program. New decision-support tools and an expanded set of models will allow for better prioritization and adjustment of management activities. USGS and NOAA will lead the establishment of a Chesapeake Monitoring Alliance and Data Enterprise to improve documentation of changes in ecosystem conditions and progress toward environmental goals.

Implementation and Accountability

The final chapter of the strategy focuses on implementation and accountability. This chapter outlines the role and responsibilities of the Federal Leadership Committee in implementing the strategy, as well as the federal government's commitment to increase accountability by establishing milestones every two years for taking action. The final chapter also outlines a series of accountability tools and processes to promote transparency in the planning, tracking, reporting, evaluating and adapting of restoration activities. These tools include:

- **Federal Two-Year Milestones:** Federal agencies will join the states in establishing two-year milestones with many federal efforts designed to support the states and District in meeting their current and future water quality milestones. But federal agencies will also develop appropriate two-year milestones for the other outcomes outlined in this strategy, beyond those for water quality.
- **Annual Action Plan:** The action plan will identify the protection and restoration activities that FLC agencies will undertake in the following year to carry out the actions and move toward the goals outlined in this strategy.
- **Annual Progress Report:** The annual progress report will assess the success of the federal agencies' efforts in implementing the actions identified in the preceding year's action plan.
- **Independent Evaluation:** The FLC will arrange for thorough and ongoing independent evaluation of the implementation of the strategy's protection and restoration actions, including progress toward environmental goals.
- **Adaptive Management:** The FLC will adopt an adaptive management process built on the cycle of: set goals, plan actions, implement, monitor, evaluate and adjust.

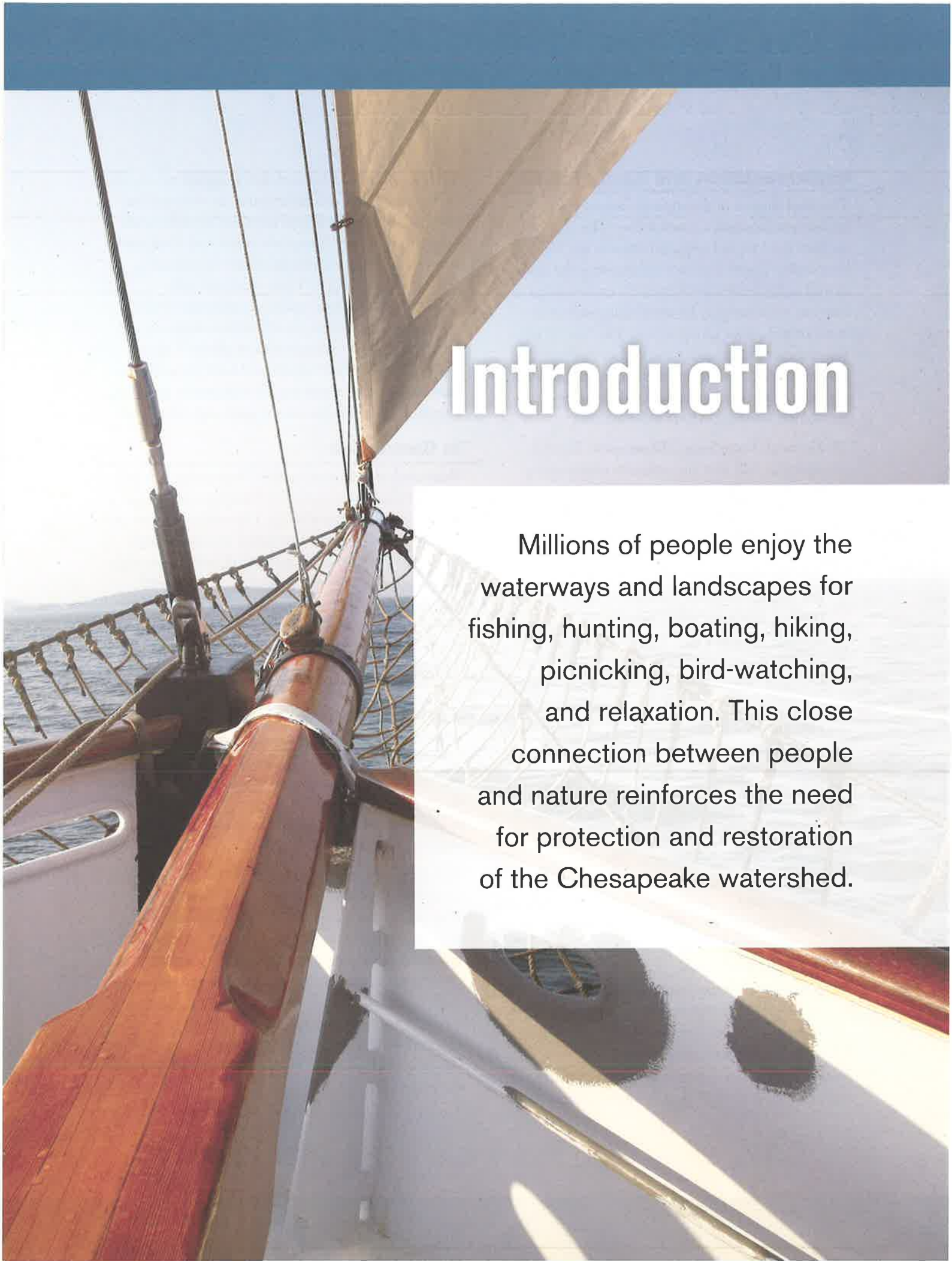
Greater transparency and integration of federal, state and local actions will be greatly enhanced through *ChesapeakeStat*, a web-based tool designed to provide performance data and information in a format that allows a range of audiences to understand the work being done in the Chesapeake watershed. Over time, this tool will increase accountability by providing greater access to data. When combined with science-based analysis explaining the effectiveness of management actions, it will inform decisions and facilitate adaptive management of efforts. Visitors to the *ChesapeakeStat* website will have the ability to view information about specific restoration activities, spending and progress toward goals and milestones.

In Conclusion

Restoring and protecting the Chesapeake Bay and its watershed is a significant challenge, as the last several decades have shown. The wide spectrum of serious environmental problems, combined with the sheer size of the Bay and its 64,000-square-mile watershed, magnify the challenge. Success will depend on an unprecedented level of engagement and collaboration among all levels of government, the private sector, nonprofit organizations and the 17 million residents of the watershed.

But the increased investment of resources in the Chesapeake Bay and regional landscape – including the thousands of streams, creeks and rivers – will yield a priceless return for the environment, for local and regional economies, for the cultural and historic heritage, and, most importantly, for communities in cities, suburbs and rural areas.

The Executive Order emphasizes the urgency and need for renewed commitment to restoration. The pieces for success are in place around the watershed in the form of leadership, science and public interest. Restoring clean water and protecting nature throughout the region is a duty to the people who call this place home. The generations that come after us will point to this time as a defining moment for reviving the integrity and splendor of the Chesapeake Bay and its watershed.



Introduction

Millions of people enjoy the waterways and landscapes for fishing, hunting, boating, hiking, picnicking, bird-watching, and relaxation. This close connection between people and nature reinforces the need for protection and restoration of the Chesapeake watershed.

A National Treasure

The effort to restore the Chesapeake Bay and its watershed has garnered widespread public interest and captured national attention for several decades. It was one of the first attempts in the United States to restore a large body of water and led to similar efforts in other coastal areas. It is the unique nature of the Chesapeake region and its special importance to millions of people, however, that have made the cleanup so critical.

The Chesapeake Bay is the nation's largest estuary – a place where freshwater and saltwater mix – and the third largest in the world. The vast watershed and its network of streams, creeks and rivers covers 64,000 square miles of the East Coast, stretching from upstate New York to southern Virginia, from the West Virginia panhandle to the Delmarva Peninsula. In the heart of the Chesapeake region are America's first permanent European settlement at Jamestown, Virginia, and the nation's capital city of Washington, D.C.

The Chesapeake watershed is a world-class ecological treasure that is home to several thousand species of plants and animals, such as the blue crab and the bald eagle. The region is steeped in history that is treasured by residents, including the legacy of American Indians, the arrival of Europeans in the New World, the inspiration of the American Revolution, and the tragedy of the Civil War. Across the watershed are spectacular landscapes, such as the Shenandoah Mountains, the Susquehanna River Valley and Smith Island. The Bay's waters represent a rich cultural heritage that includes world-renowned waterfowl hunting, trophy sport fishing, and the tradition of watermen who harvest fish, crabs and oysters. Seafood, tourism and marine transportation also help to make the Chesapeake Bay a multi-billion dollar economic driver for the mid-Atlantic.

The Bay and its watershed provide extensive recreational resources. Millions of people enjoy the waterways and landscapes for fishing, hunting, boating, water sports, hiking, picnicking, bird-watching, and relaxation. This close connection between people and nature reinforces the need for protection and restoration of the Chesapeake watershed. About 17 million people live in the region, and tens of thousands of streams, creeks and rivers flow past their homes and through their neighborhoods. These local waterways and landscapes are priceless resources for countless communities throughout six states and the District of Columbia. The lives and livelihoods of many citizens are intertwined with the water and the land.

An Ecosystem in Trouble

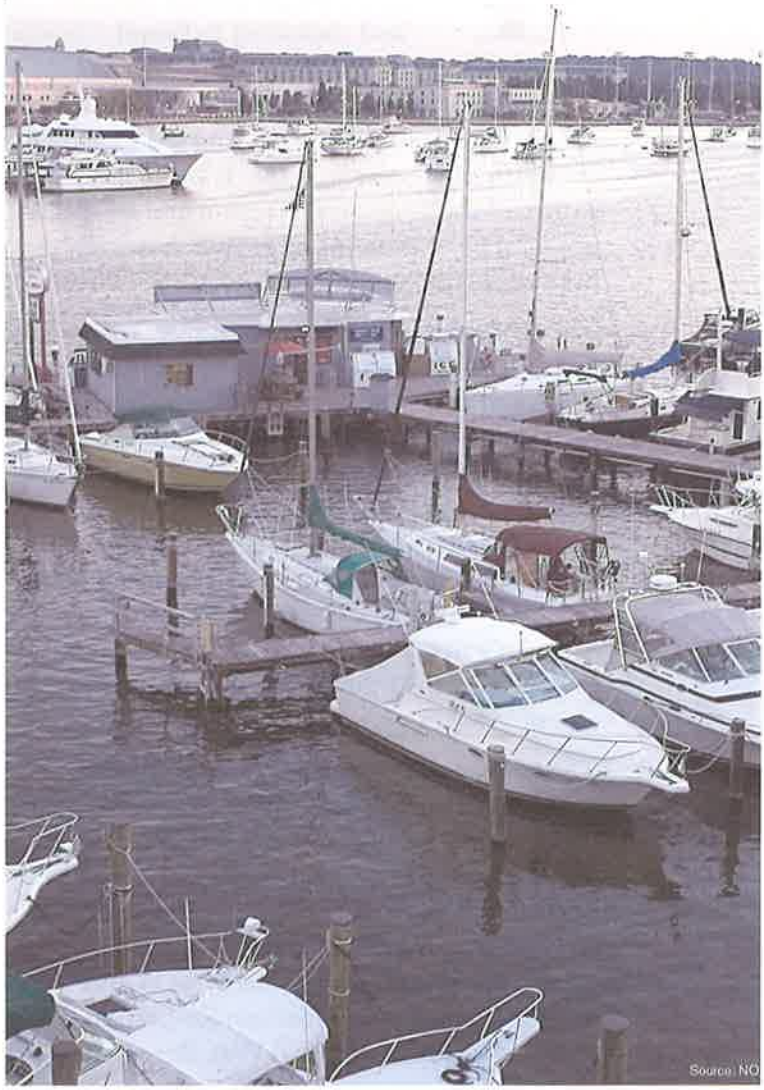
Unfortunately, the Chesapeake Bay and many of its tributaries remain in poor health. The water continues to be polluted, populations of key species such as oysters are extremely low, and habitats such as underwater grass beds and wetlands are degraded. The problems facing the Chesapeake region stem from human activity that has transformed the natural landscape, the impacts of which have accelerated due to rapid growth and development during the last few decades. The population in the watershed has doubled since 1950, and the resulting development has destroyed forests and wetlands that previously filtered pollution and provided wildlife habitat. Farms have been converted to subdivisions and suburban sprawl has led to a proliferation of roads, parking lots and rooftops, as well as increased numbers of vehicles on the roads – all sending polluted runoff into streams, creeks, rivers and the

Bay. Historic overharvesting of fish and shellfish has contributed to the decline of key species. The region's waterways are polluted primarily by nitrogen, phosphorus, sediment and toxic contaminants from agricultural land, cities and towns, wastewater plants, and airborne emissions and vehicle exhaust. The impact of these forces is magnified because the Bay is shallow and has the largest land-to-water ratio of any coastal body of water in the world.

Now restoration and protection activities must anticipate and account for climate change, which is projected to raise sea levels, warm the water and air, and affect the intensity of storms. Although the Chesapeake restoration effort already benefits from some of the world's best science, there is a need to continuously improve research and monitoring, foster the development of innovative technologies, and ensure that information is accessible to managers and policy-makers whose decisions ultimately shape the fate of the Bay watershed. A vital need also exists for expanded public education and citizen stewardship, so the 17 million residents of the watershed fully understand their impact on the environment and are engaged in making a positive difference.

A Pivotal Moment

Protecting the environment is one of society's defining challenges of the 21st century, and cleaning up the Bay and its rivers is this region's responsibility – an obligation to the residents of today and generations of tomorrow. This strategy's solutions to create cleaner water, thriving farms, protected habitats, abundant fish and wildlife, and conserved landscapes in the Chesapeake watershed can serve as a national model.



The Executive Order acknowledges that although the federal government should assume a strong leadership role in the restoration of the Bay, Success depends on a collaborative effort involving state and local governments, businesses, non-governmental organizations and the region's residents.

May 12, 2009 was a historic day for the Chesapeake watershed. On that date, President Obama issued Executive Order 13508 on Chesapeake Bay Protection and Restoration. It is the first-ever presidential directive on the Chesapeake Bay and was the first Executive Order of the Obama administration related to the environment. In the Executive Order, President Obama declared the Chesapeake Bay a "national treasure" and ushered in a new era of federal leadership, action and accountability.

The purpose of the Executive Order is "to protect and restore the health, heritage, natural resources, and social and economic value of the nation's largest estuarine ecosystem and the natural sustainability of its watershed." The Executive Order recognized that the efforts of the past 25 years were not making sufficient progress in restoring the Chesapeake Bay and its watershed, and that success will require responsible government agencies to make dramatic policy changes and initiate bold new actions.

To bring the full weight of the federal government to address the Chesapeake's challenges, the Executive Order established the Federal Leadership Committee for the Chesapeake Bay (FLC), which is chaired by the Administrator of the U.S. Environmental Protection Agency and includes senior representatives from the departments of Agriculture, Commerce, Defense, Homeland Security, Interior and Transportation.

The federal agencies were charged with developing recommendations to address seven key challenges: water quality, targeting of resources, stormwater management on federal land, climate change, land conservation and public access, scientific tools and monitoring, and protection of habitat, fish and wildlife. Draft reports containing the initial recommendations were completed in September 2009 and refined in updates published in November 2009. (See Appendix E.)

The initiatives in the seven reports were blended into a draft strategy that was released in November 2009 and now form the core of this *Strategy for Protecting and Restoring the Chesapeake Bay Watershed.* The strategy also identifies goals for environmental improvement, outlines federal coordination with state activities, creates a process for reporting on progress and explains how efforts will be adapted based on science and resources.

A Collective Effort

The Executive Order acknowledges that although the federal government should assume a strong leadership role in the restoration of the Bay, success depends on a collaborative effort involving state and local governments, businesses, non-governmental organizations and the region's residents. Pursuant to the Executive Order, representatives of the FLC agencies have consulted with the six Bay watershed states (Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia), the District of Columbia, and the Chesapeake Bay Commission. The federal government has also reached out to key stakeholders in the private sector, held public meetings and created a web site to promote government transparency and public engagement. Citizens provided comments on the draft strategy and on proposed environmental measures and goals. A summary of public comments is available at *http://executiveorder.chesapeakebay.net.* The final strategy for Chesapeake Bay restoration and protection was forged through this collaborative process and published by May 12, 2010 as required by the Executive Order.

Vision for the Chesapeake

In developing the strategy, federal agencies drafted a vision statement that describes the desired conditions of the Chesapeake Bay and its watershed. The vision also strongly reflects the hopes voiced by a multitude of residents in the past and present. The goals and actions in the strategy are directly designed to work toward achieving this vision:

A Chesapeake watershed with

- clean water that is swimmable and fishable in streams, rivers and the Bay
- sustainable, healthy populations of blue crabs, oysters, fish and other wildlife
- a broad network of land and water habitats that support life and are resilient to the impacts of development and climate change
- abundant forests and thriving farms that benefit both the economy and environment
- extensive areas of conserved lands that protect nature and the region's heritage
- ample access to provide for public enjoyment
- cities, towns and neighborhoods where citizens are stewards of nature.

The strategy aims to achieve this vision through a dual emphasis on restoration and protection efforts. It is necessary to restore poor water quality, improve degraded habitats such as wetlands and forests, and bring back populations of fish and wildlife. But it is equally important to protect waterways that are clean, habitats that are pristine, animals that are thriving and land that is undeveloped.

Structure of the Strategy

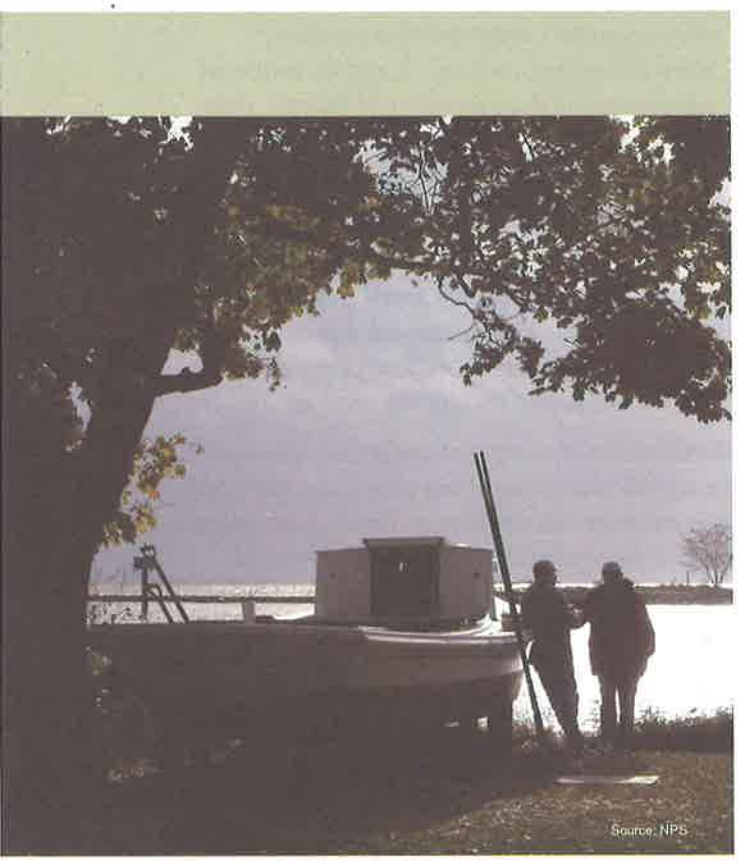
The Executive Order directed federal agencies to "define environmental goals for the Chesapeake Bay and describe milestones for making progress toward attainment of these goals." For the strategy, federal agencies identified the four most essential goals for a healthy ecosystem and developed 12 key environmental outcomes that reflect progress toward these goals.

- **Goal: Restore Clean Water**
  Outcomes: restoration of Bay water quality, stream restoration, agriculture conservation
- **Goal: Recover Habitat**
  Outcomes: wetlands restoration, expanded forest buffers, improved fish passage
- **Goal: Sustain Fish and Wildlife**
  Outcomes: sustainable populations of oysters, blue crab, brook trout, black ducks
- **Goal: Conserve Land and Increase Public Access**
  Outcomes: expanded land conservation and public access to the Bay and its tributaries

These four goals and associated actions are presented in the next four chapters of the strategy. Each of the chapters describes the overall goal, such as restoring water quality, and explains why it is vital to the Chesapeake Bay ecosystem. The specific measures of progress supporting the goal are also presented, including numerical targets for future progress compared to current conditions. The heart of the strategy is a description of the actions that will be taken to accomplish the goals.

A series of additional components are also featured in each chapter:

- **Around the Watershed –** These maps show examples of federal actions that will be happening on-the-ground and in-the-water around the watershed.
- **Partnering with Communities –** An icon of shaking hands appears next to actions that support local governments, communities, watershed groups and citizens.
- **State Activities –** These sidebars highlight examples of ongoing state activities that will assist in the meeting of overall goals and environmental outcomes.



Through processes outlined in this Strategy, the federal government commits to meeting milestones every two years in order to protect the Bay watershed's special places.

- **Science Support –** A section in each chapter presents supporting actions that scientific agencies (such as USGS, NOAA and FWS) will conduct.

The strategy also includes four chapters on supporting strategies, which contain actions that provide invaluable cross-cutting support to achieving overall goals or are critical complementary efforts in the restoration and protection of the Chesapeake Bay and watershed. The supporting strategy chapters are:

- **Expand Citizen Stewardship**
- **Develop Environmental Markets**
- **Respond to Climate Change**
- **Strengthen Science**

The final chapter of the strategy focuses on implementation and accountability. This chapter outlines the role and responsibilities of the FLC in implementing the strategy, as well as the federal government's commitment to meet milestones every two years. Also outlined are a series of accountability tools and processes to promote transparency in the planning, tracking, reporting, evaluating and adapting of restoration activities. These tools include:

- Federal Two-Year Milestones
- Annual Action Plan
- Annual Progress Report
- Independent Evaluation
- Adaptive Management.

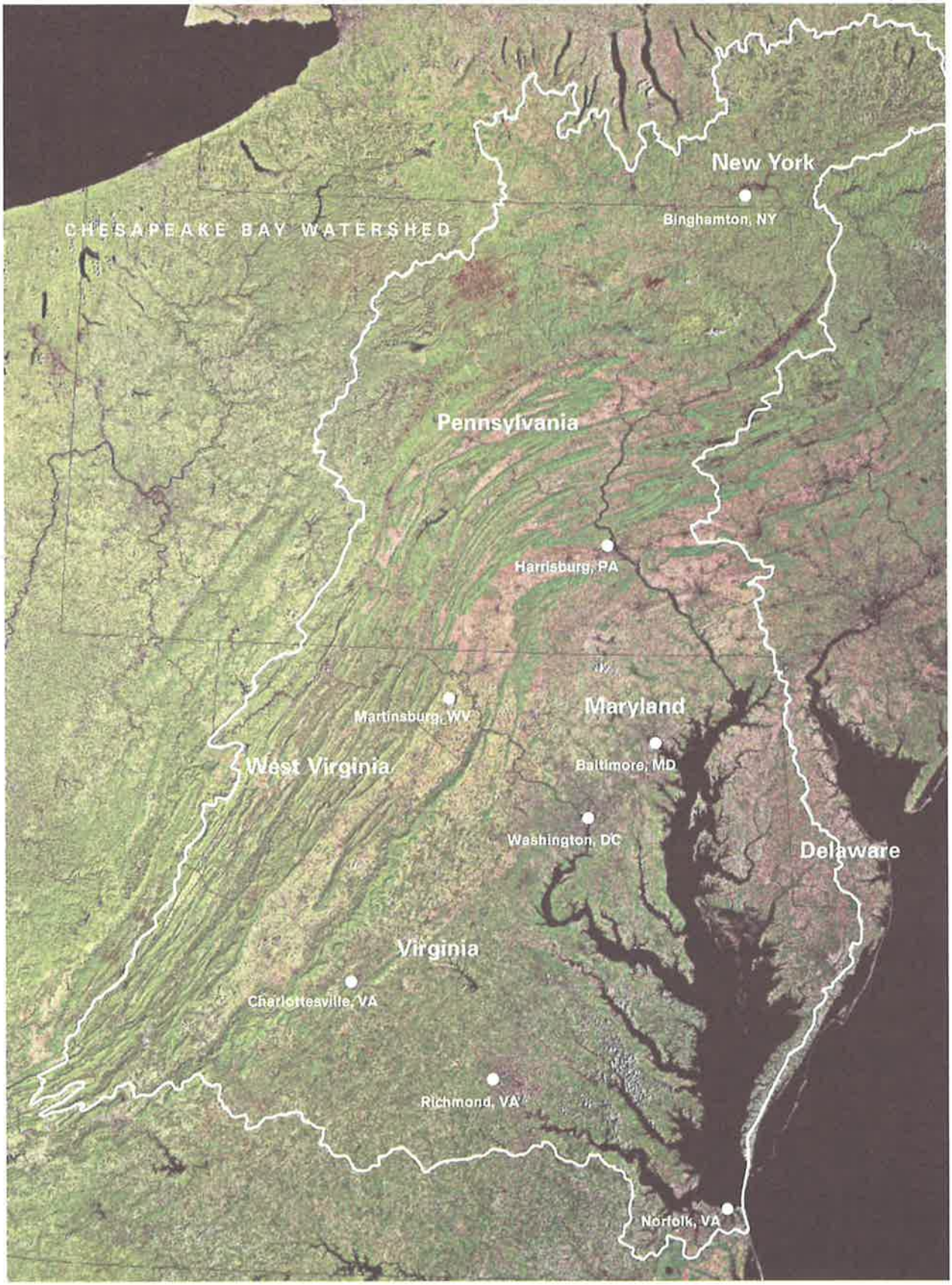
Regional Strategy Reflecting National Priorities

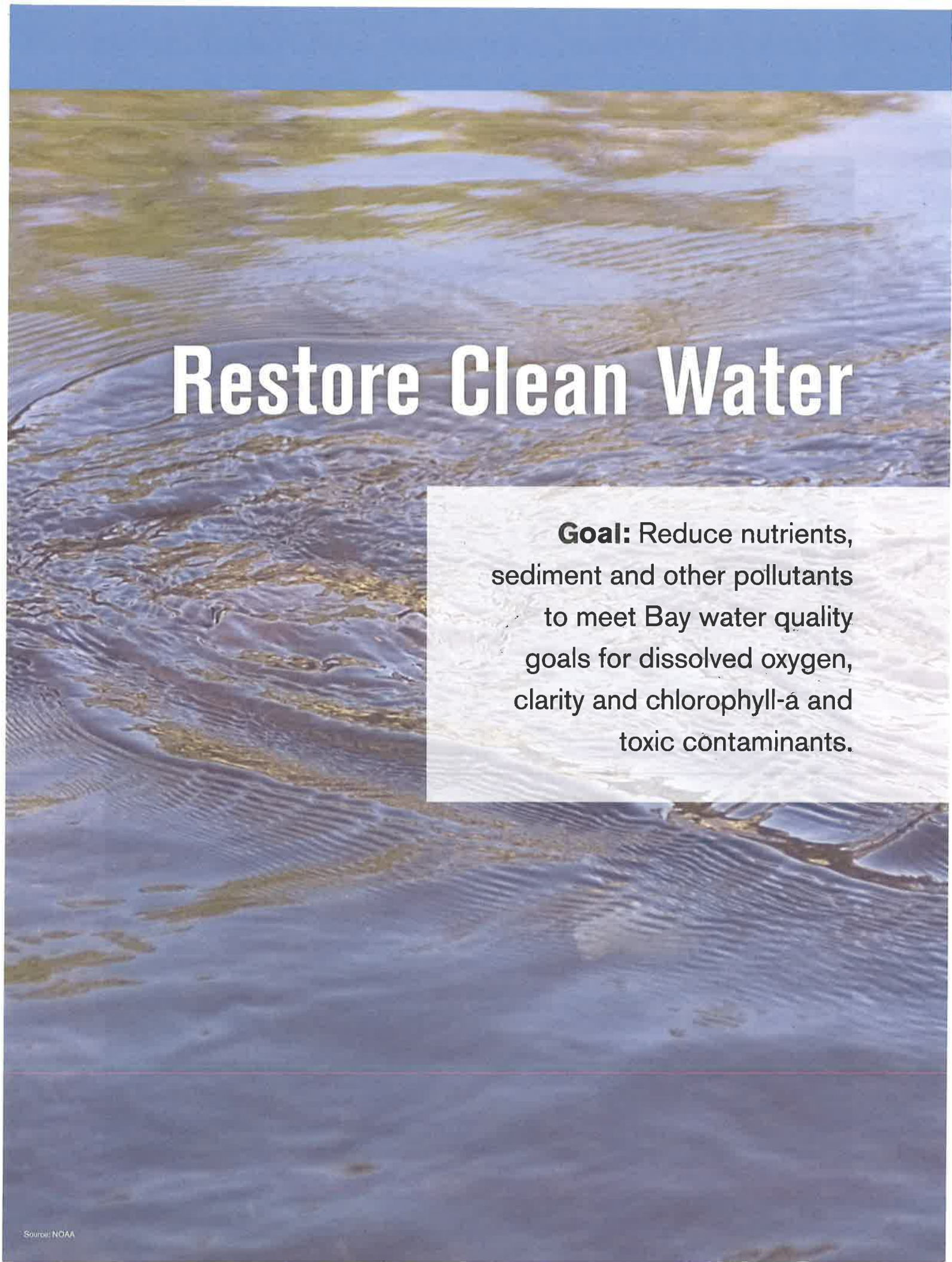
In developing the strategy, federal agencies have incorporated cornerstone principles from several major national initiatives that are guiding overall environmental improvement in the United States. Reflecting national policy in a regional strategy further illustrates that solutions in the Chesapeake

Bay watershed can serve as a model for restoring aquatic ecosystems elsewhere in the country. Federal agencies will be able to share the lessons learned in the Chesapeake with partners on the national initiatives. Details on some of the national initiatives listed below are available at *http://www.whitehouse.gov/administration/eop/ceq/initiatives.*

- **Ocean Policy Task Force –** charged with developing a recommendation for improved stewardship of oceans, coasts and the Great Lakes. It will also recommend a framework for improved stewardship and effective coastal and marine spatial planning.
- **America's Great Outdoors –** a multi-agency effort to collect the best ideas on locally supported land conservation and develop an action plan for how the federal government can help and reconnect Americans to our rivers and waterways, landscapes of national significance, ranches, farms and forests, great parks, and coasts and beaches.
- **Interagency Climate Change Adaptation Task Force –** charged with recommending key components to include in a national strategy on climate change adaptation.
- **Federal Leadership in Environmental, Energy and Economic Performance (Executive Order 13514) –** set sustainability goals for federal agencies and focuses on making improvements in their environmental, energy and economic performance, including implementation of the stormwater provisions of the Energy Independence and Security Act of 2007.
- **Environmental Justice Executive Order (Executive Order 12898) –** to ensure that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.
- **Transparency and Open Government Memorandum –** ordered unprecedented openness in government through an emphasis on transparency, public participation and collaboration. This promotes accountability, provides information, enhances government effectiveness and fosters innovation.

Ecosystem-based management is also among the most significant overarching principles included in this strategy. An ecosystem-based management approach recognizes the interdependence of all aspects of an ecosystem, including water, fish and wildlife, habitats, and land-use. Management actions are guided by this scientific understanding. Restoring water quality is not an exclusive action or need, but is interdependent with the condition of habitats, health of fish and wildlife, and activities on land. The purpose of ecosystem-based management is to protect, maintain and restore overall environmental functioning to achieve long-term sustainability of ecosystems and the human communities that depend on them.


CHESAPEAKE BAY WATERSHED
New York
Binghamton, NY
Pennsylvania
Harrisburg, PA
Maryland
Martinsburg, WV
West Virginia
Baltimore, MD
Washington, DC
Delaware
Virginia
Charlottesville, VA
Richmond, VA
Norfolk, VA



Restore Clean Water

Goal: Reduce nutrients, sediment and other pollutants to meet Bay water quality goals for dissolved oxygen, clarity and chlorophyll-a and toxic contaminants.

Source: NOAA

Clean water is one of the most precious resources to communities and people throughout the region and is essential for healthy habitats, wildlife and fish, from the most remote streams in the watershed to the depths of the Chesapeake Bay. It is vital to have water that is not polluted, has enough oxygen to support fish, crabs and other aquatic life, and is clear enough for sunlight to reach underwater grasses.

In 2009, however, water quality in the Bay was extremely poor, meeting only 24 percent of the water quality goals established by the Chesapeake Bay Program. Stream quality in the watershed was also degraded with 52 percent of the streams having a rating of poor or very poor (based on the index of biological integrity). Significant reductions in nitrogen, phosphorous, sediment and chemical contaminants are needed to achieve water quality goals throughout the Bay and its watershed.

Achieving these pollution reductions will require significant reductions from the major sources of pollution to the Bay, including discharges and runoff from urban and suburban lands, farms, municipal wastewater and stormwater systems, industrial wastewater facilities, and leaching to surface waters from septic systems. Atmospheric deposition of nitrogen to the Bay and its watershed from industrial, commercial and mobile sources including automobile emissions also needs to be reduced.

Reducing these pollutants will require improved pollution control technologies and expanded use of established pollution reduction practices. EPA intends to work with federal partners, the six watershed states, the District of Columbia, local governments and other parties to put in place a comprehensive, transparent and accountable set of commitments and actions that together ensure that pollution controls needed to restore Bay water quality are implemented by no later than 2025. Strategies to achieve water quality standards must also account for any increased loadings from projected population growth and economic development. Today, 89 of the 92 tidal segments of the Bay are impaired. EPA expects that at least 60 percent of these 89 segments will be restored by 2025 as a result of this effort.

Additionally, farming and forestry have a tremendous impact on water quality and have been vital components of the Bay watershed, providing a reliable source of food, feed, fiber and rural landscapes. These lands account for 75 percent of the 44 million acres that make up the watershed. Forests occupy the majority of that area, while about one-third of that amount is used for agriculture. Farm and forest lands also anchor rural communities and provide precious open space, wildlife habitat and other amenities important to the cultural and environmental fabric of the region. In addition, urban and community forestry becomes a more important force in the 21st century for local governments to realize the ecosystem services, as well as the social and commercial benefits, associated with tree cover.

The stewardship of farm and forest lands has a tremendous influence on the quality of natural resources in the watershed. Agriculture, while an important component of the landscape and economy, is also a major source of nitrogen, phosphorus and sediment that adversely affect the quality of the Bay and its tributary waters. Forests are among the most beneficial land uses, and even though the majority of forests receive little or no management they are critical to reducing non-point source pollution. Improved management of farms and forests will lead to improved water quality.

Restore Clean Water

Today, farm and forest lands are under increasing pressure from development – since 1982, conversion of farm and forest acres to development has averaged 200 acres per day. Among the long-term consequences of losing these agricultural and forested areas are declines in access to local, fresh foods, reduction in the capture of carbon in soils and plants, reduction in water recharge, and increased stormwater discharges from roads, roofs and parking lots. Consider that a one-acre parking lot produces about 16 times the volume of runoff that comes from a one-acre meadow. Once these impervious surfaces cover more than 10 percent of a watershed, the streams and rivers become seriously degraded.

Well-managed forest and farm lands provide an important foundation for water quality. While the focus of this strategy is on water quality, the approach must include dimensions of increasing economic viability of rural areas, strengthening and building markets for local foods and ecosystem services, and protecting the natural heritage that makes the Chesapeake Bay watershed a national treasure. USDA is leading the federal effort to increase implementation of high-impact conservation practices in priority watersheds to better protect the Bay and its tributary waters.

WATER QUALITY OUTCOME:

Meet water quality standards for dissolved oxygen, clarity/underwater grasses and chlorophyll-a in the Bay and tidal tributaries by implementing 100 percent of pollution reduction actions for nitrogen, phosphorus and sediment no later than 2025, with 60 percent of segments attaining standards by 2025. (Current condition: 89 of the 92 segments of the Bay and its tidal waters are impaired.)

STREAM RESTORATION OUTCOME:

Improve the health of streams so that 70 percent of sampled streams throughout the Chesapeake watershed rate fair, good or excellent, as measured by the Index of Biotic Integrity, by 2025. (Current condition: 45 percent of sampled streams are rated fair, good or excellent.)

Action Overview:

- Establish and, in partnership with the Bay states, the District of Columbia and other federal agencies, implement the Chesapeake Bay TMDL, a rigorous accountability framework for reducing pollution to ensure that all practices needed to reduce pollution to meet Bay water quality standards are in place by 2025.
- Take regulatory and other actions to support state and District plans to implement the TMDL.
- Reduce pollution through increased enforcement and compliance for environmental laws.
- Coordinate with the Clean Water State Revolving Fund managers to build partnerships in using financial resources to better protect the Chesapeake watershed.
- Provide states with additional grants for regulatory and accountability programs.
- Reduce point and nonpoint source stormwater discharges from federal facilities and lands to contribute to pollution load reduction goals for each state and the District under the Chesapeake Bay TMDL.
- Implement federal land management practices and programs that protect forested areas and wetlands, reduce pollutant loads to nearby receiving water bodies, and incorporate sustainable practices.

Recent progress toward collaborative restoration approaches in Maryland and Virginia emphasizing comprehensive tributary approaches to ecological restoration and long-term sustainability are promising.

- Take actions to reduce toxic contaminants impacting the health of fish, wildlife, and people.

Implement the Chesapeake Bay TMDL, a rigorous accountability framework for reducing pollution to ensure that all practices needed to reduce pollution to meet Bay water quality standards are in place by 2025.

EPA is establishing a strict "pollution diet" to restore the Chesapeake Bay and the region's streams, creeks and rivers. EPA is working with state partners to set limits on nitrogen, phosphorus and sediment pollution through a Total Maximum Daily Load, or TMDL, a tool of the federal Clean Water Act. The Bay TMDL will be the largest and most complex ever developed in the nation, involving pollution sources throughout a 64,000-square-mile watershed that includes six states and the District of Columbia.

The Bay TMDL – actually a combination of many smaller TMDLs for individual Chesapeake Bay tidal segments – will include pollution limits that are sufficient to achieve state and District water quality standards for dissolved oxygen, water clarity and chlorophyll-a, an indicator of algae levels. The pollution diet will be divided among all jurisdictions in the watershed and the states and the District will further divide the pollution loading reductions among local sources and sectors in the watersheds of each of the 89 impaired tidal segments.

The states and the District will prepare Watershed Implementation Plans detailing how they will accomplish their portions of the pollution diet. The plans will identify pollution reduction targets by watershed area and source sector and will include a description and schedule of actions to be taken to achieve the reductions.

States and the District will specify reductions they intend to get from "point sources" like sewage treatment plants, urban stormwater systems and large animal feeding operations that are regulated under the federal Clean Water Act and other sources such as discharges and polluted runoff from agricultural lands, towns and septic systems. EPA expects that, in certain jurisdictions, control actions for all major sources of nutrients and sediments, including nonpoint sources, will be based on regulations, permits or otherwise enforceable agreements. In the plans, EPA also expects that all jurisdictions commit to tracking and verifying that pollution reduction practices are properly installed and maintained. The TMDL will also provide that new or increased pollutant discharges expected by 2025 be projected and managed, either by reserving an allocation for new/expanded discharge or through a program that reliably and verifiably offsets these new or expanded discharges. More information on Watershed Implementation Plans is provided in a guidance memorandum letter from the Regional Administrator to the Chesapeake Bay Program Principals' Staff Committee. (See *http://www.epa.gov/reg3wapd/pdf/pdf_chesbay/tmdl_implementation_letter_110409.pdf.*)

Milestones for this action include:

- Final Phase 1 Watershed Implementation Plans submitted: November 2010
- Bay TMDL published: December 2010
- Final Phase 2 Watershed Implementation Plans submitted: November 2011
- Establishment of 2012-2013 two-year milestones: January 2012
- Complete assessment of progress made to implement the May 2009-December 2011 two-year milestones: May 2012

The Watershed Implementation Plans will be supported by a series of two-year milestones for achieving specific near-term pollution reduction actions needed to keep on schedule to meet long-term restoration commitments. EPA and the states will track the implementation of pollution reduction actions to assess progress toward the goal of having all practices needed to restore impaired tidal segments in place by 2025. EPA expects that at least 60 percent of the 89 tidal segments will be restored by 2025 as a result of this work.

EPA, USGS, states and the District will monitor and model the effect of the pollution reduction actions by measuring nitrogen, phosphorus, sediment in free-flowing and tidal streams and the Bay. EPA will adopt additional federal actions if there are insufficient commitments in a jurisdiction's Watershed Implementation Plan or a failure to meet the established two-year milestones. More information about potential federal actions is provided in a memorandum letter from the Regional Administrator to the Chesapeake Bay Program Principals' Staff Committee, to states and the District available at *http://www.epa.gov/region03/chesapeake/bay_letter_1209.pdf.*

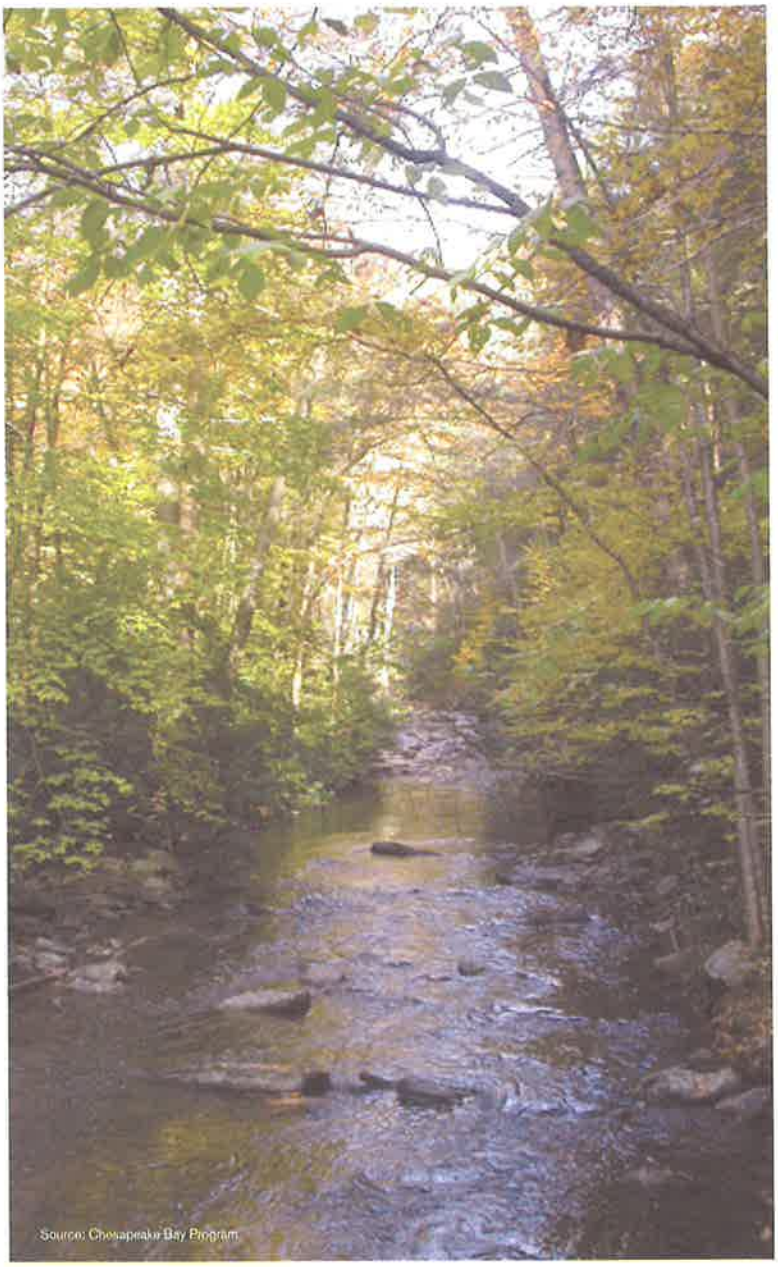
Federal agencies will contribute to Watershed Implementation Plans. Federal agencies with property in the watershed will provide leadership and will work with the Bay jurisdictions in the development of their Watershed Implementation Plans to:

- Estimate nutrient and sediment loads delivered from federal lands to the Bay by providing information on property boundaries, land cover, land-use, and implementation of management practices.
- Identify pollution reductions from point and non-point sources associated with federal lands that will help restore water quality.
- Commit to actions, programs, policies and resources necessary to reduce nitrogen, phosphorus and sediment by specific dates.

Waste load and load allocations and reduction plans for individual federal facilities and installations will be set following one of two general approaches: a) states would establish explicit load reduction expectations for individual federal facilities as part of the WIP process; or b) based on broad load reduction goals established by the state, individual federal facilities/installations would develop Federal Facility Implementation Plans that would demonstrate to the state how the facility proposes to achieve needed load reductions. In either case, the states and the District would ultimately decide what loading reductions to propose for federal facilities in its WIP.

Federal facilities/installations that decide to develop Federal Facility Implementation Plans to demonstrate how they will achieve the needed load reductions will use their determined nutrient and sediment loads and consider, at a minimum, the following in targeting and achieving their ultimate load reductions:

- Assess properties to determine the feasibility of installing urban retrofit practices and implementing non-structural control measures that reduce volume and improve quality of stormwater runoff.
- Align cost-effective urban stormwater retrofits and erosion repairs with TMDL goals and states' two-year milestones.
- Assess and implement appropriate non-structural practices to control stormwater runoff from developed areas and to reduce, prevent or control erosion from unpaved roads, trails and ditches.
- Consider the full spectrum of nutrient and sediment sources at a particular facility or installation to assess the ideal approach to achieve the needed nutrient and sediment reduction.



EPA and USGS will build the capacity for tracking and reporting changes in land-use and land cover at local scales (counties and small watersheds) by July 2012.

To support these decisions, each federal agency will provide spatial property boundary data for their respective facilities and lands to EPA to assist in determining a baseline pollutant load estimate from their facilities by October 2010. Federal agencies are providing initial land-use coverages in spring 2010 to support states and the District in the development of Watershed Implementation Plans.

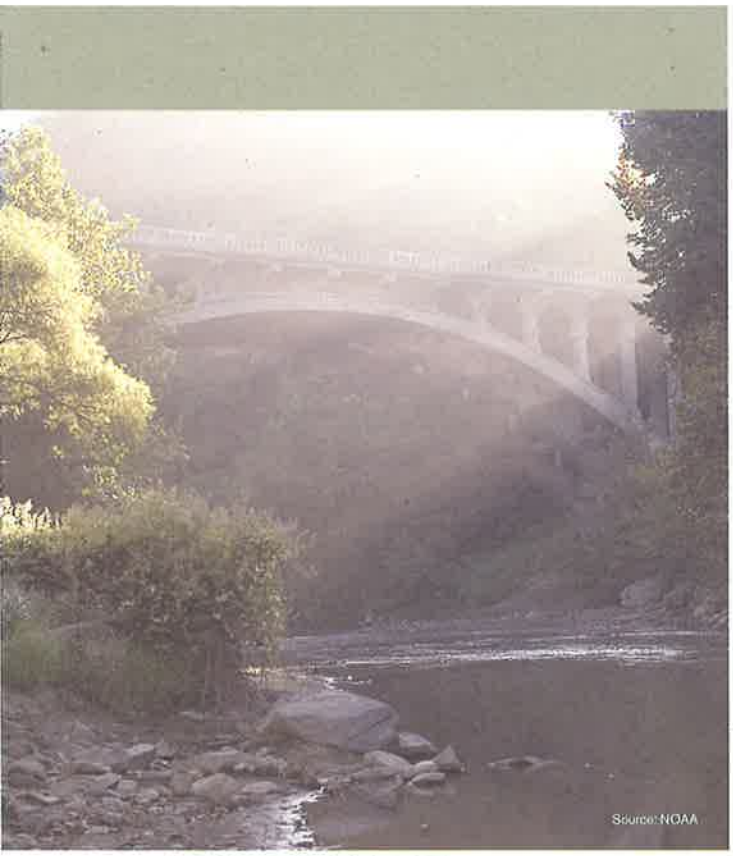
Federal agencies will complete these actions on a schedule to support states and the District as they develop draft and final Phase I Watershed Implementation Plans prior to EPA's establishment of the TMDL, draft and final Phase II Plans and commitments as part of the two-year milestone process described below.

