United States Environmental Protection Agency
Region 3
Chesapeake Bay Program Office (3CB00)
Annapolis, Maryland
in cooperation with the Chesapeake Bay Program Partners

Chesapeake Bay Program
A Watershed Partnership

Strengthening the Management, Coordination, and Accountability of the Chesapeake Bay Program

Report to Congress

CBP/TRS-292-08
July 2008

Executive Summary

Chesapeake Bay Program Overview

The Chesapeake Bay Program (CBP) is a comprehensive cooperative effort by federal, state, and local governments, non-governmental organizations, academics, and other entities that share the mission of restoring and protecting the Chesapeake Bay and its watershed.

Created in 1983 and authorized by Section 117 of the Clean Water Act, the Chesapeake Bay Program is directed by the Chesapeake Executive Council (EC). The Chesapeake Bay Program Office (CBPO) is maintained by the U.S. Environmental Protection Agency (EPA), supported and staffed by many partners, and provides support to the EC and CBP. The CBPO serves several critical functions, as defined in the authorization, including:

- implementing and coordinating science, research, and monitoring;
- reporting on the environmental quality and living resources of the Chesapeake Bay and its watershed;
- in cooperation with other federal, state and local authorities, assisting in developing and implementing specific action plans;
- coordinating the actions of EPA with those of other federal, state, and local agencies and organizations; and
- implementing outreach programs for public information, education, and stewardship.

The Chesapeake Executive Council directs the CBP through signed agreements and directives. The most recent agreement signed by the EC, the *Chesapeake 2000* agreement, describes a bold effort to combat the current trends and to restore the Bay by 2010. A hallmark of the CBP's success has been its use of science as the basis for building clear outcome goals for complex, multi-stakeholder restoration efforts, allocating those goals through a consensus-based approach among the partners, and measuring progress toward meeting those goals. The partnership has developed unparalleled cooperative efforts and pioneered clean up strategies that have resulted in measurable gains in reducing the flow of pollutants into the Bay and improving aquatic habitat for the Bay's living resources.

The CBP reports its comprehensive understanding of Bay health and restoration progress to the public through an annual assessment using a series of related indicators. The most recent assessment, *Chesapeake Bay 2007 Health and Restoration Assessment: A Report to the Citizens of the Bay Region,* was released in April 2008.

Despite substantial effort and progress by the full spectrum of partners, the Bay's health remains degraded. Restoration efforts are being overtaken by current trends. For example, population in the watershed has grown nearly 17 million bringing more roads, homes, industrial and business parks, and other impervious surfaces which harden the landscape. Development has drastically altered the natural hydrology and thereby the natural filtering systems for nutrient and sediment pollution.

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Context for this Report

In October 2005, the U.S. Government Accountability Office (GAO) issued its report *Chesapeake Bay Program: Improved Strategies are Needed to Better Assess, Report and Manage Restoration Progress*. The GAO report recommended that CBPO:

- complete efforts to develop and implement an integrated assessment approach;
- revise its reporting approach to improve effectiveness and credibility; and
- develop a comprehensive, coordinated implementation strategy that takes into account available resources.

In December 2007, Congress passed the Consolidated Appropriations Act of 2008 (P.L. 110-161). The Act's Explanatory Statement directed EPA to:

- immediately implement all of the recommendations of the 2005 GAO Report;
- submit a report to Congress and to GAO, with supporting evidence, that demonstrates the GAO recommendations have been implemented; and
- develop a Chesapeake Action Plan for the remaining years of the *Chesapeake 2000* agreement that contains specified components (i.e., realistic annual targets, actual activities, amount and source of funding, process to track and measure progress).

2005 GAO Recommendations Fulfilled – At a Glance

This Report to Congress describes the collective efforts of CBP partners to implement all the GAO recommendations. This report provides documentation and evidence to demonstrate how these recommendations have been implemented and will support enhanced coordination, collaboration, and accountability among the CBP partners.

In addition, this report describes the CBP's development of the Chesapeake Action Plan (CAP), which is an important enhancement of the CBP's management system that supports implementation of the GAO recommendations.

Chesapeake Action Plan – Purpose and Elements

Consistent with GAO's recommendations and the Explanatory Statement of the FY 2008 Consolidated Appropriations Act (P.L. 110-161), the CBP partners have designed, developed, and begun implementation of the first version of the CAP.

The CAP includes four primary components, each of which is described in this report to Congress:

- a strategic framework that unifies CBP's existing planning documents and clarifies how CBP partners will pursue the restoration and protection goals for the Bay and its watershed;
- an activity integration plan with comprehensive, quality assured data for 2007 that identifies and catalogues CBP partners' implementation activities and corresponding resources;
- dashboards, which are high-level summaries of key information, such as clear status of progress, expected progress toward certain *Chesapeake 2000* goals, summaries of actions and funding, and a brief summary of the challenges and actions needed to expedite progress; and

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- an adaptive management process that begins to identify how this information and analysis will provide critical input to CBP partners' actions, emphasis, and future priorities.

This first version of the CAP includes the implementation activities and corresponding resources of ten federal agencies, six states, the District of Columbia, the Chesapeake Bay Commission and two non-governmental organizations.

These components should promote enhanced coordination among CBP partners; encourage the partners to continually review and improve their progress in protecting and restoring the Bay; increase the transparency of CBP's operations for partners and the public; and improve the accountability mechanisms of CBP as a whole and of the individual partners for meeting their Bay health and restoration goals.

The CAP includes the tools necessary to support a management system that more closely aligns implementation responsibilities with the unique capabilities and missions of the CBP partners. Through the activity integration plan, partner activities will be made transparent and maintained in a centralized database to position the CBP to identify potential activity overlap and gaps. This will improve our ability to avoid duplication of effort and better target our resources. As a whole, the CAP represents an important enhancement to the way CBP will operate.

It is important to note that CBP partners have long been engaged in significant actions to advance the protection and restoration of the Chesapeake Bay. CBP partners are strongly committed to achieving CBP's goals for the Bay. The CAP should place CBP on a course to accelerate the pace at which the partners implement actions to improve the Bay.

III Chesapeake Action Plan – Next Steps

The CAP represents an important enhancement in coordination and accountability. While much has been accomplished in the design, development, and implementation of the plan, key next steps include:

- verifying and validating the preliminary 2008 and 2009 funding data currently contained in the CAP database;
- validating the design of the CAP;
- expanding the scope of the CAP to include additional watershed partners;
- continuing to refine the breadth and quality of the information on implementation activities by CBP partners;
- closely evaluating and considering how the CAP can better enhance coordination, collaboration, and accountability; and
- providing information about the CAP to the public and to other estuary and watershed programs.

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Summary of CBP's Implementation of GAO's Recommended Actions

GAO Recommendation	GAO Recommended Action	Implemented	CBP Action
Complete efforts to develop and implement an integrated approach to assess overall restoration process.	1. Complete plans to develop and implement an integrated approach to assess overall restoration progress.	1a. April 2005 1b. May 2006	a. Reduced more than 100 Bay health and restoration indicators into three indices of ecosystem health and five indices of restoration effort. b. Organized 102 *Chesapeake 2000* commitments into a six-goal strategy and began managing the program according to this design.
Revise reporting approach to improve the effectiveness and credibility of reports.	2. Include an assessment of the key ecological attributes that reflect the Bay's current health conditions.	March 2006	Developed 13 environmental indicators that directly measure key ecological attributes of the Bay. These indicators were the basis for the first integrated health assessment of the Bay, published in March 2006.
	3. Report separately on the health of the Bay and on the progress made in implementing management actions.	March 2006	Separated restoration activities from ecosystem health and developed an annual reporting process for both. Published annual *Chesapeake Bay Health & Restoration Assessment* reports in new format starting in 2006.
	4. Establish an independent and objective reporting process.	September 2006	Established a new reporting process based on an independent review of the first integrated *Health & Restoration Assessment* and instituted longer term process for ensuring continued independent review of the *Assessments* through the Chesapeake Bay region's scientific community.
Develop a comprehensive, coordinated implementation strategy that takes into account available resources.	5. Develop an overall, coordinated implementation strategy that unifies the program's various planning documents.	May 2008	Developed a strategic framework that unifies CBP's past agreements, policies, plans, and indicators into a single, integrated implementation strategy. This action, along with the action described in response to GAO's sixth recommended action, constitutes the Chesapeake Action Plan.
	6. Establish a means to better target its limited resources to ensure that the most effective and realistic work plans are developed and implemented.	May 2008	As directed by Congress, designed and produced an initial activity integration plan that identifies current and planned protection and restoration activities undertaken by CBP partners, as well as funding allocated by CBP partners for those activities. The activity integration plan will continue to be revised and improved. Developed initial realistic annual targets for the remaining years of the *Chesapeake 2000* agreement.

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Acronyms

AMD	Acid Mine Drainage
BARC	USDA Beltsville Agricultural Research Center
CAJO	Captain John Smith Chesapeake National Historic Trail
CAP	Chesapeake Action Plan
CBC	Chesapeake Bay Commission
CBF	Chesapeake Bay Foundation
CBP	Chesapeake Bay Program
CBPDC	Chesapeake Bay Program Data Center
CBT	Chesapeake Bay Trust
CBPO	Chesapeake Bay Program Office
DC	District of Columbia
DE	Delaware
DEC	Department of Environmental Conservation
DEP	Department of Environmental Protection
DEQ	Department of Environmental Quality
DNR	Department of Natural Resources
DU	Ducks Unlimited
EBFMPs	Ecosystem-based Fisheries Management Plans
EC	Chesapeake Executive Council
EPA	U.S. Environmental Protection Agency
FEP	Fisheries Ecosystem Planning for Chesapeake Bay
GAO	Government Accountability Office
IC	Chesapeake Bay Program Implementation Committee
ICR	Information Collection Request
MD	Maryland
MSX	Oyster parasite *Haplosporidium nelsoni*
MWEE	Meaningful Watershed Educational Experience
N	Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	U.S. Natural Resources Conservation Service

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NY	New York
OL	Organizational Liaison
P	Phosphorus
PA	Pennsylvania
PENNVEST	Pennsylvania Infrastructure Investment Authority
P.L.	Public Law
QA	Quality Assurance
QARS	Quality Assurance Report System
RFB	Riparian Forest Buffer
RLA	Resource Land Assessment
SAV	Submerged Aquatic Vegetation
SME	Subject Matter Expert
STAC	Chesapeake Bay Program Scientific and Technical Advisory Committee
UMCES	University of Maryland Center for Environmental Science
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VA	Virginia
WV	West Virginia

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CHAPTER 1

The Chesapeake Bay Program

The Chesapeake Bay, the largest estuary in the United States, is part of an extremely complex ecosystem. This ecosystem consists of the Bay, its tributaries and the living resources it supports. The Chesapeake Bay watershed covers more than 64,000 square miles in six states and the District of Columbia.[1] Recognized as the largest and most productive estuary in North America, the Bay is home to more than 3,700 species of plants and animals and is one of this country's most valuable natural treasures.

The Chesapeake Bay Program (CBP) is a regional partnership leading and directing protection and restoration of the Chesapeake Bay. It was formed in 1983, with the first Chesapeake Bay Agreement signed by the Governors of Maryland, Virginia, and Pennsylvania, the Mayor of the District of Columbia, the Chairman of the Chesapeake Bay Commission (a tri-state legislative body) and the Administrator of the United States Environmental Protection Agency (EPA) representing the federal government. These officials come together annually as the Chesapeake Executive Council (EC) to set policy direction and call for specific actions. In 2002, the states of Delaware, New York and West Virginia formally joined the water quality restoration effort.

The CBP is authorized by Section 117 of the Clean Water Act and is directed by the EC. The Chesapeake Bay Program Office (CBPO), also authorized by Section 117, is maintained by EPA, supported and staffed by many partners, and provides support to the EC and CBP. CBP partners define their collective actions through formal, voluntary agreements and provide general policy direction through consensus documents. While all agreements are entered into voluntarily, they may be implemented in various ways by individual CBP partners.