Actions to support this accountability framework include:

- **Create a system for tracking and reporting for TMDL pollution reduction commitments and two-year milestone commitments.** EPA will work with other federal agencies, states, the District and local government partners to develop a draft design of a tracking and accountability system for pollution reduction actions, including the underlying information technology infrastructure. As the system evolves over time, it will track permit requirements; permitted dischargers; offsets for new or increased discharges; voluntary practices that meet EPA standards for installation, maintenance and verification; load reductions necessary to meet the Bay TMDL allocations at the local level; and related two-year milestones. EPA will complete the final Bay TMDL by December 31, 2010 and begin to use the system by January 31, 2011.
- **Improve mechanisms for tracking and forecasting land-use and land cover changes associated with water quality degradation.** EPA and USGS will build the capacity for tracking and reporting changes in land-use and land cover at local scales (counties and small watersheds) by July 2012. Components will be continuously added to the Chesapeake Bay Land Change Model to enhance its ability to characterize changes in land-use and land cover and support the development of future scenarios in the Chesapeake Bay Phase 5.3 watershed model. The results will be accessible as part of the information used in the CBP watershed model and USGS land-cover database, which will be used by the states and federal agencies to adjust Watershed Implementation Plans.

Take regulatory and other actions to support state and District plans to implement the TMDL. EPA will initiate a series of pollution control actions to support and complement the programs described in Watershed Implementation Plans.

- **Implement current regulations for concentrated animal feeding operations (CAFOs) and propose new regulations to more effectively achieve pollutant reductions necessary to meet the Chesapeake Bay TMDL.** EPA will conduct a review of each state's CAFO program by December 30, 2010 and work with the states to ensure that they meet the programmatic requirements of the 2008 CAFO rule. EPA will conduct a review of Chesapeake Bay states' technical standards for nutrient management by December 15, 2012 to ensure that they meet the requirements of the CAFO regulations.



Stormwater runoff affects places around the watershed. Improvements to the current stormwater program will have positive effects around the Bay.

EPA will also develop new CAFO regulations to more effectively address pollutant reductions necessary for the Bay TMDL. The rulemaking will consider expanding the universe of CAFOs by means which might include (but are not limited to) making it easier to designate an AFO as a CAFO or increasing the number of animal operations that would qualify as CAFOs. EPA will propose more stringent permitting requirements for land application of manure, litter and process wastewater, such as requiring next-generation nutrient management plans and off-site manure management. EPA plans to propose the CAFO rule by June 30, 2012 and to take final action on the proposal by June 30, 2014.

- **Implement improvements to the current stormwater program and initiate new national stormwater rulemaking with Chesapeake Bay watershed provisions.** EPA will initiate national rulemaking to control pollutant discharges from new development and redevelopment sites. EPA is considering other changes to strengthen the stormwater program, including expanding the area subject to municipal separate storm sewer system (MS4) regulations and setting new requirements for retrofitting existing discharges. EPA will propose additional provisions that would help to protect and restore the Bay. EPA plans to propose the stormwater rule by September 2011 and to take final action by November 2012.

  In the interim, EPA will encourage state NPDES programs to incorporate more objective and enforceable permit provisions in stormwater permits prior to promulgation

of a revised regulation. In April 2010, EPA issued for public comment the District of Columbia MS4 permit. The provisions of this draft permit may serve as a model for MS4 permit for throughout the Bay watershed jurisdictions.

In addition, by July 31, 2010, EPA will publish an "MS4 Storm Water Permitting Approach for the Chesapeake Bay Watershed" which will identify the key regulatory and water quality performance expectations for the next generation of Phase I MS4 stormwater permits. This new approach will be enforced through EPA's oversight review of draft permits.

EPA will also work with states as they develop and review by January 1, 2015, all proposed Phase I MS4 permits, Phase II MS4 general permits, construction general permits and their supporting regulations to ensure that the permits meet regulatory requirements, are enforceable and will meet water quality requirements.

As a result of these actions, all stormwater permits will be strengthened and will have appropriate conditions to better protect the Chesapeake Bay.

- **Engage in early dialogue with Bay states and the District regarding how EPA will determine if state programs achieve TMDL pollution reduction goals and meet minimum federal program elements for stormwater and Concentrated Animal Feeding Operations.** EPA will meet with the states and District following EPA's establishment of the Chesapeake Bay TMDL and at key decision points during rulemaking to discuss EPA's position on key issues such as how frequently EPA would review state programs, how the rules would apply in states that have approved Watershed Implementation Plans and meet their two-year milestones, and any minimum program elements for transparency and accountability.

- **Reduce pollution from wastewater dischargers.** By January 1, 2015, EPA will review all new or reissued NPDES permits for significant municipal and industrial wastewater dischargers submitted by Bay jurisdictions to ensure that the permits are consistent with the applicable Bay water quality standards and

the Bay TMDL wasteload allocations. EPA could impose more stringent requirements on wastewater dischargers if: 1) a jurisdiction's initial Watershed Implementation Plan does not adequately demonstrate that pollution controls and loading reduction practices from all source categories, including nonpoint sources, would be implemented on a schedule to have all controls needed to meet clean water goals in place by 2025; or 2) if a jurisdiction does not fully implement its two-year milestones.

EPA will issue an NPDES permit for the Washington, D.C.-area Blue Plains treatment plant (the largest publicly owned treatment plant in the Bay watershed) that incorporates stringent new limits by June 2010, or as soon thereafter as EPA concludes consultation under the Endangered Species Act with the National Marine Fisheries Service.

- **Reduce pollution from septic systems.** By June 30, 2013, EPA will develop a model program with general recommendations for activities to reduce pollution from septic systems in the Chesapeake Bay watershed. As part of the model program, EPA will also encourage states and local governments to develop and implement regulations and policies that reduce impacts from septic systems. EPA will track state progress in adopting the model program or similarly effective programs through a report card-approach identifying the numbers of septic systems upgraded or replaced and progress toward reducing nitrogen loads from septic systems.
- **Reduce pollution from atmospheric deposition.** EPA will significantly reduce nitrogen deposition to the Bay and watershed by 2020 by implementing programs to remedy air pollution under the Clean Air Act that will reduce nitrogen emissions from electric utilities, other industrial point sources, and on- and off-road vehicles, including ships.

  EPA will account for air deposition of nitrogen in the load allocations in the TMDL. By including air deposition in the TMDL load allocations, states will benefit from federally mandated emission reductions achieved by Bay states as well as those achieved by other states within the airshed. Furthermore, states may be adopting their own regulations to reduce nitrogen emissions to meet the national ambient air quality standards as part of the state implementation planning (SIP) process. States any will also be able to take credit that go for nitrogen emission reductions that go beyond federal emission control measures.

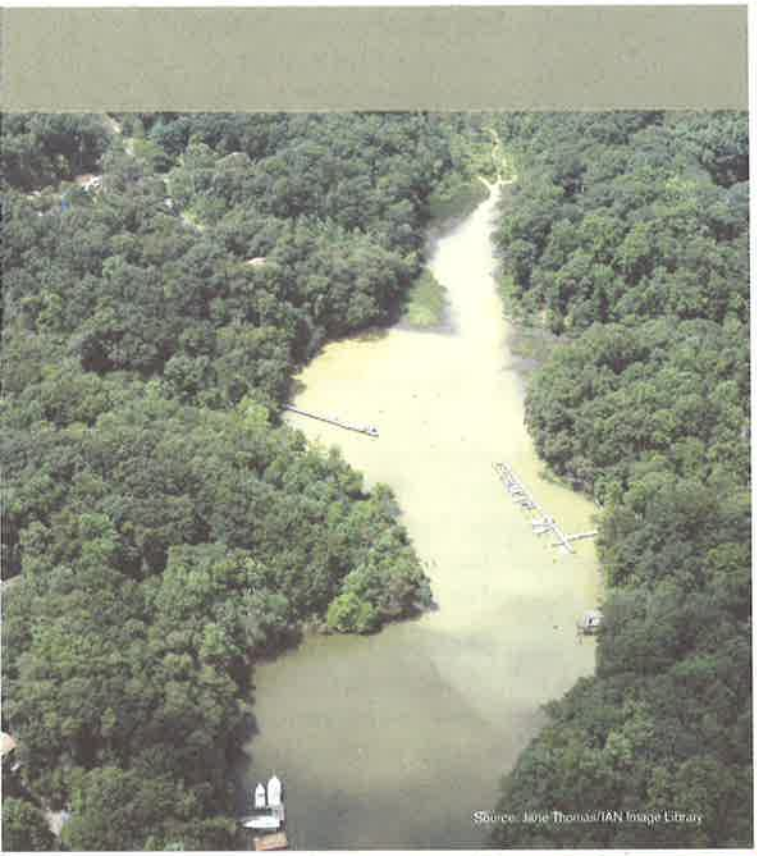
  In addition to these regulatory efforts, EPA will continue to pursue enforcement actions, where appropriate, to reduce nitrogen loading to the Bay. These actions may target significant sources of NOx emissions within the Chesapeake Bay airshed. In addition EPA may investigate ammonia emissions from agricultural sources within the Chesapeake Bay watershed.
- **Reduce costs and provide flexibility through trading and development of protocols and programs for offsetting new and expanded discharges of nutrients and sediment.** EPA will work with states, USDA and other federal agencies to explore opportunities to further support the use of trading among pollution sources to achieve water quality goals cost effectively, including opportunities for inter-state trading. In addition, Watershed Implementation Plans may address projected new or increased

pollution loads by requiring that they be offset by reductions from other sources. See additional discussion in the Environmental Markets chapter.

- **Reduce pollution through enforcement and compliance efforts.** EPA will implement a Chesapeake Bay Compliance and Enforcement Strategy that is a multi-year, multi-state, multi-source strategy that addresses violations of federal environmental laws resulting in nitrogen, phosphorus, sediment and other pollution. Key elements of the strategy include:
  - Identifying industrial, municipal and agricultural sources releasing significant amounts of pollutants, particularly nitrogen, phosphorus and sediment, in excess of the amounts allowed by the Clean Water Act, the Clean Air Act and other applicable environmental laws.
  - Identifying nutrient and sediment impaired watersheds, as well as significant regulated sources discharging these and other pollutants in violation of their requirements under federal environmental laws.
  - Targeting key regulated business sectors that, when in non-compliance with applicable environmental regulations, contribute significant amounts of nutrients, sediment and other pollutants into the Bay including:
    - Concentrated animal feeding operations (CAFO);
    - Municipal and industrial wastewater facilities;
    - Storm Water National Pollution Discharge Elimination System (NPDES) point sources including Municipal Separate Storm Sewer System (MS4s) and stormwater discharges from construction sites and other regulated industrial facilities; and
    - Air deposition sources of nitrogen regulated under the Clean Air Act, including power plants.
  - Identifying appropriate opportunities for compliance and enforcement activities related to the Clean Water Act Section 404 program that regulates discharges of dredge and fill to waters of the U.S.
  - Identifying compliance and enforcement opportunities related to federal facilities, and Superfund sites, including remedial action and removal sites, and Resource Conservation Recovery Act corrective action facilities.
  - Exploring opportunities to use imminent and substantial endangerment authorities (including CWA section 504, SDWA section 1431, RCRA section 7003, CERCLA section 106, and Clean Air Act section 303) to address significant pollution problems affecting the Bay.

Investigations and inspections will be targeted as follows:

- The Delmarva peninsula, south-central Pennsylvania and the Shenandoah Valley for CAFOs
- Significant wastewater treatment plants as designated by the Bay states based on design flow or nitrogen and phosphorus loading, which are in noncompliance with nutrient-related requirements
- Geographic areas with high nitrogen and phosphorus loadings and counties with high rates of growth and development for stormwater NPDES point sources
- The Elizabeth, Anacostia and Patapsco (Baltimore Harbor) rivers for toxic contaminants.



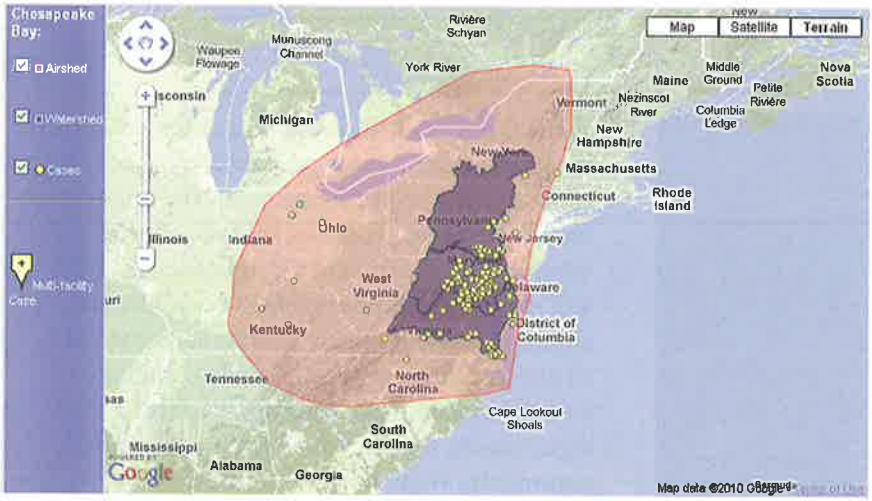
Each federal agency will adopt an agency-specific policy that defines administrative and management controls needed to ensure implementation of the stormwater requirements for new development and redevelopment in Section 438 of the Energy Independence and Security Act.

While EPA plays an important enforcement role in the Bay states, the states themselves are critical, conducting a large percentage of the compliance monitoring (e.g., compliance inspections, compliance assistance) and enforcement. EPA will closely plan and coordinate compliance and enforcement efforts with its state partners to ensure robust watershed-wide compliance and enforcement programs that establish clear expectations for the public and the regulated community regarding compliance.

- **EPA will coordinate with the Clean Water State Revolving Fund managers to build cooperation and partnership in using resources to better protect the Chesapeake Bay.** Under the Clean Water State Revolving Fund (CWSRF) appropriation and American Recovery and Reinvestment Act, the Bay states and District received $1.475 billion in 2009 and 2010 which they can use to fund projects that help local governments reduce nitrogen, phosphorus and sediment pollution affecting the Bay. Under the President's 2011 Budget, the Bay states and District would receive an additional $431 million in Clean Water SRF funding.

  EPA is coordinating with the Bay state CWSRF programs and convened a meeting in April 2010 with state program managers to discuss activities each CWSRF may take to support implementation, including potential new initiatives and innovations. This collaboration will continue and help state CWSRF programs market their programs to prospective recipients in the Bay watershed.

  EPA will work with Maryland Department of the Environment (MDE) on a pilot project to identify possible revisions to Clean Water State Revolving Fund documents. Work will



EPA's Chesapeake Bay compliance and enforcement strategy addresses violations of federal environmental laws resulting in nutrient, sediment and other pollution in the Bay watershed and airshed. An online map provides information on enforcement actions and cases since 2009. This snapshot of the map reflects enforcement actions from January 2009 through April 2010. Access the map at http://www.epa.gov/compliance/civil/initiatives/progress-chesapeakebay.html

begin in 2010 to provide MDE with technical assistance for proposed changes that will encourage use of CWSRF to fund projects that promote sustainable communities.

- **Provide states and the District with additional grants for regulatory and accountability programs.** In 2010, EPA received an increase of $11.2 million to initiate new Chesapeake Bay Regulatory and Accountability Program grants. These new funds are in addition to the $8.9 million that EPA provides annually to the states in the Chesapeake Bay Implementation Grants program. EPA expects to maintain this funding level in 2011. These new funds are intended to support state work to develop and implement additional regulatory and accountability programs to control urban, suburban and agricultural runoff in the watershed. These new grants will also help states to develop new regulations, design TMDL Watershed Implementation Plans, reissue and enforce permits, and provide technical and compliance assistance to local governments and regulated entities. Consistent with Section 202 (c) of the Executive Order, in 2011 these grant funds are being "targeted...to better protect the Chesapeake Bay and it tributary waters, including resources under the Clean Water Act." In addition, beginning in 2011, EPA will be targeting its other Clean Water Act funds (e.g., Chesapeake Bay Implementation Grants) in the Chesapeake Bay watershed to better protect the Bay and its tributaries.

- **Pursue funding of stream restoration grants.** EPA will, by December 2010, complete an assessment of options to direct existing funds from other program areas to support increased funding for stream restoration grants. If these funds become available, they would be targeted and directed for use at a local government, local watershed and community-based level.

- **Launch the Chesapeake Bay/Anacostia Green Streets-Green Jobs Initiative.** In October 2010, EPA, through collaboration with public and private partners, will initiate a pilot grassroots effort, targeting towns and communities in urbanized watersheds to help retrofit and create "green streets" that enable sustainable watershed protection, accelerated implementation of green infrastructure stormwater management through low-impact development practices, renewable energy use, green jobs creation and greater connectedness and access to restoration opportunities. Specific actions include:

- Pilot the Green Street-Green Jobs Academy to bring a town's "Green Vision" together with tools to accelerate local greening efforts. The Academy is intended to build a better pipeline for federal and state support to grassroots greening efforts, as exemplified by the Edmonston, MD "Green Street" project.

  Starting in the Anacostia River watershed, EPA will work with the District, Maryland, the Chesapeake Bay Trust, the Region 3 Green Highways Partnership, and other key public and private partners to leverage resources that create green jobs and help participating towns integrate green street and green community plans into their local plans. For example, EPA will hold the first regional Green Streets-Green Jobs training forum in Anacostia in fall 2010 and hold three additional training forums throughout the watershed in 2011-2103.

  EPA will work with up to 10 demonstration communities per year for the next three to five years to create Green Streets-Green Jobs plans and designs that support local and Bay water quality and watershed protection plans. EPA will use pilot results to expand work to additional small to mid-sized urbanizing towns in the Chesapeake, based upon local stakeholder interest and available capacity.

Ensure the federal government leads by example in reducing pollution from federal lands and facilities. In addition to supporting development of state Watershed Implementation Plans, federal lands and facilities managers will take the following actions:

- Each federal agency will adopt an agency-specific policy that defines administrative and management controls needed to ensure implementation of the stormwater requirements for new development and redevelopment in Section 438 of the Energy Independence and Security Act,

Riparian buffers established in the Shenandoah Valley through the Conservation Reserve Enhanvement Program provide both water quality and wildlife habitat benefits.

consistent with guidance developed by EPA in coordination with other federal agencies. This policy should include mechanisms for producing an annual internal agency action plan and progress report and be in place by December 2010, with implementation beginning in 2011. The results of each federal agency's actions to comply with Section 438 of EISA will be published as part of the Annual Progress report issued under the direction of the Executive Order.

- **Implement sustainable land management practices and programs into all federal capital improvements, public works management and energy management projects.**
  - As directed by Section 502 of the Chesapeake Bay Executive Order, EPA will publish guidance for federal land management activities in the Bay watershed by May 2010. This guidance addresses agriculture, urban/suburban development, septic systems, forestry, buffers and hydromodification. As directed by Section 501 of the Executive Order, each federal agency with land, facilities or installation management responsibilities affecting 10 or more acres in the Chesapeake Bay watershed will implement the Section 502 guidance as expeditiously as practicable and to the extent permitted by law.
  - Federal agencies will incorporate Section 502 guidance considerations as part of their overall strategy to meet load reductions assigned to them by states and the district under Chesapeake Bay TMDL WIP Phase II plans.
- **Ensure that stormwater impacts are minimized as part of environmental review of federal-aid highway projects and other federally-assisted transportation projects.** In 2010, DOT will issue a letter encouraging state and District DOTs to implement projects to address stormwater issues relating to existing federal-aid roadways, including using federal transportation funds eligible under environmental restoration for projects to address stormwater management problems.

AGRICULTURAL CONSERVATION OUTCOME:

Work with producers to apply new conservation practices on four million acres of agricultural working lands in high-priority watersheds by 2025 to improve water quality in the Chesapeake Bay and its tributaries. (Current condition: Of the approximately eight million acres of agricultural working lands in high-priority watersheds, approximately four million acres are identified as having soils with the highest potential for leaching and runoff, which may affect water quality. The four million-acre target is to apply or expand conservation treatment on virtually all of these most vulnerable agricultural lands.)

Action Overview:

- Focus resources on priority watersheds and agricultural conservation practices to assist states in implementing their Watershed Implementation Plans.
- Accelerate agricultural conservation adoption by working with partners to leverage funding and simplify program participation.
- Accelerate development of new agricultural conservation technologies.
- Develop a system of accountability for tracking and reporting conservation practices.

Focus resources on priority watersheds and practices for agriculture to assist states in implementing their Watershed

Implementation Plans (WIPs). USDA will target funding to key watersheds to assist states in meeting two-year milestones as identified in their WIPs. Focusing on the most economically and environmentally effective conservation practices can improve program efficiency in reducing nitrogen, phosphorus and sediment delivery to the Chesapeake Bay and tributary waters.

- **Target efforts at watersheds that contribute the most nitrogen, phosphorus and sediment.** Continuing its 2009 effort, USDA will collaborate with EPA, USGS, FWS, state governments and conservation districts to identify watersheds with the highest nitrogen, phosphorus and sediment delivery to the Bay and its tributary waters. USDA will work with these partners to apply best available science, through a process of adaptive management, to identify and treat lands within high-priority watersheds that are most vulnerable to leaching and runoff.

  USGS will provide updated information in 2011 on areas of high sediment loads reaching the Bay to support prioritizing conservation actions. USDA, in partnership with the states, will complete an evaluation of priority watersheds and identify any revisions to the priority list by October 2012, and every two years thereafter through 2025.
- **Identify the most effective conservation practices.** USDA will align program delivery to emphasize the priority practices used by the states to reach their two-year milestones. Throughout the WIP development process, USDA will work with the states to identify the suite of conservation practices with greatest potential to reduce nitrogen, phosphorus and sediment losses. As states revise their two-year milestone commitments, USDA will help inform priority practice selection through scientific studies such as the Conservation Effects Assessment Project.

Accelerate conservation adoption by working with partners to leverage conservation funding and simplify program participation. While agriculture has substantially reduced runoff of nitrogen, phosphorus and sediment, there is more to be accomplished. Increasing technical and financial assistance through collaboration with states and conservation partners can help accelerate practice implementation.

- **Leverage funding for conservation in the Chesapeake Bay watershed.** In 2010, USDA will use its authorities under the Cooperative Conservation Partnership Initiative to focus resources on the Chesapeake Bay watershed. This program provides a unique opportunity to leverage partner resources and increase outreach to accelerate conservation progress. Up to $5 million will be made available for partnership agreements in the Chesapeake Bay watershed in fiscal year 2010.
- **Utilize EPA funding for agriculture challenges.** EPA will coordinate funding opportunities with USDA to accelerate nitrogen, phosphorus and sediment reductions in priority watersheds and tackle key agriculture challenges. Examples of funding opportunities include the EPA 319 Program, State Revolving Fund, CWA section 117 and STAR grants. The coordination of these federal resources will help states and the agriculture community to address the many environmental challenges within the Chesapeake Bay watershed. Coordination of funding has increased in 2010 and will continue through 2025.
- **Establish showcase projects in small watersheds.** Beginning in 2010, USDA will establish showcase projects in small watersheds to test and monitor the benefits of a focused, highly partnered, voluntary approach to conservation. USDA will use Chesapeake Bay

Watershed Initiative funding and leverage funds from states and other conservation partners to implement conservation projects in several small watersheds. The watersheds are small enough (about 30,000 to 40,000 acres) so that an increased outreach effort can reach 100 percent of the agricultural producers in each watershed.

- **Monitor the results of showcase projects.** Beginning in 2010, USDA will work with USGS and other partners to develop a strategy for evaluating increased conservation efforts in showcase projects. USGS will work with partners to implement water-quality monitoring in 2011, which is expected to be needed for 10 years (see supporting science for more information). This information will be used to adapt and expand projects to test new situations and transfer successes throughout the Chesapeake Bay watershed.
- **Simplify conservation planning for producers.** By 2012, USDA will implement improved conservation planning technologies developed through the Conservation Delivery Streamlining Initiative. The improved tools will simplify resource assessment and conservation planning, which will make it easier for producers to participate in conservation. In addition, this initiative will reduce the administrative workload on field staff, allowing for increased time available to directly assist agricultural producers.

Accelerate development of new conservation technologies. Current conservation technologies and tools, such as conservation tillage and comprehensive nutrient management, have demonstrated successes in reducing nitrogen, phosphorus and sediment losses from agricultural operations. Progress toward improving the condition of the Chesapeake Bay watershed will be accelerated by expanding and improving the conservation toolbox.

- **Fund research and development of conservation technology.** USDA will align grant funding with key resource challenges to foster increased public-private research partnerships and encourage development of new technologies that provide environmental benefits as well as increased revenue opportunities. In 2010, USDA will make up to $5 million available in Conservation Innovation Grants to foster technology innovation and development to address the most pressing issues facing agriculture and conservation in the Bay watershed. In addition, beginning in 2011, USDA will work with other granting partners to avoid duplication of granting efforts and maximize the efficiency of program resources.
- **Evaluate effectiveness of next generation conservation tools.** USDA and EPA will work with states and agricultural and environmental research partners to evaluate the next generation of conservation tools and technologies. Beginning in 2010, a strategy will be developed for assessing new technologies and management practices and their nitrogen, phosphorus and sediment reduction benefits in order to accelerate their use throughout the watershed. As new conservation tools and technologies become available, states can incorporate their implementation into their two-year milestone goals.

Develop a system of accountability for tracking and reporting conservation practices. Full accounting of conservation practices applied to the land is a necessary data input for improving the quality of information and ensuring that the practices are properly credited in the Bay model. In development of this system, USDA will uphold all privacy requirements as called for in Section 1619 of the 2008 Farm Bill.

- By December 2011, USDA and EPA will work with state and local partners to expand existing tracking and reporting systems for conservation practices, best management practices and treatment technologies to ensure reporting and tracking at local scales of implementation – counties, conservation districts and/or small watersheds.
- By July 2012, mechanisms for tracking and reporting of voluntary conservation practices and other best management practices installed on agricultural lands will be developed and implemented.

TOXIC CONTAMINANTS:

Addressing the significant problem of toxic pollutant contamination in the Bay and its watershed is a key element of this strategy. At this time, federal agencies have substantially less information on which to base specific goals and strategies for toxics reduction than for nutrients and sediments. As described below, federal agencies are committed to working with state and local governments and stakeholders to significantly expand understanding of this problem and to develop contaminant reduction outcomes by 2013 and strategies by 2015.

Toxic contaminants in the Bay and its watershed come from several sources. Some of these toxic contaminants are a "legacy" from past pollutant discharges. Some toxic contamination comes from stormwater that carries metals and combustion byproducts (e.g., PAHs) and previously-contaminated soils into the waterways. In the case of mercury, air emissions from the Bay states contribute about one-third of the loadings – more than half is from global sources outside the United States. During the past decade, a number of "emerging" contaminants have been identified that are associated with a variety of possible sources, including pharmaceuticals and personal-care products.

The environmental and human health risks of these contaminants are significant. Toxic contaminants pose health risks to people including potentially higher incidence of cancer by consuming fish. Some toxic contaminants in the Bay watershed have already been shown to impact the reproduction systems of fish and wildlife. Emerging contaminants may further impact the health of fish and wildlife and potentially pose new risks to people in the Bay watershed. Possible impacts on fish and wildlife include greater susceptibility to disease and infections, compromised reproductive systems (such as "intersex" in some fish in the Potomac river), lesions and death.

EPA, DOI and NOAA will work with state and local governments and stakeholders to expand understanding of the extent and seriousness of the toxic contaminant problem in the Bay and its watershed and to develop contaminant reduction goals by 2013.

- During 2011 and 2012, the USGS, FWS, NOAA and EPA will examine existing monitoring information from regional and national programs and compare existing toxicity benchmarks to the monitoring results. In November 2012, after coordinating with the Chesapeake Executive Council and federal partners, EPA will issue a report summarizing this information. The report will also include an assessment of the progress of management actions taken to date pursuant to the Chesapeake Bay Basinwide Toxins Reduction and Prevention Strategy.
- DOI will coordinate with EPA on sampling chemicals in the Bay watershed. The focus will include sampling of selected fish species

that have already shown impacts from toxic contaminants, other key indicator species (such as brook trout), and water and sediment samples. Results from an ongoing assessment of emerging contaminants in the Potomac River will be available in 2013. Assessments for the two other largest river basins in the Chesapeake Bay watershed (Susquehanna and James Rivers) will be conducted by 2017 to provide additional information on any emerging contaminants that may pose risks to tidal segments and their respective biotic communities.

- EPA will work with DOI, the Bay states, the District and stakeholders to develop toxic contaminant reduction goals by 2013.

EPA will work with DOI, states and stakeholders to develop strategies for reducing toxic contaminants by 2015. USGS will supply information from the contaminant assessments to assist FWS and EPA in prioritizing the types and locations of control measures. The strategies may be refined in 2017 as additional information on emerging contaminants in the Bay watershed becomes available. The strategies will address environmental justice issues of concern in the Bay watershed. Agencies will also act now to reduce toxic contamination.

- As described previously, EPA will develop new regulations for stormwater pollution and, in the interim, work to strengthen stormwater permits. These actions have the potential to reduce loadings of metals, combustion byproducts (e.g., PAHs) and PCBs that reach the Bay and local waterways.
- EPA is now implementing a multi-regional initiative to reduce impacts from mountaintop mining, acid mine drainage, Marcellus shale-gas extraction and flue gas desulfurization at coal-fired power plants. USGS and FWS will work with EPA to assess the potential impacts of Marcellus Shale-gas extraction on streams and habitats. Some of these actions have already reduced discharges to the Bay and its tributary waters. This work will be integrated with the control strategies to be developed by 2015.
- EPA is actively engaging in compliance and enforcement activities related to the Clean Water Act programs regulating dredge and fill operations and federal facilities, and taking action to reduce the release of toxic contaminants from Superfund sites and facilities regulated under the Resources Conservation and Recovery Act. This includes a continued emphasis on reducing contaminants in the Elizabeth River, Anacostia River and Patapsco River. NOAA is providing scientific support to maximize the effectiveness of these cleanups and restoring injuries to natural resources. This work will be included within the control strategies to be developed by 2015 and will be expanded as appropriate.
- FWS will promote take-back programs for selected pharmaceuticals and other compounds of concern.

EXAMPLES
AROUND THE WATERSHED

- Results from an ongoing assessment of toxic contaminants in the Potomac will be available in 2013 and used to help develop a numeric outcome for contaminants.
- In 2011, USGS will develop a groundwater model of the Delmarva Peninsula to predict "lag time" of nitrogen pollution based on the amount of time it takes nitrogen to move through groundwater and into streams, creeks and rivers.
- Investigations and inspections will be targeted in areas contributing pollutants to the watershed, including:
  - The Delmarva peninsula, south-central Pennsylvania and the Shenandoah Valley for CAFOs
  - Significant wastewater treatment plants, which have been designated by the Bay states based on design flow or nutrient loading, throughout the Bay watershed
  - Geographic areas with high nitrogen and phosphorus loadings and counties with high rates of growth and development for stormwater NPDES point sources
  - The Elizabeth, Anacostia and Patapsco (Baltimore Harbor) rivers for toxic contaminants
- EPA issued the District of Columbia municipal separate storm sewer (MS4) permit to serve as a model MS4 permit for Bay watershed jurisdictions.
- EPA will issue an NPDES permit for the Blue Plains treatment plant (the largest publicly owned treatment plant in the Bay watershed)
- USGS and EPA will work with states to explain changes in water quality and the effects of management actions in the major drainage areas (Susquehanna, Potomac, James, and Delmarva) in the Bay watershed.

Federal agencies will provide enhanced research, monitoring and models to support prioritizing, monitoring and evaluating the effect of management actions to improve water-quality conditions.

Prioritize the types and locations of management actions

Improve computer models used to guide restoration activities. Federal agencies will improve models and efforts to priorize actions including:

- **Use results from watershed models to prioritize locations of actions.** In 2011, USGS and EPA will provide results from the newly updated watershed models to help USDA, FWS and the states focus water-quality actions in the areas of highest nutrient and sediment loads to the Bay.
- **Develop groundwater models.** USGS will develop groundwater models of key areas to predict "lag time" of nitrogen pollution (and pollution reductions) based on the amount of time it takes nitrogen to move through groundwater and into streams, creeks and rivers. In 2011, USGS will provide a model of the Delmarva Peninsula.
- **Ensure availability of Bay forecasts and modeling results.** NOAA is actively developing and running several models of Chesapeake Bay processes and will make results, forecasts and products available to Chesapeake Bay partners and decision-makers. USGS will provide river flow and nitrogen and phosphorus load information to NOAA so they can improve several models and forecasts including:
  - Harmful Algae Bloom forecasts;
  - Hypoxia forecasts;
  - Circulation and coastal water level via the operational Chesapeake Bay Observational Forecast System model;
  - Operational and scenario modeling of coastal and overland inundation through the Chesapeake Inundation Prediction system and the proposed Chesapeake Bay Coastal Estuary River Information System; and
  - High-resolution operational meteorological analyses and forecasts.

Monitor

Federal agencies will work with state partners to improve monitoring of pollution loads and/or levels in the Bay watershed, reporting of management practices and attainment of water-quality standards in the Bay. This will occur as part of the Chesapeake Monitoring Alliance. Specific actions include:

- **Improve water-quality monitoring in the watershed.** EPA and USGS have worked with states to identify urban, suburban and agricultural areas where sites are needed to improve watershed monitoring for nitrogen, phosphorus and sediment. In 2011, EPA and USGS will work with partners to evaluate existing programs and identify new opportunities to add sites in 2012 and 2013.
- **Improve tracking of management actions and land-use activities.** EPA and USGS will work with the states to improve tracking and verification of the implementation of conservation practices and land activities on agricultural, suburban and urban lands. The information will be used to assess the effect of water-quality actions on reducing nutrients and sediment.
- **Monitor and assess restoration activities in small urban and agricultural watersheds.** USDA, USGS and EPA, working with state and local partners, will plan and initiate monitoring of water quality conditions in agricultural and urban watersheds to help document the effectiveness and cost-effectiveness of restoration actions. In 2011,

agencies will begin baseline monitoring in three USDA showcase watersheds and two urban watersheds. Monitoring will be needed for at least 10 years and additional assessment activities, including preparation of water-quality models, will be needed to assess effectiveness of restoration activities.

- **Improve monitoring and assessment of stream conditions.** EPA, USGS and FWS will work with the states to improve monitoring of stream conditions in the watershed. In 2010 and 2011, monitoring to support the current stream health indicator will be examined to better address changes over time. Additionally, other information on the physical condition of streams, such as bank stability and floodplain connectivity, will be considered to help improve the stream health indicator.
- **Improve monitoring of tidal waters.** A tidal monitoring component of the Chesapeake Monitoring Alliance will expand tidal monitoring for water-quality information needed to better manage fish and wildlife. In 2010 and 2011, NOAA and EPA will work with Maryland, Virginia and academic partners to identify and implement the best opportunities to improve Bay monitoring. NOAA will collect and distribute satellite ocean remote sensing data covering the Bay in 2010 and beyond.
- **Expand NOAA buoy system to improve water quality monitoring and assess new sensors for monitoring emerging contaminants.** As a contribution to the Monitoring Alliance, NOAA will improve and expand the Chesapeake Bay Interpretive Buoy System (CBIBS). In 2011, NOAA will continue to monitor changes in water quality and explore new sensors and observing techniques to support monitoring, assessment, modeling and decision tools, focusing on the tidal mainstem of the Bay. By 2012, NOAA will introduce and test a new smaller CBIBS buoy for use in tributaries. Monitoring buoys in tidal tributaries, including shallow water sites can provide instantaneous data on dissolved oxygen, turbidity, pH, chlorophyll-a that are useful for regulatory review. Changes in the quality of shallow water areas are the best indicators of local water quality degradation, including effects from septic seepage, dredging storm water discharge and shoreline construction impacts.
- **Evaluate water-quality changes and progress to adjust management actions.** EPA, USGS, NOAA and the Bay jurisdictions will work with state and academic partners to explain water-quality changes and progress toward water quality standards and the Bay TMDL. USGS and EPA will work with states to explain changes in water quality and the effects of management actions in the major drainage areas (Susquehanna, Potomac, James, and Delmarva) in the Bay watershed. Partners will explain water quality changes and progress toward standards in the Bay. Work will begin in 2012 and be completed prior to the 2017 "mid-point" assessment of the Bay TMDL.
- **Ensure TMDL allocations account for climate change impacts.** EPA and USGS will work in conjunction with the states to conduct an analysis by 2017 to consider accounting for uncertainties of climate change in TMDL allocations. USGS has begun initial assessment of changes in pollution loads in the watershed under different climate and land-use scenarios. Initial results will be available in 2012 and be used to further plan assessments for TMDL allocations. Enhanced assessment will begin in 2016.

EXAMPLES OF STATE AND DISTRICT ACTIVITIES

Pennsylvania WIP Development

Pennsylvania's Chesapeake Watershed Implementation Plan will build upon three core elements that have already shown success. The first is milestone implementation and tracking. Pennsylvania will accelerate existing programs including erosion and sedimentation regulations for animal heavy use areas and mandatory 150-foot riparian forest buffers for impaired exceptional value and high quality streams. Pilot projects are underway to collect data on best management practices in place that were not supported by public funding. New technology and nutrient trading is the second core element. Enhanced regional methane digesters are being promoted to digest manure, produce electricity and substantially reduce nitrogen and phosphorus pollution. To facilitate the nutrient trading market, efforts are underway to create a Bank and Exchange in PennVEST that would buy and sell nutrient credits. Eight non-point source to point source trades have been completed. The third element focuses on compliance. Pennsylvania's Chesapeake Bay Agricultural Water Quality Initiative will use a targeted watershed approach to achieve agricultural compliance. Pennsylvania's Point Source Compliance Plan will continue to be implemented. Permits for the 63 Phase I wastewater treatment plants (85 percent of the load) have been issued.

NPDES Permit for the District's Municipal Separate Storm Sewer System

The District has been working very closely with EPA Region 3 to develop an MS4 permit and Stormwater Management Program that has many positive attributes that will help improve local watersheds and the Chesapeake Bay. The permit requires the District to implement specific measures such as installation of a certain number of trees and green roofs, enhancing street sweeping in the city, and requiring broad application of low-impact development (LID) practices. The District is implementing these initiatives in the hope that they will contribute in a measurable way to the Chesapeake Bay TMDL. EPA Region 3 has recently labeled the District's MS4 permit as a model for the Chesapeake watershed.

Enforcing the Federal Energy Independence & Security Act of 2008 in the District

The District is currently working with federal agencies in the city to implement stormwater management requirements established by Section 438 of the federal Energy Independence and Security Act of 2008 (EISA). Currently, all new federal development and redevelopment projects over 5,000-square-feet within city limits are subject to the District's stormwater management regulations. This process requires proposed development to have a stormwater management plan to reduce runoff and the pollutants carried into District waterways. Under EISA, federal agency facilities are required to retain stormwater runoff equivalent to the 95th percentile rain event, which in the District is 1.7 inches. The District Department of the Environment (DDOE) is working with federal agencies, including EPA, to implement and enforce the requirements of EISA in any new stormwater management plans developed for federal properties located within city limits. The District hopes that this initiative will greatly enhance water quality in local waterways, as well as the Chesapeake Bay.

RiverSmart Homes

To address stormwater runoff in residential areas, the DDOE initiated the RiverSmart Homes program to provide incentives for homeowners to install best management practices on their properties. The District currently offers up to $1,200 per homeowner to install one, or several, of the following landscape enhancements to help reduce stormwater runoff: shade trees, rain barrels, pervious pavers, rain gardens and bayscaping.

Green Roof Incentive Program

Since the early 2000's, the District has been working to install green roofs on new and existing buildings throughout the city. Green Roofs sequester stormwater and pollutants, such as nitrogen and phosphorus, before they enter local waterways. In cooperation with DC Greenworks, DDOE has implemented a subsidy program providing $5 per square foot for installation of green roofs up to 4,000 square feet in size on new and existing properties. In cooperation with the Anacostia Watershed Society, DDOE has implemented a subsidy program providing $7 per square foot for new buildings with green roofs over 4,000 square feet. The District currently has the second highest number of green roofs in the nation, behind only Chicago.

Maryland's Enhanced Nutrient Removal

Maryland's Enhanced Nutrient Removal (ENR) strategy focuses on a consistent application of best available technology at all major wastewater treatment plants, with a stringent level of nitrogen to be achieved in the effluent of 4 mg/l. This strategy has the added value of consistent and mandatory reporting and, if necessary, enforcement. The Bay Restoration Fund that pays for the ENR upgrade is also an example of an approach to raise the resources, funding in this case, that will be necessary to achieve the restoration goals.

Potomac Headwaters Water Quality Report

The West Virginia Department of Agriculture released the Potomac Headwaters Water Quality Report which summarizes 10 years of monitoring date collected from 114 sites in 10 watersheds. This comprehensive report presents the findings of the program for parameters such as temperature, dissolved oxygen, pH, conductivity, total phosphorus, ammonia-nitrogen, nitrate-nitrogen and fecal coliform.

West Virginia Two-Year Milestones

West Virginia is working on developing a trading program and identifying funding options for upgrades to wastewater treatment plants. The funding sources in West Virginia's two-year milestones are in place for implementation of the planned practices. The development of the nutrient trading program slated to be in place by 2011 will increase opportunities for nitrogen and phosphorus reductions.

Pennsylvania's Growing Greener Program

Pennsylvania's Growing Greener grant program supports nitrogen, phosphorus and sediment reduction activities with emphasis on targeted watersheds, including those in the Chesapeake Bay watershed. Growing Greener is focused on restoring streams that are biologically impaired. Water quality improvements are tracked and documented. Growing Greener is the largest single investment of state funds in Pennsylvania's history to address critical environmental concerns. Pennsylvania's total funding commitment to the Growing Greener Program is $1.3 billion through 2012. A permanent dedicated fee of $4 per ton on municipal waste disposal will insure funding into the foreseeable future.

EXAMPLES OF STATE AND DISTRICT ACTIVITIES CONT.

District Regulatory Initiatives on Toxics and Trash

The District has implemented two pieces of legislation that will help to improve conditions in local watersheds. With the passage of the city's Comprehensive Stormwater Management Enhancement Amendment Act of 2008, the District banned the use of coal tar pavement products on public and private property. Coal tar contains polycyclic aromatic hydrocarbons (PAHs), which are highly toxic chemicals that have been found to have harmful impacts on humans and animals, and are suspected to cause cancer. By banning use of coal tar, the District has ensured reduction of the introduction of PAHs through stormwater runoff into the District's waterways and Chesapeake Bay.

In 2009, the city ratified the Anacostia River Cleanup and Protection Act, also known as the "Bag Bill." This legislation placed a five cent fee on all plastic and paper bags used in local District businesses (e.g., grocery stores, pharmacies) in the hopes that there would be a reduction in the number of bags introduced as litter to District waterways. The District hopes this will help the city, and its regional partners, in meeting the goals outlined in the Trash Free Potomac by 2013 strategy.

Agricultural Conservation in Pennsylvania

Pennsylvania continues to implement the existing water quality requirements for animal manure storage, erosion and sedimentation control, and manure management. Pennsylvania has initiated revisions to regulatory and administrative tools, including ongoing revisions of regulations to address animal heavy use areas and near-stream activities, and the Manure Management Manual to address workable manure plan format, phosphorus, buffers, Animal Concentration Areas, incorporation and winter spreading of manure consistent with the approach taken in nutrient management program. Pennsylvania continues to work with county conservation districts and NRCS through the Chesapeake Bay Implementation Grant program to provide funds for 50 conservation district staff positions and 60 to 70 agriculture conservation projects annually. Pennsylvania also adopted a targeted watershed approach to assess and address agricultural issues, particularly in the Conowingo and Watson run watersheds.

Agricultural Conservation in Delaware

Delaware's Nutrient Management Law mandates that all farmers, golf courses and other nutrient handlers develop and implement phosphorus-limited nutrient management plans, maintain nutrient handling records, maintain nutrient certification, and submit an annual report. Since 2007, all farms requiring a nutrient management plan have developed one and implementation levels will be maintained into the future.

Delaware's Relocation Program moves poultry litter/manure from farms with insufficient land or high soil phosphorus levels to farms with nutrient needs or to alternative use facilities. This program has resulted in relocating almost all of the excess litter in Delaware, most of which comes from Chesapeake Bay watersheds. Over 50 percent of the excess litter was sent to alternative use projects such as the Perdue AgriRecycle fertilizer plant, which processed a total of 39,508 tons of Delaware's litter in 2009.

Delaware's Nutrient Management Commission continues to implement agreements with Delaware poultry companies (Allen's, Mountaire and Perdue). These agreements have resulted in the incorporation of the phytase enzyme in all feed, which helps poultry digest phosphorus and reduces the amount in litter. Phystase and other litter/manure amendments and handling practices have reduced the phosphorus content in litter by 30 to 40 percent. Agreements with poultry companies have also resulted in increased nutrient management education, certification and stewardship.

For the first time ever, Delaware was able to submit more detailed information regarding cover crop implementation. The watershed model recently incorporated best management practice effectiveness estimates for various cover crops, which vary depending on the date the crop is planted. In the past, Delaware just submitted total acres planted, but this year was able to differentiate between early and standard plantings and the crop species planted in most regions. This improved data tracking and reporting will help track progress toward Delaware's milestones goals.

Delaware's Nutrient Management Commission has approved a pilot program in the Choptank River and Gravely Branch watersheds in an attempt to fill data gaps on BMP implementation. Most of the agricultural BMPs that Delaware currently reports are part of cost-share programs, thus BMPs that are implemented voluntarily are not often credited in the Bay Program models. This pilot project will request additional information from roughly 100 farmers in the two watersheds about their nutrient applications and use of BMPs. This will establish better accountability for agriculture, paperwork relief and measurable nutrient and sediment load reductions. By law, all individual reports are protected from public view and data will only be disseminated in an aggregated watershed report. Each participating farmer will receive a minimum of one nutrient management continuing education credit for completing the report.

Eastern Panhandle Conservation District's Agriculture Enhancement Program

The Eastern Panhandle Conservation District and West Virginia Conservation Agency launched the state's first agriculture financial and technical assistance program. This program, designed to enhance agriculture production while protecting water quality, features cost share on several practices that protect water quality including cover crops, stream fencing, water systems, stream crossings and riparian buffers. To date, 84 farmers have enrolled in the program in Berkeley, Jefferson and Morgan counties. It is important to also note that according to the Chesapeake Bay model, these counties have some of the highest rates for nitrogen delivery from West Virginia.

Using NRCS financial and technical assistance, the Sussex Conservation District designed and installed a shallow-water area for wildlife.

EXAMPLES OF STATE AND DISTRICT ACTIVITIES CONT.

New York's Agricultural Environmental Management

New York's Agricultural Environmental Management (AEM) program has aided farmers in protecting water quality. The program is a proven example of how government can help farmers be better stewards of our natural resources. The driving principles of AEM's success are:

- A farm specific focus. Each farm represents a different environmental system with soil types, crop rotations and management capabilities that are specific only to the individual farm. These unique farm characteristics require a customized plan to address water quality issues. The AEM program achieves this goal by using a farm specific environmental evaluation and nutrient planning process to develop an overall implementation plan.
- An educational component. Only by inspiring constant environmental awareness on a daily basis can long-term water quality be improved. To develop this recognition it is critical to achieve farmer buy-in of new management practices. This can only occur if programs have a strong educational focus. Under the AEM program, farmers' environmental knowledge is increased through a tiered planning approach that includes an ongoing evaluation component, ensuring continual improvement.
- Locally coordinated. Addressing water quality in an agricultural setting requires knowledge of specific environmental issues within each local watershed. Having local soil & water conservation districts lead efforts, such as they do in the AEM program, means limited resources are targeted to areas that will make the most impact in water quality improvement.
- Participant confidence. Regardless of the amount of cost share available for best management practice implementation, there will always be a contribution by the farmer, whether in financial resources or even just focusing management time on the project. As business owners, farmers must have confidence in the technical assistance being provided or they will not view recommended water quality improvements as a wise and worthwhile investment. In New York's AEM program, technical assistance is provided by local soil & water conservation districts that have a long history and significant trust with farmers.

Farmers want to protect the environment and they are very proud of their responsibility as the caretakers of lands and waters. This is clearly demonstrated by farm participation in programs such as AEM which is currently working with over 12,000 of New York's approximately 35,000 farms.

Virginia's Continued Progress with New Nutrient Removal Facilities

Twelve new WQIF grant agreements signed in 2010 to bring total number of projects up to 53, committing a total of almost $627 million in state cost-share. Three plants brought their nutrient reduction systems on-line this year, bringing the total number of Bay dischargers operating with nutrient removal to 29. Based on the annual compliance plan (Feb. 2010) for dischargers covered by the Virginia Chesapeake Bay Watershed Nutrient Discharge General Permit, projections show the total delivered nutrient loads will meet, or even be lower than, the WLAs in all basins for calendar year 2011.

Erosion and Sediment Control Local Program Reviews in Virginia

Virginia has completed a five-year statewide review of all locally-administered erosion and sediment control programs. Where local programs were found inconsistent with state law, corrective action agreements were completed and shortcomings

corrected. As of March 2010, 155 or 94.5 percent of the programs have been found consistent with state law. Well-run locally administered programs reduce the loss of sediments and other pollutants from active construction sites.

Advances in Addressing NPS from agricultural sources in Virginia

Use of targeted incentive funds through Virginia Agricultural Ag BMP Cost-Share Program (VACS) continues to result in roughly 85 percent of available funds being used for implementation of the suite of five "priority practices" across the state. While VACS funding for the coming year (begins July 1, 2010) will not be at levels appropriated for the two prior years, for the first time ever (thanks to an action taken by the 2010 Virginia General Assembly) there is now a revenue source dedicated to VACS funding. The funding source originates from an increase in the fee for recording land transactions at the local level. Further enhancements in the collection of data for agricultural conservation include the ongoing improvements in a web-based BMP tracking program.

Virginia's New Turf and Landscape Category of Nutrient Management Certification

Virginia has initiated a new category of Nutrient Management Planner Certification to better meet the needs of professionals developing nutrient management plans for urban/suburban developed lands, such as golf courses, office parks, public lands that receive nutrients, and areas treated by lawn service companies. The agriculture certification category has been offered since 1996 and has 329 certified planners. So far, 65 persons have become certified in the new Turf and Landscape category. Individuals must meet educational and experience requirements and pass a two-part examination to become certified.

Poultry Litter End User Regulation in Virginia

New requirements on Virginia end users of poultry litter became effective on January 1, 2010. The new regulations require enhanced tracking and accounting of poultry litter that is transferred from the farm where the litter is generated. End users are required to store and land apply poultry litter in accordance with the requirements outlined in the amended regulation which address the proper rate and timing of applications as well as setbacks to environmentally sensitive features for land application and storage of poultry litter.

Maryland's Cover Crop Program

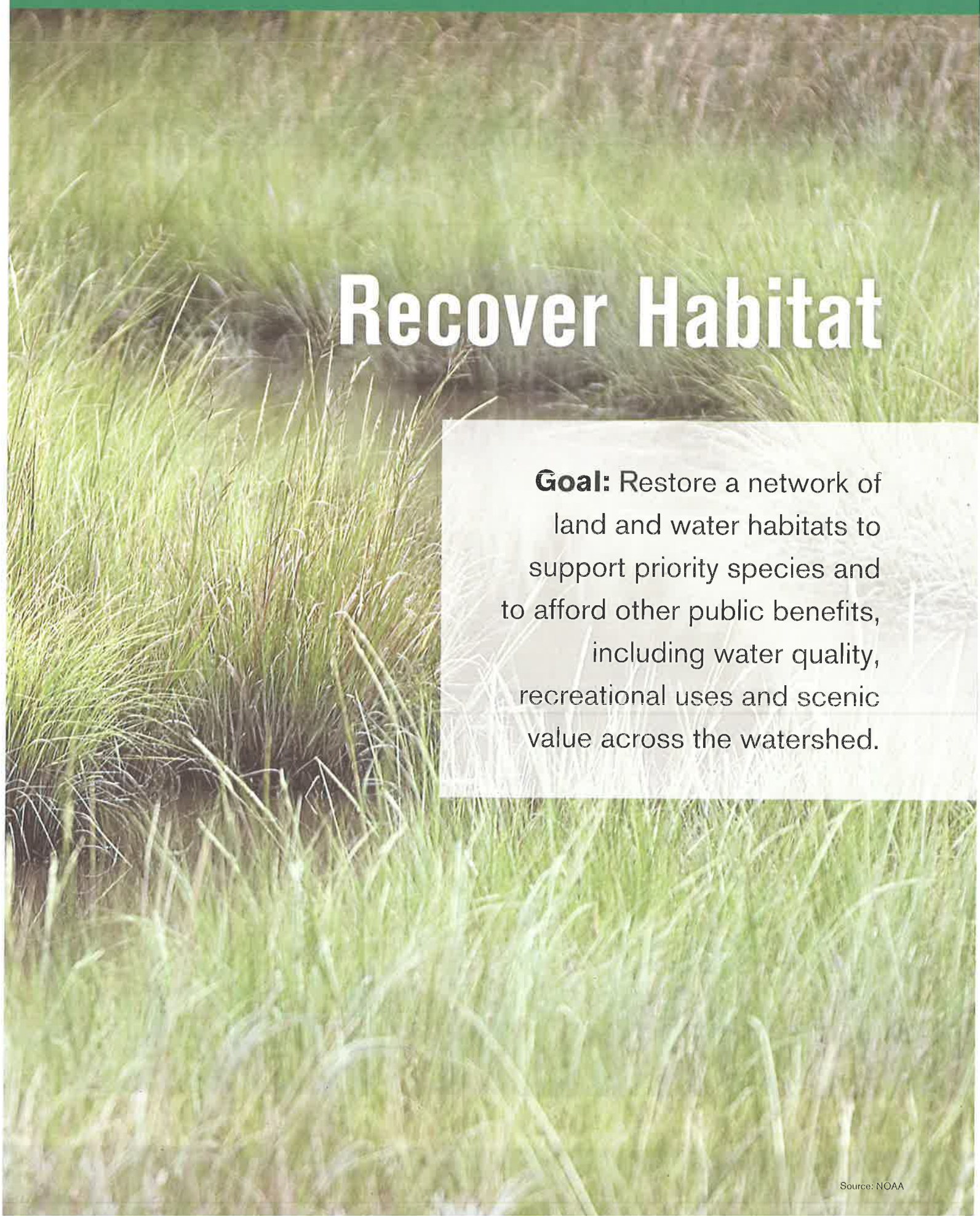
Provides incentives to farmers to plant cover crops in the fall to absorb nitrogen which may remain in the soil from the previous crop. Cover crops are one of the most effective best management practices available to reduce nitrogen loading to the Bay, but are not cost effective to the farmer without an incentive to offset costs of implementation. Additional incentives are provided for management proven to improve effectiveness, such as early planting. Maryland has requested the CBP to examine model efficiencies for cover crops. Maryland is making available $15 million for farmers to plant cover crops in the fall of 2010.

Maryland's Manure Transport Program

Instituted as a pilot program in 1998 to address surplus poultry litter, the program provides incentives to relocate excess animal manure to farms that can safely use the manure as part of their crop nutrient program. The region's poultry companies match State funds, dollar for dollar, to support the relocation of poultry litter. The program also supports relocation of other animal manure types in an effort to balance crop needs with nutrient sources. In FY 09, 119,892 tons of animal manures were relocated through this program, including 62,506 tons of poultry litter.

Recover Habitat

Goal: Restore a network of land and water habitats to support priority species and to afford other public benefits, including water quality, recreational uses and scenic value across the watershed.



Source: NOAA

Wetlands, forests, fields, streams, underwater grasses and mudflats in the Chesapeake watershed provide thousands of species of plants, fish and wildlife with the places they need to find food, shelter, reproduce and rear their young. Chesapeake habitats also provide "habitat highways" for Atlantic Coast fish populations and birds migrating along the Atlantic Flyway. These habitats play an important role in filtering nitrogen, phosphorus and sediment pollution before it enters local waterways and, ultimately, the Chesapeake Bay. Wetlands in tidal and non-tidal areas serve as holding tanks and water filters for coastal storm surge and heavy rainfall and help prevent costly flood damage. Forest buffers along streams and shorelines provide shade to keep streams cool, food for aquatic organisms and corridors for wildlife movement. Streams are the arteries that connect the upper and lower parts of the watershed and provide not only passage for fish but also a physical connection from every local community to the Bay. The water, submerged aquatic vegetation, intertidal mudflats and benthic habitat of the Bay provide areas for numerous Bay species to shelter, spawn and feed.


Source: NOAA

WETLANDS OUTCOME:

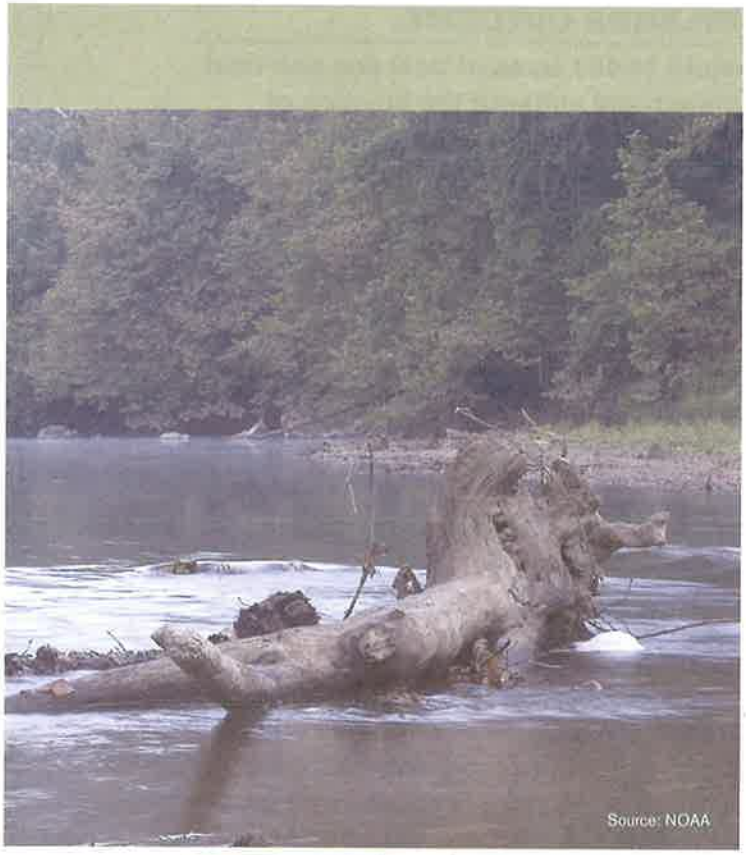
Restore 30,000 acres of tidal and non-tidal wetlands and enhance the function of an additional 150,000 acres of degraded wetlands by 2025. (Current condition: 1 million acres of tidal and non-tidal wetland estimated to be available in the Chesapeake watershed for restoration or enhancement. Between 1998 and 2008, 18,217 acres of wetlands were restored and 97,738 acres were enhanced.)

Action Overview:

- Restore and protect priority Chesapeake marshes.
- Increase incentives for wetland restoration and enhancement on private land.
- Strengthen federal coordination on permits that impact wetlands.

Restore and protect priority Chesapeake marshes. FWS and NOAA will work with state and local partners to protect and restore marshes that have been degraded or are under pressure from shoreline development and sea-level rise. The highest priority marshes and shorelines will be selected based on the existing level of degradation, existing and future threat from sea level rise and erosion, and the feasibility of restoration and/or protection. Conserving parcels landward of priority marshes will allow marshes to migrate and will be a focus of the protection efforts. These restoration and protection activities will be strategically targeted in priority tributaries throughout the Bay.

Understanding impacts of sea-level rise on coastal ecosystems and communities is critical for effective adaptation and mitigation strategies in the Chesapeake Bay. FWS and NOAA will use existing information and conduct new assessments to quantify the vulnerability of different coastal areas throughout the Bay and help prioritize



FWS will increase on-the-ground assistance for restoration and enhancement of non-tidal wetlands and associated upland buffers on private lands.

management strategies. Using the existing USACE Erosion Vulnerability Assessment and FWS Submerged Lands Affecting Marshes Model, partners will prioritize marshes that are both susceptible to erosion and offer high habitat value to tidal wetland-dependent species such as black ducks. Beginning in 2011, USGS will conduct enhanced vulnerability assessments using new information on sea-level rise projections and land-cover change that will improve prioritization of tidal wetland restoration. (See Climate Change chapter) Partners will leverage funding to implement projects in 2012 in places like the Choptank and Blackwater Rivers, with a milestone of 10,000 acres of combined tidal and non-tidal wetland restored in priority areas by 2015.

Increase incentives for wetland restoration and enhancement on private land. FWS will increase on-the-ground assistance for restoration and enhancement of wetlands and associated upland buffers on private lands (with a focus on connecting geographical gaps in habitat between USDA priority watersheds). Beginning in 2010, FWS field biologists will work in close partnership with NRCS, private landowners, the Federal Highway Administration, state departments of transportation and non-governmental organizations such as Ducks Unlimited and the Chesapeake Bay Trust to help landowners restore 10,000 acres and enhance an additional 25,000 acres of combined tidal and non-tidal wetland. Through 2015, efforts will focus on habitat corridors identified by the states as having high value for terrestrial and aquatic species such as bog turtles and wood ducks, including forested wetlands in the Nanticoke, Pocomoke and Patuxent sub-watersheds.

Strengthen federal coordination on permits that impact wetlands. Resource agencies (FWS, NOAA, NPS) will increase participation in 2012 to engage fully in pre-application

conferences on permits with regulatory agencies (EPA, USACE, Federal Energy Regulatory Commission) under existing authorities and subject to appropriations. Agencies will explore increased coordination on other licenses and permits (e.g., those related to hydropower, wind power, water infrastructure, natural gas extraction and highway projects). This approach will promote timely and collaborative decision-making on project permits, reduce costly permitting delays and strengthen permit conditions to minimize impacts to fish and wildlife habitat. It could also create incentives for mitigation in the form of wetland restoration and enhancement in priority watersheds.

FOREST BUFFER OUTCOME:

Restore riparian forest buffers to 63 percent, or 181,440 miles, of the total riparian miles (stream bank and shoreline miles) in the Bay watershed by 2025. (Current condition: 58 percent of the 288,000 total riparian miles in the Bay watershed has forest buffers in place.)

Action Overview:

- Accelerate application of Conservation Reserve Enhancement Program (CREP) to achieve state goals.
- Restore forest buffers in priority watersheds.
- Explore funding incentives for installation of targeted riparian forest buffers.
- Enhance technical capacity for riparian buffer restoration.

Accelerate application of CREP to help achieve state goals for riparian forest buffer adoption. By 2012, USDA will collaborate with state governments to increase CREP applications by increasing riparian forest buffer outreach and delivery. USDA's CREP is a voluntary land retirement program that provides additional incentives to help agricultural producers protect environmentally sensitive land. There are a number of programs that private landowners can use to help restore riparian forest buffers, but most are restored using CREP.

Restore forest buffers in priority watersheds. By 2012, USDA will concentrate land retirement practices, especially CREP riparian forest buffers, in priority watersheds to most effectively connect habitats and reduce non-point source pollution. Forest buffers are often an agricultural conservation practice and contribute toward improving water quality.

Explore funding incentives for installation of targeted riparian forest buffers. The environmental benefits provided by a forest buffer vary according to landscape features. By 2012, USDA and partners will explore innovative mechanisms to pay for riparian forest buffer restoration in proportion to environmental benefits/outcomes (e.g., pounds of pollution reduction). The potential exists to expand benefits of buffers at lower costs to taxpayers.

Enhance technical capacity for riparian buffer restoration. USFS will, to the extent possible, fund additional restoration biologists/outreach coordinators for riparian forest buffers in Chesapeake Bay watershed states to increase outreach to landowners and improve on-the-ground assistance for installation and maintenance of riparian forest buffers. Beginning in 2011, FWS will increase capacity through its Partners for Fish and Wildlife program to provide landowner assistance for riparian forest buffer restoration through site assessment and project design and delivery on private lands in the Chesapeake watershed.

FISH PASSAGE OUTCOME:

Restore historical fish migratory routes by opening 1,000 additional stream miles by 2025, with restoration success indicated by the presence of River herring, American shad and/or American eel. (Current condition: Approximately 1,924 stream miles in the Chesapeake Bay watershed have been opened and are accessible for fish migration. Projects are currently being ranked and prioritized through a collaborative federal and state process designed to strategically target priority projects.)

Action Overview:

- Remove stream barriers and provide fish passage.
- Document return of fish to opened stream reaches.

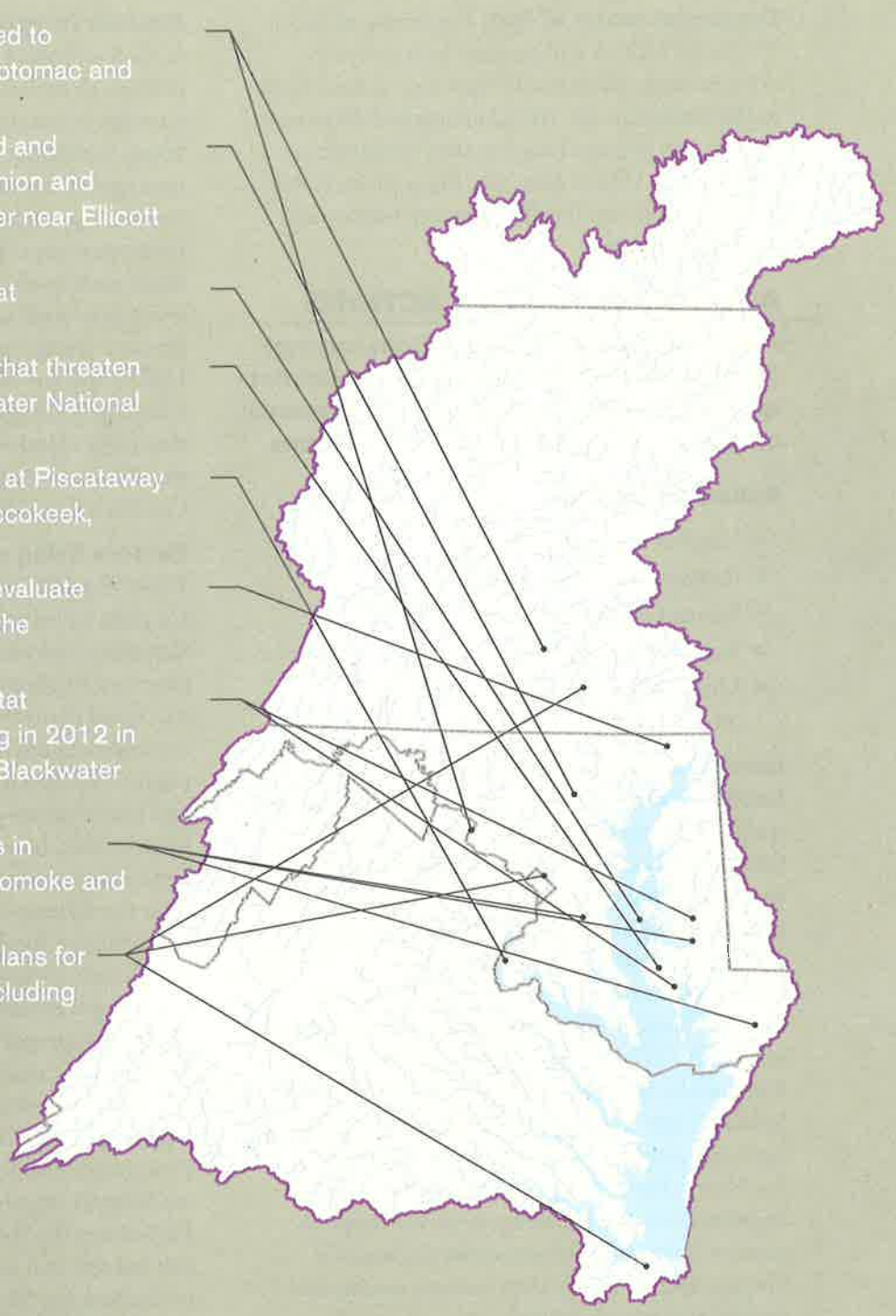
Remove stream barriers and provide fish passage. The damming and diversion of free-flowing rivers and streams result in habitat fragmentation and fewer routes for aquatic species migration. Fish passage projects include removing derelict dams, culverts and other river barriers. Projects enhance public safety and provide ecological, social and economic benefits while improving habitat for populations of fish such as striped bass, American eel, American shad and herring.

FWS and NOAA will work with state and local partners to prioritize stream barriers that inhibit fish passage and implement priority projects by leveraging funds to remove barriers, retrofit culverts, install passage structures and monitor for presence of indicator species. Beginning in 2011, projects will be prioritized through a collaborative federal and state process based on criteria designed to strategically target priority projects. These criteria are likely to favor projects that are the most downstream blockage in a river, open the largest stretches of highest quality habitats, are dam removals as opposed to structural fishways, and enhance passage of migratory fish and brook trout over other fish and/or target areas where shad and herring stocking programs occur.

EXAMPLES

AROUND THE WATERSHED

- USACE will identify river flow needed to sustain the ecology in the Middle Potomac and Susquehanna rivers.
- NOAA, in partnership with Maryland and American Rivers, is removing the Union and Simkins dams on the Patapsco River near Ellicott City, Maryland.
- USACE will design island habitats at mid-Bay islands.
- FWS will combat invasive species that threaten wetlands, such as nutria at Blackwater National Wildlife Refuge.
- NOAA is restoring living shorelines at Piscataway Park along the Potomac River in Accokeek, Maryland.
- USACE will work with partners to evaluate sediment build-up behind dams in the Lower Susquehanna River.
- USGS will conduct enhanced habitat vulnerability assessments beginning in 2012 in places such as the Choptank and Blackwater sub-watersheds.
- FWS will restore forested wetlands in places such as the Nanticoke, Pocomoke and Patuxent sub-watersheds.
- USACE is developing watershed plans for key Chesapeake Bay tributaries including the Anacostia, Susquehanna and Lynnhaven Rivers.



Document return of fish. Beginning in 2012, FWS and NOAA will partner with states to document the presence of indicator species such as the American eel, river herring and American shad at fish passage projects after construction is complete. Where possible, these projects will be integrated into locally supported watershed management plans.

ADDITIONAL HABITAT ACTIONS

Following are five priority habitat recovery actions that address more than one habitat type and therefore will support achievement of more than one of the habitat measures.

Action Overview:

- Combat invasive species.
- Restore forest habitat.
- Restore living shorelines.
- Restore island habitats.
- Mitigate impacts of highway projects on habitat.

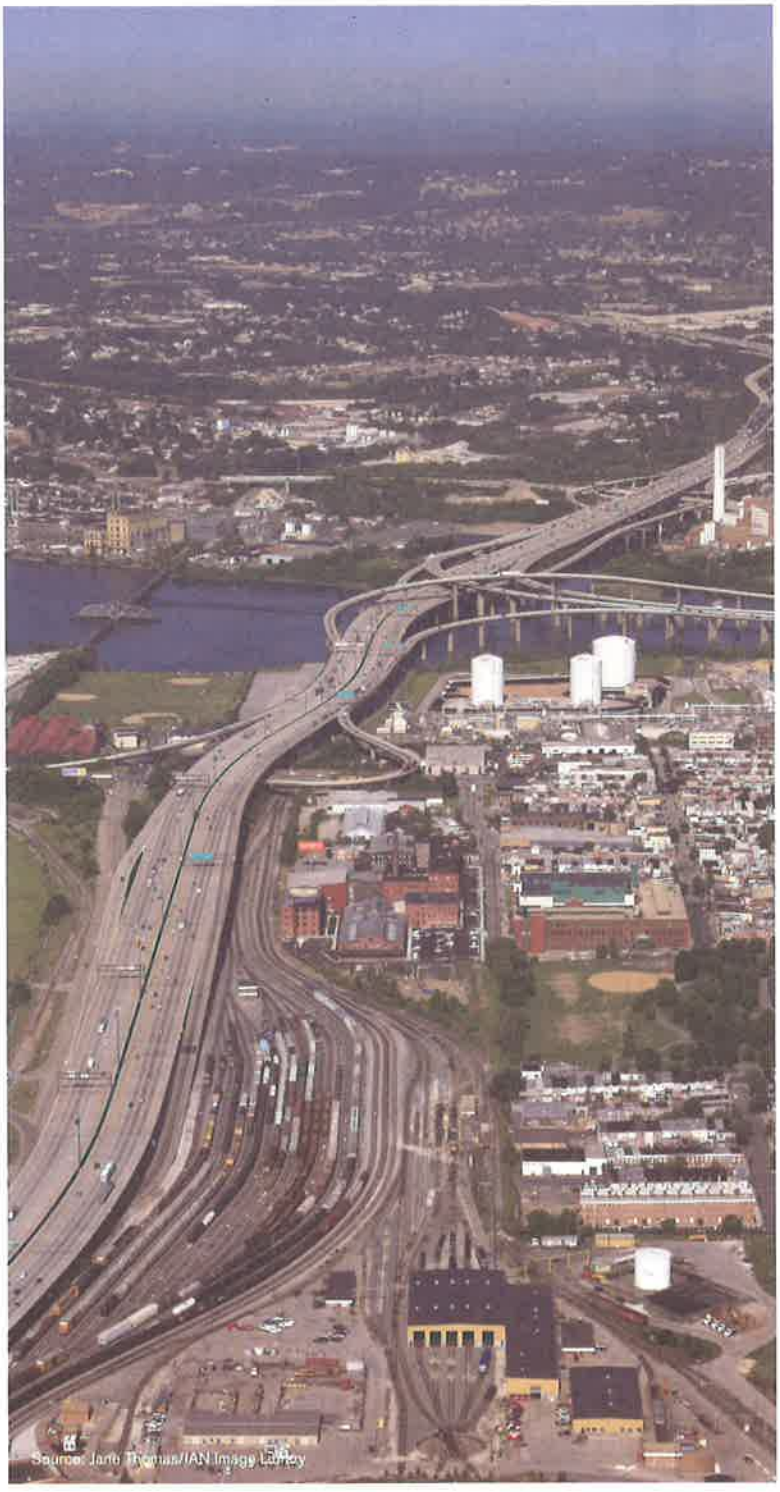
Combat invasive species that threaten habitat. FWS and NOAA will combat invasive species, the second biggest threat to habitat in the Chesapeake watershed after habitat loss from land-use change and development, by developing a rapid response team in each state by the end of 2012 to detect and control invasive species and by seeking full implementation of the Nutria Management Plan by October 2015, with monitoring continued until 2020. With support from the Mid-Atlantic Panel under the national Aquatic Nuisance Species Taskforce, and in partnership with federal agencies, private landowners, states, universities, the Nutria Partnership, and non-governmental organizations, these lead agencies will work to prevent infestations of terrestrial and aquatic invasive species before they become established and more costly to control.

Restore forests in priority areas. By 2012, USDA will work with DOI and other federal entities to develop a Chesapeake Bay watershed strategy to maximize forest restoration in priority areas, including: residential land currently managed as lawn; areas covered by community tree canopy expansion and green infrastructure programs; gaps in core wildlife habitat; deficient lands such as abandoned mine lands, brownfields areas and lands with vulnerable soils; and agro-forestry areas. Specifically, beginning in 2012, USDA will provide grants to Bay counties with a high percentage of turf to develop programs that target landowners with large lawns and offer to reforest portions of it, similar to Baltimore County's Rural Residential Stewardship program.

Restore living shorelines. In 2011, NOAA, USACE and FWS will work with Maryland and Virginia to prioritize critical segments for living shoreline restoration and identify opportunities to promote implementation of living shorelines over hardened shorelines. Maryland and Virginia have created detailed inventories of existing shoreline conditions (eroding, hardened, natural, accreting) and likely causes of these conditions (wind, waves, tides, boat wakes), and have recommended actions to improve conditions. In partnership with the Chesapeake Bay Trust, federal partners will leverage funding and provide engineering and design assistance for living shoreline projects to local governments and private homeowners. USACE is preparing several shoreline management documents and guides as part of the Maryland Shoreline Management Study to help implement Maryland's Living Shoreline Protection Act. In Accokeek, Maryland, NOAA is working to restore living shorelines at Piscataway Park along the Potomac River, providing fish habitat and erosion protection, as well as protection for 30 acres of freshwater wetland and a threatened Native American archeological site.

Restore island habitats in the Bay. USACE will in 2011 design island habitats at mid-Bay islands (James and Barren Islands) to be created through beneficial use of dredged material (based on assumed funding and local sponsor coordination). USACE will continue to restore upland and wetland habitats at Poplar Island that provide essential habitat for a host of wildlife, including birds migrating along the Atlantic Flyway. See the climate chapter for additional detail on the Poplar Island restoration and federal partnership. By 2012, federal, state and local partners will work together to identify five to six small islands that are important for waterbird nesting populations and evaluate climate-informed options to restore these islands by 2020. Resource and habitat trade-offs that may include loss of other important habitats will be fully considered as part of the evaluation.

Mitigate impacts of highway projects on habitat. Beginning in 2010, the U.S. Department of Transportation (DOT) will work with partner agencies (FHC, EPA, NOAA, DOI, USACE) to encourage use of the Eco-Logical approach as an innovative tool to promote effective planning to mitigate highway impacts on habitat and implementation across agency boundaries. The Eco-Logical approach addresses ecosystem-level mitigation planning to provide for design of infrastructure that is more sensitive to terrestrial and aquatic habitats and is more effective in assuring mitigation and compensation of impacts that cannot be avoided.



Federal agencies will provide enhanced research, monitoring and models to support prioritizing, monitoring and evaluating the effects of management actions to restore habitats.

Prioritize

Improve forest buffer and wetland habitat mapping. In 2012, Forest Service researchers will work with partners to use new technologies such as LiDAR (Light Detection and Ranging) and SAR (Synthetic Aperture Radar) to improve habitat mapping and monitoring – including identification of unmapped streams, wetlands and isolated forests – to identify new habitat and to prioritize restoration of low-lying habitats that are also critical to water quality. To create incentives for wider buffers capable of supporting forest-dwelling birds and other forest-dependent species, such data could be evaluated for potential nutrient reduction credit in the next calibration of the Chesapeake Bay watershed model for buffers wider than 300 feet and for riparian/wetland complexes.

Provide forest mapping tool to watershed groups and local governments. In 2010, USFS and USGS will make available a new user-friendly, online mapping tool (RB Mapper) for citizen groups to be able to monitor trends in riparian forest buffers, impervious surfaces, tree cover and wetland cover. This tool also can help prioritize areas for restoration on a scale appropriate to local government decision-making and identify opportunities for wider buffers capable of supporting forest-dependent species and for restoring riparian/wetland complexes.

Improve tools to identify and prioritize stream corridors and passage of fish to streams for restoration projects. FWS and NOAA will determine by 2011 how many miles of stream need to be opened to restore access to the highest quality habitat for migratory fish and brook trout. This will be accomplished using new and existing GIS tools, computer models and information collected during the prioritization exercise. Example data layers to be developed include migratory fish and brook trout habitat and potential habitat (using historical data, current monitoring and expert knowledge), natural falls or natural fish barriers, and a data set of all known fish barriers.

Integrate watershed planning for key tributaries. USACE, in collaboration with other federal agencies, states, local governments and regional partnerships, has undertaken watershed planning for key Chesapeake Bay tributaries including the Anacostia, Susquehanna and Lynnhaven rivers. These plans will aid in the prioritization and integration of comprehensive restoration actions in these systems. The Anacostia Restoration Plan, developed by USACE and the Metropolitan Washington Council of Governments (MWCOG) and recently adopted by the Anacostia River Partnership, identifies more than 3,000 projects for implementation by many stakeholders. As the lead for 16 federal agencies participating in the Susquehanna River Basin Commission, USACE is developing a strategy for implementing integrated water resources management projects. This strategy will balance restoration, soil and water conservation practices, and nonstructural measures to reduce flood damage, improve water quality, and create wildlife habitat in the Juniata River, Upper Susquehanna River and the Chemung River watersheds. The Lynnhaven River ecosystem restoration project being undertaken by the City of Virginia Beach and USACE will identify and prioritize opportunities for wetland creation or restoration, underwater grass restoration and fisheries and shellfisheries habitat restoration.

Monitor

Improve monitoring of habitats. As part of the Chesapeake Monitoring Alliance, FWS, USGS, NOAA and EPA will work with academic partners and the states to improve monitoring of selected habitats in the Bay and its watershed, including underwater grasses, wetlands, forests and streams.

Work will begin in 2010 and continue in 2011 to assess programs with the best opportunities to improve monitoring for habitats listed in the Executive Order (wetlands, forests and fish passage). Monitoring will be enhanced in 2012 based on new partnerships with existing programs. Additional monitoring will be proposed for 2012 and beyond to address highest priority gaps.

Improve tracking of wetland restoration. Chesapeake Bay Program partners will collaborate to improve the tracking of wetland restoration by establishing common wetland definitions and reducing the reporting burden on partnering agencies, states and organizations. FWS and EPA will expand data collection and computer modeling to include wetland buffers and enhanced acres of wetlands, both of which are critical components of wetland function as habitat and for water quality.

Evaluate

Improve baseline data for wetlands. Federal agencies will determine how many acres of wetlands in the Chesapeake Bay watershed need to be re-established, rehabilitated and enhanced to achieve water quality goals and habitat goals for fish and wildlife. This will require determining how many restored acres of wetlands are needed to see gains in functions over a finite time period, compared to how many acres have the potential for re-establishment, rehabilitation and enhancement in the face of predicted land-use changes and climate change. This work will be accomplished by 2013 using new and existing tools, models and information.

Predict impacts of stressors at the land-water interface. NOAA will work with the Smithsonian Environmental Research Center to study the causes and consequences of habitat degradation in the mid-Atlantic region. The effort began in late 2009, and the overall goal is by 2015 to improve the capability of predicting the combined effects of shoreline hardening, watershed land use, water clarity, hypoxia, and Phragmites invasion of tidal wetlands on habitat quality for underwater grasses, fish and invertebrates. The project will compare multiple sub-estuaries, different shoreline types (e.g., riprap, bulkhead, shallow beach), and include before and after comparisons of shoreline change (e.g, natural to hardened shoreline). The project is being conducted through a strong partnership among management agencies to ensure the outputs (enhanced suitability models for blue crabs, white perch and other species) provide a basis for environmental management decisions.

Evaluate use of coastal and marine spatial planning in the Bay. NOAA will investigate opportunities for undertaking a comprehensive, adaptive, integrated, ecosystem-based and transparent coastal and marine spatial planning (CMSP) process in the Bay. CMSP is a public process of analyzing and allocating the spatial and temporal distribution of human activities in coastal and marine areas to identify areas most suitable for various types of activities to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security and social objectives. Efforts will begin with improving our understanding of human uses in the Bay and using these data to improve decision-making for habitat protection and restoration and fishery management.

Evaluate impacts of river flow and sediment build-up on habitat. The USACE Middle Potomac and Susquehanna Rivers Low Flow Management studies will identify river flow needed to sustain the ecology in these rivers. Sediment management projects can be implemented using the Chesapeake Bay Shoreline Management Plan developed by USACE and Maryland, which identifies priority locations for restoration and/or shoreline stabilization, thereby reducing sediment input to the Bay. USACE and Maryland are also undertaking an effort to evaluate methods of managing sediments behind dams on the Lower Susquehanna River, primarily behind Conowingo Dam, complementing studies underway by the Federal Energy Regulatory Commission in the relicensing of that facility.

EXAMPLES OF
STATE AND DISTRICT ACTIVITIES

Fish Passage in Maryland

The goal of the Maryland Fish Passage Program is to reopen the highest-quality habitat to migratory fish (shad, herring, eels) and resident fish (especially trout). The program developed criteria to prioritize fish blockages in Maryland based on ecological value. Parameters used to determine value include fishery resource assessment, stream order, Index of Stream Health, opportunity for American eel passage, upstream percent of impervious surface, first blockage on the river and number of miles of habitat reopened. Removal of the Union and Simkins Dams, located on the Patapsco River in Maryland, is part of a suite of removals aimed at restoring more than 25 miles of mainstem habitat and 375 miles of tributary access for migratory species such as American eel. Removal of these blockages will occur in fall 2010 and is expected to restore previously buried fish habitat, improve water quality and remove a potential safety hazard. These removals will be funded through the American Reinvestment and Recovery Act.

Adapting to Sea Level Rise for Maryland's Marshes

As sea levels rise, habitats in Maryland's coastal zone, such as marshes and coastal forests, will be challenged to keep pace. Maryland is undertaking a project to determine where the most effective coastal habitat migration areas are located and where the state might need to take management action. As sea levels rise, tidal marshes, beaches and dune habitats have the potential to migrate landward (if there are no barriers to migration, such as roads and buildings and if marshes have adequate sediment supplies) or be eliminated (if the opportunity to migrate landward is blocked or the rate of migration is exceeded by the rate of sea-level rise). Maryland is developing a GIS model and project scorecard to identify areas and land characteristics, including the current Blue and Green Infrastructure high priority areas that would provide marsh migration opportunities. The Maryland Department of Natural Resources will include the results of the model and scorecard values in land conservation targeting by adding it as a component to the current Green Infrastructure (GreenPrint) approach.

Restoring Wetlands in Virginia

Virginia Department of Game and Inland Fisheries staff meet regularly with interested landowners to identify potential wetland restoration sites and provide landowners with project design, permitting and construction assistance. Funding comes through a variety of methods including the Virginia Migratory Waterfowl Stamp. Virginia, in conjunction with partners and the Atlantic Coast Joint Venture, has developed focus areas to target projects and funds to the most critical habitat areas. Typical projects result in restoring hydrology, wetland vegetation, and wildlife habitat to former agricultural fields.

Mitigating for Habitat Functions in Pennsylvania

The Pennsylvania Department of Environmental Protection wetlands program is developing a comprehensive in-lieu-fee program that will track and compensate for regulatory impacts by restoring, creating, or enhancing wetland functions (hydrologic, biogeochemical and habitat); stream functions (habitat, water quality, riparian vegetation, flood capacity and public recreation); and lake and reservoir functions (habitat and public recreation). Compensation would primarily occur through funding or contracting with existing programs and private efforts.

Riparian Forest Buffers in Pennsylvania

Pennsylvania surpassed its goal to restore 3,300 miles of forest buffers by the year 2010. The state has planted a total of 3,901 miles of forest buffers along waterways since 2002 through its Stream ReLeaf program. Pennsylvania is home to the largest Conservation Resource Enhancement Program (CREP) in the nation. CREP delivers more than $50 million in state and federal assistance for best management practices nationally and, unlike other federal Farm Bill programs, targets key edge-of-stream practices to protect water quality.

Riparian Habitat Restoration in Virginia

Virginia has implemented a multi-year program designed to restore natural stream channels and riparian buffers in watersheds that are home to many of the state's rare and at-risk aquatic wildlife. Private lands are targeted primarily through the Landowner Incentive Program at the Department of Game and Inland Fisheries. Using local landowner connections and state-of-the-art GIS technologies, stream restoration biologists target restoration opportunities in those regions that support species of greatest conservation need as identified in Virginia's Wildlife Action Plan.

Fish Passage in Pennsylvania

The Pennsylvania Fish and Boat Commission (PFBC) and partners have completed more than 75 fishway and dam removal projects in the Susquehanna and Potomac watersheds, reopening hundreds of stream miles to the migratory movements of migratory and resident fish. This includes acquisition of millions of dollars to support passage restoration efforts. PFBC is participating in collaborative efforts to rank and prioritize additional projects with federal, state and other partners. Dozens of high quality projects in the Susquehanna Basin will be advanced in the future.

Wetland Restoration in New York

The Upper Susquehanna Coalition (USC) Wetland Program includes restoration, construction, conservation, protection and research with its scientific partners. USC is a network of Soil and Water Conservation Districts. Wetland projects are successfully implemented by specialized USC staff and program partners in an integrated system. This system combines wetland site identification, evaluation, delineation, survey, design and monitoring with construction and heavy equipment expertise, and allows the coalition wetland program to complete any wetland project. Since 2003, USC has restored over 500 acres of wetlands. In 2009, USC received a $736,000 "Green Innovation Grant." This three-year contract partners USC with foresters of the New York State Department of Environmental Conservation to restore 200 acres of wetlands.

Maryland's Natural Filters Program

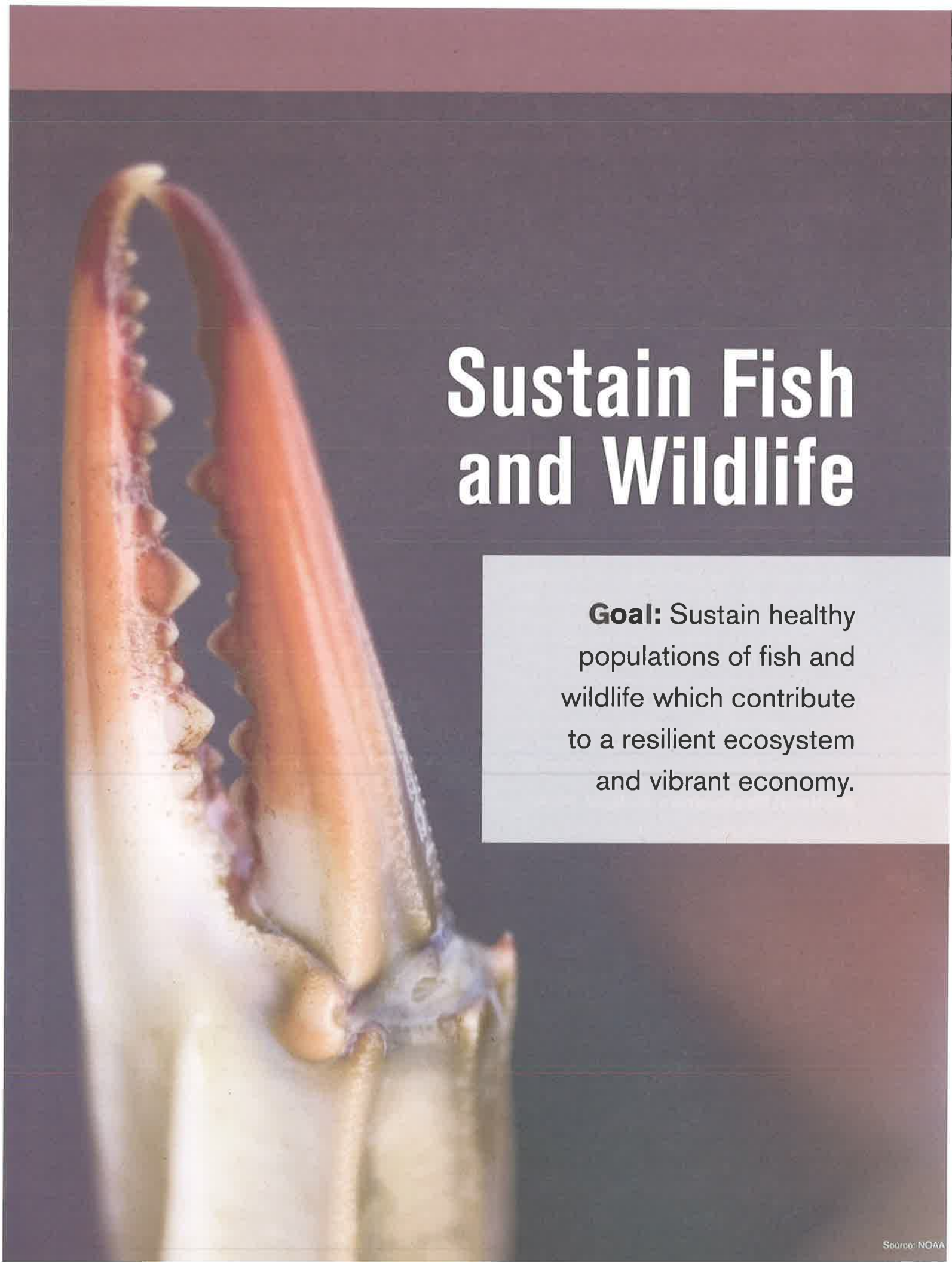
Maryland has adopted two-year milestone goals of restoring the state's natural filters by enhancing wetlands and riparian buffers and retiring highly erodible lands. Private lands are being targeted through CREP as well as Maryland Forest Service's Special Rivers Project, which promotes riparian buffer restoration on private lands. Natural filters on public land will be implemented via state and local government entities. The Department of Natural Resources manages over 500,000 acres of land and maintains a GIS-based targeting scheme for identification of restoration opportunities on state and local lands.

Fish Passage in the District

The District is working to reopen closed fish passage and spawning routes by removing in-stream barriers and installing manmade fish passage assistance apparatuses (i.e., fish ladders). Sections of Rock Creek up to Pierce Mill and beyond that have been re-opened are currently being used by shad, river herring and American eel. Additional tributaries on the Anacostia and Potomac Rivers are under investigation for similar operations.

Delaware's Private Lands Assistance Program

The goal of the Delaware Division of Fish and Wildlife's Private Lands Assistance Program is to provide technical and financial assistance to landowners on habitat management and restoration practices to benefit species of greatest conservation need outlined in the State Wildlife Action Plan. The Program also helps landowners manage game species on their properties to continue to provide hunting and fishing opportunities. The Program is working on wetland restoration projects using ditch plugs, water control structures, or high water flows to restore the hydrology and improve water quality species within the Nanticoke Watershed. Restoring the natural hydrology will in some cases hydrate the area longer, providing more habitats for amphibians and reptiles.