CBP's organizational structure (Figure 1) includes the EC including the governors of Maryland, Pennsylvania, and Virginia; the EPA Administrator; and the chair of the Chesapeake Bay Commission (CBC). The Principals' Staff Committee, composed of cabinet-level representatives from the CBP partner states and the District of Columbia, EPA's Regional Administrator, a U.S. Department of Agriculture (USDA) representative, a CBC representative, and the Director of the CBPO, serves as an advisory body to the EC members. CBP's Implementation Committee (IC) is composed of senior managers from each CBP partner, chairs of CBP subcommittees, federal agency representatives, and other protection and restoration leaders. The IC directs and coordinates CBP's subcommittees and workgroups. CBP's subcommittees include partner representatives as well as academic experts, staff members from advocacy organizations, and others.

The Chesapeake Executive Council directs the CBP through signed agreements and directives. The most recent agreement signed by the EC, the *Chesapeake 2000* agreement

[1] Of the total watershed area, 22,552 square miles are in Pennsylvania, 21,857 in Virginia, 9,256 in Maryland, 6,263 in New York, 3,583 in West Virginia, 705 in Delaware, and 63 in the District of Columbia.

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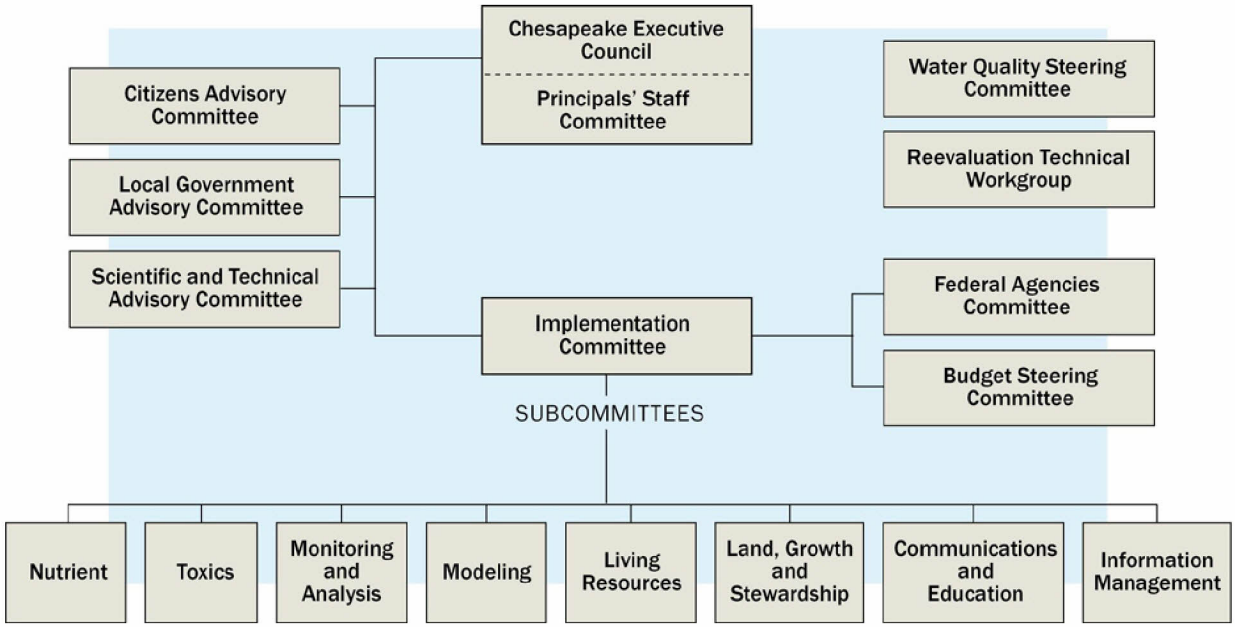
Figure 1. *Chesapeake Bay Program Committee Structure*



describes a bold effort to combat the current trends and to restore the Bay by 2010. While that goal will not be reached by 2010, the vision remains valid and progress will continue.

A hallmark of the CBP's success has been its use of science as the basis for building clear outcome goals for complex, multi-stakeholder restoration efforts. The partnership has developed unparalleled cooperative efforts and pioneered clean up strategies that have resulted in measurable gains in reducing the flow of pollutants into the Bay.

The CBP reports its comprehensive understanding of Bay health and restoration progress to the public through an annual assessment using a series of related indicators. The most recent assessment, *Chesapeake Bay 2007 Health and Restoration Assessment: A Report to the Citizens of the Bay Region*, was released in April 2008.

Despite the progress made through the adoption of uniform water quality standards across the Bay, establishment of an aggressive permitting approach for wastewater treatment plants, implementation of the most cost-effective agricultural best management practices, restoration of forests and wetlands, and increases in states' funding of Bay restoration, the Bay remains degraded.

Restoration efforts are being overtaken by current trends. Population in the watershed has grown to nearly 17 million bringing more roads, homes, industrial and business parks, and other impervious surfaces which harden the landscape. While the population of the Bay watershed increased by about eight percent in the past decade, the amount of the impervious surface increased by about 41 percent. Development has drastically altered the natural hydrology and thereby the natural filtering systems for nutrient and sediment pollution.

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The CBPO facilitated and coordinated the development of this Chesapeake Action Plan. EPA is submitting this Report to Congress on behalf of the Chesapeake Bay Program. The CBP partners have contributed to and embraced the Chesapeake Action Plan as the comprehensive coordinating mechanism for a more effective Chesapeake Bay Program partnership and the means to better report on partner implementation actions to achieve *Chesapeake 2000* goals.

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CHAPTER 2

The Charge for This Report

In October 2005, the Government Accountability Office (GAO) published *Chesapeake Bay Program: Improved Strategies Are Needed to Better Assess, Report, and Manage Restoration Progress* [GAO-06-96]. In that report, GAO set forth the following recommendations and actions for implementing those recommendations:

"*To improve the methods used by the Bay Program to assess progress made on the restoration effort, we recommend that the Administrator of EPA instruct the Chesapeake Bay Program Office to complete its plans to develop and implement an integrated approach to assess overall restoration progress. In doing so, the Chesapeake Bay Program Office should ensure that this integrated approach clearly ties to the five broad restoration goals identified in* Chesapeake 2000.

To improve the effectiveness and credibility of the Bay Program's reports on the health of the Bay, we recommend that the Administrator of EPA instruct the Chesapeake Bay Program Office to take the following three actions to revise its reporting approach:

- *include an assessment of the key ecological attributes that reflect the Bay's current health conditions,*
- *report separately on the health of the Bay and on the progress made in implementing management actions, and*
- *establish an independent and objective reporting process.*

To ensure that the Bay Program is managed and coordinated effectively, we also recommend that the Administrator of EPA instruct the Chesapeake Bay Program Office to work with the Bay Program partners to take the following two actions:

- *develop an overall, coordinated implementation strategy that unifies the program's various planning documents, and*
- *establish a means to better target its limited resources to ensure that the most effective and realistic work plans are developed and implemented.* "

In comments published as Appendix IV to GAO's report, CBP signatory organizations generally agreed with GAO's recommendations and suggested that many of the recommended actions were already underway. Since the publication of the GAO report, the CBP partners have continued to implement GAO's recommended actions. This Report to Congress provides detailed descriptions of the progress the CBP partners have made in these efforts. The CBP partners believe the implementation of these recommended actions is improving the program's effectiveness, efficiency, and progress toward restoration of the Chesapeake Bay.

2008 Appropriations Act Report

On page 1255 of the Explanatory Statement to P.L. 110-161, the Consolidated Appropriations Act, 2008, Congress provided the following direction regarding the Chesapeake Bay Program:

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"Directives for specific geographic programs are as follows:

1. Chesapeake Bay Program:

$31,000,000 for this program, instead of $30,000,000 proposed by the House and $32,812,000 proposed by the Senate. The Agency is directed to allocate the Chesapeake Bay funding as follows:

$21,000,000 for base programs;

$8,000,000 for Targeted Watershed Grants;

$2,000,000 for Small Watershed Grants.

The Agency is further directed to implement immediately all of the recommendations contained in the October, 2005 Government Accountability Office (GAO) report. Of the funds provided to the Bay Program and the Office of the Administrator of EPA, $5,000,000 in administrative funds shall not become available until 60 days after the EPA Administrator submits a report to the Senate and House Appropriations Committees and to the Comptroller General stating, with supporting evidence, that EPA has implemented the recommendations contained in the GAO report.

In addition, the Agency is directed to develop a Chesapeake Bay action plan for the remaining years of the Chesapeake 2000 Agreement. This plan must: (1) clearly articulate realistic targets the Chesapeake Bay Program expects to achieve in each of the remaining years; (2) describe the actual activities the Chesapeake Bay Program will implement in each year to achieve these annual targets; (3) identify the amount and source of funding that will be used to accomplish each of these activities; and, (4) describe the process the Chesapeake Bay Program will use to track and measure the progress of these actions. Finally, the GAO is directed to conduct periodic performance assessments of progress made on this action plan."

This report constitutes CBP's response to Congress's request for a report on the implementation of GAO's recommended actions. The report also describes the CBP partners' development and continued refinement of an action plan for the Chesapeake Bay. As described in detail in the chapters that follow, the CBP partners have developed:

- a strategic framework that unifies CBP's existing planning documents;
- an activity integration plan that identifies the activities CBP partners are taking as well as the amount and source of funding to accomplish each of these activities[2];
- a series of dashboards that track and measure the progress of the actions CBP partners are taking; and
- an adaptive management process that begins to specify how the CBP partners will track and improve their progress in the Chesapeake Bay and its watershed.

The CBP partners agree with Congress and GAO on the need to continually improve the effectiveness of the program and to acceler-

[2] EPA is working with the partners to identify funding for planned activities; however, to date these data are incomplete. This is partially because CBP partners conduct their budgeting on different cycles and schedules. Identifying resource availability in future years, therefore, can involve estimation and is subject to revision.

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ate the restoration and protection of the Chesapeake Bay.

As a whole, the Chesapeake Action Plan represents an important enhancement to the way CBP operates. The components of the CAP promote a strategic approach to enhance coordination among CBP partners, engage CBP partners in continual evaluation of efforts to protect and restore the Bay and its watershed, increase the transparency of CBP's operations for partners and the public, and improve the accountability mechanisms of CBP as a whole and of the CBP partners for meeting their goals for Bay health and restoration. The CBP partners appreciate the interest of Congress and GAO in the program, and believe that the implementation of these recommendations provides the program with new opportunities to increase cooperation and accountability that will lead to better progress in improving the health of the Chesapeake Bay.

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CHAPTER 3

CBP Has Implemented GAO's Recommendations

Implementation of the actions recommended by GAO and Congress is resulting in a stronger Chesapeake Bay Program and in enhanced coordination among the CBP partners. This section describes the efforts of the CBP partners to implement those recommended actions and summarizes the benefits of such efforts.

GAO Recommendation 1

To improve the methods used by the Bay Program to assess progress made on the restoration effort, we recommend that the Administrator of EPA instruct the Chesapeake Bay Program Office (CBPO) to complete its plans to develop and implement an integrated approach to assess overall restoration progress. In doing so, the CBPO should ensure that this integrated approach clearly ties to the five broad restoration goals identified in Chesapeake 2000.

CBP has implemented this recommendation by strategically integrating its obligations under *Chesapeake 2000* with its goals and by using these goals as the organizing principle for its reporting of annual restoration progress.

The CBP partners organized the multitude of separate agreements, policies, strategies, and plans under the five broad strategic themes of the *Chesapeake 2000* agreement. For information on CBP's commitments under *Chesapeake 2000*, see Appendix B of this report. CBP partners translated the strategic themes into five action-oriented goals (see Figure 2). CBP partners added a sixth goal, "Enhance Partnering, Leadership, and Management," to reflect actions related to CBP's overarching structure and coordination.

CBP partners use this approach in their annual Chesapeake Bay Health & Restoration Assessment (Assessment). Prior to 2005, CBP's assessments presented more than 100 indicators in a manner that blurred the distinction between Bay health and restoration efforts, making it difficult to develop an overall assessment of ecosystem health or restoration efforts. In response to GAO's recommendations, a CBP task force identified the most important indicators for public reporting and categorized these indicators into three indices of Bay health and five indices of restoration effort (see Figure 3).