Sustain Fish and Wildlife

Goal: Sustain healthy populations of fish and wildlife which contribute to a resilient ecosystem and vibrant economy.

Source: NOAA

Success in protecting and restoring the Chesapeake Bay ecosystem will ultimately be measured by the vitality and richness of its fish and wildlife and the health and well-being of the people who rely upon them.

The Chesapeake Bay is one of the premier fish production areas for the East Coast. More than 250 fish species, both resident and migratory, use the Bay and tributaries for some portion of their life cycles. American and hickory shad, river herring, striped bass, eel, weakfish, bluefish, flounder, oysters, and blue crabs hold tremendous ecological, commercial and cultural value. More than 300 migratory bird species can be found in the watershed. At least 132 migratory songbird species feed and nest in the forests, wetlands and meadows of the watershed. During the fall, the skies come alive as one million ducks, geese and swans return to overwinter on the Chesapeake. Managing Bay fisheries and wildlife is critical to restoring and protecting the population of these species and their important place in the ecosystem.

As described in the prior chapter, protection and restoration of habitat is essential to sustaining the iconic species (e.g., blue crabs, oysters, striped bass, and waterfowl) of the Bay. Habitat loss as a result of poor water quality, land use and urbanization, climate change, and other human activities is threatening the sustainability of fish and wildlife species. Oyster populations are less than one percent of historic levels. Over 5,000 miles of fish spawning habitat on Bay tributaries remain blocked by man-made obstructions. Key fish and shellfish species have declined dramatically in abundance or productivity.

NOAA and FWS are leading the federal effort to strengthen programs to restore and protect critical fish and wildlife in the Bay and its watershed, and will continue to work extensively with the states. To achieve long-term resiliency and sustainability of the Chesapeake ecosystem, federal partners must lead the way in implementing an ecosystem-based management (EBM) approach that considers the interdependence of all aspects of the ecosystem, allows for public engagement and is adaptive. In contrast to individual species or single-issue management, EBM considers a wider range of relevant ecological, environmental and human factors bearing on societal choices regarding resource use. Science will support prioritizing, monitoring and evaluating the effect of actions to improve fish and wildlife outcomes and move toward a comprehensive ecosystem-based management approach.

For the purpose of tracking progress in the Bay and headwaters, this strategy focuses on four species – oysters, blue crab, brook trout and black ducks – because they reflect the habitat health and hold great ecological, commercial and recreational significance. Appendix D identifies additional priority species based on current scientific assessments of species' ecological, commercial and recreational significance. The appendix also provides a framework to further prioritize restoration efforts for fish and wildlife of the Chesapeake Bay watershed based on habitat type and corresponding stressors.

OYSTER OUTCOME:

Restore native oyster habitat and populations in 20 tributaries out of 35 to 40 candidate tributaries by 2025. (Current condition: 0 tributaries with fully restored oyster populations; several tributaries with successful living oyster reef habitat.)

Action Overview:

- Launch a Bay-wide oyster strategy using scientific support for decision making.
- Restore priority tributaries and support enforcement.
- Expand commercial aquaculture.

Launch a Bay-wide oyster strategy using scientific support for decision-making.

Oysters are a keystone species and were once the dominant hard-bottom habitat in the Chesapeake Bay. They grow naturally in reefs that create and provide habitat not just for themselves and additional generations of oysters, but for many species of commercially and recreationally important finfish, shellfish and migratory waterfowl. Restoring water quality, habitat and fisheries in the Bay is closely linked to our ability to restore oyster populations.

NOAA and USACE will coordinate with Maryland, Virginia and the Potomac River Fisheries Commission (PRFC) to develop and implement a collaborative, Bay-wide, native oyster protection and restoration strategy to protect existing healthy native oyster populations, restore oyster reefs and expand native oyster aquaculture between 2011 and 2025. This strategy will build on the Draft Maryland Oyster Restoration and Aquaculture Development Plan, the multi-agency Programmatic Environmental Impact Statement and Record of Decision on Native Oyster Restoration, and the work of

Collaborative oyster restoration in Maryland and Virginia emphasizing comprehensive tributary approaches to ecological restoration is showing early signs of success.

the Virginia Blue Ribbon Oyster Panel. Using spatially explicit habitat information, the partners will identify priority areas to establish sanctuaries and will use the best new and existing restoration techniques to launch oyster reef restoration projects. Development of the strategy will begin in 2011 and be completed by 2012. The first subset of tributaries to be restored will be identified and implementation of restoration activities initiated by 2012.

Restore priority tributaries and support enforcement. Recent progress toward collaborative ecological restoration approaches in Maryland and Virginia emphasizing comprehensive tributary approaches and long-term sustainability are promising. For example, large scale efforts in the Great Wicomico River in Virginia show signs of success in restoring living oyster reefs. The actions below advance these large-scale efforts to make substantial change in the level and extent of oyster restoration, leading to significant gains in oysters in the Bay.

Beginning in 2010, NOAA and USACE will work with the states to continue focused restoration activities in tributaries that have previously been identified (with consideration of spatial planning) as priority areas (i.e., by Maryland's Oyster Restoration Plan and Virginia's Blue Ribbon Oyster Panel) and that can support the desired ecological endpoints. Initial planning documents indicate that sufficient water quality is needed at planned restoration sites to support spat survival. Following an initial assessment of priority tributaries to be completed in 2012, oyster restoration partners will begin restoring these tributaries at a rate of roughly two tributaries per year (one in each state). Restoration approaches will be site specific, and typically will include large-scale bottom reconditioning through substrate placement and planting of hatchery-reared spat on shell (planting will be required in successive years to create multiple-year classes on the reefs). The use of alternative substrate will be applied as appropriate. NOAA will also work with the states to protect restoration investments by supporting enforcement of regulations to protect oyster sanctuaries.

Expand commercial aquaculture. To provide economic alternatives for watermen, reduce fishing pressure on oysters and complement ecological oyster restoration efforts, NOAA will support state efforts to expand commercial shellfish aquaculture in the Bay. Oyster aquaculture improves water clarity, removes nitrogen and phosphorus pollution, keeps working waterfronts economically viable and reduces development pressure, creates jobs, and provides a locally grown, safe and sustainable food product. Oyster aquaculture also leverages private resources toward increasing the native oyster population.

A targeted effort to accelerate aquaculture development will support education, training and technical assistance for interested entrepreneurs who want to begin aquaculture businesses. A new loan program in Maryland is being initiated in 2010 with plans to begin providing loans in 2011 to enable watermen and others to acquire aquaculture infrastructure and engage in shellfish production. Entrepreneurs will be given the opportunity to learn through hands-on classroom and field settings about profitable shellfish farming, best management practices and current aquaculture laws and regulations.

BLUE CRAB OUTCOME:

Maintain sustainable blue crab interim rebuilding target of 200 million adults (1+ years old) in 2011 and develop a new population target for 2012 through 2025. (Current condition: 2007-2008: 131 million; 2008-2009: 223 million; 2009-2010: 315 million.)

Action Overview:

- Support continued interjurisdictional blue crab management.
- Revise blue crab population rebuilding target.

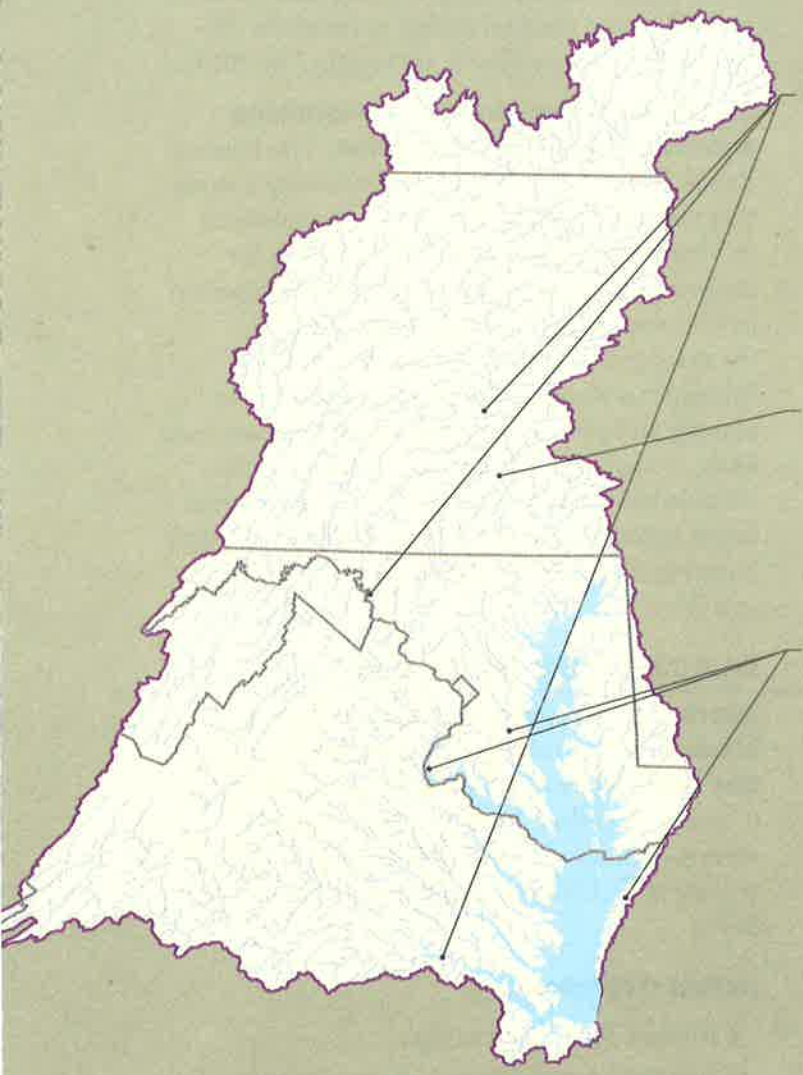
Support continued interjusrisdictional blue crab management. Blue crabs not only comprise the most valuable fishery in the Chesapeake Bay, but are major predators of benthic communities and are prey for many other fish species. The blue crab population is vulnerable to increased harvest pressure, as well as the effects of habitat loss due to poor water quality. Proper management of the crab harvest, as well as water quality improvements and habitat restoration will help restore the Bay's blue crab population and maintain this valuable resource into the future. The latest 2009-2010 winter dredge survey estimates the total population (note, the total representing juvenile and adult male and female crabs) has risen to 658 million crabs, a 60 percent increase from 2008-2009 and the highest since 1997.

The winter blue crab dredge survey designed through a partnership of NOAA, states and academia provides yearly information on the population and spawning stock status of blue crabs in the bay and is summarized in an annual Blue Crab Advisory Report. Coupled with the 2005 benchmark blue crab stock assessment and analysis by the Chesapeake Bay Stock Assessment Committee, a rigorous scientific process was undertaken in 2008 leading to the development of management reference points. As a result, in 2008, Maryland, Virginia and PRFC implemented collaborative management actions to reduce harvest pressure on female crabs by 34 percent. These actions have resulted in adult (1+ years) blue crab populations that exceed the interim target of 200 million adult crabs. Exceeding the interim target in two consecutive years does not necessarily mean the population is stable enough to ensure the long-term sustainability and resilience of the Chesapeake Bay stock. The results underscore the importance of science in supporting management decisions, demonstrate success of the state/PRFC revised management measures and highlight the importance of the role of the private sector (watermen) and the public in protecting and restoring vital Bay resources.

Revise blue crab population rebuilding target. NOAA will work with the states and PRFC to reevaluate the interim abundance target using the latest science by coordinating an effort through the Chesapeake Bay Stock Assessment Committee to evaluate the stock assessment and revise the interim target for blue crab abundance by 2012. NOAA will work with the states to incorporate the new target into interstate agreements to ensure sustainable blue crab populations. NOAA, working with Maryland Sea Grant, will also develop a Blue Crab Health Index based on ecosystem-based management principles that estimates the health of blue crabs based on a variety of factors, including climate, habitat and interactions with other species.

EXAMPLES

AROUND THE WATERSHED



- The Eastern Brook Trout Joint Venture is conducting a study that ranks the existing brook trout populations in Virginia, Maryland and West Virginia for resiliency to climate change.
- Between 2010 and 2013, the USGS and FWS will continue efforts to assess the impact of pathogens, parasites and toxic contaminants on fish kills and intersex conditions in the Potomac watershed. These studies will be expanded to the Susquehanna and James River basins between 2012 and 2016.
- Federal partners will coordinate with organizations such as the Susquehanna River Basin Commission to integrate and implement high priority fish habitat restoration projects with similar efforts in the watershed.
- National Wildlife Refuges are working to increase available food resources that support wintering black ducks on refuge lands including Chesapeake Marshlands, Eastern Virginia Rivers, the Eastern Shore of Virginia, and the Potomac and Patuxent Rivers.


Source: USFWS

BROOK TROUT OUTCOME:

Restore naturally reproducing brook trout populations in headwater streams by improving 58 sub-watersheds from "reduced" classification (10–50 percent of habitat lost) to "healthy" (less than 10 percent of habitat lost) by 2025. (Current condition: 388 of 1,294 sub-watersheds in the Chesapeake Bay currently classified as "reduced" for brook trout.)

Action Overview:

- Restore stream habitat through partnerships.
- Consider climate change in prioritizing sub-watersheds for restoration.

Restore stream habitat through partnerships. FWS will work with the Eastern Brook Trout Joint Venture, local landowners and federal, state and non-governmental partners to identify priority sub-watersheds for habitat improvement for native Eastern brook trout. Funding will be leveraged through the National Fish Habitat Action Plan to implement riparian forest buffer restoration, livestock exclusion and natural stream channel design to reclassify 20 "reduced" sub-watersheds as "healthy" by 2015.

Consider climate change in prioritizing sub-watersheds for restoration. The Eastern Brook Trout Joint Venture is conducting a study that ranks the existing brook trout populations in Virginia, Maryland and West Virginia for resiliency to climate change. Results are expected by October 1, 2010 and will be used by the the managers to prioritize where restoration investments should take place. The focus is to identify and prioritize subwatersheds that are least likely to change with climate and that contain suitable habitat for increased occupancy by wild brook trout. This study is being led by USFS and joined by Virginia Tech and Maryland, Virginia and West Virginia.

BLACK DUCK OUTCOME:

Restore a three-year average wintering black duck population in the Chesapeake Bay watershed of 100,000 birds by 2025. (Current condition: Recent mid-winter aerial surveys estimate the 2007-2009 rolling three-year average at 37,158 black ducks in the Chesapeake Bay.)

Action Overview:

- Restore black duck habitat.
- Increase nutrient sources on refuge lands.

Restore black duck habitat. Atlantic Coast Joint Venture partners will by 2012 target wetland and adjacent upland habitat protection, restoration and enhancement in waterfowl focus areas and other areas in the Chesapeake Bay watershed to increase energetic capacity (food availability

including aquatic vegetation, roots, tubers and occasionally mollusks) for wintering black ducks and work with partners to leverage funds to implement these targeted actions beginning in 2013. Partners will develop an adaptive management framework to guide habitat decisions related to restoration and enhancement at the local (i.e., National Wildlife Refuge) scale by 2013.

Increase nutrient sources on refuge lands. By 2017, National Wildlife Refuges will increase by 10 percent the availability of food resources to support energetic carrying capacity for wintering black ducks on refuge lands located within the Chesapeake watershed, which include Chesapeake Marshlands, Eastern Virginia Rivers, the Eastern Shore of Virginia, and the Potomac and Patuxent rivers. The 10-percent increase is an interim step that can be taken on federally managed refuge lands. Simultaneously, the Atlantic Coast Joint Venture and Black Duck Joint Venture are examining the total acreage of forage habitat needed to support a wintering population of 100,000 black ducks in the Chesapeake watershed, with results expected in 2011. The increase of food resources on refuges will be accomplished through active wetland restoration and management, habitat protection, invasive species control and potential expansion of refuges. In addition, to reduce the need for excess winter forage, refuges will implement disturbance reduction during wintering periods.

ADDITIONAL CHESAPEAKE WATERSHED SPECIES

The outcomes and actions for the four species above do not address all fish and wildlife management requirements in the Chesapeake Bay watershed. In addition, actions to restore habitat and maintain healthy fish and wildlife populations will provide benefits beyond the watershed. Highlighted in this section are some additional actions that federal, state and interstate resource management agencies will take to achieve measurable outcomes for additional species.

Facilitate interjurisdictional, ecosystem based fisheries management. In order to restore the Bay fisheries, partners need to develop management approaches and plans that incorporate the structure and function of the Chesapeake Bay ecosystem, including species interactions, habitat use and suitability, climate, water quality, land-use, and other factors. NOAA will work with FWS, other federal agencies, the states, the District of Columbia, PRFC and the Atlantic States Marine Fisheries Commission to strengthen interjurisdictional fishery management strategies by energizing discussion and coordination within the current management structure, including the Chesapeake Bay Program's Sustainable Fisheries Goal Implementation Team. Target species include but are not limited to menhaden, American shad, American eel and striped bass.

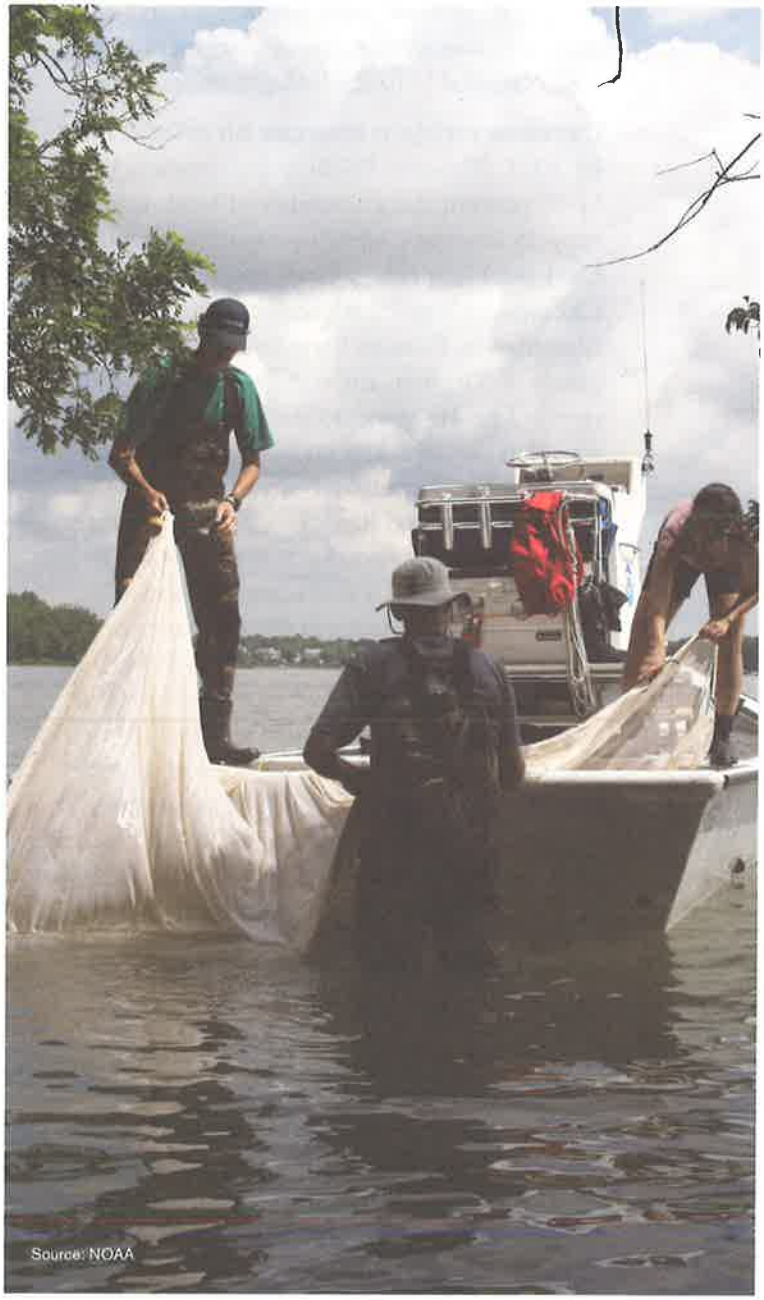
NOAA and Maryland Sea Grant, in coordination with state and federal agency partners and research institutions, are facilitating the development of a new format for ecosystem-based fishery management in the Chesapeake Bay. This project will lead to the adoption of


Source: USFWS

ecosystem-based fishery management plans for five key fish species (striped bass, blue crab, oysters, menhaden and alosids, which include American shad, hickory shad, blueback herring and alewife). These plans will expand traditional, single-species management plans to consider the interconnections between species, their habitats and human influences.

Consider alternative fisheries management approaches. NOAA will work with the states and PRFC to evaluate the management tools in place now and recommend, as appropriate, any additional tools/measures to improve management across the Bay. Fisheries management approaches in the Bay vary by species and by jurisdiction, but are primarily based on traditional single-species approaches. Evaluation will include alternative management approaches such as the use of "catch shares," gear-restrictions and sanctuaries. Catch shares are fishery-management programs that allocate a specific percentage of the total allowable fishery catch (e.g., quota-based systems) or a specific fishing area (e.g, limited-access programs) to individuals, cooperatives, communities or other entities.

Support the Atlantic Coastal Fish Habitat Partnership (ACFHP). Under the National Fish Habitat Action Plan, ACFHP brings together fishery and non-fishery associated organizations (federal, state and local governments) academic, non-profit and professional organizations to collaboratively benefit coastal habitats along the Atlantic seaboard. NOAA and FWS will work to support the partnership and promote the sustainability of Atlantic coast diadromous fish (fish that migrate between freshwater and salt water), other estuarine-dependent fish (fish that rely on estuarine habitats for at least part of their life cycle) and their essential habitats through habitat protection and restoration projects. In addition, federal partners will coordinate with organizations such as the Susquehanna River Basin Commission to integrate and implement high priority fish habitat restoration projects with similar efforts in the watershed.


Source: NOAA

Federal agencies will provide enhanced research, monitoring and models to support prioritizing, monitoring and evaluating the effect of management actions to protect and restore fish and wildlife populations.

Prioritize

Collect and organize information to help identify and prioritize areas to restore oyster habitat and populations. NOAA and the USACE will coordinate with Maryland, Virginia and PRFC to establish baseline oyster stock and habitat assessments to establish the most current condition of the stock and suitable habitat in tributaries targeted for restoration. Data will come from existing studies and new monitoring or research efforts as needed (e.g., high-resolution acoustic habitat mapping and assessments, environmental observations, GIS analysis, hydrodynamic, spatial and larval transport models). The results will identify, locate and prioritize sites for protection and large-scale restoration. The resulting assessments will also be used to tailor system-specific restoration strategies and actions in a given tributary.

Improve scientific information on selected freshwater species. FWS and USGS will enhance information for providing an adaptive-management approach to restoring priority species in the watershed. The approach includes determining the primary causes of poor fish health and fish kills in the Bay watershed, working with states to consider strategies to improve fish health, establishing monitoring and indicator species to assess progress and evaluating the effectiveness of management actions. Between 2010 and 2013, USGS and FWS will work with Maryland, Virginia, West Virginia, Pennsylvania and local partners to continue efforts to assess the impact of pathogens, parasites and toxic contaminants on fish kills and intersex conditions in the Potomac watershed. These studies will be expanded to the Susquehanna and James River basins from 2012 to 2016. As part of these assessments, FWS and USGS will identify the major sources of different environmental stresses on fish and wildlife so state and federal agencies can consider appropriate control strategies. In 2010 and 2011, FWS will work with USGS and the states to select species as indicators for stream corridor health and successful fish passage.

Improve scientific information to support Bay-wide restoration efforts. NOAA, FWS, USACE and USGS will coordinate with Maryland, Virginia, PRFC, ASMFC and academic partners to improve the scientific information needed to manage and restore living resources (including key species such as oysters, blue crab, striped bass, menhaden and alosids like shad and herring. Federal investment will be directed toward better understanding the status and trends of fish and shellfish abundance and distribution through more accurate, timely and comprehensive stock assessments and to accelerate ongoing ecosystem-based fishery management efforts and support interjurisdictional fisheries management. Federal capabilities to provide this information include the ability to:

- perform comprehensive habitat characterization, monitoring and assessment of sub-watershed(s) or tributaries
- assess fish stock and protected-resource status
- examine the health of species
- monitor living resources (throughout the food web) at appropriate levels of species resolution
- assess the differences in the status of living resources in space and time (e.g., abundance, distribution, health) influenced by both natural and harvest activities
- quantify the impacts of habitat loss on species productivity
- provide long-term monitoring and mapping of fish and wildlife.

Monitor

Establish watershed program for brook trout monitoring. FWS will work with states and federal partners to establish a watershed program for brook trout monitoring. The Joint Venture will assess existing programs to improve monitoring of brook trout as part of the Chesapeake Monitoring Alliance. Based on the most promising partnerships, FWS will lead coordination of habitat assessments, stream surveys and long-term monitoring to help determine the success of individual restoration efforts and update brook trout population status in the watershed.

Improve monitoring of black duck food sources. Black ducks and other migratory waterfowl require sufficient food to make their long migrations. The Chesapeake Bay watershed provides important food, including vegetation (wetland and underwater grasses) and clams for waterfowl. FWS and partners will develop and implement monitoring to estimate availability of food sources for black duck throughout the Bay watershed. Research projects to validate methods and estimates for the vegetation portion of the black duck diet will be complete by 2011, with the methods and estimates for other portions of their diet complete by 2013. Long-term monitoring of vegetation will be implemented by 2015, with invertebrates to follow in 2018. Further research will be conducted to determine the effects of sea-level rise on the availability and abundance of black duck food sources in the Chesapeake Bay watershed by 2018.

Evaluate

Use science to evaluate oyster restoration progress. To ensure restoration efforts are succeeding, NOAA and USACE will work with the states to develop a coordinated monitoring, assessment and research program to evaluate performance of native oyster protection and restoration efforts. These efforts will also include developing common data acquisition, monitoring and assessment protocols, and advancing technologies to promote reef habitat restoration. The foundation of this approach will be a comprehensive baseline characterization of systems set aside for protection and restoration, followed by continued monitoring to evaluate effectiveness and guide adaptive management. Follow-up monitoring will be designed to evaluate oyster population dynamics and oyster reef habitat structure and function from an ecological perspective, as well ad the impact of the restored oyster reef complex on the tributary system. Work will begin in 2011 and continue through 2025. NOAA and USACE will lead development of a set of common monitoring protocols and procedures and identify additional research priorities by 2012.

In addition, federal and state partners will employ adaptive management to revaluate the oyster outcome beginning in 2015. This will evaluate science-based targets for ecological restoration, and an assessment of technical, resource and material capacity to reach the stated outcome. Results of this analysis may require a revision of the outcome and management actions.

Develop ecosystem models to support decision-making. NOAA will provide model results to describe relationships between habitat restoration and sustainable fisheries populations based on selected management scenarios. NOAA will provide initial results from the Chesapeake Atlantis Model in 2011, with enhanced model scenarios available in 2012. Model outputs allow exploration of the ecosystem effects of environmental changes, policy options and management strategies, and can help identify and prioritize research needs. For instance, what will the ecosystem effects be if:

- there is a loss/gain of marsh habitat in a specific region; nutrient input is halved or doubled?
- there is an increase/decrease in the population size of adult striped bass (and/or) blue crab (and/or) oyster (and/or) menhaden (and/or) shad and herring?

- there is an increase/decrease of rainfall for the Chesapeake Bay watershed overall, or for just one region?
- a protected area is established or a new fishery is opened or an existing fishery closed?

Evaluate native bivalve restoration for water quality improvement. Native bivalves of the Bay, such as oysters are intense filter feeders. Enhancing populations of mussels and other bivalves may be particularly effective if centered in Bay tidal tributaries experiencing heavy pollution loads that are fueling algae growth. Beginning in 2011, NOAA will coordinate with Bay states to evaluate the feasibility of enhancing native bivalve populations to improve water quality in targeted tributaries. Potential human health concerns and other possible unintended impacts will be considered.

Assess quality of black buck habitat. By 2020, FWS and partners will assess the effects of human disturbance, food resources and wetland structure on black duck daily movements and residency on wetlands. FWS will also characterize the relationship between black duck winter condition and seasonal survival of wintering black ducks and subsequent breeding success in the Chesapeake Bay watershed by 2020.

EXAMPLES OF STATE AND DISTRICT ACTIVITIES

Maryland's Oyster Restoration and Aquaculture Development Plan

In December 2009, Maryland launched the Oyster Restoration and Aquaculture Development Plan which is designed to develop an abundant, self-sustaining native oyster population in the Chesapeake Bay and its tributaries. The plan will support a healthy and competitive oyster industry by maintaining a significant public fishery while simultaneously building investment and opportunity in aquaculture. The plan will create opportunity for growing private investment by opening 600,000 new acres to aquaculture. The plan will set aside an additional 16 percent of existing quality habitat for oyster sanctuary areas (increase from 9 percent to 25 percent), maintaining 75 percent of quality habitat for the public fishery. Protecting at least 25 percent of quality oyster habitat is essential to both the future health and prosperity of the Bay's oyster population and to sustainable harvest. The sanctuary network will:

- Protect some of the Bay's most productive oyster grounds, allowing them to increase in size and quality over time.
- Facilitate development of natural disease resistance.
- Span a broad geographic distribution across all salinity zones.
- Increase the ability to protect these important areas from poaching.
- Serve as a reservoir of reproductive capacity, generating larvae to populate other areas.

Blue Crab Management in Maryland and Virginia

A blue crab management control rule was adopted by the Bi-State Blue Crab Advisory Committee (2001) and incorporated into the 2003 Chesapeake Bay Blue Crab Amendment. The control rule is based on the relationship between adult crab abundance, exploitation and management reference points. In response to the results of the 2007 stock status, the states took action to constrain the 2008 fishery to a target of 46 percent exploitation, designed to reduce harvest and allow the stock to rebuild. An interim abundance target of 200 million adult (age one year or older) crabs was developed. As a result of management measures adopted in 2008 and 2009, the crab population has increased. The jurisdictions will continue to maintain conservation strategies that protect the blue crab population while allowing exploitation. Management measures include:

- Limiting the harvest of female blue crabs by commercial and recreational fisheries.
- Removing derelict crab pots and preventing unintended mortality. To date, the program has eliminated approximately 8,000 crab pots in Maryland waters and 18,000 pots in Virginia waters.
- Continuing to reduce effort in the blue crab commercial fishery through the license Buy-Back Program. To date, more than 600 Limited Crab Catcher licenses in Maryland and 359 commercial blue crab pot licenses in Virginia have been bought back by state management agencies to reduce potential fishing effort.
- Conducting a new stock assessment that analyzes additional sex-specific data and evaluates the current biological reference points for managing the stock

Brook Trout Habitat Restoration in the Upper Potomac River and New York

Brook trout habitat restoration is a high-priority project in the National Fish Habitat Action Plan of the Eastern Brook Trout Joint Venture. Ongoing projects at Big Run and Whitethorn Creek are aimed at restoring and protecting degraded sections of essential brook trout habitat on tributaries to the South Branch of the Potomac River in West Virginia. Coldwater trout streams on private land in the upper Potomac watershed are often impaired due to nitrogen, phosphorus and sediment pollution from non-point sources, livestock grazing and destruction of streamside vegetation. Restoring forest buffers, keeping livestock out of streams and allowing for natural stream channel restoration will decrease temperatures and provide cover and holding habitat in the wild brook trout systems located in the headwaters of the South Branch of the Potomac River. With significant involvement from local landowners, these projects will restore and protect habitat for native Eastern brook trout.

In cooperation with the Eastern Brook Trout Joint Venture, the New York State Department of Environmental Conservation has initiated fisheries surveys on brook trout distribution, population status and threats to those populations. Threats include improperly sized or installed culverts, bank erosion and lack of suitable streamside vegetation. It is hoped that this assessment will identify needed restoration projects for the future.

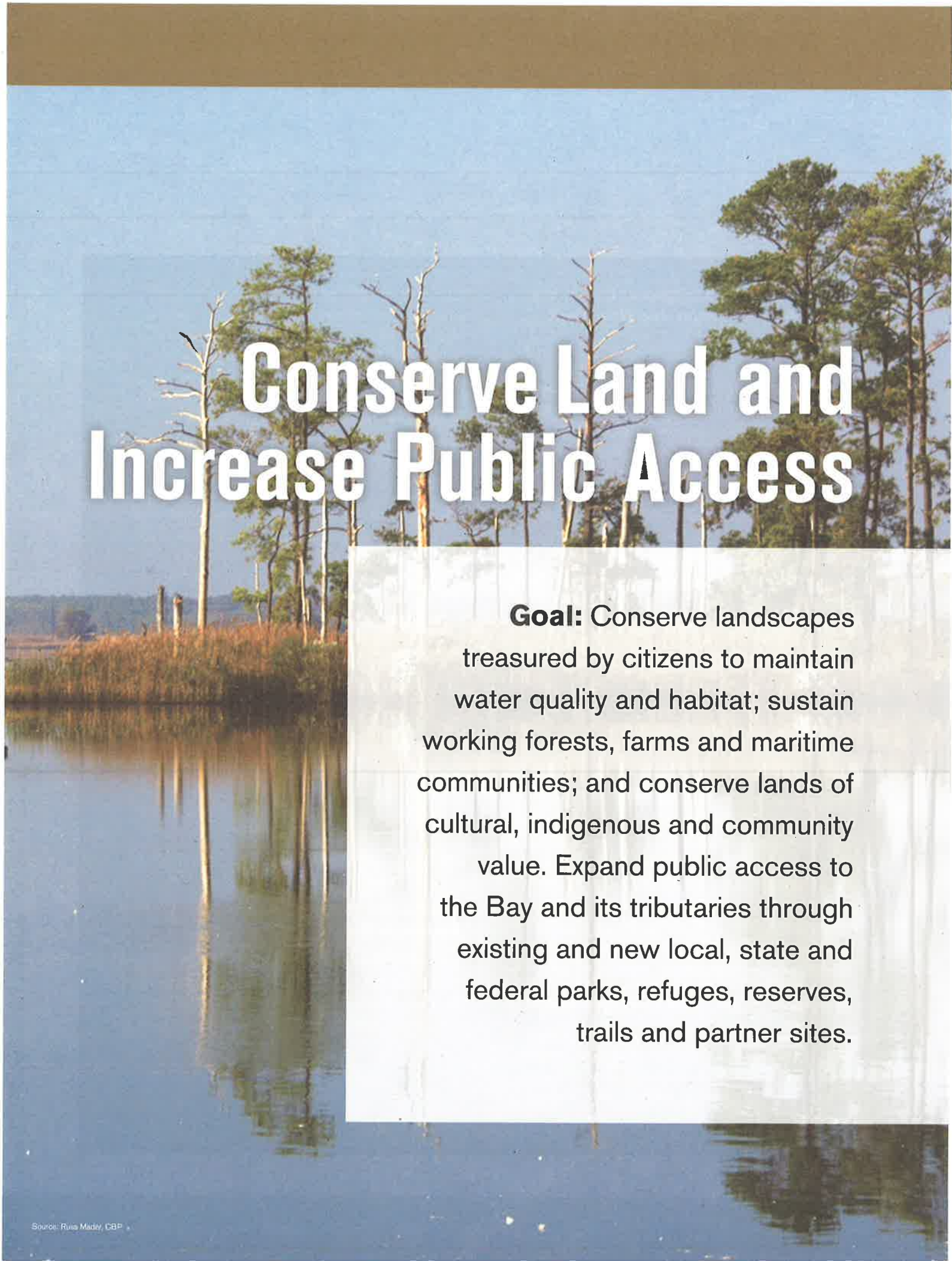
Maryland Brook Trout Management Plan

Maryland adopted a Brook Trout Management Plan in 2006. The goal of the plan is to "restore and maintain healthy brook trout populations in Maryland's freshwater streams and provide long-term social and economic benefits from a recreational fishery." The plan was one of Maryland's brook trout conservation strategies developed in conjunction with the Eastern Brook Trout Joint Venture. The plan provides a framework for assessing brook trout populations, determining habitat priorities and developing actions to protect, enhance and restore brook trout populations. Priority actions from the plan for 2010 are:

- Implement a joint research project between Maryland Department of Natural Resources - Fisheries Service and the University of Maryland Center for Environmental Science - Appalachian Lab to investigate the life history characteristics (i.e., mortality, longevity, fecundity and growth rate) of brook trout populations in Maryland and develop a complete life history management strategy for the Savage River with statewide application.
- Develop a geographic information system (GIS) map to identify "at risk" brook trout populations, create a priority list of populations/sites and direct conservation activities to protect and improve those populations and/or sites.
- Develop statewide guidelines for restoring extirpated brook trout populations.

Shad in the Potomac and Anacostia Rivers

To restore American shad populations in uppers tidal areas of the Potomac and Anacostia Rivers, the District will continue to stock more than one million American shad annually.



Conserve Land and Increase Public Access

Goal: Conserve landscapes treasured by citizens to maintain water quality and habitat; sustain working forests, farms and maritime communities; and conserve lands of cultural, indigenous and community value. Expand public access to the Bay and its tributaries through existing and new local, state and federal parks, refuges, reserves, trails and partner sites.

Source: Russ Mader, CBP

At the heart of the Chesapeake region lie the landscapes along the Bay and its major tributaries. These treasured landscapes are the special places we revere as individuals, as communities and as a people for their ecological, cultural, historical and recreational values, and for their role in maintaining and renewing our identity and spirit.

Many of these landscapes are large; they are the settings or surroundings in which life in the Chesapeake region plays out. Some are protected or formally recognized as parks, wildlife refuges, historic sites or heritage areas. But most are not; they are sweeping segments of the countryside – forests, farming communities and natural areas often linked to the water – that we recognize as creating the sense of place that is the Chesapeake region. These treasured places have names such as Jamestown, Gettysburg, Shenandoah Valley, Blackwater, Pennsylvania Amish Country, Tidewater Virginia, the Eastern Shore, the Susquehanna Water Gaps, and Smith and Tangier Islands. These are but a few of the treasures of the Chesapeake, a region that has served as the setting for some of the most important events in the formation of our nation.

Yet, many of the Chesapeake's treasured landscapes are threatened. Rapid and poorly planned development increasingly pressures both natural and cultural lands, tearing at the fabric that defines the region and supports a way of life. Forests are lost at the rate of 100 acres each day. Chesapeake watershed farmland suffers a similar threat: every day between 1982 and 2003, approximately 100 acres of farmland were lost to development. Converting forests and open spaces to development simply exacerbates pollution problems now harming the Bay and its rivers. On average, an acre of forest delivers just 3.3 pounds of polluting nitrogen to streams annually while an acre of developed land delivers 32.9 pounds. The same forests, farmlands and wetlands upon which we rely also provide habitat for the iconic wildlife species of the region.

Bay states have identified more than 2.5 million unprotected acres as important to conserve including 695,000 acres of forest land of highest value to maintaining water quality. But this represents only part of the picture. It does not include key conservation objectives such as protecting farmlands and many other culturally important landscapes in several states; nor does it include all local conservation priorities. Thus the total acreage of valuable unprotected lands is likely even higher. Conserving these valuable lands is critical to maintaining the Chesapeake's heritage and identity, ensuring the quality of our waters and supporting the fish and wildlife for which this region has long been renowned.

Conserving important places relies on public support. Providing opportunities for the public to visit and use these places is often a crucial factor in building that support. Yet physical access to nature and the Bay and its rivers is limited. If a core Chesapeake restoration goal is to make the Bay and its tributaries "fishable and swimmable" then increasing public access to the water is not only an end goal, but also a necessary step to get there. Access to water allows people to enjoy fishing, hunting, swimming, kayaking, hiking and picnicking, which create opportunities for public education, personal connections with nature, citizen stewardship and land conservation.

The Chesapeake's treasured landscapes merit high national attention. The goal, outcomes and actions are intended to help stimulate a renewed and expanded commitment to conserving these important lands and ensuring residents can enjoy them.

Conserve Land and Increase Public Access

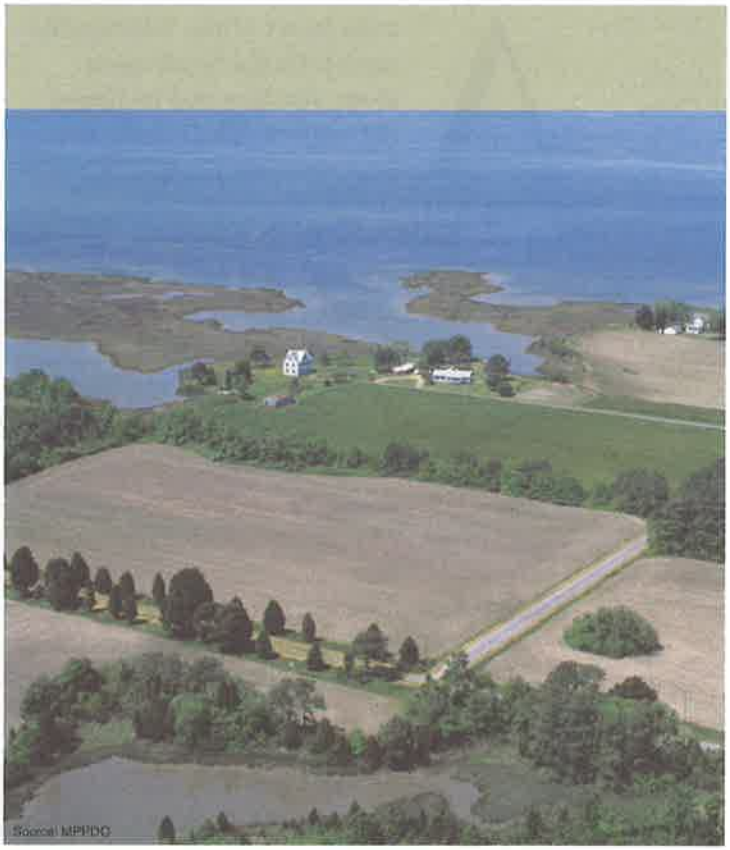
LAND CONSERVATION OUTCOME:

Protect an additional two million acres of lands throughout the watershed currently identified as high conservation priorities at the federal, state or local level by 2025, including 695,000 acres of forest land of highest value for maintaining water quality. (Current condition: 7.8 million acres currently protected watershed-wide)

Action Overview:

- Launch Chesapeake Treasured Landscape Initiative.
- Coordinate and target federal land conservation funding.
- Conserve landscapes through National Park Service partnership areas.
- Achieve mutual conservation goals through National Wildlife Refuge partnerships.
- Develop a Bay-wide strategy to reduce the loss of farms and forests.
- Support creation and expansion of protected coastal and marine areas.
- Provide community assistance for landscape conservation.
- Identify culturally significant landscapes.
- Establish watershed-wide GIS-based land conservation targeting system.
- Develop integrated transportation, land use, housing and water infrastructure plans.

Launch a Chesapeake Treasured Landscape Initiative. DOI will launch an initiative to expand land conservation and public access in priority Chesapeake landscapes. This builds on and furthers the goals of the national *America's Great Outdoors Initiative* within the Chesapeake region. Beginning in 2010, DOI will initiate a



The working farms, forests and natural areas around the tidal region of the Bay are central to creating the Chesapeake's sense of place. These landscapes connect us to deep traditions and vital economic and ecological values.

series of actions to expand funding, better coordinate and target conservation efforts across federal agencies and initiate new strategies for conserving landscapes. Along with DOI, other federal agencies will play important roles in carrying out these actions. However, the role of state, local and private partners in land conservation is equally, if not more, significant. The federal government will pursue all of the actions below through collaboration with these partners.

- **Increase Land & Water Conservation Fund allocations.** DOI will lead an interagency effort to provide proportional increases in Land & Water Conservation Fund allocations for Chesapeake watershed landscapes based on increases in the national program identified in the President's Budget beginning in 2011 and fulfilling the President's goal of full funding ($900 million) of LWCF by 2014.
- **Create a public-private conservation funding partnership.** NPS will convene federal and state agencies and nongovernmental organizations to create a public-private partnership to coordinate and leverage federal and possibly state conservation funding. Beginning in 2010, federal partners will develop a formal agreement with a non-governmental organization on the relationship and scope of activities and conduct a pilot funding project.

Coordinate and target federal land conservation funding. DOI will coordinate efforts at targeting federal funding to expand strategic land protection in the Chesapeake Bay watershed. Partners include federal and state program managers for the Land & Water Conservation Fund, Forest Legacy, Coastal and Estuarine Land Conservation Program, Wetlands Reserve Program, Farm and

"Americans are blessed with a vast and varied natural heritage. From mountains to deserts and from sea to shining sea, America's great outdoors have shaped the rugged independence and sense of community that define the American spirit. Our working landscapes, cultural sites, parks, coasts, wild lands, rivers, and streams are gifts that we have inherited from previous generations. They are the places that offer us refuge from daily demands, renew our spirits, and enhance our fondest memories, whether they are fishing with a grandchild in a favorite spot, hiking a trail with a friend, or enjoying a family picnic in a neighborhood park. They also are our farms, ranches, and forests the working lands that have fed and sustained us for generations. Americans take pride in these places, and share a responsibility to preserve them for our children and grandchildren."

- President Barack Obama, April 16, 2010.

Ranchlands Protection Program, Transportation Enhancements, and the Readiness and Environmental Protection Initiative. DOI will convene program managers in 2010 to ensure conservation planning approaches and priorities are shared and coordinated across jurisdictions and programs in the Chesapeake Bay watershed.

- **Increase collaboration in the Coastal and Estuarine Land Conservation Program.** NOAA will lead a collaborative effort among states to identify priority conservation areas that will benefit the Chesapeake Bay through state Coastal and Estuarine Land Conservation Program (CELCP) plans. In 2010, NOAA will convene a meeting with coastal state partners to finalize CELCP plans within the Chesapeake region and ensure that priority acquisitions at National Estuarine Research Reserve System sites are fully incorporated into statewide CELCP planning.
- **Encourage consideration of Transportation Enhancements, Scenic Byways and Recreational Trails programs to support land conservation.** DOT will continue to work with state agencies administering Transportation Enhancements, Recreational Trails and Scenic Byways programs to enhance understanding of program provisions and procedures and eligibility requirements. These programs may offer funding opportunities to support land conservation and public access development in priority landscapes.
- **Conserve priority landscapes around defense installations.** By 2011, DOD and DOI will identify locations where land conservation priorities of military bases, National Wildlife Refuges, National Parks and National Trails overlap and develop coordinated land conservation strategies. The DOD Readiness and Environmental Protection Initiative program provides extra credit for proposed projects that result in a title fee or easement purchase of significant landscape and areas of ecological and/or cultural value. DOD will revise the guidance in 2011 to ensure Chesapeake Bay projects receive this credit.

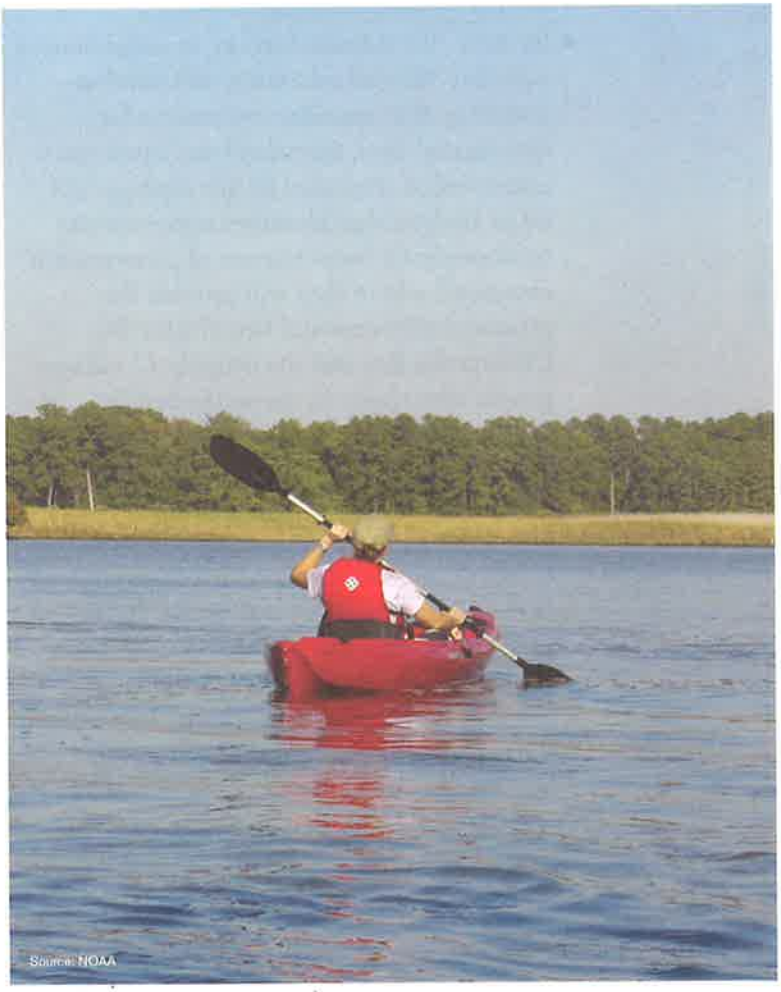
Conserve landscapes through National Park Service partnership areas. NPS will coordinate broad, collaborative conservation efforts in priority landscapes. Working with FWS and other federal, state, local and non-governmental partners, NPS will use existing national trail designations and explore a new designation to bring national recognition to these landscapes and support interpretation and education, community assistance and land conservation. These efforts will support conservation of sustainable working forests, farms and maritime communities, natural areas and habitats, and cultural, historic, community, indigenous and recreation values. Specifically, NPS will undertake the following actions:

- **Consider a new unit of the National Park System for Chesapeake Bay & Rivers.** In 2010, the NPS will convene representatives of the states' governors to explore the potential for a new unit of the National Park System focused on the Chesapeake and its rivers. While the possible types of NPS unit designations vary widely, approaches appropriate for this region would focus on non-traditional models. They would involve collaborative partnerships and retain existing patterns of land ownership and land-use, with federal lands as a small fraction of the conserved area. Further exploration of a "partnership park" based in part on the 2004

Chesapeake Bay Special Resource Study would include working landscapes, public access, public interpretation and recreation components. Further analysis would be required to determine the feasibility of a new unit. A new unit of the National Park System would require congressional legislation.

- **Identify high priority landscapes along National Trails.** NPS will work with federal, state and non-governmental organizations to identify high priority landscapes along the routes of the Captain John Smith Chesapeake National Historic Trail, Star-Spangled Banner National Historic Trail and Potomac Heritage National Scenic Trail. This will focus land conservation efforts along these trails. For national historic trails, NPS will publish landscape and site criteria and priority locations in the trail comprehensive management plans in 2010 and 2011.
- **Coordinate NPS conservation actions with FWS refuge partnerships.** On an ongoing basis, NPS will work with FWS and state, local and nongovernmental organization partners to coordinate National Wildlife Refuge conservation partnerships and planning and investments for the Captain John Smith Chesapeake National Historic Trail, Star-Spangled Banner Historic Trail and the Chesapeake Bay Gateways and Watertrails Network.

Achieve mutual conservation goals through National Wildlife Refuge partnerships. FWS will work with communities and partners in the Bay watershed to identify those natural and cultural resources that embody the vision of treasured landscapes. For those areas where there is mutual agreement to protect, restore or enhance these resources, FWS will assist communities and partners in achieving their stewardship objectives. FWS will focus on the major rivers of the Bay, especially where there is already a presence by the National Wildlife Refuge System, such as on the Rappahannock and James rivers. In 2010, FWS will dedicate additional resources to its Partners for Fish and Wildlife and Coastal Programs to work with landowners who wish to receive cost-sharing and technical assistance to voluntarily restore or improve fish and wildlife habitats on their properties. Also in 2010, FWS will bring in new planning expertise to begin the process of engaging with existing and potential partners and communities to identify important areas and help develop land conservation strategies.


Source: NOAA

Develop a Bay-wide strategy to reduce the loss of farms and forests. Well-managed agricultural and forest lands support a healthy Chesapeake Bay watershed, but these lands are under increasing pressures, leading to conversion to other uses. USDA will lead the following actions to help sustain agricultural presence on the landscape:

- In 2010, USDA will expand outreach on the "Know Your Farmer, Know Your Food" initiative in communities across the Chesapeake Bay watershed. This initiative promotes local and regional food systems by stimulating community economic development and ensuring equitable access to affordable fresh and local food.
- By 2012, the Administration, in collaboration with Bay Watershed States, will develop a strategy that considers incentives for agricultural land, forestland and open space conservation. Included in this strategy will be an analysis that identifies opportunities to strategically focus the use of conservation easements where they will provide the greatest environmental benefits for the Chesapeake Bay and the roughly 17 million people who reside in the watershed. In addition, the Administration will explore how an extension of federal tax benefits for qualified conservation contributions can play a role in the overall strategy to achieve conservation and stewardship of private lands in the Chesapeake Bay watershed. In the past, tax benefits for qualified conservation contributions appear to have stimulated conservation activity nationwide. Extension of the tax benefits would require an action by Congress.

Support creation and expansion of protected coastal and marine areas. Marine protected areas (MPAs) are increasingly recognized as an important and promising management tool to support conservation of our natural and cultural marine heritage and sustainable production of marine resources. The National System of MPAs provides coordination and tools for collaborative development and effective use of MPAs, helping to restore and maintain healthy environments and contribute to the overall protection and of important habitats and resources. NOAA will apply the technical expertise of the National Marine Protected Area Center, the National Marine Sanctuaries Program and the National Estuarine Research Reserve System (NERRS) and NOAA regional offices to support states in evaluating the establishment of science-based protected areas to conserve and sustain natural and culturally significant coastal and marine resources. NOAA, working in collaboration with state and federal partners and other stakeholders, will consider improved integration and potential expansion of Chesapeake Bay protected areas by providing technical tools and opportunities for capacity building through training and grants. By 2011, NOAA will support expansion of existing NERRS protected areas, in coordination with the states, by pursuing priority acquisitions that address climate change impacts on coastal ecosystems. NOAA will explore, through the Office of National Marine Sanctuaries, the potential for future culturally-focused Chesapeake Bay sanctuaries in collaboration with state and federal partners, and other stakeholders. NOAA will also invite Chesapeake Bay Marine Protected Areas (MPAs) to nominate sites to the national system of MPAs and provide competitive funding opportunities for Chesapeake Bay sites in the national system of MPAs.

Provide community assistance for landscape conservation. NPS will deliver coordinated community assistance for priority landscape identification, assessment and conservation. Beginning in 2011, NPS will convene federal and

Landscapes along the Chesapeake's great rivers, including the Susquehanna (top) and the Shenandoah (bottom), are scenic treasures with deep historic value. They are vital ecological corridors as well, sustaining wildlife and clean water.

state partners to assess current technical assistance capabilities and gaps, and ways to improve local government and land trust access to assistance providers and capacity building support.

Identify culturally significant and ecologically important landscapes. NPS will coordinate work to conduct landscape surveys to identify landscapes of cultural significance to different communities and the region. The surveys will ensure specific coverage where the existing analysis is weak, including landscapes with significance to American Indians, African Americans and Hispanic Americans, as well as working landscapes with significance to family farmers and watermen, among others. Important ecological corridors and resources will also be identified. The resulting surveys will inform land conservation priorities and be incorporated in the land conservation database and prioritization system (see following action). Work will begin in 2011 and continue through 2015.

Establish watershed-wide GIS-based land conservation targeting system. USGS, NPS and FWS will adapt or develop a watershed-wide strategic, publicly accessible land conservation geographic information and targeting system to support sound conservation planning and decision-making. This will build on and expand systems used at the state level (such as Maryland's Greenprint) to ensure full coverage of federal, state and local land conservation priorities (including new information from the landscape surveys described above) and foster strategic coordination across the watershed for multiple land conservation values. The system will also incorporate information on anticipated land change to ensure land conservation priorities are informed by vulnerability to development pressure and climate change. In 2010, USGS and NPS will convene federal agency partners, states and non-governmental organizations to develop

a scope for the system and the mechanisms to put the system into place beginning in 2011. USGS will establish a decision-support specialist for land conservation to manage the system and data and develop products to help users understand the implications of different conservation options.

- **Improve monitoring of land-use changes.** USGS and NOAA will improve monitoring of land-use changes to help assess progress of land conservation efforts. USGS and EPA will improve spatial resolution and consistency of land-cover and impervious surface monitoring for the watershed. USGS recently produced land-cover change analysis for 1984-2006 for the entire watershed and will work with NOAA to update land-use conditions for 2010-2011. Land-cover updates will continue through 2025 (at five-year intervals).
- **Describe land-cover change to evaluate progress toward land conservation.** USGS will describe changes in different types of land cover and implications for conserving lands. The first assessment will be done based on the 2010-2011 land cover update. The information will be used to help partners adapt land conservation approaches.

Develop integrated transportation, land use, housing and water infrastructure plans setting forth smart growth and environmental stewardship visions. Coordination of planning for transportation, housing, land-use and water infrastructure can lead to more livable communities. The Partnership for Sustainable Communities among DOT, EPA and the Department of Housing and Urban Development (HUD) is working to build more sustainable communities by providing more transportation choices including bicycling and walking, more equitable and affordable housing, and increased economic competitiveness. The partnership will seek opportunities to support existing communities, leverage federal investment and value communities and neighborhoods. DOT will work with partners to encourage initiation of integrated plans in one or more communities in the watershed. Beginning in 2011, pending availability of funds, DOT and partner agencies will provide communities that undertake integrated planning with technical assistance and enhanced capacity for modeling and data collection. DOT, EPA and HUD will work with local planning authorities, state resource agencies, metropolitan planning organizations and state DOTs beginning in 2011 to further promote environmentally sustainable transportation and development as part of integrated regional planning.

PUBLIC ACCESS OUTCOME:

Increase public access to the Bay and its tributaries by adding 300 new public access sites by 2025. (Current condition: 761 public access sites providing access to Bay and its tributaries exist in DC, MD, PA, VA; data on existing access sites in NY, DE and WV to be collected in the future).

Action Overview:

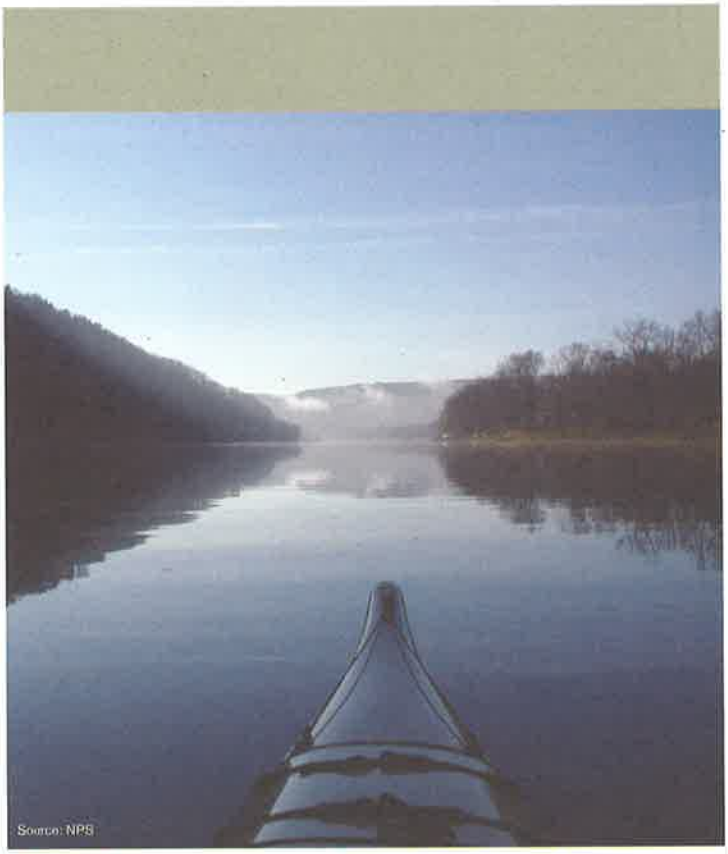
- Develop a plan to expand public access.
- Prioritize funding for public access development.

Develop a plan to expand public access. The NPS, in conjunction with the states, FWS and other federal agencies, will develop a public access plan to inform and guide expansion of Chesapeake watershed public access. The access plan will assess current and projected public demand, describe existing access facilities and threats facing them, determine gaps in public access (for example, gaps according to geography, types of access, handicapped accessibility, underserved communities) and barriers to access

such as railroads, and identify opportunities for expanding existing access areas and creating new access areas. Along with Statewide Comprehensive Outdoor Recreation Plans, the access plan will be used to focus federal, state and local funding for public access expansion. NPS will convene partners to begin development of the access plan in 2011 and complete the plan by 2012.

- **Identify public access needs and opportunities along National Trails.** NPS will identify public access needs and opportunities along the Captain John Smith Chesapeake National Historic Trail, Star-Spangled Banner National Historic Trail and Potomac Heritage National Scenic Trail. This information will contribute to the public access plan above. For national historic trails, public access needs and opportunities will be identified in the trail comprehensive management plans to be completed in 2010 and 2011.

Prioritize funding for public access development. NPS will set public access site development as a priority funding emphasis in Chesapeake Bay Gateways and Watertrails Network grants for 2010 and 2011. Partners at more than 165 designated gateways and water trails are eligible to apply for these network matching grants.



Access to the water connects Americans with the outdoors. If a core Chesapeake restoration goal is to make the Bay and its tributaries "fishable and swimmable," then increasing public access to the water is not only an end goal, but also a necessary step to get there.

EXAMPLES OF STATE ACTIVITIES

Listed below are just a few examples of important state programs anticipated as collaborative partners in advancing land conservation and public access.

Pennsylvania Conservation Landscape Initiative (CLI)

Led by Pennsylvania's conservation and natural resources agency, related state agencies, local governments, nonprofits and other groups are collaborating to drive strategic investment and actions around sustainability, conservation, community revitalization and recreation projects in targeted landscapes. CLI works with communities to support land conservation, locally driven planning and community revitalization efforts tied to natural and cultural resources. Landscape areas are selected because of extensive public land holdings and a strong programmatic presence by the Department of Conservation and Natural Resources. Five CLI areas are within the Bay watershed.

GreenPrint Maryland

GreenPrint Maryland uses color-coded maps, natural resource assessment data and aerial photography to show the relative ecological importance of every parcel of land in the state and to identify ecological conservation tracts. This web-enabled tool applies the best environmental science and geographic information systems to the work of preserving and protecting environmentally critical lands. GreenPrint also tracks the achievements of the state's land conservation programs. This is a model for strategic land conservation planning.

Virginia Governor's Land Conservation Goal: Virginia met its self-imposed statewide land conservation goal of 400,000 acres over the past four years, preserving 424,103 acres as of winter 2010. Specific land conservation accomplishments include the creation of two new state parks, six new state forests and 13 natural area preserves. Moreover parts of 13 Civil War battlefields were protected. Governor McDonnell has established a new goal to preserve an additional 400,000 acres by the end of his administration. In just four years and in just one state, this ambitious effort could achieve 20 percent of this strategy's 15-year, two-million-acre land protection goal.

New York & Pennsylvania Public Fishing Access Programs

Both New York and Pennsylvania maintain creative programs for expanding access to rivers and streams for fishing. Since 1935, the New York State Department of Environmental Conservation has worked with private landowners to ensure access to prime fishing waters. Nearly 1,200 miles of public fishing rights easements have been purchased on over 350 streams across the state. Similarly, Pennsylvania's Fish and Boat Commission is purchasing low-cost fishing easements in the Juniata watershed, a tributary of the Susquehanna. In both states, the permanent easements allow the public to wade and walk on a strip of land along the streambed and banks for the purpose of fishing. The landowner continues to own the land affected by the limited fishing rights easement. The easements also allow the states to help perform streambank improvement work such as planting trees or shrubs.

Delaware's Nanticoke River Water Trail

The Delaware Department of Natural Resources & Environmental Control and its local and private partners will launch the Nanticoke River Water Trail in summer 2010. The 26-mile trail will be accessed from at least six public access sites. A map and guide will be available providing

paddlers with information to safely plan their water-based recreational experiences and interpretation highlighting the area's rich history and noteworthy natural and cultural heritage.

New York State Open Space Conservation Plan

New York State's 2009 Open Space Conservation Plan presents an important blueprint for advancing the state's land conservation efforts with guidance for open space planning and protection at the state, regional and community levels. The plan lists priority projects identified by citizen-based regional advisory committees and comprehensive policy and program recommendations, including recommendations to advance stream, riparian area, wetland and forest protection programs. Based on grassroots involvement, the plan includes priority conservation areas along the Susquehanna River valley corridor in the Chesapeake Bay watershed of New York State.

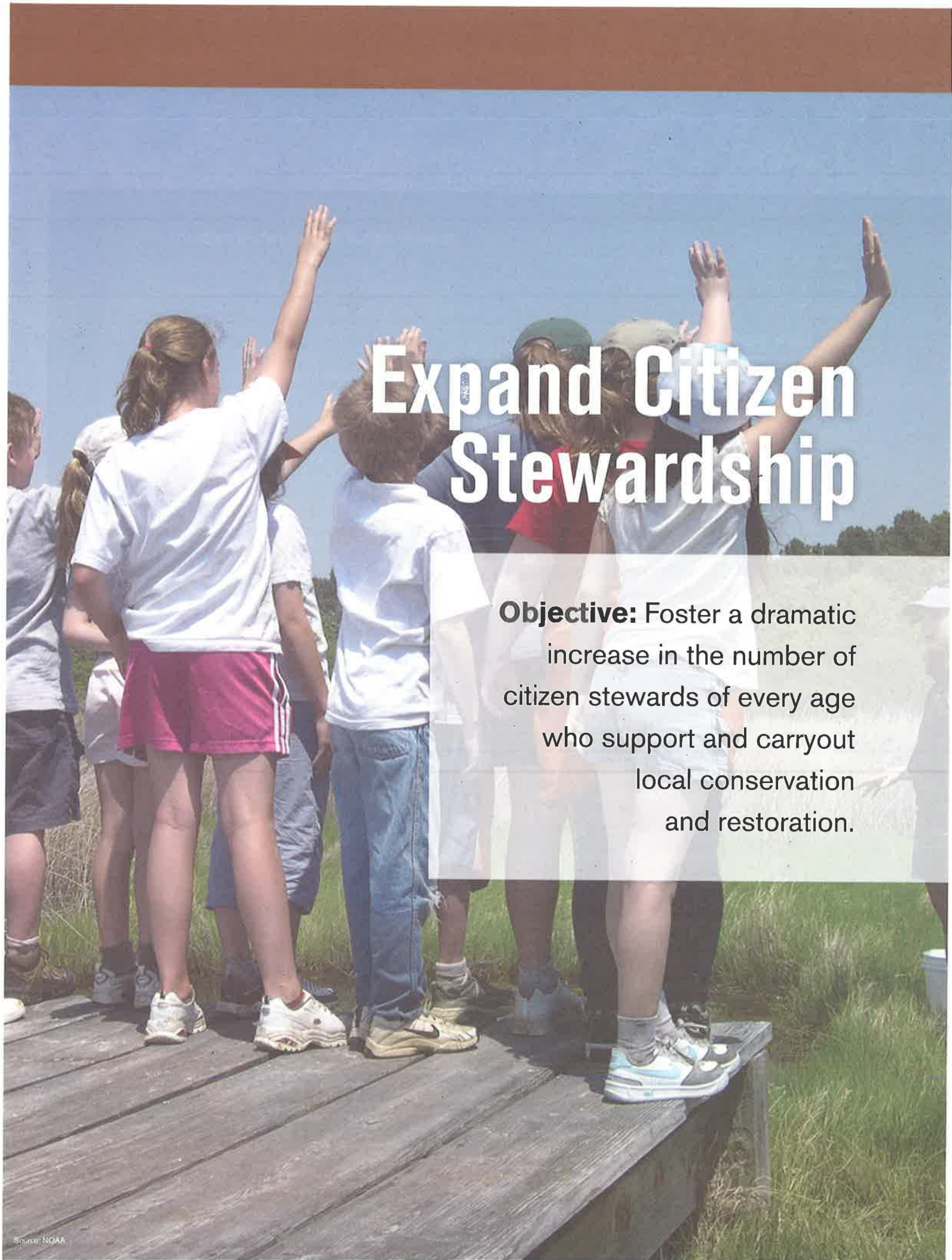
Maryland Program Open Space

Maryland's Program Open Space acquires land for natural resource protection, recreation and public use, and also provides grants to local governments for land acquisition and park facilities development. Since 1969, Program Open Space has symbolized Maryland's long-term commitment to conserving natural resources while providing exceptional outdoor recreation opportunities for our citizens. More than 303,000 acres have been acquired to date. Over 5,500 local grant projects to counties and municipalities have either acquired land or built facilities for Maryland's conservation and recreation needs.

Maryland's Rural Legacy Program

Maryland's Rural Legacy Program enhances natural resource, agricultural, forestry and environmental protection while maintaining the viability of resource-based land uses such as farm production and timber harvest. The program provides funds to local governments and land trusts to conserve land in designated Rural Legacy Areas through the purchase of conservation easements. The program is focused on a grass-roots approach to land conservation, stressing partnerships among local, state and federal governments and non-profit land trusts. Counties are encouraged to support additional land protection methods to build upon Rural Legacy accomplishments.

Source: Chris Spielmann for NPS



Expand Citizen Stewardship

Objective: Foster a dramatic increase in the number of citizen stewards of every age who support and carryout local conservation and restoration.

Source: NOAA

People tend to protect the places they understand and care about. Freeman Tilden, a pioneer in enhancing visitor experiences in our national parks, recognized that people whose lives are enriched by personal connections to the landscape become its most strident defenders. Tilden described a process through which experience brings understanding, understanding brings appreciation, and "through appreciation, protection." Providing outdoor opportunities and education that nurture this continuum are critical to personal well-being, community character and stewardship of the environment.

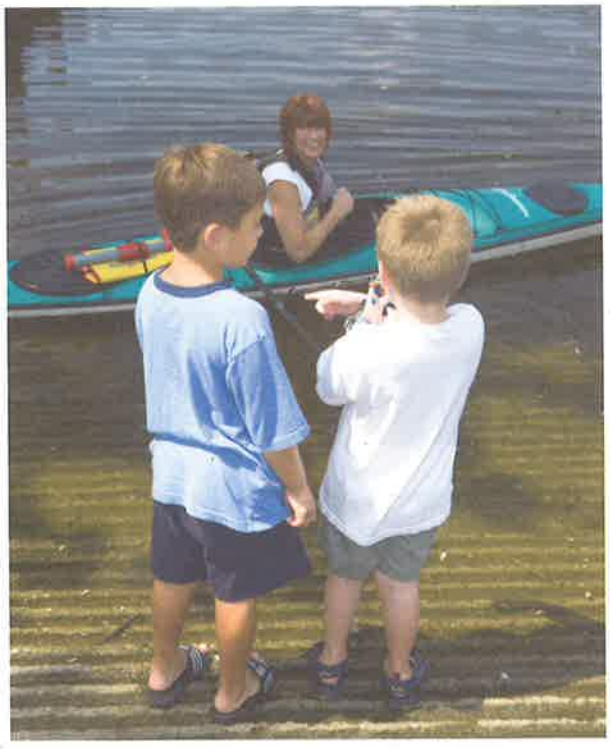
The Chesapeake region is rapidly urbanizing. More than eight million people including significant diverse communities and new immigrants, live in urban core areas. Fewer people interact on a regular basis with the forests, open lands and waters of the Bay region. Despite this trend – or perhaps because of it – regional residents increasingly seek opportunities to reconnect with the outdoors.

Federal, state and local governments are guardians of these opportunities, providing sites and resources allowing everyone to enjoy the natural and cultural bounty of the Bay region by relaxing, learning and reflecting in direct interaction with the Bay's treasured landscapes. Moreover, government and legions of non-governmental organizations provide opportunities for direct engagement in citizen stewardship. Opportunities for stewardship can and should be made available to citizens of different ages, at several points and through multiple systems. Caring for the Chesapeake requires long-term engagement.

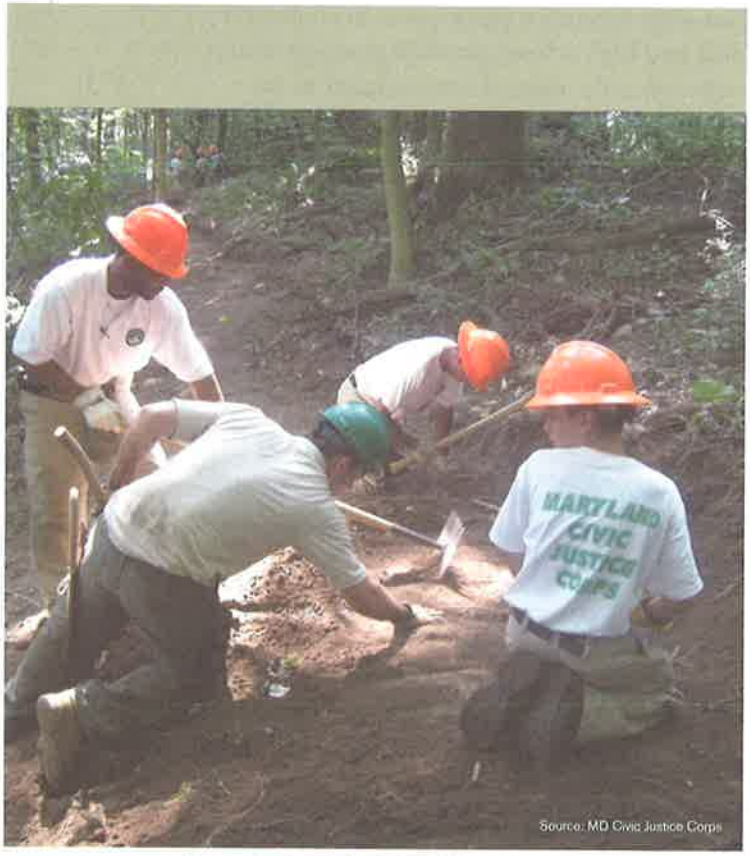
For children – the stewards of tomorrow, but with the ability to make real contributions today – this begins with formative experiences in elementary, middle and high school, providing opportunities to experience the natural environment in the watershed coupled with curricula to ground the experience. Recognizing this, the Chesapeake Bay Program is working to provide every student with "meaningful watershed educational experience" in elementary, middle and high school.

For adults of many ages, engagement can focus on direct stewardship actions. For citizens of the watershed, the places where people experience the Chesapeake – parks, refuges, maritime museums, etc. – and the places where people spend most of their time – their homes, schools and neighborhoods – provide venues for further engagement and action.

Ultimately, meeting the water quality, habitat restoration and land conservation goals described in this strategy depends on engaged citizens who both support stewardship in the larger community and take personal action to carry it out.



Expand Citizen Stewardship



Providing opportunities for young people to work outdoors builds stewards for the future. Maryland's Civic Justice Corps (top photo) is a unique summer program for students to help conserve and restore state parks.

OBJECTIVE:

Foster a dramatic increase in the number of citizen stewards of every age who support and carryout local conservation and restoration.

Action Overview:

- Expand Chesapeake conservation corps workforces.
- Expand master watershed stewards program.
- Prioritize citizen stewardship in Small Watershed Grants Program.
- Expand outreach to private forest landowners.
- Enhance visitor experiences and stewardship messaging at designated Chesapeake sites and trails.
- Build long-term local partnerships for engaging communities and citizens along national trails.
- Initiate robust elementary and secondary environmental literacy initiative.

Expand Chesapeake conservation corps workforces. NPS will convene federal, state and non-governmental partners to expand existing conservation corps workforces that create jobs and carry out conservation and restoration projects in priority watersheds – create a broadened Chesapeake Conservation Corps. NPS will coordinate efforts to examine existing models and programs, especially those focusing on underserved communities, assess issues and needs, and identify mechanisms for measuring progress. Among these are dependable multi-year funding, enhanced capacity of existing programs (particularly in terms of administrative and logistical support), ongoing training of leaders and participants, and support for ongoing maintenance projects. NPS will coordinate development of a proposed strategy for expanding corps programs by 2011.

Expand master watershed stewards program. NPS will work with federal, state and local partners to determine how best to expand the existing model master watershed stewards program for training citizens to organize and conduct restoration in a series of priority landscapes and watersheds. NPS will coordinate efforts of the partners to develop an expansion plan and methods for measuring progress by 2011.

Source: NPS

Prioritize citizen stewardship in Small Watershed Grants Program. The Chesapeake Bay Small Watershed Grants Program promotes community-based efforts to develop conservation strategies to protect and restore the diverse natural resources of the Chesapeake Bay and its watershed. EPA will make citizen stewardship-based projects a priority funding category in the Small Watershed Grants Program in 2011 to encourage projects that help residents develop a better understanding of their personal connection to the Bay and a strong knowledge of what steps they can take to be stewards of their watershed.

Expand outreach to private forest landowners. About 900,000 private forest landowners own approximately 80 percent of forested lands in the Chesapeake watershed. Forestry for the Bay, a program supported by the U.S. Forest Service, provides education and outreach to landowners to promote sustainable forest management. By 2015, the Forest Service will dramatically increase outreach and resources to reach an additional 3,000 forest landowners (representing approximately 50,000 acres of forest) through Forestry for the Bay by expanding the program's web site capabilities and using existing and developing landowner information networks that target highly vulnerable regions of Pennsylvania. Current Forestry for the Bay participation is 300 landowners.

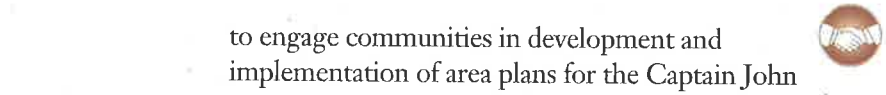
Enhance visitor experiences and stewardship messaging at designated Chesapeake sites and trails. The NPS and FWS will develop and lead an expanded strategy for enhancing visitor experiences and stewardship messaging at designated sites and trails (Chesapeake Bay Gateways and Watertrails, units of the National Park System, National Wildlife Refuges, National Historic Trails and National Scenic Trails). In 2011, NPS will coordinate a collaborative effort to define "meaningful Chesapeake visitor experiences" and how to measure progress.

Build long-term local partnerships for engaging communities and citizens along national trails. The NPS will convene local government and non-governmental partners to plan for long-term stewardship, sustainable tourism and landscape conservation along major tributaries with national historic and national scenic trails. Beginning in 2011, NPS will work with partners

to engage communities in development and implementation of area plans for the Captain John Smith Chesapeake National Historic Trail and the Star-Spangled Banner National Historic Trail. These plans will build long-term relationships for community and citizen involvement in trail and watershed stewardship.

Initiate robust elementary and secondary environmental literacy initiative. By December 2011, NOAA will pursue engagement of additional federal and state partners – including the U.S. Department of Education, Department of Interior, Department of Energy and EPA – to develop a Chesapeake Bay Elementary and Secondary Environmental Literacy Strategy that expands upon the meaningful watershed educational experience objective.

- **Support and enhance outdoor student environmental education programs.** NOAA, EPA and NPS will ensure that national programs that encourage increased environmental stewardship and career choices related to green jobs – including Hands on the Land and programs focused on science, technology, engineering and math (STEM) – are fully represented in the Chesapeake Bay region by December 2012. In addition, NPS will work with the Alice Ferguson Foundation to expand the Bridging the Watershed program, which provides educational experiences connecting students to their place in the natural and cultural world.
- **Provide high-quality professional development, tools and resources for educators.** In 2010, NOAA will open a new Environmental Science Training Center to provide continuing education on emerging science and related content to the informal environmental education professionals who are providing teacher professional development throughout the region.



- **Encourage the creation and maintenance of green schools, including schoolyard habitat and green facilities programs.** By December 2011, FWS and NOAA will work with other federal agencies and the states to ensure that the Environmental and Secondary Environmental Literacy Strategy includes a clear set of priorities related to creating and maintaining schoolyard habitat and green facilities and grounds. This strategy will incorporate existing federal and state programs, such as the EPA Clean School Bus USA program, the U.S. Department of Energy's EnergySmart Schools, and Farm to School programs.

A master watershed steward installs a rain barrel at a residential property to slow the flow of stormwater runoff.

EXAMPLES OF
STATE ACTIVITIES

Listed below are just a few examples of state and regional programs anticipated as collaborative partners in expanding citizen stewardship.

Maryland Partnership for Children in Nature: Recognizing the urgency in ensuring that Maryland's young people have the opportunity to connect with nature and grow to become informed and responsible stewards of our environment, Governor Martin O'Malley established the Maryland Partnership for Children in Nature by Executive Order in April 2008. Co-managed by the Maryland Departments of Natural Resources and Education, the partnership developed a comprehensive environmental literacy plan as well as a plan to provide youth with structured and unstructured opportunities for play, outdoor recreation, learning and scientific study.

Virginia's Chesapeake Bay Gateways Youth Corps: The Virginia Department of Conservation and Recreation established a Chesapeake Bay Gateways Youth Corps to foster citizen stewardship of the Chesapeake and improve public access along the Captain John Smith Chesapeake National Historic Trail. The program engages volunteer youth teams and supervisors in work projects and environmental education at 10 Virginia State Parks designated as Chesapeake Gateways. The Youth Corps work projects improve sites that help visitors access, enjoy, understand and appreciate the natural, cultural, historic and recreational resources of the Chesapeake Bay watershed. The program allows youth, supervisors and park visitors to develop a stewardship ethic through an understanding of resource management.

Watershed Stewards Academy of Anne Arundel County, Maryland: The Watershed Stewards Academy (WSA) is an initiative of the Anne Arundel County Department of Public Works, the Arlington Echo Outdoor Education Center to train community leaders, Maryland and NOAA, called "Master Watershed Stewards," to reduce the negative impacts of stormwater runoff in Anne Arundel County. This initiative educates, engages and builds the capacity of local government, business and citizen communities to make a significant reduction in pollution sources entering local waterways. WSA recognizes that although the government has the responsibility to provide leadership, enforcement and resources toward ensuring clean water, without the collective contributions of all watershed residents, no real progress may be made toward this goal.

Virginia Clean Marinas: The Virginia Clean Marinas program is run by Virginia Sea Grant in partnership with the Virginia Departments of Environmental Quality and of Conservation and Recreation. The program promotes voluntary adoption of measures to prevent or reduce pollution from traditional and non-traditional marinas, boatyards and recreational boats. Marina operators adopting such measures are designated as "Virginia Clean Marinas." Individual boaters can also pledge to carry out a series of steps to help keep rivers, streams and the Bay clean, including recycling, practicing proper fueling, keeping Virginia waters free of trash, and using pump-out facilities.

Virginia Sea Grant: Virginia Sea Grant provides workshops combining scientific updates with teaching resources throughout the year. Recent topics include sea turtles, oyster reefs, blue crabs, sharks, benthic communities and biological invaders. A recurring focus is on oyster gardening. Virginia Sea Grant teamed with teachers, the Oyster Reef Keepers of Virginia and members of the Tidewater Oyster Gardeners Association (TOGA) for workshops on the subject, including oyster biology, oyster reef ecology and oyster restoration. With help from the TOGA members, teachers have built oyster floats where they raised seed oysters with their students. Since 2000, a Master Oyster Gardener Refresher Course has been held every other year for past graduates.

Environmental Markets

Objective: Working collaboratively, USDA, EPA, Bay states and other federal partners will develop environmental markets for the Chesapeake Bay, including the management infrastructure for measuring, reporting and verifying environmental performance for a suite of ecosystem services.

Source: Caroline Wicks/IAN Image Library

Environmental markets are an innovative approach to natural resource management that can accomplish environmental protection goals, encourage new technologies, improve efficiencies, reduce costs and help manage growth. The basic premise of environmental markets is that an entity that needs to reduce impacts to the environment buys credits representing an equivalent or greater amount of environmental improvement from a provider of that improvement. These credits must be verified to ensure measurable environmental improvement and may be registered and traded much like any other commodity. Environmental markets have the potential to create more resilient ecosystems that better respond to key stressors, including climate change, population growth, and land-use change while providing incentives to keep well managed land in forest and agricultural production.

The 2008 Farm Bill directs USDA to facilitate the participation of farmers, ranchers and forest landowners in emerging environmental markets. In addition, the Farm Bill directs USDA to establish technical guidelines for measuring environmental benefits, a protocol for reporting environmental benefits and a registry to collect, record and maintain the benefits measured. The Farm Bill also directs USDA to establish guidelines for a process to verify that a farmer, rancher, or forest landowner who reports an environmental benefit has implemented the reported conservation or land management activity.

In establishing these verification guidelines, the Farm Bill directs USDA to consider the role of third-parties in conducting independent verification of benefits produced for environmental markets. America's farmers, ranchers and foresters are poised to generate environmental credits that can help regulated entities across the nation meet their environmental obligations.

USDA is actively working to meet the 2008 Farm Bill directives and seeks to ensure that market processes and management infrastructure operate as seamlessly as possible. Farmers, ranchers and forest landowners need to be able to create credits of all types (e.g., nutrients, sediment, habitat, carbon and wetlands) and the management infrastructure is needed to define the demand for credits and assure that credits are reliable and are in addition to practices that need to be employed to meet programmatic or regulatory baseline expectations. One key to the success of environmental market strategies is the ability of federal and state governments to demonstrate that environmental benefits can be achieved in ways that bolster landowner livelihoods. USDA is leading an effort in assessing opportunities for "stacking" multiple types of credits so that private landowners can maximize the economic benefits they derive from participation in environmental markets. USDA will also examine the relationship between existing conservation program rules and environmental markets to test compatibility and effectiveness.

In the Chesapeake Bay watershed, there is an immediate opportunity to build upon current state trading programs and EPA guidance to expand the market for nutrient and sediment trading. By December 2010, EPA will establish a TMDL for the Chesapeake Bay. The new TMDL will set pollution limits for nitrogen, phosphorus and sediment in the Chesapeake Bay and its tributaries and require that states account for anticipated new or increased pollution loads over time. These new or increased loads can be accounted for by several mechanisms

including: 1) more stringent pollution controls on existing sources in order to create a reserve to accommodate new or expanded pollution loads, or 2) a process in which dischargers of new or increased loads are required to "offset" their loads by acquiring pollution reductions from other sources.

The new limits on nutrients and sediment to be established in the TMDL will help establish demand for projects that reduce these pollutants and make a market for these reductions viable. At the same time, environmental markets provide an important new mechanism to complement the water pollution control programs described in the water quality portion of this strategy.

The Federal Leadership Committee sees environmental markets as an important new tool for meeting the diverse environmental goals for the Chesapeake Bay and its watershed that are described in this strategy. Several initial projects have provided proof-of-concept but the infrastructure to enable environmental markets to function effectively in the Chesapeake Bay region currently does not exist. Successful environmental markets in the Bay watershed might be used as a template for environmental markets nationwide.

EPA's work on trading and offset mechanisms under the TMDL and USDA's work on a system of environmental market options will proceed on parallel but complementary tracks. USDA and EPA will work together to develop the technical tools, documentation and tracking methods and other mechanisms that will help ensure the integrity and compatibility of water quality and environmental market programs in the Bay.

Actions

- The first priority will be to establish a market for trading pollutant reduction credits for nutrients and sediments in support of the water quality goals in the TMDL. Building on expectations provided to the states and District of Columbia in 2009, EPA will issue guidelines concerning credits for nutrient and sediment reduction to accompany the draft TMDL (October 2010) and final TMDL (December 2010). These guidelines will, for example, outline EPA's expectations for how states may operate programs to ensure that credits that support NPDES permits and TMDL loading caps are reliable and verifiable. EPA will work with the Environmental Market Team (see below) to assure that tools and protocols developed by the team are reflected in this and subsequent guidance to the greatest extent possible. EPA will work closely with the states and District of Columbia to capitalize on their investments in trading programs.
- USDA will lead, in coordination with EPA and other federal agencies (including DOC, DOI, DOT, DOD, USACE, CEQ, and OMB), an interdepartmental Environmental Market Team to coordinate efforts in establishing the environmental market infrastructure in the Chesapeake Bay. This team will move expeditiously to:
  - Develop and evaluate scientific tools to measure the environmental performance of conservation practices and projects that can be used in environmental markets.
  - Develop protocols that define and measure relevant baselines for supplying credits.
  - Define and measure the environmental improvement (performance) of practices and projects used in environmental markets.
  - Develop protocols to certify and verify that measurable environmental improvements occur.

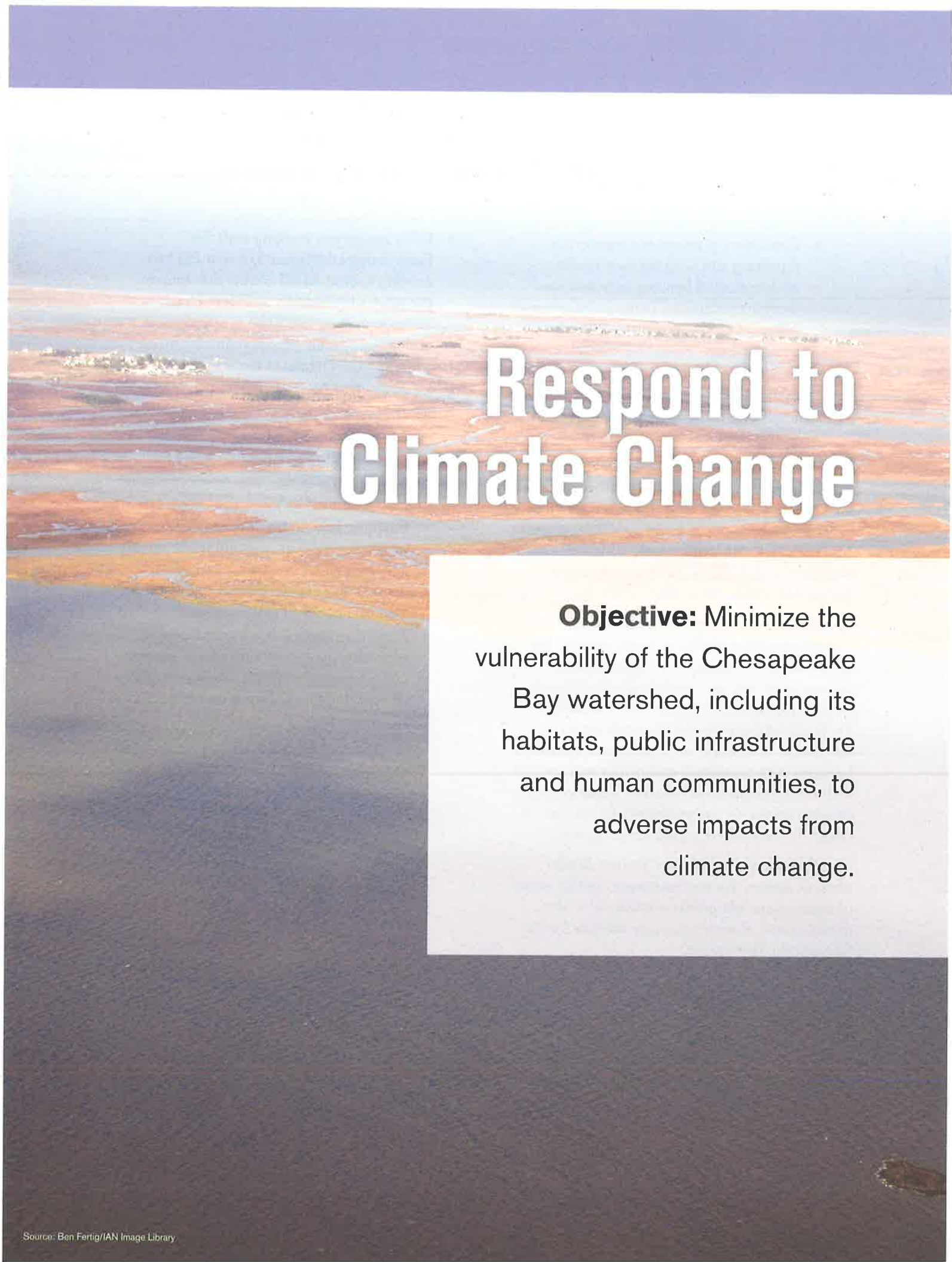
- Establish a platform for registering, reporting and tracking measurable environmental benefits over time to facilitate commerce between buyers and sellers of credits and provide market transparency.
- Establish a credible and robust management infrastructure that lends control, oversight, visibility and transparency to the markets.

In addition, the Environmental Market Team will evaluate options for reducing market risk and assess the value of stacking and bundling more than one ecosystem service in a market structure. The team will also work closely with states and interested stakeholders and will seek public review and comment on draft protocols.

Recognizing the unique authorities and regulatory responsibilities of each agency, the team will also cooperatively explore options for new crediting and market opportunities in habitat, wetlands and conservation banking. To facilitate the potential for landowners to sell credits in multiple environmental markets, agencies with regulatory authorities will consult with the Environmental Market Team as they develop protocols and guidelines for the use of offset credits in their regulatory programs.

The Environmental Market Team will also work to ensure that environmental justice issues of concern are adequately considered in the development of environmental markets for the Chesapeake Bay region.

- FWS anticipates working with the Environmental Market Team in 2011 to develop habitat-based credits that reflects the value of ecosystem services. This is in addition to the work FWS is already doing to develop species-based credits for brook trout and the Delmarva fox squirrel.
- NOAA will provide expertise in the development of the Chesapeake Bay environmental market infrastructure by:
  - Strengthening scientific integrity by participating in the rules development of emerging markets;
  - Examine how to broaden the focus, where appropriate, beyond water quality and agriculture to coastal and estuarine management tools. This could result in new categories of activities; and
  - Exploring how to develop and deploy tools that may assist with spatial planning and analysis of multiple credit potential of the Chesapeake Bay as an ecosystem.



Respond to Climate Change

Objective: Minimize the vulnerability of the Chesapeake Bay watershed, including its habitats, public infrastructure and human communities, to adverse impacts from climate change.

Source: Ben Fertig/IAN Image Library

Climate change is a significant challenge to successful restoration and protection of the Chesapeake Bay and its watershed. Scientists project that climate change will have a variety of impacts on this region, including rising sea levels, warmer water and air temperatures, changing precipitation patterns and increases in rainfall intensity, and changes to freshwater flows with corresponding significant impacts to water quality and habitats. Although there is still some uncertainty surrounding specific climate change projections and impacts at the scale of the Chesapeake Bay, available information is more than sufficient to begin exploring adaptation and mitigation practices that minimize impacts of climate change and the most likely future scenarios, as well as to raise awareness among policy makers and the public.