Figure 2. *Chesapeake 2000 Strategic Themes and CAP Goals*

Chesapeake 2000 Strategic Themes	CAP Goals
1. Living Resource Protection and Restoration	1. Protect and Restore Fisheries
2. Vital Habitat Protection and Restoration	2. Protect and Restore Vital Aquatic Habitats
3. Water Quality Protection and Restoration	3. Protect and Restore Water Quality
4. Sound Land Use	4. Maintain Healthy Watersheds
5. Stewardship and Community Engagement	5. Foster Chesapeake Stewardship
	6. Enhance Partnering, Leadership, and Management

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Figure 3. *Chesapeake Bay Health and Restoration Effort Indices and Indicators*[3]

Bay Health Indices and Indicators	Restoration Efforts Indices and Indicators
Water Quality Index • Dissolved Oxygen Standards Attainment • Mid Channel Water Clarity • Chlorophyll a • Chemical Contaminants **Habitats & Lower Food Web Index** • Bay Grass Abundance • Phytoplankton • Bottom Habitat • Tidal Wetlands Abundance **Fish & Shellfish Index** • Blue Crab Abundance • Native Oyster Abundance • Striped Bass Abundance • Shad Returning to Chesapeake Bay • Juvenile Menhaden Abundance in Maryland	**Managing Fisheries Index** • Blue Crab Fisheries Management Effort • Oysters Fisheries Management Effort • Striped Bass Fisheries Management Effort • Shad Fisheries Management Effort • Menhaden Fisheries Management Effort **Restoring Habitats Index** • Bay Grasses Planted • Wetlands Restoration Efforts • Opening Rivers to Migratory Fish • Native Oyster Annual Restoration Efforts **Reducing Pollution Index** • Agricultural Pollution Controls • Wastewater Pollution Controls • Urban/Suburban Pollution Controls • Air Pollution Controls **Protecting Watersheds Index** • Riparian Forest Buffers Planted • Watershed Management Plans Developed • Watershed Lands Preservation **Fostering Stewardship Index** • Public Access • Bay Program Website Visits • Educational Field Experiences Provided • Bay Partner Communities

[3] For detailed description of indices and methods refer to www.chesapeakebay.net/indicatorshome.aspx

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Under this approach, Bay health indices draw on current monitoring data gathered by CBP partners to assess the overall health of the Chesapeake Bay ecosystem. Restoration effort indices assess the overall progress of implementation actions by CBP partners based on a combination of monitoring data, reported implementation actions, and model simulations. The streamlined indicators framework includes three indices of Bay health (composed of 13 indicators) and five indices of restoration efforts (composed of 20 indicators).

Since the restoration efforts indices evaluate the progress CBP is making toward its goals, CBP partners developed a restoration efforts index for each of the goals (except the new sixth goal). These indicators and indices are related in that progress in CBP partners' restoration work should lead to improvements in the health of the Chesapeake Bay, as measured by the Bay health indices (see Figure 4).

GAO Recommendation 2

Include an assessment of the key ecological attributes that reflect the Bay's current health conditions.

CBP has implemented this recommendation by developing and continually improving upon a set of environmental indicators that clearly identify key ecological attributes representing the health of the Chesapeake Bay.

In 2004 and 2005, an indicators redesign task force critically evaluated the existing set of indicators and made recommendations for improving the assessment and communication of the Bay's health and restoration efforts with the use of a new indicators framework.[4] Based on CBP's April 2005 decision to adopt the new framework, the CBP partners completed development of a new set of 13 indicators that clearly identify key ecological attributes representing the health of the Bay (see Figure 3). These indicators are

Figure 4. *Relationship of CAP Goals and Restoration Efforts Indices to Bay Health Indices*

CAP Goals	Restoration Efforts Indices
Protect and Restore Fisheries	Managing Fisheries Index
Protect and Restore Vital Aquatic Habitats	Restoring Habitats Index
Protect and Restore Water Quality	Reducing Pollution Index
Maintain Healthy Watersheds	Protecting Watersheds Index
Foster Chesapeake Stewardship	Fostering Stewardship Index
Enhance Partnering, Leadership, and Management	

Bay Health Indices
Water Quality Index
Habitats & Lower Food Web Index
Fish & Shellfish Index

[4] For more information, visit http://archive.chesapeakebay.net/pubs/calendar/IC_04-21-05_handout_4_5509.pdf

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combined into three integrated indices for water quality, habitats and lower food web, and fish and shellfish (see Figure 4). These indicators have served as the framework for assessing the health of the Bay since the development of CBP's first draft of an integrated health assessment of the Bay, *Chesapeake Bay 2005 Health & Restoration Assessment: A Draft Report to Citizens of the Bay Region, Part One: Ecosystem Health.*[5] In this draft report, CBP also established a common metric, the percentage of the restoration goal achieved, to provide context for the amount of work remaining to restore key ecological attributes of Bay health.

In the *Chesapeake Bay 2006 Health & Restoration Assessment*[6], CBP partners further improved and finalized the assessment by addressing issues raised in an independent scientific review by CBP's Scientific and Technical Advisory Committee (STAC).[7] The review recommendations, as well as comments from the public and CBP partners, guided CBP in improving on the data and reporting elements of the 2006 Assessment and filling some of the indicator gaps identified in the 2005 draft Assessment. CBP's *Chesapeake Bay 2007 Health & Restoration Assessment*, released to the public on March 31, 2008, continues this pattern of continual improvement by filling all indicator gaps identified in the previous assessments, improving key indicators, and integrating into the report assessments of the health of the freshwater rivers and streams that feed the Chesapeake Bay.

GAO Recommendation 3

Report separately on the health of the Bay and on the progress made in implementing management actions.

CBP has implemented this recommendation by developing an annual reporting process that makes clear the distinction between ecosystem health and restoration effort indicators in the Chesapeake Bay Health & Restoration Assessment.[8]

In the 2005 and 2006 assessments, CBP partners reported on the Bay health indicators and restoration effort indicators in two separate publications to eliminate confusion about the intent of the indicators. For the 2007 assessment, CBP published a single document that includes distinctly separate chapters for the two types of indicators. Also, based on the GAO recommendations and independent review, CBP partners redesigned the way indicator information is presented on the CBP website. For more information, please visit http://www.chesapeakebay.net/indicatorshome.aspx.

[5] EPA A-903-R-06-001A, released in March 2006, available at http://www.chesapeakebay.net/content/publications/cbp_12892.pdf

[6] EPA 903R-07001, released in March 2007, available at http://www.chesapeakebay.net/content/publications/cbp_15548.pdf

[7] Chesapeake Bay Program Scientific and Technical Advisory Committee, Monitoring, Assessment, and Indicator Review Subcommittee. Meeting Report. September 9, 2006. http://www.chesapeake.org/stac/Pubs/STACIndicatorReview9-12-06.pdf

[8] CBP's Health & Restoration Assessments are available at http://www.chesapeakebay.net/indicatorshome.aspx

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GAO Recommendation 4

Establish an independent and objective reporting process.

CBP has implemented this recommendation by establishing two mechanisms that ensure continued independent and objective reporting on the Bay's health and restoration efforts.

Since 2006, CBP's STAC has had a standing team of scientists charged with responsibility for assuring the scientific integrity of the data, new indicators, and new indices used in CBP's publications.

In 2007, CBP instituted a separate independent and objective reporting process for its annual Chesapeake Bay Health and Restoration Assessment. This reporting process is conducted by the University of Maryland Center for Environmental Science (UMCES) with the direct involvement of the Bay region's scientific community and is issued publicly in the easy-to-read format of a Chesapeake Bay report card. The UMCES report card is released on the same day as CBP's Chesapeake Bay Health & Restoration Assessment and serves as an independent assessment of Bay health.

GAO Recommendation 5

Develop an overall, coordinated implementation strategy that unifies the program's various planning documents.

CBP has implemented this recommendation by unifying its multitude of separate planning documents into an integrated strategic framework that articulates how the partnership will pursue its goals.

CBP's strategic framework is supported by six detailed goal strategies, which are narrative descriptions of CBP's approach for meeting its overarching goals. Each goal strategy includes the following components: a goal for the specific CBP topic area; a rationale that explains why the goal is important for protecting and restoring the Bay; desired results; and a set of implementation strategies to achieve each desired result. The implementation strategies account for the activities underway by the CBP partners.

The unification of pre-existing planning documents—agreements, policies, strategies, and plans—in this integrated format allows the CBP partners to share a common understanding of the partnership's agenda of work, provides a single framework for all Bay protection and restoration work, and, through the development of realistic annual targets, establishes a uniform set of measures to evaluate CBP partners' progress in improving the Bay. More information on CBP's strategic framework and goal strategies is provided in Chapter 4 of this report. A summary version of the strategic framework is provided as Appendix A of this report.

GAO Recommendation 6

Establish a means to better target its limited resources to ensure that the most effective and realistic work plans are developed and implemented.

CBP has implemented this recommendation by developing the strategic framework described here and three management resources—realistic annual targets, an activity integration plan, and program progress

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dashboards—that will allow the program to improve its tracking, monitoring, and reporting of the activities of CBP partners to protect and restore the Chesapeake Bay. These resources, along with the strategic framework, directly address Congress' direction as discussed in Chapter 2 of this report.

The CBP realistic annual targets are specific targets that the CBP partners believe can be met. These targets reflect the annual progress which can be made by 2010 towards the ambitious goals set forth in the *Chesapeake 2000* agreement. The CBP partners have developed 16 realistic targets based upon historic and existing levels of funding and progress. Discussions with experts at state and federal agencies regarding the capacity to expand efforts and implement on-the-ground activities also influenced the establishment of targets.

CBP's activity integration plan is a comprehensive catalogue of the activities in which CBP partners are engaged to protect and restore the Chesapeake Bay. The activity integration plan is intended to provide information (organized by goal) on:

- the actual activities being implemented by the CBP partners;
- the lead partner for each activity and any cooperating partners;
- the amount and source of funding dedicated to accomplishing each activity by all cooperating partners;
- the location of each activity; and
- progress toward the established realistic annual targets.

The activity integration plan is supported by a database to which CBP partners contribute through a newly developed, web-based reporting form. As of May 1, 2008, the data submitted to CBP's activity integration plan database for 2007 accounted for 885 partner activities valued at $1.1 billion. The 2007 data represent a comprehensive, quality data set that constitute the majority of information in the database due to varying budget cycles of CBP partners and the uncertainties associated with future budgets. The activity integration plan and associated quality assurance activities are described in Chapter 5 and Appendix F of this report.

CBP's dashboards are high-level summaries of key information, presented in visual terms, that is essential for program planning and management. The dashboards report on CBP's progress toward its protection and restoration goals. As mentioned above, progress in the program's restoration efforts should be reflected in improvements in the health of the Chesapeake Bay. The dashboards provide an overview of CBP's progress in meeting its *Chesapeake 2000* commitments and realistic annual targets (given existing programs and resources), as requested by Congress. The dashboards also include a strategic analysis of the topic area, the planned activities in that area, and gaps in meeting the *Chesapeake 2000* goals for that area. The CBP dashboards developed to date are included as Appendix E of this report.

In order to use the elements of the CAP effectively, the CBP partners found that an explicit process of adaptive management for the program and its implementation strategies was important. CBP's activity in-

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tegration plan, dashboards, and adaptive management process are described in detail in Chapter 5 of this report.

Benefits of These Actions

The CBP partners have worked to meet the expectations of Congress in the Explanatory Statement to the Consolidated Appropriations Act, 2008 (P.L. 110-161) and of GAO in its October 2005 report.

CBP has developed a meaningful way of implementing *Chesapeake 2000* across all CBP partners. CBP has made a clear delineation between the measures used to assess the health of the Bay ecosystem and those that it uses to measure its progress, which allows partners to better assess the effects of its actions and allows observers to better understand the program's actions.

The remainder of this report details CBP's implementation of efforts to better target its resources, articulate realistic targets for 2008 through 2010, identify the activities CBP plans to implement to reach these targets, enumerate the amounts and sources of activity funding for 2007, and track and measure the program's progress. These tools signal the evolution of the Chesapeake Bay Program to a new, more efficient organization that is more strategic, effective, and accountable for meeting its goals.

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CHAPTER 4

Implementing GAO Recommendation 5 – A Unifying Implementation Strategy

In GAO's words, "restoring the Chesapeake Bay is a massive, complex, and difficult undertaking. The ultimate success of the restoration hinges on several factors, of which a well-coordinated and managed implementation approach is key." To this end, GAO's fifth recommendation for the Chesapeake Bay Program was to "develop an overall, coordinated implementation strategy that unifies the program's various planning documents."

The CBP partners have responded to GAO's recommendation by creating a strategic framework, including a set of narrative goal strategies that unifies the program's existing multitude of planning documents.

Guiding Principles of CBP's Strategic Framework

CBP partners have long understood that accomplishing the program's mission depends on the commitment of all partners to implement actions addressing all dimensions of the Chesapeake Bay's problems. This calls for an overarching strategy for CBP based on three guiding principles. These guiding principles inform the manner in which partners developed the CBP strategic framework and goal strategies.

First, CBP operates as a partnership that formally includes federal and state agencies and representatives of the region's local governments and scientific and business communities and welcomes participation from the wide range of stakeholders with an interest in the health and restoration of the Bay. Second, CBP approaches the challenges of protecting and restoring the Chesapeake Bay in a comprehensive manner that encompasses water, land, and air and acknowledges the complexity of the relationships between these environmental media. Third, CBP bases its decisions and direction on sound science.

The Chesapeake Bay Agreement of 1983 formally established partnership as a guiding principle of CBP's strategic approach. The agreement states that "a cooperative approach is needed" to protect and restore the Chesapeake Bay. Partnership is essential due to the enormous economic, political, and social challenges inherent in trying to protect and restore the Chesapeake Bay. An expert panel convened by the CBP Chesapeake Executive Council in 2003 estimated that restoring the Bay would cost $15 billion for restoration commitments outlined in the Tributary Strategies and $28 billion for practices required by regulation primarily for local water quality benefits.[9] Moreover, the size of the Bay and watershed, a growing population in the Bay watershed that increases stress on the Bay ecosystem, and the fact that environmental challenges do not recognize political boundaries demand that multiple jurisdictions collaborate to address the problems in the Chesapeake Bay.

To confront these challenges, the federal government, states, and other partners serve

[9] Chesapeake Bay Watershed Blue Ribbon Finance Panel, 2003, Saving a National Treasure: Financing the Cleanup of the Chesapeake Bay.

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on CBP committees and subcommittees, work side-by-side on protection and restoration projects, and confer on programmatic decision making. The Chesapeake Action Plan is intended to strengthen this partnership by more strategically planning, implementing, and evaluating the effectiveness of the investments CBP partners are making toward Bay protection and restoration, and by enhancing the adaptive process by which the effectiveness of the partnership itself is examined on a regular basis.

The comprehensive aspect of CBP's strategic approach also was set forth in the 1983 agreement, which stated that the signatories recognized that the program needed "to fully address the extent, complexity, and sources of pollutants entering the Bay." The *1987 Chesapeake Bay Agreement* provided an operational framework for the strategic choice to address all sources of the Bay's degradation. The 1987 agreement set forth goals and priority commitments for living resources, water quality, population growth and development, public information, education and participation, public access, and governance. Though this structure has been revised in the 21 years since it was written, those later iterations have maintained the commitment of the program to pursue progress on the totality of the Bay's pollution sources.

CBP's strategic approach includes a principle of undertaking scientifically validated protection and restoration activities in the Bay watershed. Research, monitoring, and analysis inform the approaches CBP partners use in their implementation activities in and around the Bay. In the agriculture sector, for example, the development of effective nutrient management plans depends on soil analysis, crop planning, analysis of the effectiveness of best management practices, and other information that depends on scientific research. CBP's science program features a network of researchers in federal and state agencies, universities, non-governmental organizations, and other institutions. Furthermore, CBP's Scientific and Technical Advisory Committee has operated since 1984 to independently ensure the quality of the science underlying CBP's decisions, activities, and policies. An example of the CBP's application of science is provided in the "Establishing Geographic Priorities for Action" sidebar, illustrating how the partners use mapping technologies to direct collective restoration resources towards designated areas of the watershed.

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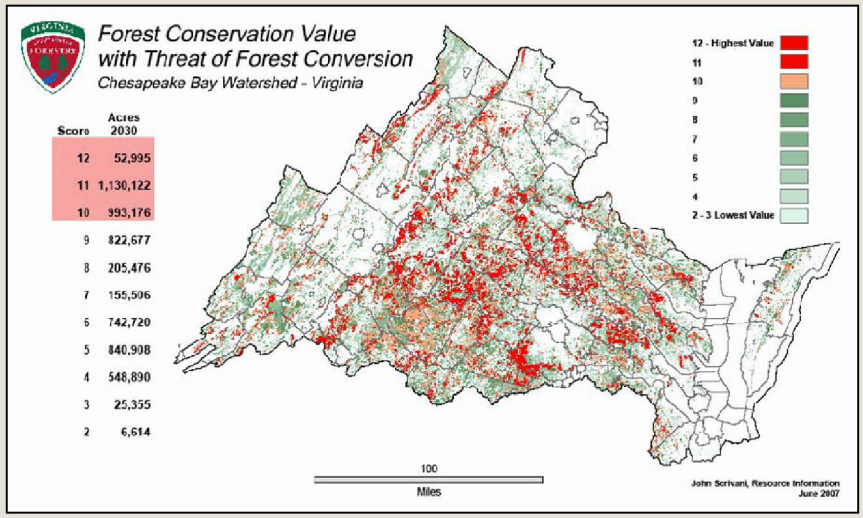
Establishing Geographic Priorities for Action

CBP has extensive capabilities to use mapping technologies to determine effective approaches to meeting identified targets. CBP's mapping capabilities allow partners to identify where in the Chesapeake Bay watershed specific protection and restoration activities will be most effective.

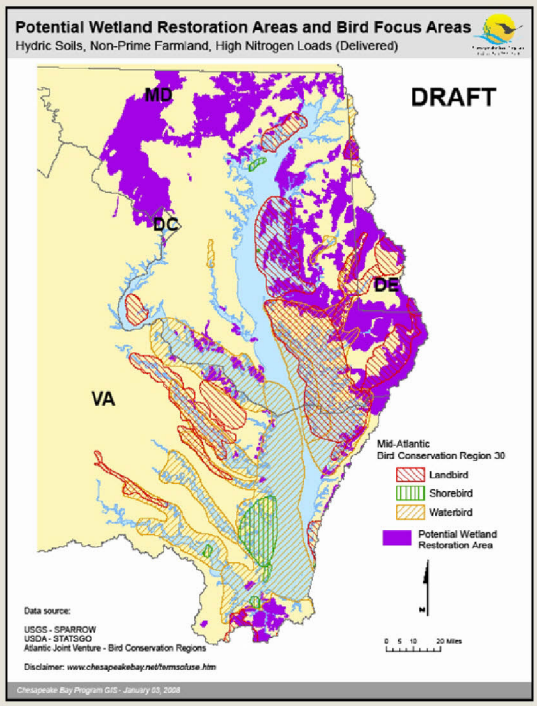
For example, *Chesapeake 2000* called for an "assessment of the Bay's resource lands including forests and farms, emphasizing their role in the protection of water quality and critical habitats, as well as cultural and economic viability." CBP responded to its obligation by developing the Resource Lands Assessment for the Chesapeake Bay Watershed (RLA), which uses GIS models and expert knowledge to assess the value of resource lands within the watershed. The RLA was the Chesapeake Bay's first watershed-wide attempt to establish geographic priorities for land protection for multiple ecological and socioeconomic benefits.

In 2007, CBP partners used variations on the RLA water-quality model to establish state-specific, place-based priorities and quantitative goals for conservation of forest lands in the Chesapeake Bay watershed. These efforts were undertaken to meet the expectations of the Chesapeake Executive Council's Forest Conservation Directive, and were greatly enhanced by the RLA approach. Geographic information may be useful in a number of other CBP implementation efforts.

For more information, please visit http://www.chesapeakebay.net/resourcelandsassessment.aspx?menuitem=19096.



This map shows the location of priority forests for the conservation of water quality using the Virginia prioritization model in conjunction with an overlay identifying lands under high threat of conversion to non-forest use.



This map illustrates areas with high wetland restoration potential in areas of high nitrogen loading to the Bay, overlaid with areas important to land birds, waterbirds, and waterfowl as identified by U.S. North American Bird Conservation Initiative maps.

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CBP Strategic Framework

Since the signing of *The Chesapeake Bay Agreement of 1983*, CBP partners have formally agreed that more can be accomplished by working together than working separately. The CBP partnership has evolved since its creation from sharing research, monitoring, and modeling to agreeing to goals and outcomes, as seen in the *1987 Chesapeake Bay Agreement* and *Chesapeake 2000*, as well as in several other directives and goal statements. These shared goals and measurement systems have allowed for progress to be measured in comparable ways, while allowing individual jurisdictions the flexibility to achieve those goals through locally appropriate programs. Implementation strategies, therefore, have been the responsibility of each CBP partner, and not necessarily integrated with other strategies.

The next step in CBP's evolution focuses on better strategic collaboration of federal, state, and local agencies and organizations. The CBP strategic framework coordinates the numerous planning documents that inform the implementation choices of individual CBP partners—including annual budgets, *Chesapeake 2000*, organizational strategic plans, and statutory and congressional requirements in order to enhance the partners ability to focus on achieving the best results with limited resources.

The CBP partners, therefore, have developed a strategic framework composed of the six goal strategies shown in Figure 5. Each goal strategy includes the following components: the goal; a rationale that explains why the goal is important for protecting and restoring the Bay; the desired results; and a set of implementation strategies to achieve each desired result. The implementation strategies account for the partner activities underway to meet the expectations of existing CBP planning documents. Progress toward the desired result is measured by the realistic annual targets the CBP partners have developed and is communicated in CBP's dashboards. The unification of pre-existing planning documents in this format allows the CBP partners to share a common understanding of the partnership's agenda of work and, through the development of realistic annual targets, establishes a uniform set of measures to evaluate CBP partners' progress in improving the Bay.

Figure 5 provides a concise summary of CBP's strategic framework, including program goals, topic areas, desired results, and implementation strategies. CBP's realistic annual targets and dashboards are described in Chapter 5 of this report. A summary version of the strategic framework and the six goal strategies is provided as Appendix A of this report.