Many of the region's urban centers and significant ecosystems are in low-lying areas that are particularly vulnerable to sea-level rise and storm surge. The impacts of climate change extend to infrastructure, habitat, fish and wildlife populations, stream flow, water quality, and valued Bay landscapes and waters. Climate change threatens past restoration gains and the effectiveness of future actions.

Adapting to the impacts of climate change involves maintaining or enhancing the resiliency and reducing the vulnerability of the Chesapeake Bay and its watershed. The design and implementation of adaptation strategies includes careful analysis of existing decision-making processes. It is necessary to understand:

- rates at which conditions are changing and are projected to change in the future;
- how various factors, such as land-use changes, interact with climate change impacts;
- likely consequences for water quality, habitats, fish and wildlife and communities

The keys to a successful adaptive management approach are to provide the public and decision-makers with the most current scientific information while advancing understanding through research, monitoring and modeling. The best available science on climatic changes should be factored into restoration and protection of the Chesapeake Bay watershed. The Bay states and the District of Columbia are in varying stages of completing climate action plans, with several plans completed and others underway. Although states have identified or begun to identify their needs and recommended actions, the lack of more localized assessments of climate change projections and impacts challenge the states' ability to effectively implement all of the needed adaptation and mitigation actions. Because much of the region's infrastructure is tightly interwoven, regional climate adaptation planning to protect, upgrade and adapt the region's infrastructure is essential. Maintaining ecosystem health is also essential to the function and vitality of the region's landscape through measures such as improved shoreline management to provide wetland migration capacity.

In addition to the cross-cutting objectives and actions described below, actions that consider the impacts of a changing climate are included in the habitat, fish and wildlife, and other chapters of this strategy. Efforts to understand potential impacts and identify actions to respond to impacts will be expanded and continue to be integrated into management and planning activities.

OBJECTIVE:

Minimize the vulnerability of the Chesapeake Bay watershed, including its habitats, public infrastructure and human communities, to adverse impacts from climate change.

The supporting objectives described in this chapter are:

- Improve information on the communities, habitats and resources at risk from the impacts of climate change in the Chesapeake region by conducting vulnerability assessments and supporting research priorities.
- Develop communication and decision-support products to increase knowledge and capacity to plan for and implement projects that build community and ecosystem resilience.
- Conduct monitoring activities to deliver routine and sustained climate information products and services.
- Integrate climate change information into Chesapeake Bay Program decision-making and planning and into federal land management and planning in the Bay watershed.
- Adopt practices that mitigate greenhouse gas emissions.

Supporting Objective:

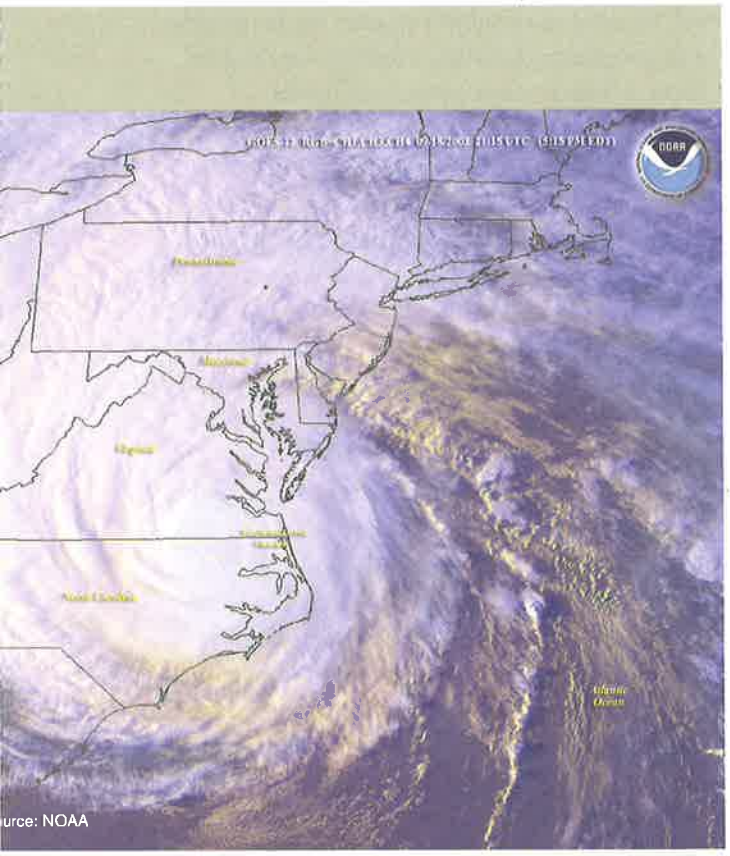
Improve information on the communities, habitats and resources at risk from the impacts of climate change in the Chesapeake region by conducting vulnerability assessments and supporting research priorities.

Action Overview:

- Identify communities that are vulnerable to the impacts of climate change.
- Identify and assess risk to key Bay and coastal habitats from potential impacts of sea-level rise climate and land-use change.
- Demonstrate and implement effective restoration planning in the face of land elevation change and sea-level rise.
- Identify and assess risk to key watershed habitats from potential impacts of climate and land change.
- Enhance federally supported research to improve and streamline vulnerability assessments.

Identify communities that are vulnerable to the impacts of climate change. NOAA and USGS, in collaboration with other federal partners and states, will identify Chesapeake region communities and public infrastructure most vulnerable to the impacts of climate change. The states have completed substantive efforts in planning for climate change, and federal agencies will coordinate with state and local plans to ensure federal efforts are addressing the most critical gaps on projected impacts to Chesapeake communities and their resources. NOAA support for local community adaptation planning will be initiated with small financial awards to Maryland and Virginia in 2010 and 2011 to support projects as prioritized by the states. Assessments of vulnerable communities and infrastructure will continue based on identification of interested communities.

In addition, NOAA will by 2012 seek to expand the availability of Chesapeake Inundation Prediction System (CIPS) modeling to additional communities at high risk for inundation. USGS will support this effort through forecasting future urban development in and around coastal communities to support local adaptation of land-use policies to climate change.



Agencies will identify potential impacts of climate change to habitats and conserved lands in the Chesapeake watershed.

Demonstrate and implement effective restoration planning in the face of land elevation change and sea-level rise. NOAA, USGS and FWS will demonstrate the infrastructure, computer models and tools necessary to support the incorporation of local sea-level rise data and projections into coastal restoration projects. The agencies will implement climate change considerations into their restoration projects. The Recover Habitat chapter includes a detailed discussion of the actions to protect and restore priority Chesapeake marshes and shorelines under pressure from sea-level rise and development. To demonstrate applications of these efforts, federal and state partners are collecting sea-level rise and land elevation data and using this information to demonstrate adaptation approaches at Poplar Island and the Blackwater National Wildlife Refuge. NOAA and USGS will summarize the information in 2011 to demonstrate the type of observations needed to assess relative sea-level rise in other areas of the Bay.

Identify and assess risks to key tidal and coastal habitats from potential impacts of changing climatic conditions and rising sea-level. NOAA and USGS will lead the identification and assessment of risks to critical Bay habitats and coastal areas that are vulnerable to the impacts of climate change. An assessment of tidal wetlands most vulnerable to sea-level rise and climate change will be initiated in 2011 and completed by 2016. The vulnerability assessment will discuss implications for important NPS and FWS lands and critical areas being protected in collaboration with states under NOAA programs (e.g., the National Estuarine Research Reserves). NOAA, USGS and EPA will work together in 2011 to improve the methodology for vulnerability assessments of other critical Bay

habitats such as underwater grasses. Based on the outcome of the effort, additional assessments of key estuary habitats will be proposed in 2012.

Identify and assess risk to key watershed habitats from potential impacts of climate change and land change. USGS will work with federal partners to identify potential impacts of climate change to habitats and conserved lands in the Chesapeake watershed. USGS will improve its Land-Change model and seek opportunities to couple it with water quality and habitat models to forecast potential changes to lands, forests and stream habitats. USGS will work with the USFS to assess implications to forests, with the NPS and FWS to assess implications for conserving lands, and with FWS to assess implications for habitats for key fish and wildlife (such as brook trout) in the watershed. USGS is conducting an initial assessment of climate and land-use changes on stream flow and pollution loads in the Bay watershed with initial results available in 2011. USGS will work with EPA to determine if a more complete analysis of water quality and streamflow changes is needed.

Enhance federally-supported research to improve and streamline vulnerability assessments. Federal agencies will improve the federal research necessary for vulnerability assessments and the understanding of how climate change is projected to impact the Bay and watershed.

- NOAA and USGS will prioritize climate change research and monitoring needs specific to the Bay watershed. The agencies will interact with the DOI North Atlantic and Appalachian Mountain Landscape Conservation Cooperatives and with the NOAA northeast regional partners to identify common priorities. In 2011, this priority list will be used to develop requests for proposals and programs that direct federal funding to these priority science research needs.
- Federal agencies working to adapt national climate models for larger-scale regions will coordinate with emerging regional climate centers to provide data for the Bay watershed. This will include working closely with the DOI Climate Science Center and National Wildlife Center Hub being proposed for the northeast area of the nation, as well as with the emerging NOAA Climate Service regional services enterprise for the eastern United States.
- Specific outputs of prioritized research in the near-term include:

  Provide land-use change data. The NOAA Coastal Change Analysis Program and USGS Land Remote Sensing Program will develop and distribute (via publicly available web sites) digital land cover data sets every five years for the Chesapeake Bay watershed. NOAA will focus its mapping in areas near the Bay, while USGS will focus its mapping efforts on rest of the watershed. These data sets can be used to assess land-use changes. NOAA and USGS will conduct the assessments beginning in 2011 and make the data available in 2012.

  Provide projections of land-use changes. EPA will refine nationwide county-level population projections consistent with global climate change emission scenarios and create a subset of projections for the Chesapeake Bay watershed. This work will occur in 2010 and will inform USGS efforts to model land-use and land cover change throughout the Chesapeake Bay watershed.

  Assist states and local communities with topographic data. USGS will help states acquire high-resolution topographic data.

Work will begin in 2010 and lead to digital data for state and local communities to use for planning purposes in 2012.

Supporting Objective:

Develop communication and decision-support products to increase knowledge and capacity to plan for and implement projects that build community and ecosystem resilience.

Action Overview:

- Develop tools and training to provide effective climate adaptation planning and implementation resources.

Develop tools and training to provide states, local communities and resource managers with effective climate adaptation planning and implementation resources.

The impacts of climate change in the Bay and watershed differ between communities and resources based on their location in the watershed, extent of existing development and current zoning and development plans, as well as other factors. NOAA, USGS, FWS, EPA and academic partners will coordinate with states and other partners to develop and distribute tools to guide management responses to climate impacts. For example, NOAA will use its new NOAA Climate Portal to distribute climate data, products and information services (including decision-support tools and research results) related to changing climate conditions such as long-range temperature, precipitation records, status of sea-level rise and coastal inundation.

In addition, NOAA has planned a number of adaptation workshops and developed specific guidance/criteria for 2010 to 2011 to initiate this focused effort. This will include workshops on regional coastal habitat conservation and inundation mapping training in 2010, development of an "Assessment of Climate-Sensitive Decisions: Chesapeake Bay Program Pilot Study" by fall 2010, and provision of guidance by early 2011 on coastal habitat restoration as an adaptive response in light of rising sea levels. NOAA and USGS will work with federal partners to develop an outreach plan by 2012 to better communicate the impacts of climate change and need for climate response in the Chesapeake Bay watershed. Two examples of the types of efforts agencies will undertake are:

- **Strategic land-use decision support.** EPA will work with local governments, such as Frederick County, Maryland, to conduct a pilot evaluation of wetlands, forests and streams to identify protection and restoration opportunities. Work will begin in 2010 to create an assessment (including a vulnerability assessment) that will help guide Frederick County with strategic land-use decisions and address Chesapeake Bay goals and climate change initiatives.
- **Adapting wetland restoration techniques.** Poplar Island is a national showcase for using wetland restoration techniques to adapt islands to sea-level rise. More than 730 acres of wetlands are being built, and further expansions to the island are planned. Restoration and planning are fully considering projected impacts of rising sea levels. Resiliency of the wetland restoration requires accurate water levels at the land/Bay interface. A modeling study was conducted to quantify water level variability and evaluate changes around the island as restoration efforts are being conducted. Quality data are fundamental to the modeling needs of this wetland restoration/climate adaptation project, and NOAA's new Chesapeake Bay Operational Forecast System is being used as the computation tool for this effort. The island's


Source: Starkn Jett/National Park Service

popularity and its proximity to Washington, D.C. make Poplar Island an effective location to highlight collaborative restoration and technological and scientific advances to implement climate change adaptation.

Supporting Objective:

Conduct monitoring activities to deliver routine and sustained climate information products and services.

Action Overview:

- Improve monitoring of climate change impacts in the Bay and watershed.
- Ensure monitoring results are integrated and available to assess effectiveness and adjust management actions as necessary.

Improve monitoring of climate change impacts in the Bay and watershed. USGS and NOAA will establish climate monitoring as part of the Chesapeake Monitoring Alliance for the Bay and its watershed. Monitoring will focus on weather variability and extreme events, and changes in sea-level, temperature and precipitation; and the effects on critical resources and environmental processes. DOI and NOAA will align with national efforts to improve climate monitoring. NOAA and USGS will assess existing programs and design a climate change component of the Chesapeake Monitoring Alliance in 2011 and work with partners to identify opportunities to implement improved monitoring in 2012 to 2025.

- **Implement the Climate Effects Network.** Beginning in 2011, USGS will work with FWS and partners to develop a plan for a climate change monitoring network as part of the DOI Climate Effects Network. Based on the plan, DOI will identify opportunities to improve monitoring and research activities

in 2012. USGS is collecting and analyzing satellite imagery and weather data for Shenandoah National Park to understand potential impacts of climate change on eastern forest vegetation, hydrology and habitats.

- **Developing monitoring framework for streams.** EPA will work with Maryland to produce a monitoring framework by the end of 2011 to detect climate change responses in stream biota.
- **Develop a complementary estuarine monitoring network.** NOAA will work with USGS and other partners to improve monitoring for effects of sea-level rise on Chesapeake coastal ecosystems. NOAA will initiate this action by implementing Climate Change Sentinel Sites at Chesapeake Bay National Estuarine Research Reserves (NERRS). The NERRS effort will potentially include the installation of a long-term tidal monitoring station at Jug Bay, Maryland and a short-term station at the Virginia NERRS. NOAA will work with the Maryland and Virginia NERRS to look at habitat integrity and ensure that local data and monitoring are linked to national networks and observations and made available via the new NOAA Climate Portal described earlier in this chapter.

Ensure monitoring results are integrated and available to assess effectiveness and adjust management actions as necessary. NOAA, USGS, FWS and EPA will use monitoring information to further assess implications from the vulnerability assessments conducted on the impacts of climate change on communities and habitats. The monitoring data will also be used to improve the vulnerability assessments and help managers make adjustments in restoration and conservation strategies.

Supporting Objective:

Integrate climate change information into Chesapeake Bay Program decision-making and planning and into federal land management and planning in the Bay watershed.

Action Overview:

- Integrate climate change information and adaptation into the Chesapeake Bay Program.
- Conduct technical performance review of agencies' climate response effectiveness.
- Predict potential changes in pollution loads due to climate change.
- Develop adaptation strategies to manage vulnerable habitats and public infrastructure on federal lands to increase resiliency to climate change impacts.

Integrate climate change information and adaptation into the Chesapeake Bay Program. The Chesapeake Bay Program provides a partnership in which federal agencies, states, local governments and citizens work together to identify and address the most critical challenges facing watershed protection and restoration. As partners in this program, NOAA, USGS, FWS, EPA and other federal agencies will work with the advisory committees for science, local government and citizens to build an integrated team focused on climate change coordination and information sharing. The team will provide information to factor into decision processes and adaptive management planning for protection and restoration activities.

- In 2010, NOAA, EPA and USGS will explore creation of a new climate change coordinator position(s) for the Chesapeake Bay with the objective of having a coordinator(s) in place by early 2011. In addition, NOAA will explore securing climate change information

and services support from the NOAA National Climate Service keystone partners in the region, such as the Northeast Regional Climate Center.

- To integrate federal climate efforts in the Bay watershed with other emerging regional centers (e.g., in DOI and NOAA), the federal agencies will form a federal climate coordination team in 2010 and continue that coordinated federal effort until a fully integrated federal/state/partner team is fully operational.

Conduct technical performance review of agencies' climate response effectiveness. The Scientific and Technical Advisory Committee (STAC) of the Chesapeake Bay Program will lead an annual performance review of effectiveness of monitoring, restoration, conservation and research activities for adapting to and mitigating climate change effects. The performance review will also identify important next steps for integration of climate change into the setting of environmental goals and milestones.

Predict potential changes in pollution loads due to climate change. EPA and USGS will develop scenarios of future water quality under changing climate and land-use conditions. For 20 U.S. watersheds (including the Susquehanna River Basin), EPA will develop scenarios that reflect broad regional patterns of changes in stream runoff and loadings of nitrogen, phosphorus and sediment. USGS has begun an initial assessment of changes in pollution loads in the watershed under different climate and land-use scenarios and will coordinate with EPA as initial results become available in 2011. USGS will work with EPA to determine if a more complete analysis of water quality and streamflow changes is needed after these assessments are completed.

Develop adaptation strategies to manage vulnerable habitats and public infrastructure on federal lands to increase resiliency to climate change impacts. The federal interagency climate team will coordinate the major federal landholding and granting agencies to establish a strategy to conduct assessments that identify potentially vulnerable habitats and infrastructure on federal lands, federally managed lands and lands receiving federal funding in the Bay watershed. Federal agencies can use this strategy as a tool for informing management decisions in regard to the potential impacts of climate change on unique resources. USGS and FWS will provide outreach support for this effort beginning in 2011.

Supporting Objective:

Adopt practices that mitigate greenhouse gas emissions. Agencies are largely undertaking climate mitigation at the national level, and this section identifies only a select number of activities that relate to those national efforts, as well as identifying opportunities to consider the mitigation benefits of actions undertaken for climate adaptation planning.

Action Overview:

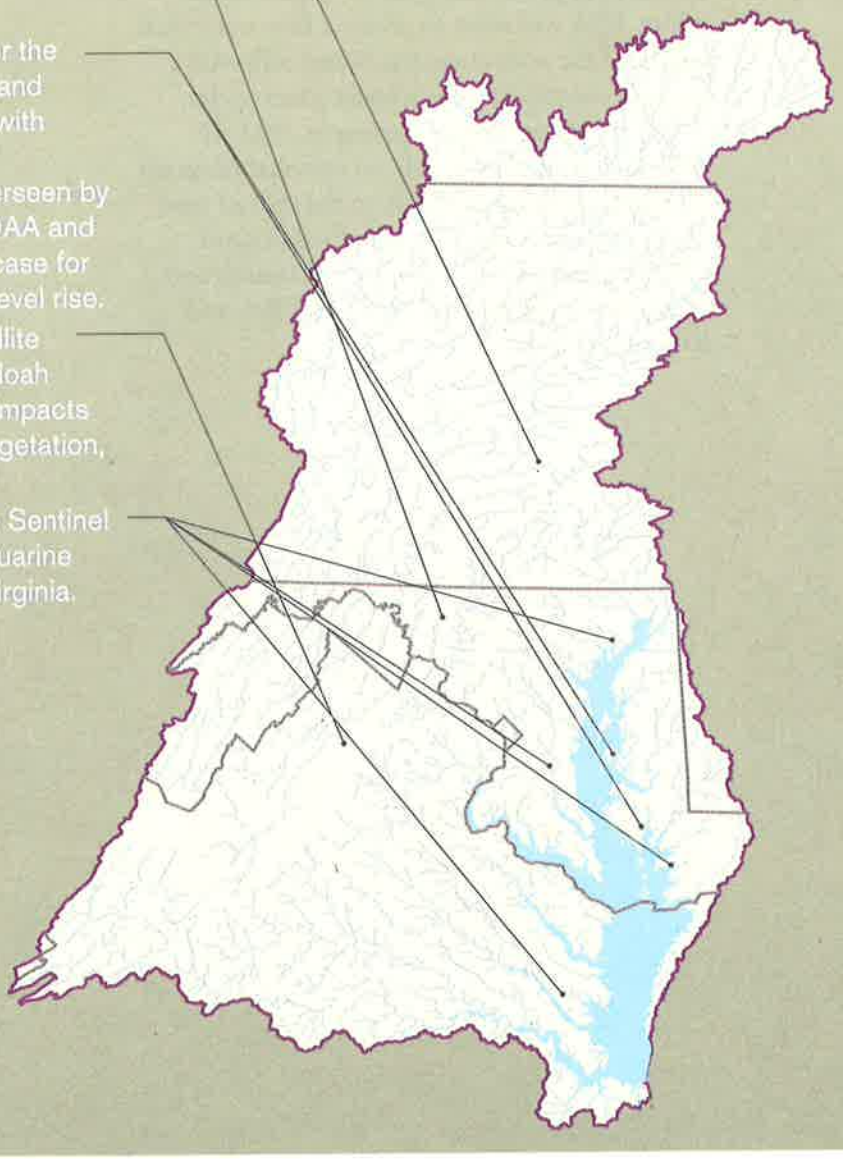
- Integrate climate response into federal growth and development programs and strategies.
- Coordinate with other national initiatives to enhance federal greenhouse gas mitigation efforts in the Bay watershed.

Integrate climate response into federal growth and development programs and strategies. EPA will work in conjunction with organizations such as the National Center for Smart Growth and Maryland Department of Planning to support activities to integrate climate change adaptation and greenhouse gas mitigation into Smart Growth and Sustainable Community strategies.

EXAMPLES

AROUND THE WATERSHED

- For 20 U.S. watersheds (including the Susquehanna River Basin), EPA will develop scenarios that reflect broad regional patterns of changes in stream runoff and loadings of nitrogen, phosphorus and sediment.
- Work will begin in 2010 to create an assessment that will help guide Frederick County, Maryland with strategic land-use decisions and address Chesapeake Bay goals and climate change initiatives.
- Poplar Island is a national showcase for the incorporation of sea-level rise into wetland restoration, as undertaken by USACE with scientific support by NOAA and FWS. Blackwater National Refuge, being overseen by USFWS and supported by USGS, NOAA and the USACE, is a similar national showcase for wetland restoration in the face of sea-level rise.
- USGS is collecting and analyzing satellite imagery and weather data for Shenandoah National Park to understand potential impacts of climate change on eastern forest vegetation, hydrology and habitats.
- NOAA will implement Climate Change Sentinel Sites at Chesapeake Bay National Estuarine Research Reserves in Maryland and Virginia.



Coordinate with other national initiatives to enhance federal greenhouse gas mitigation efforts in the Bay watershed. Beginning in 2010, federal agencies will enhance mitigation opportunities in the Bay watershed through Executive Order 13514 on Federal Leadership in Environmental, Energy, and Economic Performance. Compliance with this separate Executive Order demonstrates federal leadership in reducing greenhouse gases. As part of this effort, EPA will work to create a Bay-watershed subset of the emissions data being collected by large emitters of greenhouse gases under a new reporting system starting in 2011. In addition, agencies will rely on national program efforts to enhance research on the role of land management, conservation and restoration actions in biological carbon sequestration and apply the results to the Chesapeake Bay and its watershed.

EXAMPLES OF
STATE ACTIVITIES

Maryland and Virginia Coastal Zone Programs

To ensure coastal communities are protected from coastal hazards and the impacts of climate change, the Maryland and Virginia Coastal Zone Management Programs, including the Coastal Training Programs of the National Estuarine Research Reserves, have begun to invest in an array of projects that address vulnerability of the developed and natural environment, adaptation planning options, and green infrastructure planning to mitigate potential climate change effects.

Reducing Maryland's Vulnerability to Climate Change

In August 2008, Maryland released a Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change, a key component of Maryland's Climate Action Plan. The strategy identified a number of policy, regulatory and programmatic measures to assist with climate change and sea-level rise adaptation. As a result, two key pieces of adaptation policy were adopted in 2008:

- The Living Shorelines Protection Act of 2008 requires the use of nonstructural, "living shoreline" stabilization measures that preserve the natural environment, except in areas mapped by the state as being appropriate for structural stabilization measures. As sea level rises, the need for shore protection along the coast will increase. The benefit behind "living shorelines" is that while they control erosion they also allow for preservation of the natural shoreline, maintain coastal processes and provide aquatic habitat.
- Strengthened provisions of the Chesapeake and Atlantic Coastal Bays Critical Area Protection Program Act now require an update of the jurisdictional boundaries of the program to reflect changes in tidal wetlands caused by sea-level rise, an increase in the vegetated buffer from 100 to 200 feet for new development and the inclusion of coastal flood hazards as a factor to consider during "growth allocation" decisions.

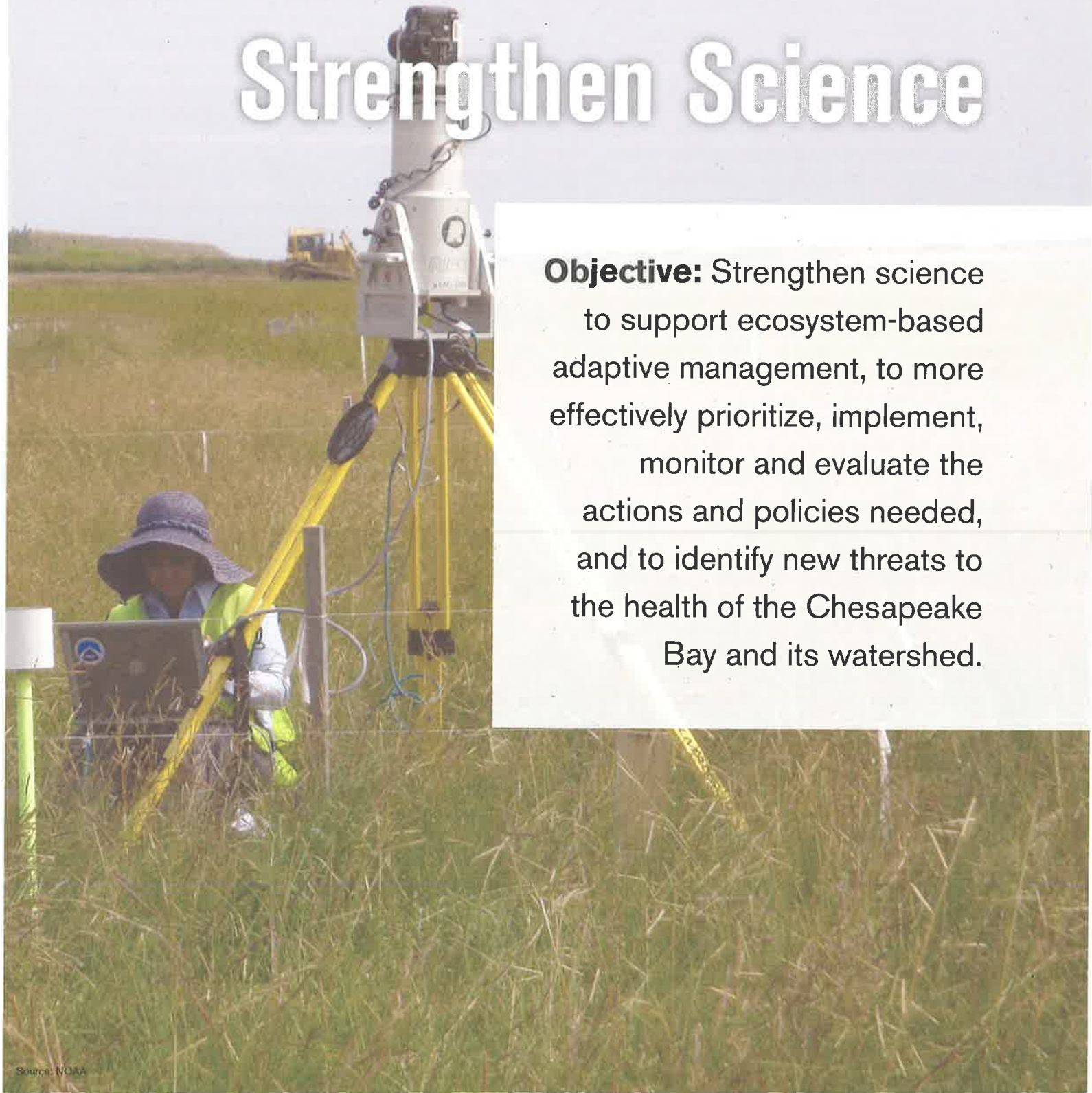
Maryland Coast-Smart Communities Initiative

In partnership with NOAA, the Maryland Department of Natural Resources launched the Coast-Smart Communities Initiative in 2009. The Coast-Smart Initiative provides both financial and technical assistance to Maryland's local communities to identify and implement strategies to protect life and property vulnerable to coastal hazards and climate change.

Addressing Climate Change in Virginia

In December 2008, Virginia released the Final Report of the Governor's Commission on Climate Change: A Climate Change Action Plan. The 45-member commission representing a wide diversity of sectors met throughout 2008 to discuss the impacts of climate change on Virginia and develop a range of recommendations to address those impacts. The commission developed more than two dozen specific recommendations to address adaptation that included expanding existing capacity within Virginia to ensure implementation of the Climate Change Action Plan; developing public education programs to increase climate change awareness; incorporating climate change concerns into consideration when planning for infrastructure, transportation and emergency preparedness; and developing shoreline management policies that increase coastal resiliency.

Strengthen Science



Objective: Strengthen science to support ecosystem-based adaptive management, to more effectively prioritize, implement, monitor and evaluate the actions and policies needed, and to identify new threats to the health of the Chesapeake Bay and its watershed.

Source: NOAA

The *Strategy for Protecting and Restoring the Chesapeake Bay Watershed* **requires strengthening science and implementing ecosystem-based management, improving accountability and addressing new challenges including climate change.** For the Bay and its watershed, this will require improved monitoring, computer models and research.

Federal agencies, lead by USGS and NOAA, will interact with state and academic partners to promote ecosystem-based, adaptive management, which will enable agencies to better prioritize and implement restoration activities, monitor and evaluate ecosystem change, and adjust management actions and polices accordingly. (See figure 1.) The federal government will support partners' decision-making needs by expanding tools and models to prioritize and target actions, making available the most effective engineering designs and conservation practices, and improving the ability to forecast probable outcomes and assess trade-offs of different management options. Monitoring will be improved to document ecosystem change and track implementation of management actions. Research will be focused to evaluate ecosystem change and the effects of management actions. Decision-support activities will be expanded to help federal agencies, states, local governments, watershed groups and elected officials make adjustments to improve actions and policies.

OBJECTIVE:

Strengthen science to support ecosystem-based adaptive management, to more effectively prioritize, implement, monitor and evaluate the actions and policies needed, and to identify new threats to the health of the Chesapeake Bay and its watershed.

The supporting objectives described in this chapter are:

- Promote ecosystem-based, adaptive management through enhanced coordination of science and decision-support activities.
- Better prioritize and adjust management actions by developing decision-support tools and an expanded set of models.
- Establish a Chesapeake Monitoring Alliance and Data Enterprise to improve monitoring to document changes in ecosystem conditions and progress toward goals.
- Better explain ecosystem change, assess restoration progress and effects of management actions, and identify new threats to the ecosystem.

Adaptive Management for Ecosystem Decision Making

[(Modified from Williams and others (2007) and Levin and others (2009)]

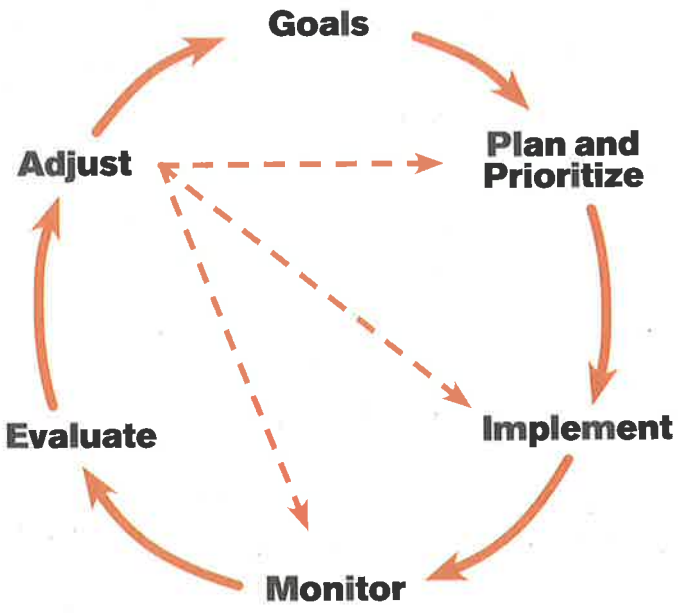


Figure 1.

Supporting Objective:

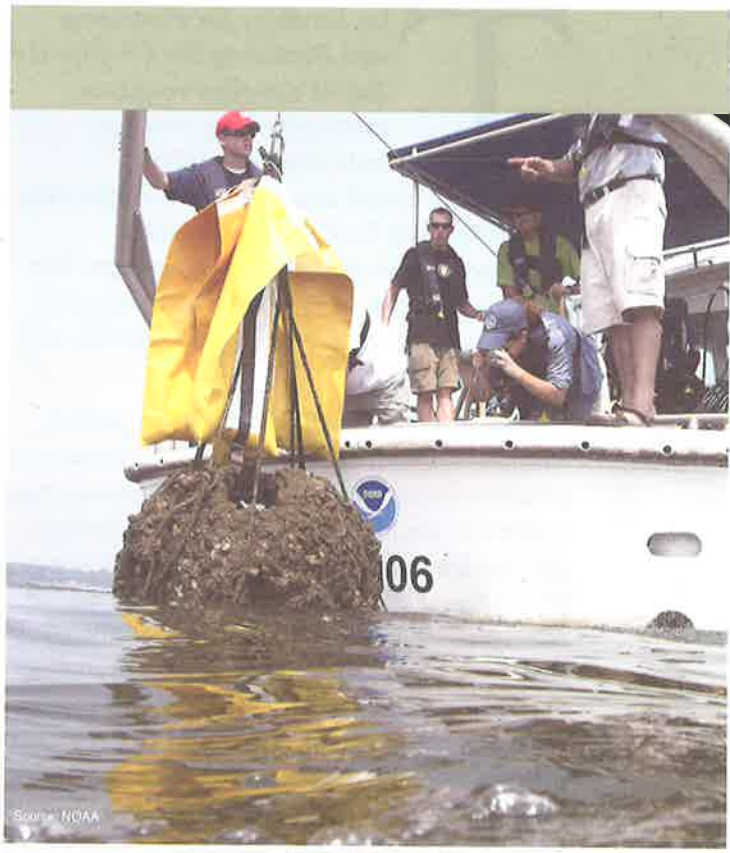
Promote ecosystem-based, adaptive management through enhanced coordination of science and decision-support activities.

Action Overview:

- Expand scientific coordination and capabilities of the Chesapeake Bay Program.
- Establish decision-support specialists.
- Improve communication products.
- Review and improve Chesapeake Bay Program science approaches.

Expand scientific coordination and capabilities of the Chesapeake Bay Program. EPA, USGS and NOAA will lead the transformation of the Chesapeake Bay Program's Scientific, Technical Assessment and Reporting (STAR) team to be the primary coordinating entity for ongoing science activities in the Chesapeake Bay Program. (See figure 2.) STAR will be reorganized by 2011 to promote ecosystem-based, adaptive management. Specifically, a draft reorganization plan will be developed by December 2010 to share with agency partners and support STAR reorganization in 2011. Additional federal agencies will become partners in technical workgroups (including modeling, monitoring and assessment, and information management) to improve Chesapeake Bay Program scientific capabilities.

Establish decision-support specialists. USGS, NOAA and other federal agencies will identify decision-support specialists to enhance technical support for restoration goals. The decision-support specialists will have a technical understanding of the information available to prioritize, evaluate and adjust management



A spectrum of scientific data from experts at a number of agencies is needed to support decision-making around the Bay.

actions for different CBP goals and interact with partners to improve implementation of management actions and policies. In 2011, USGS will establish decision-support specialists for water quality and land conservation. USGS and other federal agencies will establish additional specialists in 2012 and 2013.

Improve communication products. USGS, NOAA and EPA will work in conjunction with UMCES and other regional institutions and the CBP STAR team to improve communications products that translate scientific findings and illustrate the impacts of management decisions. Improved communication strategies and products will help simplify and link ecosystem management actions with the sustainable benefits they provide in the watershed. Initial products will be produced between 2011 and 2013.

Review and improve CBP science approaches. The CBP Scientific and Technical Advisory Committee (STAC) will review key science approaches and information and provide recommendations to improve science activities ongoing between 2010 and 2025. STAC will work with academic partners and through STAR to suggest improvements.

CBP Topics and Science Support

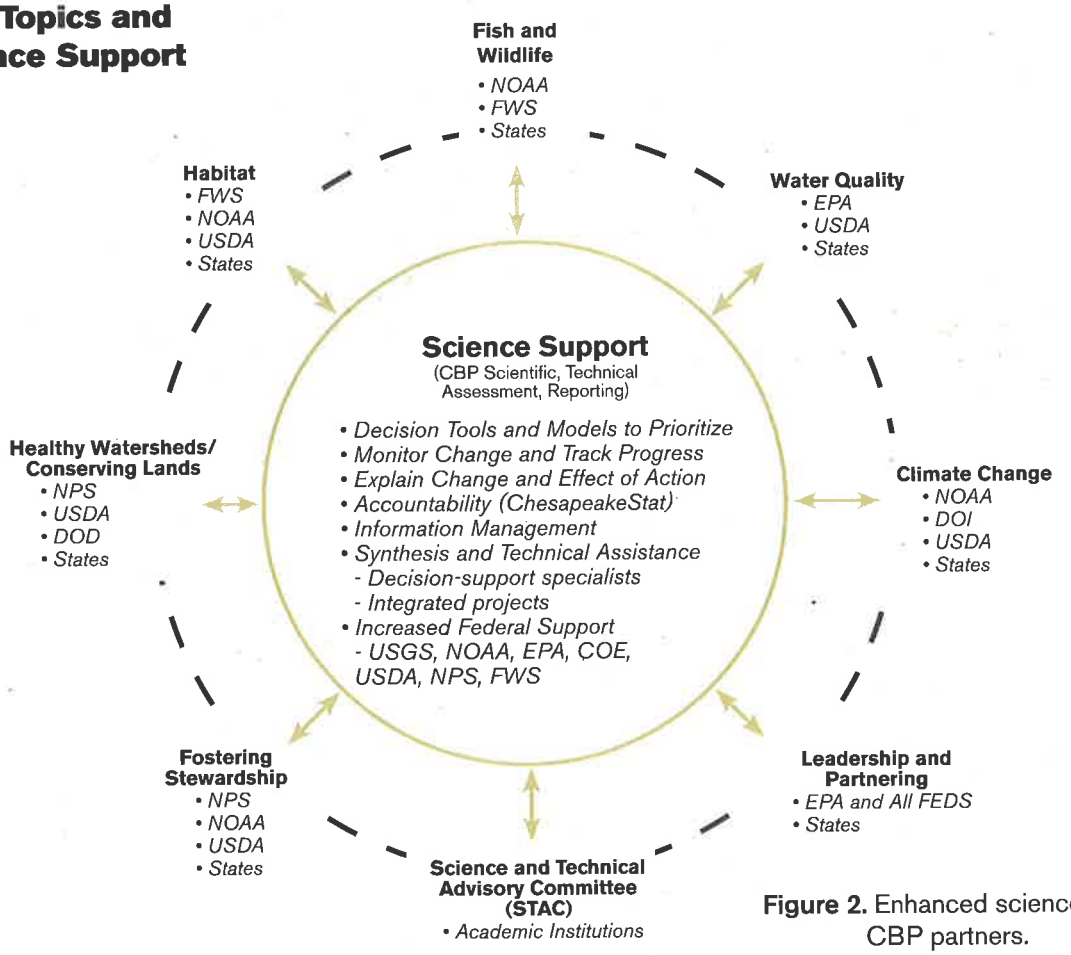


Figure 2. Enhanced science support for the CBP partners.

Supporting Objective:

Better prioritize and adjust management actions by developing decision-support tools and an expanded set of models.

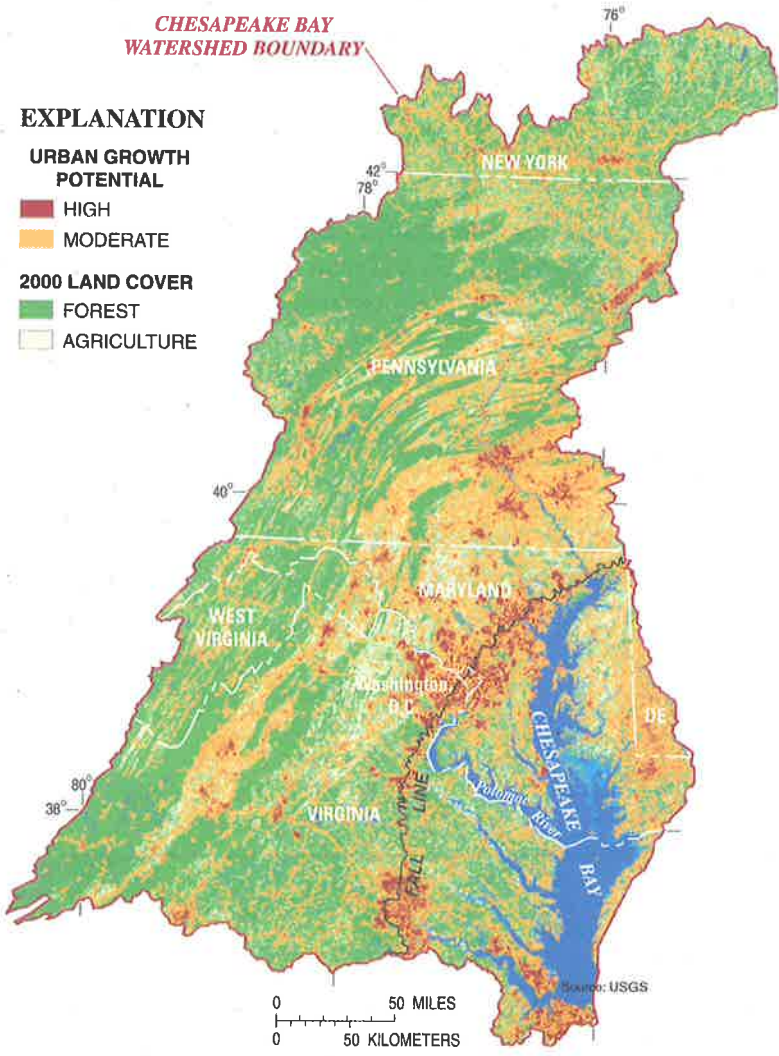
Decision-support tools will be developed to provide results from models, monitoring and research to better evaluate progress toward goals and improve management decisions. An expanded set of integrated models, validated by monitoring and observations, will be established to more accurately understand the Chesapeake ecosystem, improve the ability to test different management actions and forecast potential future conditions due to population growth and climate change.

Action Overview:

- Ensure scientific tools, data and computer model results are available.
- Establish *ChesapeakeStat*.
- Improve modeling used for restoration activities and assessing impacts of climate change.

USGS and NOAA will ensure scientific tools, data and computer model results are available. In 2011, USGS and NOAA, working with partners, will provide selected tools, data and model results through the USGS Chesapeake Online Adaptive Support Toolkit (COAST) and NOAA's Digital Coast to better apply an ecosystem-based, adaptive management framework. USGS will focus on providing results from water quality and land-change models into COAST. These decision tools will also be linked to *ChesapeakeStat* to provide users with an expanded set of tools to improve decision making.

EPA, working with Chesapeake Bay Program partners, will establish *ChesapeakeStat*. This web-based tool will improve coordination of the restoration effort and expand public accountability by providing



USGS and NOAA will work with partners to improve modeling used for restoration activities and assessing effects of climate change. The USGS Chesapeake Land Model will be improved to better forecast the impact of land use and climate change on water quality, habitats, and land conservation.

information on progress of partner activities and use of funds. A significant element of *ChesapeakeStat* is that Bay Program managers, federal agencies, states, local governments, non-governmental organizations and the public will be using the same tool to track efforts to restore and protect the Bay. EPA will launch *ChesapeakeStat* Version 1.0 in June 2010. Version 1.0 will demonstrate the decision-support capabilities and include features designed to inform and engage the public. EPA will work with partners to develop additional content for future versions of *ChesapeakeStat*, including linking with other tools such as Scenario builder and COAST.

Improve modeling used for restoration activities and assessing impacts of climate change. USGS and NOAA will evaluate selected computer models to assess if they provide information necessary to address the impacts of climate change both in the Bay and watershed. The models include, but are not limited to, the CBP watershed and Bay water quality models, USGS land change model, and the NOAA Habitat Priority Planner and Community Vulnerability Assessment Tool. Federal agencies will enhance the capabilities of selected models for water quality, habitat, fish and wildlife, and land conservation. (More detailed information is available in the science section of each chapter of this strategy.)

Supporting Objective:

Establish a Chesapeake Monitoring Alliance and Data Enterprise to improve monitoring to document changes in ecosystem conditions and progress toward goals.

Action Overview:

- Establish a Chesapeake Monitoring Alliance.
- Coordinate regional water monitoring with national networks.
- Increase monitoring by state, local and non-governmental partners.
- Improve monitoring of climate change impacts.
- Improve reporting of restoration actions and land-use activities.
- Improve management of environmental information through a Data Enterprise.

Establish a Chesapeake Monitoring Alliance. USGS, NOAA and EPA will work with federal, state and academic partners to improve monitoring by establishing a Chesapeake Monitoring Alliance. The alliance will improve coordination of existing monitoring and improve monitoring for all of the major restoration goals (water quality, habitat, fish and wildlife, and land conservation). The alliance will also attempt to address the STAC recommendation to improve monitoring and address the impacts of climate change. In 2011 and 2012, the most promising state, regional and national programs will be identified for inclusion in the alliance. Significant monitoring gaps will also be identified. From 2012 to 2016, new partnerships will be established with existing monitoring programs, and opportunities to address remaining gaps will be pursued.

The Chesapeake Monitoring Alliance is closely linked with the Data Enterprise described later in this chapter. A principal objective of an integrated monitoring alliance and information infrastructure is to provide a comprehensive framework for the design and implementation of basin-wide, coordinated monitoring networks for collecting data and generating information directly supporting Chesapeake Bay restoration and protection management actions.

Coordinate regional water monitoring with national networks. USGS, NOAA and EPA will pursue opportunities to coordinate Chesapeake tidal and non-tidal networks with

national observation systems including the Integrated Ocean Observing System (interagency, led by NOAA) and the National Water-Quality Monitoring Network (led by USGS and EPA). Other relevant national programs with monitoring programs include the National Fish Habitat Action Plan (FWS), the National Water-Quality Assessment program (USGS), the Conservation Effects Assessment project (USDA), the NPS Vital Signs Program, and the proposed Climate Effects Network (DOI). From 2010 to 2011, agencies will have discussions with federal national programs to identify possibilities. From 2012 to 2016, agencies will implement the most promising partnerships.