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Figure 5. *CBP Strategic Framework*

GOAL	TOPIC AREA	DESIRED RESULTS	STRATEGIES
1 Protect and Restore Fisheries	Ecosystem-Based Fisheries Management	**1a. Effective Fisheries Ecosystem-based Planning & Management**	■ Build science infrastructure for ecosystem-based management planning ■ Improve governance structure and process ■ Develop new or revised Ecosystem-based Fisheries Management Plans (EBFMPs) for Chesapeake Bay ■ Implement EBFMPs for Chesapeake Bay, using adaptive management
	Oysters	**1b. Increased Oyster Population**	■ Monitor the status of the stock ■ Increase hatchery production ■ Develop disease-resistant oysters ■ Identify, establish, enhance, and seed oyster reefs ■ Establish a network of permanent sanctuaries throughout the Bay ■ Support aquaculture ■ Enforce oyster management laws and regulations ■ Implement adaptive management
	Blue Crab Striped Bass Alosines Menhaden	**1c. Increased Blue Crab Population** **1d. Increased Striped Bass Population** **1e. Increased Alosine Population** **1f. Increased Menhaden Population**	■ Monitor to establish and track population and stock health/habitat ■ Target research to facilitate more effective management ■ Facilitate science-based management decision-making ■ Implement adaptive management
2 Protect and Restore Vital Aquatic Habitats	Fish Passage	**2a. Healthy and Abundant Migratory Fish Habitat**	■ Complete multi-objective fish passage projects ■ Prioritize fish passage in Susquehanna and James watersheds ■ Lead by example at state and federal dams ■ Use federal/state engineers for dam removal designs ■ Regulate installation of new dams/barriers ■ Ensure streams can support fish populations
	SAV	**2b. Healthy and Abundant Submerged Aquatic Vegetation (SAV)**	■ Accelerate protection of existing SAV beds ■ Restore SAV through planning and transplanting of SAV beds ■ Enhance public communication and education ■ Support research on SAV protection and restoration
	Wetlands	**2c. Healthy and Abundant Wetlands**	■ Prioritize areas to restore wetland acreage (water quality & habitat) ■ Restore function of degraded wetlands
	Stream Restoration	**2d. Restore Stream Health**	■ Focus actions to reduce nutrients, sediment, and contaminants in watersheds that will provide optimum benefits to improve local stream quality and reduce loads to the Bay ■ Understand the causes of fish kills and poor fish health in streams to develop management solutions ■ Implement stream restoration actions to improve hydrologic conditions and decrease sediment erosion
3 Protect and Restore Water Quality	Municipal and Industrial Wastewater	**3a. Reduced Loads from Municipal and Industrial Wastewater Facilities**	■ Issue annual N&P caps in NPDES permits during renewal cycle ■ Seek to fund nutrient reduction upgrades or secure nutrient credits ■ Determine facility upgrade schedule for significant facilities ■ Quantify the process to cap loads from non-significant facilities
	Agricultural Lands and Animal Operations	**3b. Reduced Loads from Agricultural Lands and Animal Operations**	■ Set priorities for specific practices in priority watersheds ■ Accelerate cost-effective practice with greatest N&P reduction ■ Pursue sustainable reductions (e.g., animal feed and diet management) ■ Continue strategy for managing nutrients from manure and poultry litter ■ Coordinate federal funding to focus on priority watersheds ■ Seek long-term funding for state agriculture incentive programs ■ Engage corporate sector in making agricultural production changes
	Developed Lands	**3c. Reduced Loads from Developed Lands**	■ Control stormwater on developed lands: regulate, restore, redevelop ■ Evaluate stormwater regulations and strengthen links to water quality goals ■ Promote progressive strategies to reduce/eliminate runoff
	Onsite and Septic Systems	**3d. Reduced Loads from Onsite and Septic Systems**	■ Assess adequacy of local requirements for system installation/maintenance ■ Provide mandates and incentives for new denitrification systems
	Streamside & Tidal Shoreline Riparian Areas	**3e. Reduced Loads from Streamside and Tidal Shoreline Riparian Areas**	■ Target restoration to areas with highest water quality benefit ■ Increase incentives to plant and maintain forest buffers

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Figure 5. *CBP Strategic Framework (cont.)*

GOAL	TOPIC AREA	DESIRED RESULTS	STRATEGIES
3 Protect and Restore Water Quality (cont.)	Streambanks & Tidal Shorelines	**3f. Reduced Sediment Loads from Streambanks and Tidal Shorelines**	■ Identify and target watersheds delivering high sediment loads to tidal waters ■ Improve targeting tools to better focus management at priority locations ■ Pilot Regional Sediment Management approach within Bay watershed ■ Target implementation of living shoreline restoration
	Air Emissions	**3g. Reduced Loads from Air Emissions**	■ Implement Clean Air Interstate Rule and state programs to meet air standards ■ Complete research on ammonia emissions from animal operations ■ Develop management practices for emissions from animal operations ■ Incorporate practices into tributary strategies and support widespread use
	Acid Mine Drainage	**3h. Reduced Acid Mine Drainage (AMD) Impacts on Streams**	■ Support research quantifying nutrient benefits of AMD restoration ■ Target and credit nutrient benefits from AMD restoration projects
	Chemical Contaminants	**3i. Reduced Chemical Contaminant Loads**	■ Identify actions yielding both nutrient and chemical reductions ■ Prioritize management actions to areas yielding the greatest multiple benefits to living resources
4 Maintain Healthy Watersheds	Land Preservation	**4a. Preserved Valuable Resource Lands**	■ Support local preservation planning with educational, technical, and financial assistance ■ Protect lands of national value ■ Seek to provide financial support for state & local land protection
	Land Conservation	**4b. Minimized Conversion of Forests, Wetlands & Working Farms**	■ Support local planning and implementation with technical & financial assistance ■ Technical assistance for small private forest management and conservation ■ Seek to effectively use forest conservation funding through Farm Bill programs ■ Facilitate development of ecosystems service markets ■ Seek to strengthen federal grant requirements through ties to conservation
	Pre-Development Hydrology	**4c. Minimized Impacts to Pre-Development Hydrology**	■ Explore strategies for community level nutrient & sediment allocations ■ Strengthen state implementation of federal regulatory programs ■ Seek to use federal implementation funds as leverage ■ Establish a minimum impact development model and standards ■ Recognize and certify minimum impact development ■ Support local implementation of codes and ordinances ■ Implement minimum impact development in federal projects ■ Implement Urban Tree Canopy goals
5 Foster Chesapeake Stewardship	Public Access	**5a. Enhanced Public Access**	■ Enhance public access (e.g., Capt. J. Smith Chesapeake Trail) ■ Enhance and expand access at Chesapeake Bay Gateways and Watertrails ■ Develop a Bay-wide access plan
	Watershed Education	**5b. High-Quality Bay Watershed Education**	■ Increase and improve Meaningful Watershed Educational Experience (MWEE) implementation throughout watershed ■ Assist environmental education organizations & professionals ■ Ensure availability of best resources for educators ■ Increase thoughtful use of technology in delivery of MWEEs ■ Employ government/research expertise/resources in delivering MWEEs
	Placed-Based Interpretation	**5c. High-Quality Interpretation of the Watershed and Its Values**	■ Support place-based interpretation at partnerships and along trails ■ Create Bay-wide interpretive materials, media and programming ■ Enhance informal educational and lifelong learning opportunities ■ Enhance heritage tourism marketing and product development
	Citizen Engagement	**5d. Increased Citizen & Community Engagement**	■ Develop comprehensive strategic communications plan ■ Execute timed public relations initiatives to build understanding of restoration ■ Develop social marketing initiatives targeted to specific audiences ■ Provide technical assistance to targeted audiences to promote best practices ■ Support localized citizen volunteer conservation and restoration ■ Execute internal communications structure ■ Facilitate public participation through Citizen Advisory Committees ■ Coordinate CBP communication staffs
6 Enhance Partnering Leadership & Management	Infrastructure	**6a. Effective Infrastructure Systems**	■ Maintain an integrated "campus" of partners ■ Advance "green" qualities of current and future facilities ■ Provide superior information technology support for resident staff and partners ■ Enhance the quality and delivery of administrative support and services

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Figure 5. *CBP Strategic Framework (cont.)*

GOAL	TOPIC AREA	DESIRED RESULTS	STRATEGIES
6 Enhance Partnering Leadership & Management (cont.)	Organization Management	**6b. Responsive and Effective Organizational Management**	■ Integrate adaptive management principles into organization ■ Enhance meeting management to optimize progress and results ■ Use consensus where appropriate; foster new approaches to partner leadership and innovation (e.g., champions) ■ Implement organizational changes to enhance effectiveness
		6c. Effective Coordination, Accountability, and Evaluation	■ Evolve and employ the CAP to coordinate partner actions ■ Enhance accountability and depiction of progress ■ Tailor the CAP to address the needs of state partners ■ Implement approaches to foster ongoing, independent evaluation
		6d. Effective Reporting on Health and Restoration Progress and Results	■ Continue development of annual *Health & Restoration Assessment* ■ Use annual reports to inform adaptive management efforts
		6e. Effective Grants, Contracts, and Inter-agency Agreements Management	■ Continue to follow EPA procedures that demonstrate environmental results and are linked to EPA's Strategic Plan ■ Develop work plans that contain well-defined outputs and outcomes that relate to improved health of the Chesapeake Bay

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CHAPTER 5

Implementing GAO Recommendation 6 – A Means to Better Target Limited Resources

GAO's sixth recommendation for the Chesapeake Bay Program was to "establish a means to better target its limited resources to ensure that the most effective and realistic work plans are developed and implemented." EPA understood the direction from Congress in its Explanatory Statement to the Consolidated Appropriations Act, 2008 (P.L. 110-161) as providing detail clarifying GAO's sixth recommendation.

In response to Congress and GAO, CBP has developed realistic annual targets for many of its topic areas. CBP plans to develop realistic annual targets for most of the remaining topic areas by the end of calendar year 2008. CBP developed an activity integration plan for the program, with extensive associated quality assurance activities, that describes program activities of CBP partners and identifies the funding that is used to accomplish each of these activities. CBP has constructed a database of CBP partner activities to support the activity integration plan. Furthermore, CBP has developed a tool, called dashboards, that summarizes the available information on CBP topic areas to track and measure the program's progress.

Realistic Annual Targets

Congress asked CBP to develop "realistic targets the Chesapeake Bay Program expects to achieve in each of the remaining years" of the *Chesapeake 2000* agreement. In response, CBP has developed 16 realistic annual targets that cover essential efforts to restore the health of the Chesapeake Bay. Three of the annual targets are Bay-wide measures supported by all topic areas. The annual targets developed to date are described in Figure 6. These targets are estimates of the work that CBP partners believe is achievable with current programs and resources.

The realistic annual targets draw attention to the gap between what the CBP partners expect to achieve in the next several years and

Figure 6. *CBP Realistic Annual Targets*[1]

Topic Area	Measure	Goal	*Chesapeake 2000* Goal Supported[2-3]	2007 Progress	2008 Annual Target[4]	2009 Annual Target[4]	2010 Annual Target[4]
Basinwide Nitrogen Reduction[5]	Implementation of nitrogen reduction practices	By 2010, 162.5 million pound reduction from 1985 levels to achieve an annual cap load of 175 million lbs (based on long-term average hydrologic simulations)	1.2.2.2, 2.2.5, 2.4.1.1, 3.1.1, 3.1.2, 3.1.2.1, 3.1.2.2, 3.1.2.3	47% (75.6 M lb reduction)	50% (81.19 M lb reduction)	52% (84.44 M lb reduction)	54% (87.69 M lb reduction)
Basinwide Phosphorus Reduction[6]	Implementation of phosphorus reduction practices	By 2010, 14.36 million pound reduction from 1985 levels to achieve an annual cap load of 12.8 million lbs (based on long-term average hydrologic simulations)	1.2.2.2, 2.2.5, 2.4.1.1, 3.1.1, 3.1.2, 3.1.2.1, 3.1.2.2, 3.1.2.3	62% (8.90 M lb reduction)	64% (9.19 M lb reduction)	66% (9.48 M lb reduction)	68% (9.76 M lb reduction)

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Topic Area	Measure	Goal	*Chesapeake 2000* Goal Supported[2-3]	2007 Progress	2008 Annual Target[4]	2009 Annual Target[4]	2010 Annual Target[4]
Basinwide Sediment Reduction[5]	Implementation of sediment reduction practices	By 2010, 1.69 million ton reduction from 1985 levels to achieve an annual cap load of 4.15 million tons (based on long-term average hydrologic simulations)	1.2.2.2, 2.2.5, 2.4.1.1, 3.1.1, 3.1.2, 3.1.2.1, 3.1.2.2, 3.1.2.3	64% (1.07 M ton reduction)	67% (1.13 M ton reduction)	71% (1.20 M ton reduction)	74% (1.25 M ton reduction)
Municipal and Industrial Wastewater	Wastewater nitrogen reduction	By 2010, 49.9 million pound reduction from 1985 levels	3.1.2	69% (34.29 M lb reduction)	74% (36.92 M lb reduction)	79% (39.42 M lb reduction)	84% (41.91 M lb reduction)
Municipal and Industrial Wastewater	Wastewater phosphorus reduction	By 2010, 6.16 million pound reduction from 1985 levels	3.1.2	87% (5.36 M lb reduction)	89% (5.48 M lb reduction)	91% (5.61 M lb reduction)	93% (5.73 M lb reduction)
Agricultural Lands and Animal Operations	Implementation of agricultural nitrogen reduction practices	By 2010, 96.99 million pound reduction from 1985 levels	3.1.1, 3.1.2, 3.1.2.2, 3.1.2.3	48% (46.57 M lb reduction)	50% (48.49 M lb reduction)	52% (50.43 M lb reduction)	54% (52.37 M lb reduction)
Agricultural Lands and Animal Operations	Implementation of agricultural phosphorus reduction practices	By 2010, 6.48 million pound reduction from 1985 levels	3.1.1, 3.1.2, 3.1.2.2, 3.1.2.3	51% (3.29 M lb reduction)	52% (3.37 M lb reduction)	53% (3.43 M lb reduction)	54% (3.50 M lb reduction)
Agricultural Lands and Animal Operations	Implementation of agricultural sediment reduction practices	By 2010, 2.55 million ton reduction from 1985 levels	3.1.1, 3.1.2, 3.1.2.2, 3.1.2.3	48% (1.21 M ton reduction)	50% (1.28 M ton reduction)	52% (1.33 M ton reduction)	54% (1.38 M ton reduction)
Streamside Tidal Shoreline Riparian Areas	Riparian Forest Buffers Planted	10,000 miles restored between 1996 and 2010	1.2.2.2, 2.2.5, 2.4.1.1, 3.1.2, 3.1.2.1, 3.1.2.2	57% (5,722 miles, cumulative)	62% (6,182 miles, cumulative)	65% (6,522 miles, cumulative)	68% (6,837 miles, cumulative)
Wetlands	Wetland Restoration Efforts	MD, VA, PA, DC, and NY to restore 28,500 acres between 1998 and 2010	1.2.2.2, 2.3.1, 2.3.2.1, 2.3.2.2, 2.3.3.2, 4.1.3.3	49% (13,999 acres, cumulative)[6]	53% (15,171 acres, cumulative)	57% (16,343 acres, cumulative)	61% (17,516 acres, cumulative)
SAV	Submerged Aquatic Vegetation Planting	Accelerate SAV restoration by planting 1,000 acres of new SAV beds between 2003 and 2008	2.1.1, 2.1.2, 2.1.3	14% (140 acres, cumulative)	15% (153 acres, cumulative)	16% (160 acres, cumulative)	17% (167 acres, cumulative)
Oysters	Oyster Reef Restoration	Implement oyster restoration practices on 2,466 acres of oyster bar and reef habitat between 2007 and 2010	1.1.1.1, 1.1.1.2	32% (776 acres, cumulative)	53% (1,306 acres, cumulative)	75% (1,836 acres, cumulative)	100% (2,466 acres, cumulative)
Fish Passage	Fish Passage Restoration	2,807 miles reopened between 1989 and 2014 and 100 projects completed between 2005 and 2014	1.3.1, 1.3.2	81% (2,266 miles; 40 projects, cumulative)	85% (2,376 miles; 50 projects, cumulative)	89% (2,486 miles; 60 projects, cumulative)	92% (2,596 miles; 70 projects, cumulative)
Blue Crab	Blue Crab Fishery Management	By 2007, revise and implement existing fisheries management plans to incorporate ecological, social and economic considerations, multi-species fisheries management and ecosystem approaches	1.5.1	56%	56%	56%	56%
Land Preservation	Forest Land Protection	Permanently protect 695,000 additional acres by 2020	2.2.1, 2.4.3, 4.1.2, 4.1.3.1, 4.1.3.3, 4.1.4, 4.1.5, 4.2.1, 4.2.3	0%	7% (50,200 acres, cumulative)	15% (101,000 acres, cumulative)	23% (157,200 acres, cumulative)

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Topic Area	Measure	Goal	*Chesapeake 2000* Goal Supported[2-3]	2007 Progress	2008 Annual Target[4]	2009 Annual Target[4]	2010 Annual Target[4]
Watershed Education	Meaningful Watershed Educational Experience	100% of students receive a MWEE by their high school graduation	5.1.1, 5.1.2, 5.1.4	80% of students[7]	81% of students	82% of students	84% of students

[1] Please refer to Appendix D of this report for additional information on the origin and development of the goals and realistic annual targets.

[2] As reported by CBP partners in the CBP activity integration plan database.

[3] See Appendix B to reference *Chesapeake 2000* goals.

[4] These annual targets are based on existing programs and resources and do not change the CBP commitment to achieve *Chesapeake 2000* goals.

[5] Progress toward this realistic annual target is evaluated using data from several or all of the following topic areas: Agriculture, Air Emissions, Municipal and Industrial Wastewater, Onsites and Septic Systems, Stormwater, Streambanks & Tidal Shorelines, and Streamside & Tidal Shoreline Riparian Areas.

[6] 2007 progress is different from that reported in the 2007 *Health and Restoration Assessment*, as the former includes additional commitments and efforts by New York and Delaware.

[7] 2007 progress is different from that reported in the 2007 *Health and Restoration Assessment* due to corrected data provided by Pennsylvania.

the ambitious goals set forth in the *Chesapeake 2000* agreement. The goals established in the *Chesapeake 2000* agreement used the best available science to define how a restored ecosystem could look. While many of these goals may not be met by 2010, the realistic annual targets are aimed at showing the incremental progress along the way to meet the *Chesapeake 2000* goals. They help define annual and long-term expectations.

The realistic annual targets were developed cooperatively by CBP partners with subject matter expertise and resource investments in the relevant topic areas. In many cases, the realistic annual targets are based on existing planning documents, while in other cases CBP partners pooled their expertise to determine attainable levels for their efforts through 2010. More information on the development of the realistic annual targets is provided in Appendix D of this report.

Achieving these realistic annual targets is naturally the result of a suite of activities implemented, in most cases, by multiple CBP partners. With the development of the CBP activity integration plan, the CBP partners now have the ability to identify and track the activities that all partners are conducting in a given topic area.

The CBP Activity Integration Plan

The CBP activity integration plan is designed to be a comprehensive catalogue of the activities in which CBP partners are engaged to protect and restore the Chesapeake Bay. The activity integration plan provides information on:

- the actual activities being implemented by the CBP partners;
- the lead partner for each activity and any cooperating partners;
- the amount and source of funding being used and, ideally, planned for use to accomplish each activity by all cooperating partners;
- the location of each activity; and
- progress toward the established realistic annual targets.

The CBP activity integration plan represents a significant advance in the management of the program. Prior to the development of the CBP activity integration plan, CBP had no

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means of centrally and consistently accounting for the activities of all CBP partners.

The activity integration plan will allow CBP's partners to review activities to identify successes, challenges, and opportunities for tactical changes, and to provide advice and guidance to partners on their resource allocation decisions to accelerate the pace of implementation. This tool allows for far better coordination among partners, for better project prioritization, for improved targeting of resources, and for better overall program planning. The activity integration plan is an essential tool in identifying how the CBP partners should adapt to meet the program's targets.

CBP's activity integration plan is generated by a database to which CBP partners provide information though a web-based form or through other means of transferring information. CBP staff worked closely with the CBP partners to verify the accuracy of the data entered into the activity integration plan database. As of May 1, 2008, CBP's activity integration plan database contained data covering three years. The data for 2007 accounted for 885 partner activities valued at $1.1 billion. The 2007 data constitute the majority of information due to varying budget cycles of CBP partners and the uncertainties associated with future budgets. Figure 7 summarizes the information CBP partners have submitted to the activity integration plan database for 2007. While the data in the CBP activity integration database have been reviewed for accuracy, the CBP part-

Figure 7. *2007 Funding Data Submitted to CBP Activity Integration Plan Database*[1,2]

GOAL	TOPIC AREA	*Chesapeake 2000* GOAL SUPPORTED[3]	TOTAL ($ thousands)	FEDERAL ($ thousands)	STATE ($ thousands)	NGO ($ thousands)
1 Protect and Restore Fisheries	Ecosystem-Based Fisheries Management	1.3.3, 1.4.2, 1.4.3	$ 5,507[4]	$ 5,001	$ 506	$ –
	Oysters	1.1.1.1, 1.1.1.2	8,905	5,183	3,722	–
	Blue Crab	1.5.1	4,199	3,634	565	–
	Striped Bass	1.3.3, 1.3.4, 1.4.3	3,169	2,587	582	–
	Alosines	1.3.3, 1.4.2, 1.4.3, 5.1.1	2,138	1,697	441	–
	Menhaden	1.3.3, 1.4.3	1,138	359	779	–
	Other Work to Protect and Restore Fisheries	1.2.2.2, 1.3.2, 1.3.3, 1.3.4, 1.4.3	2,614[5]	2,322	292	–
2 Protect and Restore Vital Aquatic Habitats	Fish Passage	1.3.1, 1.3.2	$ 1,463	$ 786	$ 677	$ –
	Submerged Aquatic Vegetation	2.1.1, 2.1.2, 2.1.3	1,555	669	886	–
	Wetlands	1.2.2.2, 2.3.1, 2.3.2.1, 2.3.2.2, 2.3.3.2, 4.1.3.3	24,246	21,912	1,775	559
	Vital Aquatic Habitats Support	2.3.3.1, 4.1.5	302[6]	302	–	–
	Other Work to Protect and Restore Vital Aquatic Habitats	1.2.2.2, 2.3.2.2, 2.3.3.1, 2.3.4	13,611[7]	8,386	5,162	63
3 Protect and Restore Water Quality	Municipal and Industrial Wastewater	3.1.2	$ 728,990	$ 587	$ 728,403	$ –
	Agricultural Lands and Animal Operations	3.1.1, 3.1.2, 3.1.2.2, 3.1.2.3	121,253	80,926	40,075	252
	Developed Lands	3.1.2, 3.3.2	10,727	1,838	8,685	204
	Onsites and Septic Systems	3.1.1, 3.1.2	11,057	40	11,017	–
	Streamside & Tidal Shoreline Riparian Areas	1.2.2.2, 2.2.5, 2.4.1.1, 3.1.2, 3.1.2.1, 3.1.2.2	3,210	1,264	1,627	319
	Air Emissions	3.1.2	74	74	–	–

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Figure 7. *2007 Funding Data Submitted to CBP Activity Integration Plan Database*[1,2] *(cont.)*

GOAL	TOPIC AREA	*Chesapeake 2000* GOAL SUPPORTED[3]	TOTAL ($ thousands)	FEDERAL ($ thousands)	STATE ($ thousands)	NGO ($ thousands)
3 Protect and Restore Water Quality (cont.)	Acid Mine Drainage	2.4.1.1, 3.1.2	$ 1,913	$ 704	$ 1,209	$ –
	Chemical Contaminants	3.2.2, 3.2.2.2, 3.2.3.1	506	506	–	–
	Healthy Waters Support	2.4.1.1, 3.1.1, 3.1.2, 3.1.2.1, 3.1.2.2, 3.1.2.3, 3.1.2.4, 3.5.1.2	64,743[8]	40,756	22,662	1,325
4 Maintain Healthy Watersheds	Land Preservation	2.2.1, 4.1.3.3, 4.2.3	$ 48,262	$ 7,759	$ 40,503	$ –
	Land Conservation	2.4.3, 4.1.2, 4.1.3.1, 4.1.4, 4.1.5, 4.2.1, 4.2.3	3,676	873	2,776	27
	Pre-Development Hydrology	4.1.4, 4.1.5, 4.2.10, 4.2.3	3,492	269	3,178	45
	Healthy Watershed Support	2.2.1, 2.2.5, 2.4.3, 4.1.1, 4.1.2, 4.2.3	6,896[9]	6,896	–	–
5 Foster Chesapeake Stewardship	Public Access	4.4.1, 4.4.2, 4.4.3, 4.4.4, 5.1.1, 5.3.1.1	$ 2,969	$ 2,753	$ 216	$ –
	Watershed Education	5.1.1, 5.1.2, 5.1.4	8,815	3,907	3,950	958
	Place-Based Interpretation	4.4.3, 5.1.1	558	558	–	–
	Citizen Engagement	5.1.1, 5.1.2, 5.1.3.1, 5.1.6, 5.1.7, 5.2.3, 5.2.5, 5.2.6	3,886	2,569	744	573
	Chesapeake Stewardship	5.1.1, 5.1.2, 5.1.7, 5.2.2	2,027[10]	1,127	–	900
	Other Work to Foster Chesapeake Stewardship	1.3.3, 5.1.1	573[11]	573	–	–
6 Enhance Partnering Leadership & Management	Effective Infrastructure Systems	5.3.1.1	$ 1,916	$ 1,877	$ 39	$ –
	Organization Management		20,225	7,865	12,360	–
	Other Work to Enhance Partnering Leadership & Management		1,327[12]	9	1,318	–
		Total	$ 1,115,943	$ 216,569	$ 894,149	$ 5,225