Increase monitoring by state, local and non-governmental partners. In 2010 and 2011, EPA, USGS and NOAA will identify the most promising existing monitoring programs that can be part of the Monitoring Alliance. EPA will develop partnership guidance documents that define quality assurance requirements for a monitoring program to become a partner in the Monitoring Alliance and work to implement new partnerships in 2012. Guidance for data management, data standards, data submission and metadata currently exists, but will need modification for working with small data providers.

Improve monitoring of climate change impacts. NOAA and USGS will improve observing systems and monitoring of climate change, variability and extreme weather events to better assess changes in ecosystem conditions and long-term effects of climate change. NOAA and USGS will assess potential partnerships with existing programs, such as the DOI Climate Effects Network, and design a climate change component of the Chesapeake Monitoring Alliance in 2011. Based on opportunities to work with national programs, climate monitoring will be implemented between 2012 and 2025. More information is in the Respond to Climate Change chapter.

Improve reporting of restoration actions and land use activities. EPA, in cooperation with USDA, USGS and state partners, will improve reporting of water quality management actions and land use activities in 2011 and plan for improved approaches to report management actions for habitat and land conservation actions. Beginning in 2011, USGS and USDA will also improve sharing of data for conservation actions and land use practices in the showcase watersheds. USDA, EPA and the states will improve reporting of conservation practices and land use activities that will be used to improve the Bay watershed model and better explain water quality conditions.

Improve management of environmental information through a Data Enterprise. EPA, working closely with partners, will construct a Chesapeake Bay Data Enterprise as the next evolution of the Chesapeake Information Management System (CIMS). CIMS was established in 1995 to store critical environmental information (mostly water quality data) to assess progress toward environmental goals and support computer models. The new Chesapeake Bay Data Enterprise will be used to share scientific data between partners to support the expanded computer models and assessment of progress toward goals. EPA will work with partners to design the Data Enterprise in 2011 and 2012 and begin to implement it in 2013. The blueprint and interfaces for this system will be shared with other large aquatic ecosystems (e.g., Puget Sound, Great Lakes, and Gulf of Mexico) with the aim of quickly migrating effective use of technology for performance-based management.

Supporting Objective:

Better explain ecosystem change, assess restoration progress and effects of management actions, and identify new threats to the ecosystem. Additional high-level actions are found in each section of the following goal chapters: water quality, habitat, fish and wildlife, and land conservation.

Action Overview:

- Improve indicators of environmental conditions.
- Create case studies of targeted restoration activities.
- Explain the factors affecting progress toward restoration goals and the effects of management actions.
- Assess new threats to the Bay and watershed.

Improve indicators of environmental conditions. EPA, working with federal and state partners, will improve environmental indicators used to assess progress toward ecosystem and restoration goals. Work in 2010 and 2011 will focus on having indicators to better reflect the outcomes in the Executive Order. Selected indicators will be presented in the annual release of the Bay Barometer. Additional indicators will be developed in 2012 and later as monitoring improves.

Create case studies of targeted restoration activities. NOAA and USGS will create a portfolio of case studies of small watersheds where targeted restoration activities have been implemented by federal, state and local partners. USGS will summarize water quality information in 2011 and 2012. In 2012, NOAA will summarize information on pre-restoration condition of the selected tributaries and their habitat and living resource populations. NOAA and USGS will also provide the results and implications of post-restoration monitoring and assessment after completion, and periodically during the adaptive restoration management process. Additional summaries of habitat, land conservation and fish and wildlife case studies will be considered for the 2017 evaluation of outcomes. This will enable federal, state, local and academic partners to better understand the effectiveness of management actions and prioritize future activities.

Federal agencies will improve the assessment of the health of fish and effect of management actions in the Bay and its watershed.

Explain the factors affecting progress toward restoration goals and the effects of management actions. USGS, NOAA and EPA will work with partners to conduct selected assessments of the factors affecting progress toward goals for restoring water quality, habitat, fish and wildlife, and conserving lands, including the effects of management activities. The assessments will begin in 2012 and be completed by 2017. Planned assessments include:

- USGS and EPA will explain the nitrogen, phosphorus and sediment conditions and effect of management actions in the largest drainage areas of the watershed and work with USDA and EPA to assess the effects of management actions in small watersheds. (See water quality chapter.)
- NOAA will improve understanding of ecosystem condition in the tidal Bay. Beginning in 2011, NOAA will perform habitat assessments in Bay tributaries identified as candidates for protection and/or restoration, using acoustic seafloor mapping technologies such as multibeam and side scan sonar to determine the type, quality and distribution of benthic (bottom) habitats; and biological assessments, including the identification of living resources distribution and preferred habitats. These assessments will specifically help to determine priority tributaries for protection and restoration and to provide information critical for evaluating the success of management actions taken in these systems. NOAA, in full partnership with states, will identify four candidate tributaries in 2011. In addition, NOAA will monitor oyster restoration in the Great Wicomico River (Virginia) in 2010 and 2011.
- USGS and NPS will describe land-use change and impact on conservation. (See land conservation chapter.)

EXAMPLES OF STATE ACTIVITIES

States collaborate to monitor water quality in the watershed.

In 2004, all six states in the Bay watershed, in collaboration with USGS and EPA, worked together to establish the Chesapeake Nontidal Water Quality Monitoring network. The purpose of the network is to measure the amount of nutrients and sediment in the watershed and use the results to help assess progress toward reducing these pollutants to improve conditions in the Bay. The states worked together, with EPA and USGS, to establish 85 sites throughout the watershed and are working to expand the network to meet the new requirements of the Bay TMDL.

State monitoring data used to develop a stream health indicator.

The six states in the watershed all have programs to monitor and assess the health of streams in their respective jurisdictions. Beginning in 2008, the states worked with the CBP monitoring team to integrate information to assess the overall health of streams in the Bay watershed. The stream health indicator now appears in the *Bay Barometer* and is being used to track progress to improve stream health (as discussed in the water quality section of the strategy).

Maryland and Virginia monitor the amount of crabs in the Bay.

Agencies from Maryland and Virginia, working with the University of Maryland Chesapeake Biological Lab (CBL) and Virginia Institute of Marine Science (VIMS), conduct the winter dredge survey to estimate the number of blue crabs living in the Chesapeake Bay. The winter dredge survey produces information that is essential for the management of the species, such as an estimate of the number of crabs overwintering in the Bay and the number of young crabs entering the population each year.

- NOAA will assess conditions affecting navigation and maritime trade. NOAA's newest research vessel, *Bay Hydro II*, and the NOAA ship *Thomas Jefferson* will acquire hydrographic survey data in the Lower Bay in 2011 to update NOAA nautical charts and other navigation products. Coastal managers, engineers, biologists, planners and policymakers use the hydrographic data collected to understand the formation and habitats of the Chesapeake and to improve navigation safety and efficiency of maritime trade.
- NOAA, USGS and FWS will evaluate the vulnerability methods for fish, wildlife and their habitats, including vulnerability to sea-level rise and storm surges (see climate change chapter). NOAA will also work with USGS and other agencies to evaluate potential for an integrated regional earth system model of the Bay's watershed, including the incorporation of social sciences considerations, to better predict and plan for ecological changes and societal response associated with climate change and variability.

  Additional assessment may be required. For example, USACE is planning to use integrated water resource principles to improve environmental restoration activities in the Bay watershed. USACE will organize a workgroup to develop next steps in 2011.

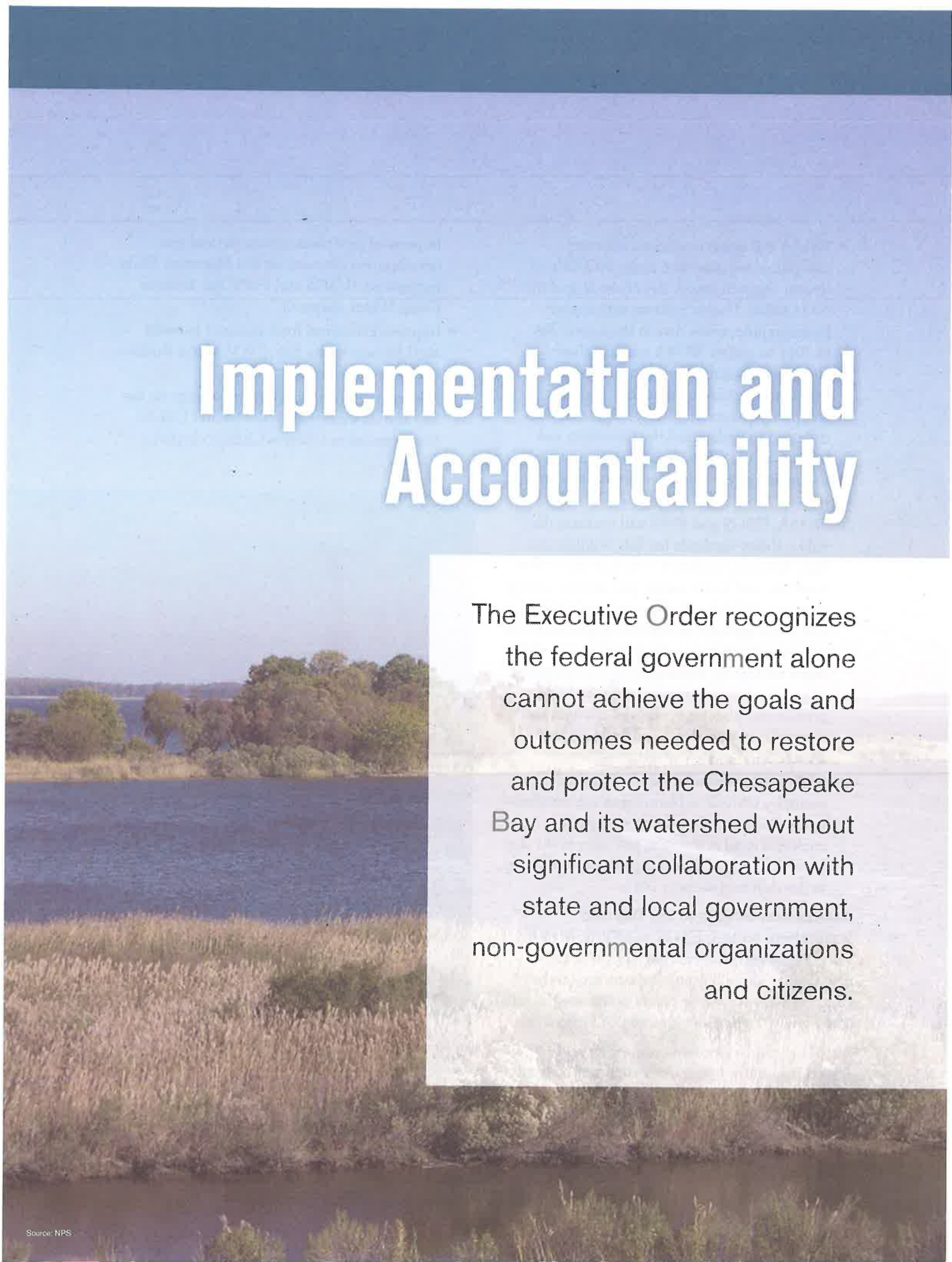
Assess new threats to the Bay and watershed. NOAA, USGS and FWS, working with federal and academic partners, will assess new threats to the Bay and its watershed to help adjust management actions and policies. Efforts to address new threats in 2011 and 2012 include:

- Systematic watershed monitoring and assessment to determine extent and sources of emerging contaminants and disease on the health of fish and wildlife heath and potential impacts of new threats from natural gas development (focused on the Marcellus Shale formation). (USGS and FWS: See Restore Clean Water chapter.)
- Improve ecological forecasting of harmful algal blooms in the Bay. (NOAA: See Restore Clean Water chapter.)
- Address the impacts of climate change on the Bay and its watershed. (NOAA and USGS: See Respond to Climate Change chapter.)

USGS and NOAA will conduct science to address new threats to the Chesapeake Bay, including the impacts of climate change.

Implementation and Accountability

The Executive Order recognizes the federal government alone cannot achieve the goals and outcomes needed to restore and protect the Chesapeake Bay and its watershed without significant collaboration with state and local government, non-governmental organizations and citizens.



Source: NPS

This chapter describes the role and responsibilities of the Federal Leadership Committee for the Chesapeake Bay (FLC) in guiding and overseeing implementation of this strategy. The following pages outline how the FLC will carry out these tasks, including steps to align its responsibilities with those of the Chesapeake Executive Council, establishing two-year milestones for tracking progress of federal actions and a series of accountability tools to promote transparency in the planning, tracking, reporting, evaluating and adapting of restoration and protection activities.

Overview of Federal Leadership Committee for the Chesapeake Bay

The Executive Order established the FLC, chaired by the Administrator of the Environmental Protection Agency and including senior representatives of the departments of Agriculture, Commerce, Defense, Homeland Security, Interior, and Transportation. In addition, section 201 of the Executive Order states that other federal agencies may be included in the FLC "as determined by the Committee." A list of FLC members can be found in appendix B.

The Executive Order directs the FLC to carry out a series of responsibilities. In addition to producing this strategy, ongoing implementation responsibilities include:

- Oversee development, coordination and implementation of new federal programs and activities for Chesapeake Bay restoration.
- Collaborate with state partners to ensure that federal actions are closely coordinated with actions by state and local agencies and resources are used efficiently.
- Consult with stakeholder groups and the general public.
- Define milestones for meeting goals.
- Track and report restoration activities and spending.
- Publish an annual Action Plan describing how federal funding will be used.
- Publish an annual Progress Report on environmental health and restoration efforts.
- Utilize independent evaluation to strengthen accountability.
- Make all reports available to the public by posting on a web site.
- Describe and carry out a process for adaptive management.

Aligning FLC and CBP Functions

The Executive Order recognizes that the federal government cannot achieve the goals and outcomes needed to restore and protect the Chesapeake Bay and its watershed without significant collaboration with state and local government, non-governmental organizations and citizens. The FLC also recognizes the long-standing roles and functions of the Chesapeake Bay Program (CBP), which includes the states in the watershed, the District of Columbia, the Chesapeake Bay Commission and EPA (representing the federal government). The CBP partnership is led by the Chesapeake Executive Council (EC), which includes the Governors of Maryland, Pennsylvania and Virginia; the Mayor of the District of Columbia; the Chair of the Chesapeake Bay Commission and the EPA Administrator. The Governors of Delaware, New York and West Virginia are invited to participate in the Executive Council for issues related to water quality. A number of CBP's roles and functions dovetail or overlap with those of the FLC. Given this, and the long-standing participation of federal agencies in the partnership, the FLC plans to take steps toward increased collaboration with

Chesapeake Bay Program partners to further align the responsibilities of both parties and implement this strategy.

The process for aligning federal, state and local actions has begun through the consultation called for in the Executive Order. In the preceding chapters, this strategy highlights a partial list of examples of state programs that play key roles in achieving the strategy's goals.

The FLC and the EC acknowledge the need to more clearly define the role of the Chesapeake Bay Program in implementation of this strategy. The FLC and EC have convened a group to recommend steps for coordinating and, where appropriate, integrating the goals, outcomes and actions of the Chesapeake Bay Program with the goals, outcomes and actions described in this strategy.

The group's recommendations will aim to produce the most efficient coordination mechanisms feasible that encompass the following principles:

- Mechanisms for reporting information on actions should not require multiple entries of the same data in different systems.
- There should be a coordinated, consistent mechanism for reporting progress to the public.
- There should be a consistent, coordinated adaptive management process for making changes to goals or outcomes that includes all partners.
- The systems should be mutually beneficial to partner agencies.

This group will take the following steps:

1. Review vision, goals and outcomes identified in this strategy with the goals and commitments of the Chesapeake Bay Program.

- Identify issues and make specific recommendations for aligning Executive Order goals and outcomes with existing CBP commitments.
- Review indicators of health, restoration and protection currently used in the Bay Barometer and recommend appropriate changes for purposes of tracking progress and assessing success. Review existing monitoring information and other data sources currently utilized in the CBP and assess their alignment with the goals and objectives resulting from the above.

2. Review the means to coordinate and integrate federal, state and local actions.
   - Include examples of state programs in this strategy for each major goal area.
   - Evaluate the use of the annual federal action plan called for in Section 205 to incorporate state and local annual actions.
   - Determine whether the Chesapeake Registry (see description under "Annual Action Plan" below) or modified Chesapeake Registry could be used to organize information on actions for the annual action plan.
3. Recommend options to clarify the operational relationship between the FLC and the EC.
   - Identify issues with and propose solutions to the current CBP structure related to implementing, monitoring, and supporting the integrated approach identified above; identify potential changes to the current CBP governance document.
4. The Chesapeake Bay Executive Council and Federal Leadership Committee will make a joint decision on the above recommendations no later than May 12, 2011.

Federal Milestones to Track Progress Toward Goals

In May 2009, the states and the District of Columbia agreed to establish milestones every two years to show progress toward the goal of having all measures needed to restore water quality in place by 2025.

Federal agencies will join the states in establishing two-year milestones with many federal efforts designed to support the states and District in meeting their current and future water quality milestones. For actions associated with the water quality milestones, federal agencies will track their actions through the transparent accountability and tracking system described in the Restore Water Quality chapter of this strategy. EPA will coordinate the effort for developing water quality milestones.

Federal agencies will also consult and collaborate with the states and District to develop appropriate two-year milestones for the outcomes outlined in this strategy beyond those for water quality. In doing so, the FLC recognizes there will be inherent differences between the regulation-driven water quality milestones and those for other outcomes.

The FLC will establish a first set of two-year milestones covering calendar years 2012 and 2013. This timing will put the federal agencies on the same schedule the states use for their water quality milestones; the states will set their second set of two-year milestones covering calendar years 2012 and 2013. For the interim

period (May 2010 to December 2011), the federal agencies will establish their first round of actions and commitments in the annual action plan required under section 205 of the Executive Order. Federal agencies will consult with the Bay jurisdictions in developing the new federal milestones. Once developed, the annual action plan and annual progress reports will incorporate the two-year milestones.

Annual Action Plan

Section 205 of the Executive Order states that the FLC "shall publish an annual Chesapeake Bay Action Plan describing how federal funding proposed in the President's Budget will be used to protect and restore the Chesapeake Bay during the upcoming fiscal year."

The FLC plans to release the first annual action plan by September 30, 2010. Timing for the development and release of subsequent annual action plans will be determined based on the most effective alignment with key information such as the release of the President's Budget. The FLC will provide opportunities for the states, the District of Columbia, the Chesapeake Bay Commission, key stakeholders and the public to review and comment on drafts of the action plan.

The action plan will identify activities FLC agencies will undertake in the following year to carry out the actions and achieve the goals outlined in the strategy. Establishing this plan and setting expectations for what agencies will achieve in the short term will allow agencies to make changes to the implementation of those actions if they do not meet necessary progress toward measurable outcomes included in this strategy. This supports the adaptive management system to be developed by the FLC. In addition, the FLC plans to provide a full accounting and explanation of the funding in the President's Budget dedicated to protection and restoration of the Chesapeake Bay and its watershed.

As described in the section above ("Aligning FLC and CBP Functions"), the FLC is working with the states to consider whether, and if so how, to incorporate their Bay-related funding into the action plan to provide a comprehensive explanation of the resources being dedicated to Chesapeake watershed protection and restoration.

Chesapeake Registry

The Chesapeake Registry is planned as an essential tool in assembling and analyzing information for the annual action plan in a coordinated and timely manner. The registry will collect detailed information on partner activities and funding organized around the goals, outcomes and actions in this strategy. The information will be used in developing the annual action plan. The FLC expects that all federal agencies responsible for actions under the Executive Order will enter data in the registry. In addition, many non-federal partners have entered data in the registry in the past; contingent upon recommendations and decisions among the FLC and EC as described in the section above, state and other partners may enter data in the registry in the future as well. The Chesapeake Registry will be accessible by all interested parties through a web site.

Progress in implementing actions is also planned for incorporation into *ChesapeakeStat* (described in more detail under "Adaptive Management" below).

Annual Progress Report

Section 205 of the Executive Order states the FLC will publish "an Annual Progress

Report reviewing indicators of environmental conditions in the Chesapeake Bay, assessing implementation of the Action Plan during the preceding fiscal year, and recommending steps to improve progress in restoring and protecting the Chesapeake Bay."

Federal Fiscal Year 2011 is the first full implementation year for this strategy. Fiscal Year 2011 ends on September 30, 2011. The FLC plans to release the first annual progress report early in 2012. In accordance with the Executive Order, the FLC will provide opportunities for the states, the District, the Chesapeake Bay Commission, key stakeholders and the public to review and comment on drafts of the Annual Progress Report.

As described in the section above ("Aligning FLC and CBP Functions"), the FLC is working with the states to consider how to best align the FLC's annual progress report with the CBP's current *Bay Barometer* for subsequent progress reports.

The FLC expects that each annual progress report will assess the success of the FLC agencies' efforts in implementing the actions identified in the preceding action plan. This should allow stakeholders to better understand the results of the FLC's work and will provide the agencies with a regular opportunity to adjust their implementation efforts to maximize success.

Independent Evaluation

Section 206 of the Executive Order states that the Federal Leadership Committee "in collaboration with state agencies, shall ensure that an independent evaluator periodically reports to the committee on progress toward meeting the goals of this order. The committee shall ensure that all program evaluation reports, including data on practice or system implementation and maintenance funded through agency programs, as

appropriate, are made available to the public by posting on a web site maintained by the chair of the committee."

The FLC plans to initiate independent evaluation mechanisms as part of its adaptive management cycle and annual progress report. As the strategy is initiated and measured through adaptive management reviews and development of the annual progress report, the FLC will request that independent evaluators examine progress toward environmental goals. This should allow the FLC to better understand the effectiveness of specific actions and how they might be improved. FLC members will use findings of the independent evaluations to inform modifications to strategies and actions in tandem with an adaptive management process (described below). The FLC will coordinate its independent evaluation with the Chesapeake Bay Program's ongoing independent evaluation process to the greatest extent practicable.

Adaptive Management

Section 202 of the Executive Order states that the FLC strategy for the Chesapeake Bay must "describe a process for the implementation of adaptive management principles, including a periodic evaluation of protection and restoration activities."

The FLC is continuing to develop an effective adaptive management process, based on the specific actions and elements described in prior chapters of this strategy. Overall, the FLC will employ the following major steps for an adaptive management process: set goals, plan actions, implement, monitor, evaluate and adjust. Each of the goal chapters includes actions which support adaptive management, and the science chapter includes additional detail on ecosystem-based adaptive management that will supplement the

Cutting-edge technology, like NOAA's Chesapeake Bay Interpretive Buoy System, tracks data scientists use to monitor Bay water quality.

FLC adaptive management process. The FLC intends to propose a regular cycle for reviewing its activities in the first annual action plan. A core component of these reviews will be to compare progress in implementing actions to the goals and timelines outlined in this strategy. Such comparisons will drive short-term and long-term adaptive changes to the FLC strategy and actions. The FLC also will establish an approach for reviewing and re-evaluating its overall goals for the Bay. The FLC will conduct this review in consultation with stakeholders, particularly the states.

The annual action plan and progress reports will be important components of the FLC's adaptive management system, as they will connect the FLC's plans and results for each year. The independent evaluation process discussed earlier also will be an important part of the adaptive management process. Taken together, these new components of the Chesapeake Bay effort will provide a wealth of tools to drive the FLC's approach to adaptive management.

ChesapeakeStat

Additionally, *ChesapeakeStat*, when more fully implemented, should provide data to show progress toward outcomes and serve as a useful adaptive management process and tool. *ChesapeakeStat* will improve coordination of the restoration effort and expand public accountability by providing information on progress of partner activities and use of funds. A significant element of *ChesapeakeStat* is that Chesapeake Bay Program managers, federal agencies, states, local governments, non-governmental organizations and the public will be using the same tool to track efforts to restore and protect the Bay. EPA will launch *ChesapeakeStat* Version 1.0 in June 2010. Version 1.0 will demonstrate the decision-support capabilities and include features designed to inform and engage the public. As described in the Strengthen Science chapter of this strategy, EPA will work with partners to develop additional content for future versions of *ChesapeakeStat*.

ChesapeakeStat supports the public's expectations and the President's directive regarding improved transparency and openness in government.

Appendix A
Executive Order 13508

Federal Register

Friday,
May 15, 2009

Part IV

The President

Executive Order 13508—Chesapeake Bay Protection and Restoration

Federal Register
Vol. 74, No. 93
Friday, May 15, 2009

Presidential Documents

Title 3—

The President

Executive Order 13508 of May 12, 2009

Chesapeake Bay Protection and Restoration

By the authority vested in me as President by the Constitution and the laws of the United States of America and in furtherance of the purposes of the Clean Water Act of 1972, as amended (33 U.S.C. 1251 *et seq.*), and other laws, and to protect and restore the health, heritage, natural resources, and social and economic value of the Nation's largest estuarine ecosystem and the natural sustainability of its watershed, it is hereby ordered as follows:

PART 1—PREAMBLE

The Chesapeake Bay is a national treasure constituting the largest estuary in the United States and one of the largest and most biologically productive estuaries in the world. The Federal Government has nationally significant assets in the Chesapeake Bay and its watershed in the form of public lands, facilities, military installations, parks, forests, wildlife refuges, monuments, and museums.

Despite significant efforts by Federal, State, and local governments and other interested parties, water pollution in the Chesapeake Bay prevents the attainment of existing State water quality standards and the "fishable and swimmable" goals of the Clean Water Act. At the current level and scope of pollution control within the Chesapeake Bay's watershed, restoration of the Chesapeake Bay is not expected for many years. The pollutants that are largely responsible for pollution of the Chesapeake Bay are nutrients, in the form of nitrogen and phosphorus, and sediment. These pollutants come from many sources, including sewage treatment plants, city streets, development sites, agricultural operations, and deposition from the air onto the waters of the Chesapeake Bay and the lands of the watershed.

Restoration of the health of the Chesapeake Bay will require a renewed commitment to controlling pollution from all sources as well as protecting and restoring habitat and living resources, conserving lands, and improving management of natural resources, all of which contribute to improved water quality and ecosystem health. The Federal Government should lead this effort. Executive departments and agencies (agencies), working in collaboration, can use their expertise and resources to contribute significantly to improving the health of the Chesapeake Bay. Progress in restoring the Chesapeake Bay also will depend on the support of State and local governments, the enterprise of the private sector, and the stewardship provided to the Chesapeake Bay by all the people who make this region their home.

PART 2—SHARED FEDERAL LEADERSHIP, PLANNING, AND ACCOUNTABILITY

Sec. 201. *Federal Leadership Committee.* In order to begin a new era of shared Federal leadership with respect to the protection and restoration of the Chesapeake Bay, a Federal Leadership Committee (Committee) for the Chesapeake Bay is established to oversee the development and coordination of programs and activities, including data management and reporting, of agencies participating in protection and restoration of the Chesapeake Bay. The Committee shall manage the development of strategies and program plans for the watershed and ecosystem of the Chesapeake Bay and oversee their implementation. The Committee shall be chaired by the Administrator of the Environmental Protection Agency (EPA), or the Administrator's designee, and include senior representatives of the Departments of Agriculture

(USDA), Commerce (DOC), Defense (DOD), Homeland Security (DHS), the Interior (DOI), Transportation (DOT), and such other agencies as determined by the Committee. Representatives serving on the Committee shall be officers of the United States.

Sec. 202. *Reports on Key Challenges to Protecting and Restoring the Chesapeake Bay.* Within 120 days from the date of this order, the agencies identified in this section as the lead agencies shall prepare and submit draft reports to the Committee making recommendations for accomplishing the following steps to protect and restore the Chesapeake Bay:

(a) define the next generation of tools and actions to restore water quality in the Chesapeake Bay and describe the changes to be made to regulations, programs, and policies to implement these actions;

(b) target resources to better protect the Chesapeake Bay and its tributary waters, including resources under the Food Security Act of 1985 as amended, the Clean Water Act, and other laws;

(c) strengthen storm water management practices at Federal facilities and on Federal lands within the Chesapeake Bay watershed and develop storm water best practices guidance;

(d) assess the impacts of a changing climate on the Chesapeake Bay and develop a strategy for adapting natural resource programs and public infrastructure to the impacts of a changing climate on water quality and living resources of the Chesapeake Bay watershed;

(e) expand public access to waters and open spaces of the Chesapeake Bay and its tributaries from Federal lands and conserve landscapes and ecosystems of the Chesapeake Bay watershed;

(f) strengthen scientific support for decisionmaking to restore the Chesapeake Bay and its watershed, including expanded environmental research and monitoring and observing systems; and

(g) develop focused and coordinated habitat and research activities that protect and restore living resources and water quality of the Chesapeake Bay and its watershed.

The EPA shall be the lead agency for subsection (a) of this section and the development of the storm water best practices guide under subsection (c). The USDA shall be the lead agency for subsection (b). The DOD shall lead on storm water management practices at Federal facilities and on Federal lands under subsection (c). The DOI and the DOC shall share the lead on subsections (d), (f), and (g), and the DOI shall be lead on subsection (e). The lead agencies shall provide final reports to the Committee within 180 days of the date of this order.

Sec. 203. *Strategy for Protecting and Restoring the Chesapeake Bay.* The Committee shall prepare and publish a strategy for coordinated implementation of existing programs and projects to guide efforts to protect and restore the Chesapeake Bay. The strategy shall, to the extent permitted by law:

(a) define environmental goals for the Chesapeake Bay and describe milestones for making progress toward attainment of these goals;

(b) identify key measureable indicators of environmental condition and changes that are critical to effective Federal leadership;

(c) describe the specific programs and strategies to be implemented, including the programs and strategies described in draft reports developed under section 202 of this order;

(d) identify the mechanisms that will assure that governmental and other activities, including data collection and distribution, are coordinated and effective, relying on existing mechanisms where appropriate; and

(e) describe a process for the implementation of adaptive management principles, including a periodic evaluation of protection and restoration activities.

The Committee shall review the draft reports submitted by lead agencies under section 202 of this order and, in consultation with relevant State agencies, suggest appropriate revisions to the agency that provided the draft report. It shall then integrate these reports into a coordinated strategy for restoration and protection of the Chesapeake Bay consistent with the requirements of this order. Together with the final reports prepared by the lead agencies, the draft strategy shall be published for public review and comment within 180 days of the date of this order and a final strategy shall be published within 1 year. To the extent practicable and authorized under their existing authorities, agencies may begin implementing core elements of restoration and protection programs and strategies, in consultation with the Committee, as soon as possible and prior to release of a final strategy.

Sec. 204. *Collaboration with State Partners.* In preparing the reports under section 202 and the strategy under section 203, the lead agencies and the Committee shall consult extensively with the States of Virginia, Maryland, Pennsylvania, West Virginia, New York, and Delaware and the District of Columbia. The goal of this consultation is to ensure that Federal actions to protect and restore the Chesapeake Bay are closely coordinated with actions by State and local agencies in the watershed and that the resources, authorities, and expertise of Federal, State, and local agencies are used as efficiently as possible for the benefit of the Chesapeake Bay's water quality and ecosystem and habitat health and viability.

Sec. 205. *Annual Action Plan and Progress Report.* Beginning in 2010, the Committee shall publish an annual Chesapeake Bay Action Plan (Action Plan) describing how Federal funding proposed in the President's Budget will be used to protect and restore the Chesapeake Bay during the upcoming fiscal year. This plan will be accompanied by an Annual Progress Report reviewing indicators of environmental conditions in the Chesapeake Bay, assessing implementation of the Action Plan during the preceding fiscal year, and recommending steps to improve progress in restoring and protecting the Chesapeake Bay. The Committee shall consult with stakeholders (including relevant State agencies) and members of the public in developing the Action Plan and Annual Progress Report.

Sec. 206. *Strengthen Accountability.* The Committee, in collaboration with State agencies, shall ensure that an independent evaluator periodically reports to the Committee on progress toward meeting the goals of this order. The Committee shall ensure that all program evaluation reports, including data on practice or system implementation and maintenance funded through agency programs, as appropriate, are made available to the public by posting on a website maintained by the Chair of the Committee.

PART 3—RESTORE CHESAPEAKE BAY WATER QUALITY

Sec. 301. *Water Pollution Control Strategies.* In preparing the report required by subsection 202(a) of this order, the Administrator of the EPA (Administrator) shall, after consulting with appropriate State agencies, examine how to make full use of its authorities under the Clean Water Act to protect and restore the Chesapeake Bay and its tributary waters and, as appropriate, shall consider revising any guidance and regulations. The Administrator shall identify pollution control strategies and actions authorized by the EPA's existing authorities to restore the Chesapeake Bay that:

(a) establish a clear path to meeting, as expeditiously as practicable, water quality and environmental restoration goals for the Chesapeake Bay;

(b) are based on sound science and reflect adaptive management principles;

(c) are performance oriented and publicly accountable;

(d) apply innovative and cost-effective pollution control measures;

(e) can be replicated in efforts to protect other bodies of water, where appropriate; and

(f) build on the strengths and expertise of Federal, State, and local governments, the private sector, and citizen organizations.

Sec. 302. *Elements of EPA Reports.* The strategies and actions identified by the Administrator of the EPA in preparing the report under subsection 202(a) shall include, to the extent permitted by law:

(a) using Clean Water Act tools, including strengthening existing permit programs and extending coverage where appropriate;

(b) establishing new, minimum standards of performance where appropriate, including:

(i) establishing a schedule for the implementation of key actions in cooperation with States, local governments, and others;

(ii) constructing watershed-based frameworks that assign pollution reduction responsibilities to pollution sources and maximize the reliability and cost-effectiveness of pollution reduction programs; and

(iii) implementing a compliance and enforcement strategy.

PART 4—AGRICULTURAL PRACTICES TO PROTECT THE CHESAPEAKE BAY

Sec. 401. In developing recommendations for focusing resources to protect the Chesapeake Bay in the report required by subsection 202(b) of this order, the Secretary of Agriculture shall, as appropriate, concentrate the USDA's working lands and land retirement programs within priority watersheds in counties in the Chesapeake Bay watershed. These programs should apply priority conservation practices that most efficiently reduce nutrient and sediment loads to the Chesapeake Bay, as identified by USDA and EPA data and scientific analysis. The Secretary of Agriculture shall work with State agriculture and conservation agencies in developing the report.

PART 5—REDUCE WATER POLLUTION FROM FEDERAL LANDS AND FACILITIES

Sec. 501. Agencies with land, facilities, or installation management responsibilities affecting ten or more acres within the watershed of the Chesapeake Bay shall, as expeditiously as practicable and to the extent permitted by law, implement land management practices to protect the Chesapeake Bay and its tributary waters consistent with the report required by section 202 of this order and as described in guidance published by the EPA under section 502.

Sec. 502. The Administrator of the EPA shall, within 1 year of the date of this order and after consulting with the Committee and providing for public review and comment, publish guidance for Federal land management in the Chesapeake Bay watershed describing proven, cost-effective tools and practices that reduce water pollution, including practices that are available for use by Federal agencies.

PART 6—PROTECT CHESAPEAKE BAY AS THE CLIMATE CHANGES

Sec. 601. The Secretaries of Commerce and the Interior shall, to the extent permitted by law, organize and conduct research and scientific assessments to support development of the strategy to adapt to climate change impacts on the Chesapeake Bay watershed as required in section 202 of this order and to evaluate the impacts of climate change on the Chesapeake Bay in future years. Such research should include assessment of:

(a) the impact of sea level rise on the aquatic ecosystem of the Chesapeake Bay, including nutrient and sediment load contributions from stream banks and shorelines;

(b) the impacts of increasing temperature, acidity, and salinity levels of waters in the Chesapeake Bay;

(c) the impacts of changing rainfall levels and changes in rainfall intensity on water quality and aquatic life;

(d) potential impacts of climate change on fish, wildlife, and their habitats in the Chesapeake Bay and its watershed; and

(e) potential impacts of more severe storms on Chesapeake Bay resources.

PART 7—EXPAND PUBLIC ACCESS TO THE CHESAPEAKE BAY AND CONSERVE LANDSCAPES AND ECOSYSTEMS

Sec. 701. (a) Agencies participating in the Committee shall assist the Secretary of the Interior in development of the report addressing expanded public access to the waters of the Chesapeake Bay and conservation of landscapes and ecosystems required in subsection 202(e) of this order by providing to the Secretary:

(i) a list and description of existing sites on agency lands and facilities where public access to the Chesapeake Bay or its tributary waters is offered;

(ii) a description of options for expanding public access at these agency sites;

(iii) a description of agency sites where new opportunities for public access might be provided;

(iv) a description of safety and national security issues related to expanded public access to Department of Defense installations;

(v) a description of landscapes and ecosystems in the Chesapeake Bay watershed that merit recognition for their historical, cultural, ecological, or scientific values; and

(vi) options for conserving these landscapes and ecosystems.

(b) In developing the report addressing expanded public access on agency lands to the waters of the Chesapeake Bay and options for conserving landscapes and ecosystems in the Chesapeake Bay, as required in subsection 202(e) of this order, the Secretary of the Interior shall coordinate any recommendations with State and local agencies in the watershed and programs such as the Captain John Smith Chesapeake National Historic Trail, the Chesapeake Bay Gateways and Watertrails Network, and the Star-Spangled Banner National Historic Trail.

PART 8—MONITORING AND DECISION SUPPORT FOR ECOSYSTEM MANAGEMENT

Sec. 801. The Secretaries of Commerce and the Interior shall, to the extent permitted by law, organize and conduct their monitoring, research, and scientific assessments to support decisionmaking for the Chesapeake Bay ecosystem and to develop the report addressing strengthening environmental monitoring of the Chesapeake Bay and its watershed required in section 202 of this order. This report will assess existing monitoring programs and gaps in data collection, and shall also include the following topics:

(a) the health of fish and wildlife in the Chesapeake Bay watershed;

(b) factors affecting changes in water quality and habitat conditions; and

(c) using adaptive management to plan, monitor, evaluate, and adjust environmental management actions.

PART 9—LIVING RESOURCES PROTECTION AND RESTORATION

Sec. 901. The Secretaries of Commerce and the Interior shall, to the extent permitted by law, identify and prioritize critical living resources of the Chesapeake Bay and its watershed, conduct collaborative research and habitat protection activities that address expected outcomes for these species, and develop a report addressing these topics as required in section 202 of this order. The Secretaries of Commerce and the Interior shall coordinate agency activities related to living resources in estuarine waters to ensure maximum benefit to the Chesapeake Bay resources.

PART 10—EXCEPTIONS

Sec. 1001. The heads of agencies may authorize exceptions to this order, in the following circumstances:

(a) during time of war or national emergency;

(b) when necessary for reasons of national security;

(c) during emergencies posing an unacceptable threat to human health or safety or to the marine environment and admitting of no other feasible solution; or

(d) in any case that constitutes a danger to human life or a real threat to vessels, aircraft, platforms, or other man-made structures at sea, such as cases of *force majeure* caused by stress of weather or other act of God.

PART 11—GENERAL PROVISIONS

Sec. 1101. (a) Nothing in this order shall be construed to impair or otherwise affect:

(i) authority granted by law to a department, agency, or the head thereof; or

(ii) functions of the Director of the Office of Management and Budget relating to budgetary, administrative, or legislative proposals.

(b) This order shall be implemented consistent with applicable law and subject to the availability of appropriations.

(c) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity, by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

THE WHITE HOUSE,
May 12, 2009.

[FR Doc. E9–11547
Filed 5–14–09; 8:45 am]
Billing code 3195–W9–P

Appendix B

Federal Leadership Committee Senior Designee Membership

Appendix B

Federal Leadership Committee

Chair

Name	Title	Agency
Lisa P. Jackson	Administrator	U.S. Environmental Protection Agency

Members

Name	Title	Agency
Tom Vilsack	Secretary	U.S. Department of Agriculture
Dr. Jane Lubchenco	Under Secretary for Oceans and Atmosphere and NOAA Administrator	U.S. Department of Commerce
Ray Mabus	Secretary of the Navy	U.S. Department of Defense
Janet Napolitano	Secretary	U.S. Department of Homeland Security
Ken Salazar	Secretary	U.S. Department of the Interior
Ray LaHood	Secretary	U.S. Department of Transportation

Senior Designee

Agency	Name	Title	Contact Info
DHS	Mr. Donald Bathurst	Chief Administrative Officer	Mail Stop #0075 Department of Homeland Security 245 Murray Lane, SW Washington, DC 20528
DOC	Ms. Sally Yozell	Director of Policy	1401 Constitution Avenue, NW Room 5128 Washington, DC 20230
DOD	Mr. Donald Schregardus	Deputy Assistant Secretary of the Navy Environment	Office of the Deputy Assistant Secretary of the Navy, Environment 1000 Navy Pentagon Room 4A674 Washington, DC 20350-1000
	The Honorable Jo-Ellen Darcy	Assistant Secretary to the Army (Civil Works)	Office of the Assistant Secretary of the Army (Civil Works) 108 Army Pentagon Room 3E446 Washington, DC 20310-0108
DOI	Tom Strickland	Assistant Secretary for Fish and Wildlife and Parks	Office of the Secretary U.S. Department of the Interior 1849 C Street, NW MS 3156 MIB Washington, DC 20240
	Will Shafroth	Deputy Assistant Secretary for Fish and Wildlife and Parks	Office of the Secretary U.S. Department of the Interior 1849 C Street, NW MS 3156 MIB Washington, DC 20240
	Deanna Archuleta	Deputy Assistant Secretary Water and Science	U.S. Department of Interior 1849 C Street, NW Room 6649, MS 6640 MIB Washington, DC 20240
DOT	Kathryn B. Thomson	Counselor to the Secretary	U.S. Department of Transportation W90-342 1200 New Jersey Avenue, SE Washington, DC 20590
EPA	Peter Silva	Assistant Administrator for Water	U.S. EPA 1200 Pennsylvania Avenue, NW Washington, DC 20460
USDA	Robert Bonnie	Senior Advisor to the Secretary for Environment and Climate	U.S. Department of Agriculture 1400 Independence Avenue, SW Room 200A Washington, DC 20250

Appendix C
Outcome Measures Background

Bay Water Quality Outcome

Outcome:

Meet water quality standards for dissolved oxygen, clarity/underwater Bay grasses and chlorophyll-a in the Bay and tidal tributaries by implementing 100 percent of pollution reduction actions for nitrogen, phosphorus and sediment no later than 2025, with 60 percent of segments attaining standards by 2025.

Current Condition:

89 of the 92 segments of the Bay and its tidal waters are impaired.

Background:

Why is it important? Restoration of tidal water quality is central to bringing back a healthy Chesapeake Bay ecosystem.

What is the measure? This outcome directly measures the three most important water quality parameters—dissolved oxygen, clarity/underwater Bay grasses and chlorophyll-a. All three parameters are routinely sampled at the over 150 stations that comprise the Chesapeake Bay Water Quality Monitoring Network.

What is the current condition? Currently, 89 of the 92 tidal segments across the Chesapeake Bay and its tidal tributaries and embayments are listed by MD, VA, DE and DC as impaired for nutrients and/or sediments on their 2008 303(d) lists.

What is the basis for the target? Based on model simulations, EPA estimates the nitrogen loads delivered to the Bay tidal waters at about 277 million pounds per year. EPA has established a draft goal of reducing the annual load to 200 million pounds of total nitrogen. Under EPA's written expectations for the jurisdictions' watershed implementation plans, the jurisdictions need to have the practices and technology implemented on the ground necessary to achieve 60 percent of the total nutrient and sediment reductions required to achieve their Bay TMDL allocations by 2017 or about 231 million pounds for nitrogen.

Based on Phase 5.2 watershed model results input into the prior version of the Bay water quality and sediment transport model, when nitrogen loadings reach in the range of 236 million pounds, EPA predicts that the majority of the Bay's tidal segments come into attainment of their dissolved oxygen water quality standards. The exceptions are the large areas of the middle mainstem Chesapeake Bay and a small number of smaller segments. Based on the latest findings from the USGS pointing to groundwater lag times of up to 10 years (on average) and higher, the Bay's tidal waters will not see the full effect of all the practices and pollution reduction technologies in place in 2017 until after 2025. An estimate of 60 percent was made for the number of segments that will meet water quality standards for dissolved oxygen, clarity/underwater Bay grasses (SAV) and chlorophyll-a in the Bay and tidal tributaries by 2025. By May 2011, EPA will have access to additional model runs and information that will increase confidence in the above percentage or a refined percentage. Following an adaptive management process under the Bay TMDL, there will be further information with the adoption of the jurisdictions' Phase 1 and Phase 2 watershed implementation plans as well as with the jurisdictions' development of their 2012-2013 two-year milestones. The current goal of 60 percent of segments achieving water quality standards for nitrogen, phosphorus and sediment by 2025 may need to be revised based on that information, as well as on the final TMDL and continued modeling.

More Information:

http://executiveorder.chesapeakebay.net/file.axd?file=2009percent2f11percent2f202a+Water+Quality+Report.pdf

Stream Restoration Outcome

Outcome:

Improve the health of streams so that 70 percent of sampled streams throughout the Chesapeake watershed rate three, four or five (corresponding to fair, good, or excellent) as measured by the Index of Biotic Integrity, by 2025.

Current Condition:

45 percent of sampled streams are rated fair, good, or excellent.

Background:

Why is it important? Restoring water quality in streams is a necessary step in meeting water quality standards in the Bay. Similarly, actions to reduce nutrients, sediment and other pollutants flowing into streams to achieve Bay standards also improves the quality of local streams. Restoring streams also benefits the fish, wildlife and people using them. This outcome also helps address comments from the public and states stressing a need to improve local streams as a way of better engaging watershed organizations and involving the 17 million watershed residents in the restoration effort.

What is the measure? This measure of stream quality is an existing CBP indicator, based on an index of biotic integrity which scores benthic macroinvertebrate communities on a scale of poor to excellent. The CBP has worked with the states to gather information from 10,452 sites across the watershed where samples have been collected during 2000-2008 and scored the average of this data based on ecoregion thresholds. For this measure, an acceptable benthic community is defined as having a score of fair, good or excellent. In the future, the CBP will take a subset of these sites to look at change in stream quality over time. The subset of sites will be designed to adequately represent the distribution of stream conditions throughout the watershed.

What is the current condition? In the most recent assessment, conditions at 4,656 sampling sites are rated fair, good or excellent (45 percent), 5,459 sites are rated very poor or poor (52 percent) and 337 (3 percent) are not rated at this time.

What is the basis for the target? The basis for the target is that as practices are implemented in the watershed to reduce nutrients, sediment and other pollutants, we will see improvements in the quality of streams. The current target (a benthic index of biotic integrity rating of fair, good or excellent) is closely tied to the Bay estuary target of meeting water-quality standards for oxygen, clarity and chlorophyll-a in 60 percent of the Bay segments by 2025. We should have a greater percentage of improvements in streams in the watershed by 2025 since they will respond to management actions prior to seeing improvements in the estuary. Therefore a target of 70 percent was chosen.

More Information:

http://www.chesapeakebay.net/status_watershedhealth.aspx?menuitem=26057

Agricultural Conservation Outcome

Outcome:

Work with producers to apply new conservation practices on 4 million acres of agricultural working lands in high-priority watersheds by 2025 to improve water quality in the Chesapeake Bay and its tributaries.

Current Condition:

Of the approximately 8 million acres of agricultural working lands in high-priority watersheds, approximately 4 million acres are identified as having soils with the highest potential for leaching and runoff, which may affect water quality. The 4 million acre target is to apply or expand conservation treatment on virtually all of these most vulnerable agricultural lands.

Background:

Why is it important? This outcome reflects the application of high priority conservation practices that are most closely aligned with reducing potential nutrient and sediment losses from farming activities. Our Conservation Effects Assessment Project (CEAP) results are quantifying the biophysical effects of conservation practices and suites of practices. Preliminary data from the Upper Mississippi River Basin suggests that treatment of the most vulnerable acres with high impact conservation practices can reduce substantially the nutrient (N&P) and sediment losses from farming activities.

What is the measure? The measure will track the application of selected conservation practices in identified priority watersheds. The selected practices will reflect those most closely aligned with reducing potential nutrient and sediment losses from farming activities. The source will be USDA program data from NRCS and FSA.

What is the current condition? In FY2009, conservation practices were applied on about 530,000 acres in the Chesapeake Bay watershed. This includes all practices on all lands in the entire Bay watershed, rather than the subset of priority watersheds. Based on the proportion of the priority watersheds to the Basin at large, we estimate about 50 percent of the acres applied (260,000 acres) would fall within the 2010 priority watershed boundaries.

What is the basis for the target? Of the 7.3 million acres of agricultural working lands in high priority watersheds, 3.6 million acres are identified as having soils with the highest potential for leaching and runoff. The 4 million acres goal would apply or expand conservation treatment on virtually all of the 3.6 million acres. The high priority watersheds are based on Sparrow data vetted through State Technical Committees and soils with the highest potential for leaching and runoff are based off of SSURGO data. We have used this process to approximate the potential size of the area to focus conservation resources; the 4 million acres goal does not imply that these acres are not currently under effective conservation management. This goal further reflects the "targeting" of resources described in the 202b report and 203 strategy, whereby we identify and treat the most strategic acres to improve water quality.

Wetlands Outcome

Outcome:

Restore 30,000 acres of tidal and non-tidal wetlands and enhance the function of an additional 150,000 acres of degraded wetlands by 2025.

Current Condition:

1 million acres of tidal and non-tidal wetlands estimated to be available in the Chesapeake watershed for restoration or enhancement. Between 1998 and 2008, 18,217 acres of wetlands were restored and 97,738 acres were enhanced.

Background:

Why is it important? Wetlands act as natural filters by absorbing nutrients and sediment from overland flow before it enters the Bay. Wetlands are a credited BMP in the CBP Watershed model (7-25 percent for nitrogen and 12-50 percent for phosphorus). Wetlands provide critical stopover habitat for birds using the Atlantic Flyway, spawning habitat for the Bay's commercially important fish species and rearing habitat for juvenile crabs. Chesapeake marshlands provide world-class hunting, kayaking and bird watching opportunities and as such are important to the regional economy. Wetlands stabilize shorelines, control erosion, and buffer inland and coastal properties from the costly damage associated with floods and storm surge.

What is the measure? Acres of tidal and non-tidal wetlands reestablished, established and enhanced in the Chesapeake Bay Watershed from 2011-2025 as reported by the state partners using standard federal wetland tracking definitions adopted by Bay Program partners in 2005. CBP guidance issued in 2005 directed partners to target wetland restoration and enhancement to areas with hydric soils, high nutrient and sediment loadings and high wildlife habitat values.

What is the current condition? The National Wetlands Inventory estimates that 1 million acres of tidal and non-tidal wetlands are available in the Chesapeake Bay watershed for restoration or enhancement. The Chesapeake experienced 5 percent (20,556 acres) of the net wetland loss in the conterminous United States (409,500 acres) from 1982-1989. (Sources: Dahl and Johnson 1991; Tiner et al., 1994). Partners have agreed on a milestone to establish baseline data for total extent of wetland acreage in the watershed based on hydric soil maps compiled at the county level.

What is the basis for the target? The new targets would be in addition to progress made over the past decade and require an increased rate of implementation. Between 1998 and 2008, 18,217 wetlands were restored and 97,738 acres of wetlands were enhanced.

More Information:

http://www.chesapeakebay.net/habitat_git_info.aspx?menuitem=47173

http://www.chesapeakebay.net/status_wetlandsrestored.aspx?menuitem=19698

Forest Buffer Outcome

Outcome:

Restore riparian forest buffers to 63 percent, or 181,440 miles, of the total riparian miles (stream bank and shoreline miles) in the Bay watershed by 2025.

Current Condition:

58 percent of the 288,000 total riparian miles in the Bay watershed has forest buffers in place.

Background:

Why is it important? The single most important indicator of watershed health is the amount of forest in that watershed (Sweeney 2009). Forests covered 95 percent of the Chesapeake watershed prior to European settlement and now account for 58 percent of the watershed. Because they are situated along streams and shorelines, riparian forest buffers play a particularly critical role in processing nutrients and sediments that flow off non-forest land uses before entering streams (across the watershed, riparian forest buffers have a baseline efficiency of 65 percent N reduction). Riparian forest buffers offer multiple water quality and habitat benefits including: stream cooling, food for aquatic organisms that conduct 'in stream' nutrient processing, improved stream morphology, and preferred habitat and migration corridors.

What is the measure? Forest restoration is measured in miles of land that borders water. A buffer must be 35 feet or wider to count. Outcomes of scientific research support a 70 percent target for riparian forest cover to maintain healthy functioning watersheds (Goetz et al. 2003; and King et al. 2005). It is not feasible to reach the full 70 percent by 2025 with current levels of funding.

What is the current condition? The baseline for riparian forest cover is 58 percent (current condition is being updated by USGS and USFS). Riparian forest buffer loss is approximately 0.09 percent per year (Claggett 2010). The average number of miles restored in the Chesapeake for the past four years is 563 miles per year. The average width of restored riparian forest buffer in 2009 was 135 feet.

What is the basis for the target? In the 2007 Forest Conservation Directive, all 7 jurisdictions and the federal government agreed to collectively restore at least 900 miles/year. At this rate of restoration, with an additional 27 miles per year to offset riparian forest loss, the 63 percent mark can be reached by 2025, pending current analysis of the baseline condition being done by USGS. The current amount of forest restoration needed to attain 63 percent is approximately 14,400 miles.

Fish Passage Outcome

Outcome:

Restore historical fish migratory routes by opening 1,000 additional stream miles by 2025, with restoration success indicated by the presence of River herring, American shad and/or American eel.

Current Condition:

Approximately 1,924 miles in the Chesapeake Bay watershed have been opened and are accessible for fish migration. Projects are currently being ranked and prioritized through a collaborative federal and state process designed to strategically target priority projects.

Background:

Why is it important? Physical structures that block or impede fish migrations to historic upstream spawning habitats are potentially the most important factor in the decline of migratory fish like American Shad, River herring and American eel. Implementing fish passage projects by removing dams or installing fish lifts, ladders and other passageways allows migratory fish to return to upstream spawning and nursery grounds while resident fish are able to move freely throughout streams.

What is the measure? Restore historical fish migratory routes by opening an additional 1,000 stream miles by 2025.

What is the current condition? Approximately 1,924 miles in the Chesapeake Bay watershed have been opened and are accessible for fish migration. Projects are currently being ranked and prioritized through a collaborative federal and state process designed to strategically target priority projects. Number of miles opened per project is a key criterion in the prioritization process. Maryland has completed a ranking process for fish passage projects. Virginia and Pennsylvania are applying for funding to complete the prioritization of the fish passage projects within each state.

What is the basis for the target? ? Currently, approximately 1,924 miles in the Chesapeake Bay watershed have been opened and are accessible for fish migration. The Chesapeake Bay Fish Passage Workgroup believes the goal is measurable and attainable under the current working conditions because there are significantly more than 1,000 miles to be reopened watershed-wide. Many of the most significant blockages have been removed or are being removed, and the vast majority of identified blockages in the watershed are small culverts that if removed will provide limited benefit to diadromous fish resources. In addition, many dams may not be removed or modified due to lack of dam-owner cooperation or other high-priority uses for those structures (flood control, water supply, recreational areas, etc.). Given these restraints, the Bay Program partners have established the target of opening 1,000 additional miles by 2025.

More Information:

http://www.chesapeakebay.net/fishpassage.aspx?menuitem=14762

http://www.chesapeakebay.net/status_fishpassage.aspx?menuitem=19701

http://archive.chesapeakebay.net/pubs/calendar/fpwkgp_12-17-09_Handout_2_10623.pdf

Oyster Outcome

Outcome:

Restore native oyster habitat and populations in 20 tributaries out of 35 to 40 candidate tributaries by 2025.

Current Condition:

0 tributaries with fully restored oyster populations; several tributaries with successful living oyster reef habitat.

Background:

Why is it important? Oysters are a keystone species in Chesapeake Bay. They grow naturally in reefs that create and provide habitat not just for themselves and additional generations of oysters, but for many species of commercially and recreationally important finfish and shellfish. Oyster reefs were once the dominant hard-bottom habitat in the Chesapeake Bay, and it is thought that the ability to restore the overall water quality, habitat and fisheries in the Bay is likely closely linked to our ability to restore oyster populations.

What is the measure? Re-establishing oyster reefs and oyster populations in priority tributaries where oysters once thrived. Restored oyster reefs should not only provide habitat structure but should support self sustaining populations of oysters over time that contribute to the overall ecological health of the tributary.

What is the current condition? (Current condition: 0 tributaries with fully restored oyster populations; several tributaries with successful living oyster reef habitat.) Disease and overfishing have reduced oyster populations to about 1 percent of historical levels. Most oyster restoration efforts since the 1990s have been small scale and aimed at restoring the fishery. Recent large scale efforts in the Great Wicomico and Lynnhaven Rivers in Virginia show signs of success, with living reefs having been restored in these tributaries. However, large (tributary) scale projects supporting "fully restored" and "self-sustaining" oyster populations have not yet been achieved. For this reason, the baseline of tributaries restored on a large scale with self sustaining populations is set at 0.

What is the basis for the target? The USACE Final Programmatic Environmental Impact Statement (PEIS) Record of Decision signed in June 2009 recommends expanding, improving and accelerating native oyster restoration and repletion in Maryland and Virginia. This target establishes a spatially explicit, tributary or large scale based approach to significantly increase the level of focused restoration effort and will drive improved coordination among agencies and partners Bay-wide. The number of candidate tributaries is an initial estimate based on the Draft Maryland Oyster Restoration Plan, the Virginia Oyster Reef Restoration Map Atlas and the USACE Master Plan. Based on these maps and their associated information, there are at least 35-40 tributaries or portions of rivers identified for potential restoration (most of these are not designated as sanctuaries at this point). There has been recent progress toward collaborative restoration approaches in Maryland and Virginia, and an emphasis on ecological restoration focused on long-term success metrics of restored, sustainable oyster populations. The Chesapeake Bay Executive Order coupled with ongoing efforts such as the USACE Master Plan and the Maryland Oyster Restoration Plan present an opportunity for federal, state and NGO partners to implement the first truly large-scale native oyster restoration efforts across the Bay.

More Information:

http://www.dnr.state.md.us/fisheries/oysters/

http://www.mrc.state.va.us/

http://chesapeakebay.noaa.gov/oystermain.aspx

http://www.nao.usace.army.mil/oysters/

Blue Crab Outcome

Outcome:

Maintain sustainable blue crab interim rebuilding target of 200 million adults (1+ years old) in 2011 and develop a new population target for 2012 through 2025.

Current Condition:

2007-2008: 131 million; 2008-2009: 223 million; 2009-2010: 315 million

Background:

Why is it important? Blue crabs not only comprise the most valuable fishery in the Chesapeake Bay, but are major predators of benthic communities and are prey for many other fish species. The blue crab population is vulnerable to increased harvest pressure, as well as the effects of habitat loss due to poor water quality. Proper management of the crab harvest, as well as water quality improvements and habitat restoration will help restore the Bay's blue crab population and maintain this valuable resource into the future.

What is the measure? In 2008, the Chesapeake Bay Stock Assessment Committee (CBSAC) recommended an abundance target labeled as an 'interim rebuilding target' (200 million age 1+ adults). The target level of 200 million is intended as an initial rebuilding goal (seen as something achievable in the short term). It is envisioned that a 'new/updated' abundance target will be identified and adopted through a peer-reviewed process by 2012.

What is the current condition? (Current condition: 2007-2008: 131 million; 2008-2009: 223 million; 2009-2010: 315 million). The Blue Crab Advisory Report provides advice to the management jurisdictions as they set regulations for the blue crab fishery. Recently released winter dredge survey results from 2009-2010 indicate that the abundance of adult blue crabs increased to 315 million.

What is the basis for the target? In 2008, the Chesapeake Bay Stock Assessment Committee (CBSAC) recommended an interim abundance target (200 million age 1+ adults). The target level of 200 million is intended as an initial rebuilding goal (seen as something achievable in the short term). The Executive Order provides an opportunity to maintain the gains made in the past two years and collaboratively establish a longer term goal and implement ecosystem based management approaches for blue crab.

More Information:

http://www.chesapeakebay.net/bluecrabmanagement.aspx?menuitem=14769

Brook Trout Outcome

Outcome:

Restore naturally reproducing brook trout populations in headwater streams by improving 58 sub-watersheds from 'reduced' classification (10-50 percent of habitat lost) to 'healthy' (less than 10 percent of habitat lost) by 2025.

Current Condition:

388 of 1,294 sub-watersheds in Chesapeake Bay currently classified as 'reduced' for brook trout.

Background:

Why is it important? Brook trout are a quintessential component of headwater streams, an important part of the natural heritage of the upper Chesapeake watershed and an extremely valuable recreational resource. The Pinchot Institute is developing a credit for brook trout habitat for trading in the BayBank. Land Trusts in WV, NY and VA are finding that the possibility of restoring brook trout to local streams is a real motivator for private landowners to take conservation actions, including livestock fencing and easements.

What is the measure? Restore healthy populations of brook trout to sub-watersheds classified as "reduced" based on presence of sensitive freshwater species as outlined in the Eastern Brook Trout Joint Venture's (EBTJV) targeted watershed approach.

What is the current condition? 388 of 1,294 sub-watersheds being assessed (30 percent of the total) in Chesapeake Bay are classified by EBTJV as reduced for brook trout. A century of declining brook trout populations has resulted in lost economic revenues and recreational fishing opportunities in the headwaters. Unless action is taken to reverse these trends, fishery managers agree that within 20 years brook trout could exist as a relic fishery with little economic value and be at risk of becoming regionally threatened in 30-40 years.

What is the basis for the target? One component in the EBTJV regional conservation strategy that is particularly important for the Mid-Atlantic states is to improve population productivity of brook trout in 30 percent of reduced watersheds. EBTJV has developed highly specified targeted watershed strategies to focus action. The Chesapeake Bay will contribute half of this regional goal by improving 58 of the 388 sub-watersheds (15 percent) that are reduced within the drainage to healthy over 15 years, or a rate of four sub-watersheds per year, with funding support from the National Fish Habitat Action Plan.

More Information:

http://www.easternbrooktrout.net

Black Duck Outcome

Outcome:

Restore a three-year average wintering black duck population in the Chesapeake Bay watershed of 100,000 birds by 2025.

Current Condition:

Recent mid-winter aerial surveys estimate the 2007-2009 rolling three-year average at 37,158 black ducks in the Chesapeake Bay.

Background:

Why is it important? The American black duck has been called the "gold standard" of eastern waterfowl. Historically the black duck was the most abundant dabbling duck in eastern North America and comprised the largest portion of the waterfowl harvest. Despite its importance to hunters and outdoor enthusiasts, the black duck population declined by greater than 50 percent between the 1950s and 1980s. The mid-Atlantic region, including the Chesapeake Bay watershed, supports the largest proportion of the overall wintering American black duck population and is critical to the long-term sustainability of the entire population.

What is the measure? Black duck numbers in the Chesapeake Bay watershed are estimated annually as part of the mid-winter waterfowl aerial surveys conducted by the Atlantic Coast and Appalachian Joint Ventures. The number of wintering ducks is dependent on sufficient food resources (vegetation, tubers, bivalves) to support them. One of the outputs to help achieve the population goal is to protect, restore and improve the carrying capacity of supporting habitats mainly tidal wetlands.

What is the basis for the target? The target is based on a continental breeding population goal from the North American Waterfowl Management Plan (NAWMP) revised in 2004 of 640,000 black ducks based on 1990 population estimates. Because the core of the wintering black duck population is in the mid-Atlantic, biologists believe that obtaining the goal of 100,000 wintering black ducks in the Chesapeake Bay Region will result in meeting the larger continental goal and thus the removal of black ducks from the Birds of Management Concern (BMC) list. A rolling three-year average is used because waterfowl populations vary year to year and black ducks are managed on a three-year average under joint agreement between the U.S. Fish and Wildlife Service and the Canadian Wildlife Service.

More Information:

http://www.blackduckjv.org

http://www.acjv.org

http://www.fws.gov/birdhabitat/NAWMP/index.shtm

Land Conservation Outcome

Outcome:

Protect an additional 2 million acres of lands throughout the watershed currently identified as high conservation priorities at the federal, state or local level by 2025, including 695,000 acres of forest land of highest value for maintaining water quality.

Current Condition:

7.8 million acres protected watershed-wide.

Background:

Why is it important? Land conservation is crucial to ecological health and community well-being. The Chesapeake's working farms, forests, natural areas and cultural and historic lands are central to a unique sense of place – and they provide a suite of benefits. Forests and natural areas safeguard air and water quality, reduce flood damage and sustain wildlife. Historic areas and working farms maintain the region's cherished character. These lands also add billions of dollars to the economy. The annual market value of Chesapeake farm products exceeds $5 billion. Chesapeake forest products deliver annual sales of $22 billion and support over 140,000 jobs. Yet, many lands are threatened by development; for example, while trends vary locally, the watershed has lost 100 acres of forest land daily since the mid-1980s.

What is the measure? This outcome is measured by the number of acres identified as high conservation priorities at the local, state or federal level which are permanently protected from development, whether by purchase or donation, through a perpetual conservation easement or fee ownership for their cultural, historical, ecological, or agricultural value. Information on protected lands is reported annually by MD, VA and PA to the Chesapeake Bay Program. This measure would expand reporting to include NY, DE and WV.

What is the current condition? Approximately 7.8 million acres of land are currently protected in the Chesapeake Bay watershed, including MD, PA, VA, WV, DE and NY.

What is the basis for the target? The target of protecting 2 million acres by 2025 is based on consultations with state officials, past land protection trends (from 2000 to 2009 an average of 125,000 acres were protected annually in PA, VA, MD and DC – continuing this trend through 2025 would conserve 1.875 million acres in these states alone) and a compilation of existing conservation priorities identified by state governments totaling some 2.5 million unprotected priority acres (this is a conservative accounting that does not include a complete list of state priorities in NY, DE and WV; nor does it include any local priorities; and it does not fully represent priority cultural landscapes). As data gaps are filled, the acreage of priority unprotected land is expected to increase.

More Information:

http://www.chesapeakebay.net/landpreservation.aspx?menuitem=14779

http://executiveorder.chesapeakebay.net/file.axd?file=2009%2f11%2f202e+Access+%26+Landscapes+Report.pdf

Public Access Outcome

Outcome:

Increase public access to the Bay and its tributaries by adding 300 new public access sites by 2025.

Current Condition:

761 public access sites providing access to the Bay and its tributaries exist in DC, MD, PA and VA; data on existing access sites in NY, DE and WV to be collected in the future.

Background:

Why is it important? Public access is the vehicle through which people experience conserved lands. Freeman Tilden, a pioneer in enhancing visitor experiences in national parks, recognized that people whose lives are enriched by personal connections to the landscape become its most strident defenders. Outdoor experiences are critical to personal well-being, community character and stewardship of the environment. They also provide substantial economic benefits; in 2007, visitors to heritage and recreation sites generated $31.6 billion in Maryland and Virginia alone. Yet, public access is limited in the Chesapeake region; less than 2 percent of the 11,600 mile tidal shoreline is publicly accessible. At the same time, the demand for water access is growing and is regularly cited as the most needed outdoor recreational opportunity.

What is the measure? This outcome is measured by the addition of new public access sites. A site is a location providing access to the water through a boat ramp, fishing pier, swimming area or adjacent boardwalk or trail; water means the Chesapeake Bay and its tributaries. Information on public access sites is reported annually by MD, VA, PA and DC to the Chesapeake Bay Program. This measure would expand this reporting to include NY, DE and WV.

What is the current condition? The Chesapeake Bay Program currently reports 761 public access sites in MD, PA, VA and DC. A list of sites in NY, WV and DE will be developed.

What is the basis for the target? The target of adding 300 new sites by 2025 is based on consultations with state officials, past access site development trends (between 2000 and 2008 an average of 17 new sites were added annually in PA, VA, MD and DC), the continuing high priority for adding water access sites as expressed in State Comprehensive Outdoor Recreation Plans, and information provided by states, federal agencies and a small sample of local and non-governmental sites indicating over 100 possible projects over five years.

More Information:

http://www.chesapeakebay.net/publicaccessrestoration.aspx?menuitem=16774

http://executiveorder.chesapeakebay.net/file.axd?file=2009%2f11%2f202e+Access+%26+Landscapes+Report.pdf

Appendix D

Critical Living Resources of the Chesapeake Bay Watershed by Region and Priority Habitat

Critical Living Resources of the Chesapeake Bay Watershed by Region and Priority Habitat

Region	Priority Habitats	Critical Living Resources
Coastal Plain (Tidal waters)	**Estuarine** • Tidal wetlands (including emergent tidal freshwater marsh and forest) • Riparian forest buffers • Submerged Aquatic Vegetation (SAV) • Open water • Benthos • Oyster reefs • Beach and dunes • Working/agricultural lands • Grass/shrub lands • Islands • Suburban and Urban	• Blue Crab • Menhaden • Striped Bass • Oysters • Eel grass • Widgeon Grass • Black Duck • Scoters • Saltmarsh Sharp-tailed Sparrow • Canvasback • Wood Thrush • Prairie Warbler
Piedmont (Non-tidal, strictly freshwater)	**Riverine** • Forested wetlands • Riparian forest buffers • In-stream habitat • Freshwater marshes **Uplands** • Working/agricultural lands • Grass/shrub lands	• American Eel • River Herring • Shad • Smallmouth Bass • Yellow Perch • Bog Turtle • Leopard Frog • Prothonotary Warbler
Appalachia (Uplands)	**Terrestrial** • Old growth forest • Isolated wetlands • In-stream habitat • Cold water streams	• Freshwater Mussels • Brook Trout • Cerulean Warbler • Eastern Hellbender • Louisiana Waterthrush • Golden-winged Warbler • Worm-eating Warbler • American Eel • Indiana Bat

Source: *Habitat and Research Activities to Protect and Restore Chesapeake Bay Living Resources and Water Quality*, Department of the Interior (USFWS) and Department of Commerce (NOAA), prepared pursuant to Section 202g of Executive Order 13508, September 2009.

	Stressors	
• Prothonotary Warbler • Atlantic Sturgeon • Northern Diamond-backed Terrapin • Horseshoe Crab • American Eel • Soft Shell and Surf Clams • Delmarva Fox Squirrel • Bald Eagle • Bay Anchovy • Wild Rice • Tiger Beetle	• Poor water quality • Eutrophication • Invasive species • Contaminants • Development/ habitat loss and fragmentation	• Climate change • Overharvesting • Sea level rise • Storm and drought • Saltwater intrusion • Altered freshwater • Dredging
• Louisiana Waterthrush • Prairie Warbler • American Woodcock • Grasshopper Sparrow • Green Heron • Bald Eagle • Delmarva Fox Squirrel	• Poor water quality • Eutrophication • Invasive species • Contaminants • Development/habitat loss and fragmentation • Climate change • Overharvesting	• Poorly managed forestry • Mining • Hydropower • Dams/ fish blockages • Dredging
	• Poor water quality • Invasive species • Contaminants • Development/habitat loss and fragmentation • Climate change	• Overharvesting • Dams/ fish blockages • Mining • Poorly managed forestry

Appendix E

E.O. 13508 Section 202 Reports and Section 502 Guidance

Section 202 Reports

Section 202 of the President's Executive Order required federal agencies to develop seven reports recommending actions for addressing key challenges facing the Bay and its watershed. The draft reports were released to the public on September 10, 2009. The draft reports were then reviewed by the Federal Leadership Committee (FLC) for the Chesapeake Bay, in consultation with relevant state agencies. The reports were revised to reflect consideration of the comments received during state consultation and preliminary public input. The revised reports were released on November 24, 2009.

The actions, strategies, and approaches described in the Section 202 reports have been refined, adapted, and modified as a result of further discussion and consideration by the FLC agencies and Bay stakeholders. Those revised actions, strategies, and approaches are included in the final coordinated implementation strategy released by the FLC on May 12, 2010.

These reports are available at http://executiveorder.chesapeakebay.net.

The reports developed to respond to Section 202 are:

202(a) Report: The Next Generation of Tools and Actions to Restore Water Quality in the Chesapeake Bay

This report identifies the pollution control strategies and actions to protect and restore Bay water quality and reflects consultation with state agencies and input from other stakeholders.

202(b) Report: Focusing Resources to Restore and Protect the Chesapeake Bay and Its Tributary Waters

This report provides a series of recommendations to leverage public and private resources in a voluntary approach to protect and restore the Chesapeake Bay ecosystem.

202(c) Report: Storm Water Management at Federal Facilities & on Federal Lands in the Chesapeake Bay Watershed

This report describes the federal government's commitment to lead by example and implement a new paradigm for storm water management on federal facilities in the Chesapeake Bay watershed.

202(d) Report: Responding to Climate Change in the Chesapeake Bay Watershed

This report focuses on how federal agencies can and should respond to the impacts of climate change and provide guidance and support to stakeholders as they develop similar adaptation strategies.

202(e) Report: Landscape Conservation & Public Access in the Chesapeake Bay Region

This report details a series of recommendations for expanding the conservation of landscapes and the amount of public access in the Chesapeake Bay region.

202(f) Report: Strengthening Science and Decision Support for Ecosystem Management in the Chesapeake Bay and its Watershed

This report identifies a series of actions designed to strengthen science and technical assistance to better plan, implement, and evaluate the actions, policies, and trade-offs needed for ecosystem based management in the Chesapeake Bay watershed.

202(g) Report: Habitat and Research Activities to Protect and Restore Chesapeake Bay Living Resources and Water Quality

This report focuses on actions that apply science and technologies to improve management decisions for habitats and living resources in the Chesapeake Bay watershed and the communities that depend on them.

Section 502 Guidance

As part of a series of actions designed to help protect and restore the Chesapeake Bay, Executive Order 13508 requires the Administrator of EPA to publish, by May 12, 2010, guidance for federal land management in the Chesapeake Bay watershed. This guidance, *Federal Land Management in the Chesapeake Bay Watershed to Control Nonpoint Source Nutrient and Sediment Pollution*, provides information and data on appropriate proven and cost-effective tools and practices for implementation on federal lands and at federal facilities.

Extensive studies of the Chesapeake Bay indicate that the great majority of nonpoint sources in the Chesapeake Bay watershed will need to be controlled, and controlled well, in order to restore the Bay. Accordingly, this guidance has chapters addressing many categories of nonpoint sources in the Chesapeake Bay watershed that comprise a significant majority of all nutrients and sediments currently being contributed to the Bay; each of these categories of activities exist on federal lands in the Chesapeake Bay watershed. The following categories of activity are addressed in this guidance

- Agriculture;
- Urban areas, including Turf (excluding sources regulated as point sources);
- Onsite/Decentralized Treatment Systems;
- Forestry;
- Riparian Areas; and
- Hydromodification.

Each chapter contains "implementation measures" that provide the framework for the chapter. These are intended to convey the actions that will need to be implemented in order to assure that the broad goals of the Chesapeake Bay Executive Order can be achieved. Each chapter also includes information on practices that can be used to achieve the goals; information on the effectiveness and costs of the practices; where relevant, cost savings or other economic/societal benefits (in addition to the pollutant reduction benefits) that derive from the implementation goals and/or practices; and copious references to other documents that provide additional information. Note that the guidance document has undergone a technical peer review.

The guidance can be found at *http://epa.gov/nps/chesbay502/*.

Appendix F
Actions Index

Appendix F
Executive Order 13508 Actions Index

Summary of outcomes and actions contained in the strategy

Number	Action	
RESTORE CLEAN WATER		
	WATER QUALITY OUTCOME: Meet water quality standards for dissolved oxygen, clarity/underwater grasses and chlorophyll-a in the Bay and tidal tributaries by implementing 100 percent of pollution reduction actions for nitrogen, phosphorus and sediment no later than 2025, with 60 percent of segments attaining standards by 2025.	
	STREAM RESTORATION OUTCOME: Improve the health of streams so that 70 percent of sampled streams throughout the Chesapeake watershed rate three, four, or five (corresponding to fair, good or excellent) as measured by the Index of Biotic Integrity, by 2025.	
WQ 1.	▪ Implement the Chesapeake Bay TMDL, a rigorous accountability framework for reducing pollution to ensure that all practices needed to reduce pollution to meet Bay water quality standards are in place by 2025.	
a	○ Create a system for tracking and reporting for TMDL pollution reduction commitments and two-year milestone commitments.	
b	○ Improve mechanisms for tracking and forecasting land-use and land cover changes associated with water quality degradation.	
WQ 2.	▪ Take regulatory and other actions to support state and District plans to implement the TMDL.	
a	○ Implement current regulations for concentrated animal feeding operations (CAFOs) and propose new regulations to more effectively achieve pollutant reductions necessary to meet the Chesapeake Bay TMDL.	
b	○ Implement improvements to the current stormwater program and initiate new national stormwater rulemaking with Chesapeake Bay watershed provisions.	
c	○ Launch the Chesapeake Bay/Anacostia Green Streets-Green Jobs Initiative.	
d	○ Engage in early dialogue with Bay states and the District regarding how EPA will determine if state programs achieve TMDL pollution reduction goals and meet minimum federal program elements for stormwater and Concentrated Animal Feeding Operations.	
e	○ Reduce pollution from wastewater dischargers.	
f	○ Reduce pollution from septic systems.	
g	○ Reduce pollution from atmospheric deposition.	
h	○ Reduce costs and provide flexibility through trading and development of protocols and programs for offsetting new and expanded discharges of nutrients and sediment.	
i	○ Reduce pollution through enforcement and compliance efforts.	
j	○ EPA will coordinate with the Clean Water State Revolving Fund managers to build cooperation and partnership in	

	using resources to better protect the Chesapeake Bay.	
k	○ Provide states with additional grants for regulatory and accountability programs.	
l	○ Pursue funding of stream restoration grants.	
WQ 3.	▪ Ensure the federal government leads by example in reducing pollution from federal lands and facilities.	
a	○ Implement the Energy Independence and Security Act, Section 438.	
b	○ Implement sustainable land management practices and programs into all federal capital improvements, public works management and energy management projects.	
c	○ Ensure that stormwater impacts are minimized as part of environmental review of federal-aid highway projects and other federally-assisted transportation projects.	
	AGRICULTURAL CONSERVATION OUTCOME: Work with producers to apply new conservation practices on 4 million acres of agricultural working lands in high-priority watersheds by 2025 to improve water quality in the Chesapeake Bay and its tributaries.	
WQ 4.	▪ Focus resources on priority watersheds and practices for agriculture to assist states in implementing their Watershed Implementation Plans (WIPs).	
a	○ Target efforts at watersheds that contribute the most nitrogen, phosphorus and sediment.	
b	○ Identify the most effective conservation practices.	
WQ 5.	▪ Accelerate conservation adoption by working with partners to leverage conservation funding and simplify program participation.	
a	○ Leverage funding for conservation in the Chesapeake Bay watershed.	
b	○ Utilize EPA funding for agriculture challenges.	
c	○ Establish showcase projects in small watersheds.	
c	○ Monitor the results of showcase projects.	
d	○ Simplify conservation planning for producers.	
WQ 6.	▪ Accelerate development of new conservation technologies.	
a	○ Fund research and development of conservation technology.	
b	○ Evaluate effectiveness of next generation conservation tools.	
WQ 7.	▪ Develop a system of accountability for tracking and reporting conservation practices.	
	TOXIC CONTAMINANTS	
WQ 8.	▪ EPA, DOI and NOAA will work with state and local governments and stakeholders to expand understanding of the extent and seriousness of the toxic contaminant problem in the Bay and its watershed and to develop contaminant reduction goals by 2013.	
WQ 9.	▪ EPA will work with DOI, states and stakeholders to develop toxic contaminant strategies by 2015.	
	STRENGTHENING SCIENCE SUPPORT: Federal agencies will provide enhanced research, monitoring and models to support prioritizing, monitoring and evaluating the effect of management actions to improve water-quality conditions.	
	Prioritize	
WQ 10.	▪ Improve computer models used to guide restoration activities.	
a	○ Use results from watershed models to prioritize locations of actions.	
b	○ Develop groundwater models.	

c	○ Ensure availability of Bay forecasts and modeling results.	
	Monitor	
WQ 11.	▪ Improve water-quality monitoring in the watershed.	
WQ 12.	▪ Improve tracking of management actions and land-use activities.	
WQ 13.	▪ Monitor and assess restoration activities in small urban and agricultural watersheds.	
WQ 14.	▪ Improve monitoring and assessment of stream conditions.	
WQ 15.	▪ Improve monitoring of tidal waters.	
WQ 16.	▪ Expand NOAA buoy system to improve water quality monitoring and assess new sensors for monitoring emerging contaminants.	
WQ 17.	▪ Evaluate water-quality changes and progress to adjust management actions.	
WQ 18.	▪ Ensure TMDL allocations account for climate change impacts.	
RECOVER HABITAT		
	WETLANDS OUTCOME: Restore 30,000 acres of tidal and non-tidal wetlands and enhance the function of an additional 150,000 acres of degraded wetlands by 2025.	
RH 1.	▪ Restore and protect priority Chesapeake marshes.	
RH 2.	▪ Increase incentives for wetland restoration and enhancement on private land.	
RH 3.	▪ Strengthen federal coordination on permits that impact wetlands.	
	FOREST BUFFER OUTCOME: Restore riparian forest buffers to 63 percent, or 181,440 miles, of the total riparian miles (stream bank and shoreline miles) in the Bay watershed by 2025.	
RH 4.	▪ Accelerate application of Conservation Reserve Enhancement Program (CREP) to achieve state goals for riparian forest buffer adoption.	
RH 5.	▪ Restore forest buffers in priority watersheds.	
RH 6.	▪ Explore alternative payment mechanisms for incentivizing the installation of targeted riparian forest buffers.	
RH 7.	▪ Enhance technical capacity for riparian buffer restoration.	
	FISH PASSAGE OUTCOME: Restore historical fish migratory routes by opening 1,000 additional stream miles by 2025, with restoration success indicated by the presence of river herring, American shad and/or American eel.	
RH 8.	▪ Remove stream barriers and provide fish passage.	
RH 9.	▪ Document return of fish to opened stream reaches.	
	ADDITIONAL HABITAT ACTIONS:	
RH 10.	▪ Combat invasive species that threaten habitat.	
RH 11.	▪ Restore forest habitat in priority areas.	
RH 12.	▪ Restore living shorelines.	
RH 13.	▪ Restore island habitats in the Bay.	
RH 14.	▪ Mitigate impacts of highway projects on habitat.	
	SCIENCE SUPPORT: Federal agencies will provide enhanced research, monitoring and models to support prioritizing, monitoring and evaluating the effects of management actions to restore habitats.	
	Prioritize	
RH 15.	▪ Improve forest buffer and wetland habitat mapping.	
RH 16.	▪ Provide forest mapping tool to watershed groups and local governments.	
RH 17.	▪ Improve tools for streams and fish passage.	

RH 18.	▪ Integrate watershed planning for key tributaries.	
	Monitor	
RH 19.	▪ Improve monitoring of habitats.	
RH 20.	▪ Improve tracking of wetland restoration.	
	Evaluate	
RH 21.	▪ Improve baseline data for wetlands.	
RH 22.	▪ Predict impacts of stressors at the land-water interface.	
RH 23.	▪ Evaluate use of Coastal and Marine Spatial Planning in the Bay.	
RH 24.	▪ Evaluate impacts of river flow and sediment build-up on habitat.	

SUSTAIN FISH & WILDLIFE

	OYSTER OUTCOME: Restore native oyster habitat and populations in 20 tributaries out of 35 to 40 candidate tributaries by 2025.	
FW 1.	▪ Launch a Bay-wide oyster strategy using scientific support for decision making.	
FW 2.	▪ Restore priority tributaries and support enforcement.	
FW 3.	▪ Expand commercial aquaculture.	
	BLUE CRAB OUTCOME: Maintain sustainable blue crab interim population target of 200 million adults (1+ years old) in 2011 and develop a new population rebuilding target for 2012-2025.	
FW 4.	▪ Support continued inter-jurisdictional blue crab management.	
FW 5.	▪ Revise blue crab population rebuilding target.	
	BROOK TROUT OUTCOME: Restore naturally reproducing brook trout populations in headwater streams by improving 58 sub-watersheds from 'reduced' classification (10-50 percent of habitat lost) to 'healthy' (less than 10 percent of habitat lost) by 2025.	
FW 6.	▪ Restore stream habitat through partnerships.	
FW 7.	▪ Consider climate change in prioritizing sub-watersheds for restoration.	
	BLACK DUCK OUTCOME: Restore a three-year average wintering black duck population in the Chesapeake Bay watershed of 100,000 birds by 2025.	
FW 8.	▪ Restore black duck habitat.	
FW 9.	▪ Increase nutrient sources on refuge lands.	
	ADDITIONAL CHESAPEAKE BAY SPECIES	
FW 10.	▪ Facilitate interjurisdictional, ecosystem-based fisheries management.	
FW 11.	▪ Consider alternative fisheries management approaches.	
FW 12.	▪ Support the Atlantic Coastal Fish Habitat Partnership (ACFHP).	
	STRENGTHENING SCIENCE SUPPORT: Federal Agencies will provided enhanced research, monitoring and models to support prioritizing, monitoring and evaluating the effect of management actions to protect and restore fish and wildlife populations.	
	Prioritize	
FW 13.	▪ Collect and organize information to help identify and prioritize areas to restore oyster habitat and populations.	
FW 14.	▪ Improve scientific information on selected freshwater species.	
FW 15.	▪ Improve scientific information to support Bay-wide restoration efforts.	
	Monitor	
FW 16.	▪ Establish watershed program for brook trout monitoring.	
FW 17.	▪ Improve monitoring of black duck food sources.	

	Evaluate	
FW 18.	▪ Use science to evaluate oyster restoration progress.	
FW 19.	▪ Develop ecosystem models to support decision-making.	
FW 20.	▪ Evaluate native bivalve restoration for water quality improvement.	
FW 21.	▪ Assess quality of Black Duck habitat.	
CONSERVE LAND AND INCREASE PUBLIC ACCESS		
	LAND CONSERVATION OUTCOME: Protect an additional 2 million acres of lands throughout the watershed currently identified as high conservation priorities at the federal, state or local level by 2025, including 695,000 acres of forest land of highest value for maintaining water quality.	
CL 1.	▪ Launch a Chesapeake Treasured Landscape Initiative.	
a	○ Increase Land & Water Conservation Fund allocations.	
b	○ Create a public-private conservation funding partnership.	
CL 2.	▪ Coordinate and target federal land conservation funding.	
a	○ Increase collaboration in the Coastal and Estuarine Land Conservation Program.	
b	○ Encourage consideration of Transportation Enhancements, Scenic Byways and Recreational Trails programs to support land conservation.	
c	○ Conserve priority landscapes around defense installations.	
CL 3.	▪ Conserve landscapes through National Park Service partnership areas.	
a	○ Consider a new unit of the National Park System for Chesapeake Bay & Rivers.	
b	○ Identify high priority landscapes along National Trails.	
c	○ Coordinate NPS conservation actions with FWS refuge partnerships.	
CL 4.	▪ Achieve mutual conservation goals through National Wildlife Refuge partnerships.	
CL 5.	▪ Develop a Bay wide strategy to reduce the loss of farms and forests.	
CL 6.	▪ Support creation and expansion of protected coastal and marine areas.	
CL 7.	▪ Provide community assistance for landscape conservation.	
CL 8.	▪ Identify culturally significant and ecologically important landscapes.	
CL 9.	▪ Establish watershed-wide GIS-based land conservation targeting system.	
a	○ Improve monitoring of land-use changes.	
b	○ Describe land-cover change to evaluate progress toward land conservation.	
CL 10.	▪ Develop integrated transportation, land use, housing and water infrastructure plans setting forth smart growth and environmental stewardship visions.	
	PUBLIC ACCESS GOAL: Increase public access to the Bay and its tributaries by adding 300 new public access sites by 2025.	
CL 11.	▪ Develop a plan to expand public access.	
a	○ Identify public access needs and opportunities along National Trails.	
CL 12.	▪ Prioritize funding for public access development.	

EXPAND CITIZEN STEWARDSHIP		
	STEWARDSHIP OBJECTIVE: Foster a dramatic increase in the number of citizen stewards – of every age -- who support and carryout local conservation and restoration.	
CS 1.	▪ Expand Chesapeake conservation corps workforces.	
CS 2.	▪ Expand master watershed stewards program.	
CS 3.	▪ Prioritize citizen stewardship in Small Watershed Grants Program.	
CS 4.	▪ Expand outreach to private forest landowners.	
CS 5.	▪ Enhance visitor experiences and stewardship messaging at designated Chesapeake sites and trails.	
CS 6.	▪ Build long-term local partnerships for engaging communities and citizens along national trails.	
CS 7.	▪ Initiate robust elementary and secondary environmental literacy initiative.	
a	○ Support and enhance outdoor student environmental education programs.	
b	○ Provide high-quality professional development, tools and resources for educators.	
c	○ Encourage the creation and maintenance of green schools, including schoolyard habitat and green facilities programs.	
DEVELOP ENVIRONMENTAL MARKETS		
	ENVIRONMENTAL MARKETS OBJECTIVE: Working collaboratively, USDA, EPA, Bay States and other federal partners will develop environmental markets for the Chesapeake Bay, including the management infrastructure for measuring, reporting and verifying environmental performance for a suite of ecosystem services.	
EM 1.	▪ Establish a market for trading pollutant reduction credits for nutrients and sediments in support of the water quality goals in the TMDL.	
EM 2.	▪ USDA will lead, in coordination with EPA and other federal agencies, an interdepartmental Environmental Market Team to coordinate efforts in establishing an environmental market infrastructure for the Chesapeake Bay.	
RESPOND TO CLIMATE CHANGE		
	CLIMATE CHANGE OBJECTIVE: Minimize the vulnerability of the Chesapeake Bay watershed, including its habitats, public infrastructure and human communities, to adverse impacts from climate change.	
	Supporting Objective: Improve information on the communities, habitats and resources at risk from the impacts of climate change in the Chesapeake region by conducting vulnerability assessments and supporting research priorities.	
CC 1.	▪ Identify communities that are vulnerable to the impacts of climate change.	
CC 2.	▪ Demonstrate and implement effective restoration planning in face of land elevation change and sea level rise.	

CC 3.	▪ Identify and assess risk to key tidal and coastal habitats from potential impacts of changing climatic conditions and rising sea-level.	
CC 4.	▪ Identify and assess risk to key watershed habitats from potential impacts of climate and land change.	
CC 5.	▪ Enhance federally-supported research to improve and streamline vulnerability assessments.	
a	o Provide land-use change data.	
b	o Provide projections of land-use changes.	
c	o Assist states and local communities with topographic data.	
	Supporting Objective: Develop communication and decision-support products to increase knowledge and capacity to plan for and implement projects that build community and ecosystem resilience.	
CC 6.	▪ Develop tools and training to provide states, local communities and resource managers with effective climate adaptation planning and implementation resources.	
a	o Strategic land-use decision support.	
b	o Adapting wetland restoration techniques.	
	Supporting Objective: Conduct monitoring activities to deliver routine and sustained climate information products and services.	
CC 7.	▪ Improve monitoring of climate change impacts in the Bay and watershed.	
a	o Implement the Climate Effects Network.	
b	o Developing monitoring framework for streams.	
c	o Develop a complementary estuarine monitoring network.	
CC 8.	▪ Ensure monitoring results are integrated and available to assess effectiveness and adjust management actions as necessary.	
	Supporting Objective: Integrate climate change information into Chesapeake Bay Program decision-making and planning and into federal land management and planning in the Bay watershed.	
CC 9.	▪ Integrate climate change information and adaptation into the Chesapeake Bay Program.	
CC 10.	▪ Conduct technical performance review of agencies' climate response effectiveness.	
CC 11.	▪ Predict potential changes in pollution loads due to climate change.	
CC 12.	▪ Develop adaptation strategies to manage vulnerable habitats and public infrastructure on federal lands to increase resiliency to climate change impacts.	
	Supporting Objective: Adopt practices that mitigate greenhouse gas emissions.	
CC 13.	▪ Integrate climate response into federal growth and development programs and strategies.	
CC 14.	▪ Coordinate with other national initiatives to enhance federal mitigation efforts in the Bay watershed.	
STRENGTHEN SCIENCE		
	STRENGTHENING SCIENCE OBJECTIVE: Strengthen science to support ecosystem-based adaptive management, to more effectively prioritize, implement, monitor and evaluate the actions and policies needed, and to identify new threats to the health of the Chesapeake Bay and its watershed.	
	Sub-Objective: Promote ecosystem-based, adaptive management	

	through enhanced coordination of science and decision-support activities.	
SS 1.	▪ Expand scientific coordination and capabilities of the Chesapeake Bay Program.	
SS 2.	▪ Establish decision support specialists.	
SS 3.	▪ Improve communication products.	
SS 4.	▪ Review and improve CBP science approaches.	
	Sub-Objective: Better prioritize and adjust management actions by developing decision-support tools and an expanded set of models.	
SS 5.	▪ USGS and NOAA will ensure scientific tools, data and computer model results are available.	
SS 6.	▪ EPA, working with Chesapeake Bay Program partners, will establish ChesapeakeStat.	
SS 7.	▪ Improve modeling used for restoration activities and assessing impacts of climate change.	
	Sub-Objective: Establish a Chesapeake Monitoring Alliance and Data Enterprise to improve monitoring to document changes in ecosystem conditions and progress toward goals.	
SS 8.	▪ Establish a Chesapeake Monitoring Alliance.	
SS 9.	▪ Coordinate regional water monitoring with national networks.	
SS 10.	▪ Increase monitoring by state, local and non-governmental partners.	
SS 11.	▪ Improve monitoring of climate change impacts.	
SS 12.	▪ Improve reporting of restoration actions and land-use activities.	
SS 13.	▪ Improve management of environmental information through a Data Enterprise.	
	Objective: Better explain ecosystem change, assess restoration progress and effects of management actions, and identify new threats to the ecosystem.	
SS 14.	▪ Improve indicators of environmental conditions.	
SS 15.	▪ Create case studies of targeted restoration activities.	
SS 16.	▪ Explain the factors affecting progress toward restoration goals and the effects of management actions.	
SS 17.	▪ Assess new threats to the Bay and its watershed	
IMPLEMENTATION AND ACCOUNTABILITY		
IA 1.	▪ Aligning FLC and CBP Functions	
IA 2.	▪ Milestones to Track Progress Toward Goals	
IA 3.	▪ Annual Action Plan	
IA 4.	▪ Annual Progress Report	
IA 5.	▪ Independent Evaluation	
IA 6.	▪ Adaptive Management	
IA 7.	▪ ChesapeakeStat	