NOTES:
1. 2007 data only are provided, as these data constitute the most robust dataset provided by CBP partners.
2. "Support" topic areas (e.g., "Vital Aquatic habitats Support") include administrative costs associated with the goal, including salaries dedicated specifically to that goal.
3. As reported by CBP partners to the CBP operating plan database.
4. Of this total, federal sport fish restoration grants account for $1,300,000, and regional technical assistance (fishery management plans, aquatic nuisance species) accounts for $596,000.
5. Of this total, fish research, including tagging and monitoring of feeding and reproduction, accounts for $1,300,000.
6. Of this total, program management support for CBP subcommittees accounts for $150,000.
7. Of this total, facilities, operations, and salaries at the Blackwater and Eastern Neck refuge account for $5,650,000; monitoring and analysis of habitat data accounts for $4,500,000; implementing the Farm Bill Wildlife Habitat Incentive Program accounts for $1,000,000; and production of artificial reefs accounts for $500,000.
8. Of this total, federal, state, and nonprofit grants programs account for $52,109,000; water quality related monitoring and assessment investments account for $7,623,000; and program management, information management, engaging partners, targeting, technical support, management tool management, technical assistance, education, and research account for $5,012,000.
9. Of this total, ecosystem protection by augmenting low flows during droughts and dissolving oxygen downstream accounts for $4,300,000.
10. Of this total, implementing the Chesapeake Capacity Building Program accounts for $900,000; and support for state and local implementation and public education efforts through tributary teams account for $600,000.
11. Of this total, school and congressional outreach events and trade shows account for $500,000.
12. Of this total, federal and state legislative policy development accounts for $950,000.

ners are aware that improvements will be made in future iterations of the database.

CBP has developed the programmatic architecture and technical infrastructure to expand the tool to account for the activities of all CBP partners across all topic areas. Figure 8 lists the CBP partners who have submitted data to the CBP database. CBP looks forward to having additional partners provide data to the activity integration plan database and expects that the scope of the information and the quality of that information will increase significantly. Inclusion of additional non-federal organizations may require com-

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Figure 8. *CBP Partners Providing Data to the CBP Activity Integration Plan Database*

Agency/Organization	Departments
Federal Agencies	
Corporation for National and Community Service	
Federal Highway Administration	
National Oceanic and Atmospheric Administration	NOAA Chesapeake Bay Office
National Park Service	NPS Chesapeake Bay Program Office
U.S. Army Corps of Engineers	USACE Baltimore District USACE Norfolk District USACE Engineer and Research Development Center, Vicksburg
U.S. Department of Agriculture	USDA Agricultural Research Service Beltsville Area USDA Natural Resource Conservation Service
U.S. Environmental Protection Agency	EPA Chesapeake Bay Program Office EPA Office of Water EPA Region 2 Office of Ecosystem Protection EPA Region 3 Environmental Assessment and Innovation Division EPA Region 3 Water Protection Division
U.S. Fish and Wildlife Service	USFWS Chesapeake Bay Ecological Services Field Office USFWS Maryland Fishery Resources Office USFWS Maryland National Wildlife Refuges
U.S. Forest Service	State and Private Forestry
U.S. Geological Survey	USGS Chesapeake Bay Studies
States and Districts	
Chesapeake Bay Commission[1]	
Commonwealth of Pennsylvania	PA Department of Agriculture PA Department of Education PA Department of Environmental Protection PA Fish and Boat Commission PA State Conservation Commission PENNVEST
Commonwealth of Virginia	VA Department of Conservation and Recreation VA Department of Education VA Department of Environmental Quality VA Department of Game and Inland Fisheries VA Environmental Endowment VA General Assembly VA Marine Resources Commission
District of Columbia	DC Department of Environment
State of Delaware	DE Department of Agriculture DE Department of Natural Resources and Environmental Control
State of Maryland	MD Department of Agriculture MD Department of Education MD Department of Natural Resources MD Department of Planning MD Department of the Environment MD General Assembly
State of New York	NY Department of Agriculture and Markets NY Department of Environmental Conservation
State of West Virginia	WV Conservation Agency WV Department of Agriculture WV Department of Environmental Protection
Non-governmental Organizations	
Chesapeake Bay Trust	
Ducks Unlimited	

[1] For the purposes of the CBP data collection effort, the Chesapeake Bay Commission is considered an agency of Maryland, Pennsylvania, and Virginia. The states fund CBC's activities through direct appropriations. Individual states periodically appropriate additional funds to support state-specific efforts. The chairmanship of CBC rotates among the states.

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pletion and approval of an Information Collection Request as required by the Paperwork Reduction Act (44 U.S.C. 3501 et seq.).[10]

The CBP activity integration plan database provides CBP with the capability not only of generating an annual report documenting the activities of all CBP partners, but the database will also allow individual CBP partners to obtain specialized reports. For example, a state partner could receive a listing of potentially all the efforts being conducted in that state by CBP partners (assuming full participation and accurate information). The ability to obtain comprehensive, comparable information about a specific jurisdiction would be a vital step forward in fostering coordinated planning and integrated implementation of CBP partner activities to protect and restore the Bay.

CBP is making certain elements of this database available to the public through the CBP's website in the future.

Ensuring Data Quality and Security

Success of the CAP is dependent upon many factors including, for example, data quality, assurance and data security. It is imperative that CBP partners have accurate and comparable information of implementation efforts and resources to optimize coordination and integration of partner efforts. CBP took great care to ensure that comprehensive data quality and data security measures were established and implemented. A summary of these measures is provided in Appendix F.

Tracking and Measuring Progress

CBP's key performance tracking and measurement tool is its annual Chesapeake Bay Health & Restoration Assessment, which draws on the most up-to-date monitoring data gathered by CBP partners to report on the overall health of the Bay ecosystem and tracking and modeling data to report on the restoration efforts. The *Health & Restoration Assessment* provides a detailed and scientifically grounded summary of what CBP has accomplished in a given year. Program enhancements were needed, however, to accelerate progress in achieving CBP goals, To improve the efficiency of the partnership, not only long term goals, but annual targets were needed and tools to evaluate whether effort was being expended appropriately across the various program activities.

To improve overall program management, the CBP partners developed a series of summary reports, called dashboards, that unite key pieces of information from the CBP activity integration plan and other information sources (see Figure 9). The dashboards allow CBP partners to review a succinct summary of:

- measures of progress toward the program's realistic annual targets;
- the resources dedicated to specific activities within topic areas;
- analyses of what needs to be done to improve implementation and

[10] An Information Collection Request (ICR) is a set of documents that describe reporting, record keeping, survey, or other information collection requirements imposed on the public by any federal agency. Each request must be sent to and approved by the Office of Management and Budget before a collection begins. The ICR provides an overview of the collection and estimates the cost and time for the public to respond. The public may view an ICR or submit comments on an ICR at any time.

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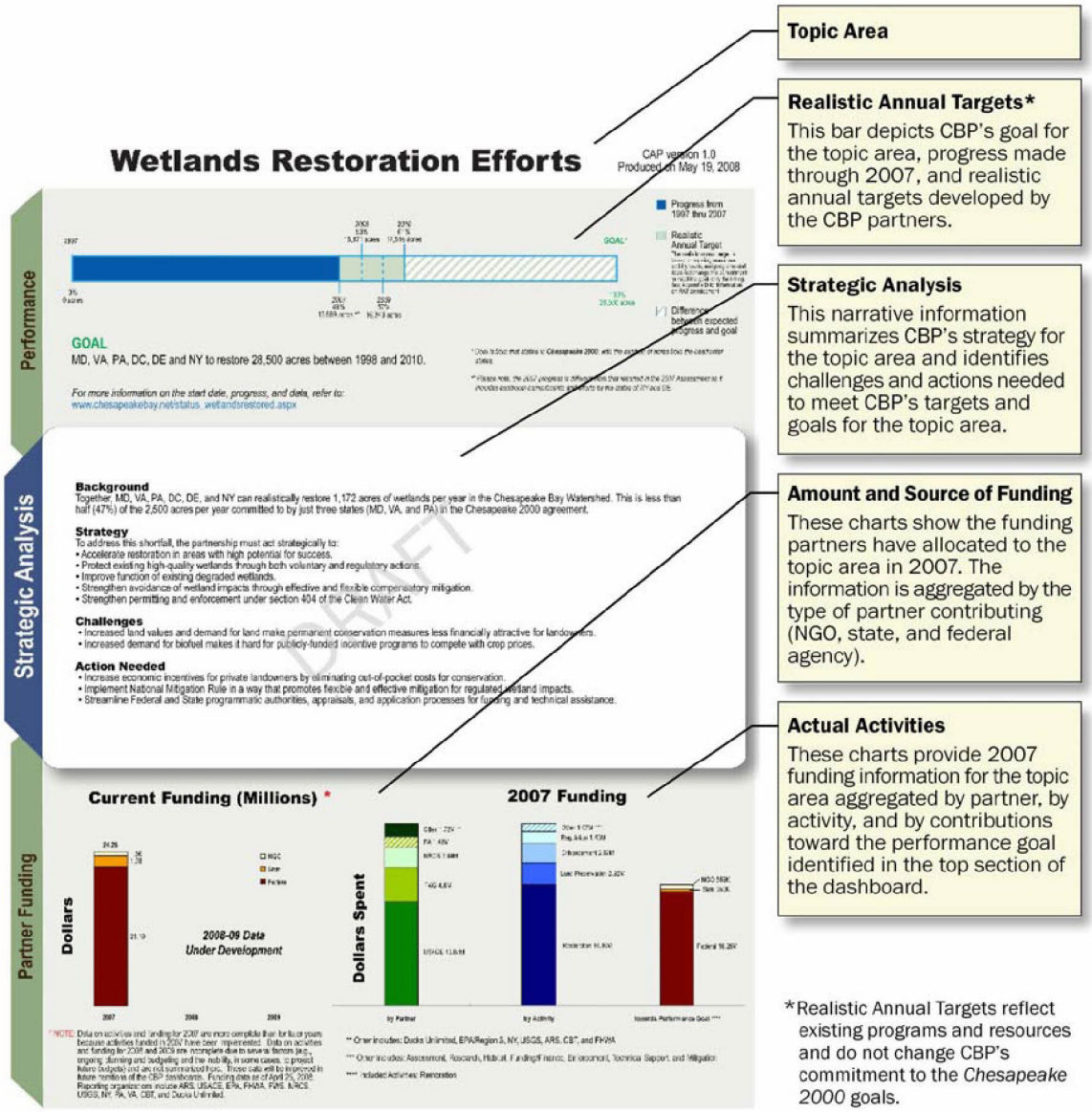
- ideally, in the future, the total resources CBP participating partners have dedicated to the topic area over several years.

The CBP partners propose to update the dashboards on a regular basis determined according to the need for such updates and the availability of new data. The CBP partners also expect to enhance the dashboards as implementation of the CAP moves forward. The CBP dashboards meet Congress's direction to CBP to identify a "process [the program] will use to track and measure the progress" of actions undertaken to meet the annual targets.

To date, the CBP partners have developed preliminary dashboards for all of the topic areas for which realistic annual targets have been developed. The most recent versions of those dashboards are provided in this report as Appendix E.

Figure 9. *CBP Dashboards – Tracking and Measuring Progress (an illustrative example)*



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CBP's Adaptive Management System

Achieving the level of integration, stakeholder coordination, and continual performance improvement called for by the CAP depends on enhanced approaches to the overall management of the Chesapeake Bay Program. The programmatic changes fostered by the CBP goal strategies, activity integration plan, and dashboards are sustainable only if the tools themselves are up-to-date, focused on action, and widely used by CBP and the CBP partners. To support the Chesapeake Action Plan, therefore, CBP is implementing an explicit adaptive management approach. In short, CBP is enhancing its overall management and understands that the CAP tools are in the early stages and will require further refinement. Additionally, the program will continue to enhance the use of adaptive management to improve the program.

Adaptive management is "a type of natural resource management in which decisions are made as part of an ongoing science-based process. Adaptive management involves testing, monitoring, and evaluating applied strategies, and incorporating new knowledge into management approaches that are based on scientific findings and the needs of society. Results are used to modify management policy, strategies, and practices."[11]

Most descriptions of adaptive management include common characteristics such as:

- an iterative, unified planning process that supports continual improvement;
- emphasis on learning by doing and on experimentation to develop solutions;
- broad stakeholder participation;
- development of cross-sector analysis to effectively allocate resources;
- integrated, comprehensive information management; and
- cooperation and transparency in resource planning.

Adaptive management system approaches have been used successfully in other restoration programs and government agencies. For example, the U.S. Department of the Interior formally adopted an adaptive management process in March 2007, stating that "adaptive management has great promise as an effective means to address significant resource management challenges under conditions of uncertainty," and developed an adaptive management technical guide. Furthermore, the State of Washington's Salmon Recovery Project has reported that its use of the Balanced Scorecard, an important element of the adaptive management system, has yielded advantages related to program learning and accountability. The U.S. Coast Guard Office of Health Services, the Naval Undersea Warfare Center, and the State of Massachusetts Department of Mental Health use elements of the adaptive management approach and the balanced scorecard to structure strategic planning efforts, to improve strategic direction, and to improve communication among organizational sub-units.

In reviewing various adaptive management models, CBP partners found that the program possessed many essential components of such a system, but lacked a single set of strategies for achieving program goals, a

[11] "Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management," *Federal Register* 65, no. 202, October 18, 2000, p. 62571.

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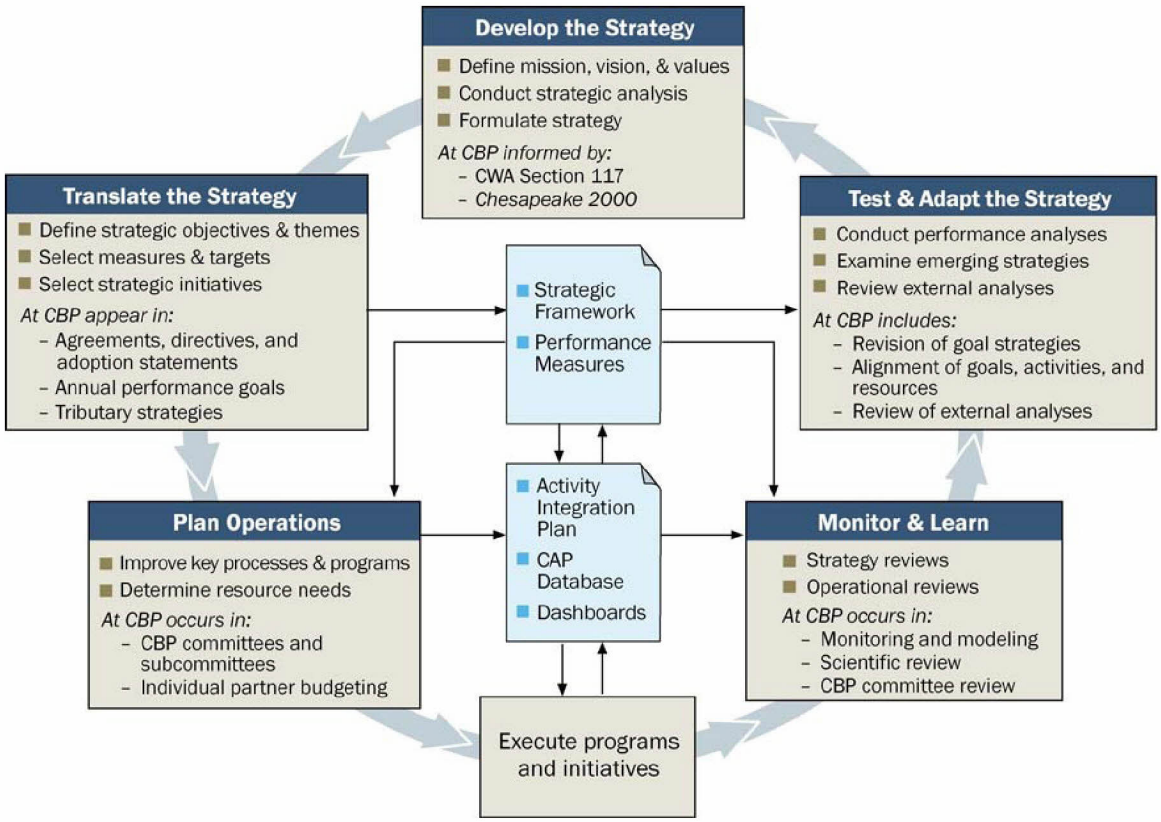
comprehensive activity plan, and a framework to organize these parts into a cohesive whole. The first two of these findings are addressed by the CBP strategy papers and activity integration plan. To address the third finding, the CBP partners adapted Kaplan and Norton's (2008) five-stage model[12] of adaptive management to CBP's specific needs and operations. The CBP process establishes strong relationships between strategy and operations and fosters continual improvement of both Bay implementation activities and CBP's organizational performance. The cycle of active strategy development, planning, implementation, and evaluation is being applied to all areas of CBP activity, so that the organization itself, not only individual partners or partners engaged in on-the-ground implementation, will learn and change based on the outputs of the adaptive management process. CBP's management system is shown in Figure 10.

As the CBP adaptive management process is putting the restoration and protection of the Bay squarely at the center of the program's operations, the CBP partners expect the existing support for the process to expand and

Figure 10. *Chesapeake Bay Program Management System*



[12] "Mastering the Management System," *Harvard Business Review*, January 2008, pp. 63-77.

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become incorporated in all facets of partner activities in the Bay.

An important consideration in the continuing implementation of the adaptive management process is that the CBP partners are subject to agency-specific planning, budgeting, and management that may not take place on the same timeframe as CBP's planning processes. No CBP partner has the authority to direct another partner to change such processes. Moreover, the diversity of the roles of CBP's federal and state partners will likely mean that partners will embrace adaptations at different rates. The CBP adaptive management process relies on the desire of the individual partners to more effectively implement their activities and to harness and focus the collective power of the CBP partners for the good of the Bay.

The CBP partners have identified a number of areas in which the program may improve as a result of integrating the management tools described above with an explicit adaptive management process. These potential benefits are described in the following sections, organized by the guiding principles of CBP's strategy. This organization is used because establishing strategy is the first step in the adaptive management process.

The following section of this chapter describes potential benefits of adaptive management for CBP and its partners. The CBP partners have begun to implement this approach and will be better able to provide more specific examples of programmatic change in the near future.

CBP Comprehensive Approach to Bay Protection and Restoration Activities

The comprehensive approach to Bay protection and restoration, by which CBP partners undertake a vast range of activities designed to improve all aspects of the Bay and its watershed, may give way to more focused activities under an adaptive management system. This shift may result largely from regular review of performance activity in the CBP activity integration plan and dash-boards, in that CBP partners may reorient or revise portions of the activity integration plan on the basis of analysis of activities and the resources being expended on them. The adaptive management approach will allow for much greater transparency across the CBP partners, so the CBP committees and subcommittees will have more information on which to base advice and guidance about specific partner activities.

Making more informed decisions about what activities CBP partners should pursue to protect and restore the Bay may yield numerous positive results, examples of which are discussed below:

- Comparing Current Year Actions with Annual Targets Using the information in the CBP dashboards and activity integration plan, CBP will have a greatly enhanced ability to determine if the resources being spent on individual activities are yielding the expected results. Potential benefits from this new analytical ability may include:
    - CBP partners should be better able to characterize the progress of individual activities and to identify any steps required to improve implementation;

  - CBP should have a much stronger capability for closely tracking activities and evaluating whether new approaches to activity strategies are yielding greater benefits; and
  - CBP should be able to track activities from year to year, adjusting activities, resources, and expected results to best support the protection and restoration of the Bay.

- Test and Forecast Alternative Implementation Progress With multiple years of data on the progress of CBP partner activities, the CBP partners will be able to forecast future implementation progress and the effects of external forcing factors. This strengthened ability to project activity impacts may yield the following benefits, among others:
  - CBP partners should be able to more effectively identify the environmental and programmatic effects of change in resource allocations, geographic shifts in implementation activities, the potential effectiveness of more integrated implementation activities, and other potential adaptations within the CBP partnership;
  - CBP partners should be better able to incorporate environmental outcome models and integrated decision-support systems with cost information to more strategically choose the types and locations of management actions to be implemented in the activity integration plan; and
  - CBP's forecasting ability should improve in accuracy and scope as the CBP activity integration plan expands, is more precisely tailored to CBP partner needs, and becomes a routine part of CBP partner data management activities.

- Evaluating Opportunities for Coordination, Integration, and Leveraging CBP hopes that its new tools will provide partners with information essential to evaluating and increasing opportunities to work together toward the improvement of the Bay and its watershed. Such adaptation will be necessary to meet annual and longer-term goals, to realize resource efficiencies, and to respond to evaluations of program progress. If the tools are effectively developed and improved, such opportunities may include:
  - CBP partners should be able to engage in better cooperative planning of discrete activities (which would also be supported by CBP's science capabilities, as discussed earlier in this report); and
  - CBP partners should see more opportunities for integration of separate activities into a single effort, or leveraging of one activity to support others with similar goals. While some integrative work is underway at CBP (see sidebar), these types of opportunities have been limited due to a lack of centrally available, comprehensive information on CBP partner activities. The CBP activity integration plan is an important part of filling this important need.

- Developing Comprehensive Budget Data With the information in the CBP activity integration plan, CBP is positioned to develop an annual budget report that accounts for all partner activities submitted to the activity integration plan database.

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As a result, potential improvements to CBP processes may include:

- CBP partners could have a more accurate view of the resources dedicated to protection and restoration of the Bay. Currently, only EPA submits its Chesapeake Bay budget (excluding salary funds) for review by the CBP Implementation Committee; and
- The adaptive management process may foster a culture in which CBP partner budgets are more strongly aligned to maximize the efficiencies of partner coordination and cooperation. Such adaptation will depend on the continued and expanded participation of CBP partners in the activity integration plan reporting and refinement process.

CBP Partnership

The CBP adaptive management system is intended to promote the introduction of new and more efficient practices in the way the partnership's work is organized. That is, the design of the CBP partnership (i.e., CBP's committees and subcommittees) and the functions of the partnership's components should be subject to review and refinement in the same way that implementation activities are reviewed in the adaptive management process.

Orienting CBP toward an adaptive approach in the management of the program itself may allow CBP partners to realize numerous benefits, including the following examples:

- Refining CBP Partnership Structure Under an adaptive management system, the CBP committee and subcommittees will be challenged to consider whether their structure and functions are appropriate to foster improvements in partner coordination (as discussed above) to accelerate the pace of progress in the Chesapeake Bay. Maximizing the learning that results from this review may include:
  - CBP partners should be better able to determine if the CBP structure supports evaluation of progress toward CBP targets and the roles of the CBP committee or subcommittee responsible for that goal.
  - CBP partners should be supportive of adjustments of CBP's structure to better achieve the partnership's implementation goals. In fact, CBP is undertaking the first phase of an initial streamlining intended to align the committee structure with the CBP strategic framework and to facilitate greater communication and integration among the partners. These changes will allow for further restructuring suggested in the evaluative processes of the adaptive management system.
- Defining Committee and Subcommittee Responsibilities CBP partners are in the initial stage of developing a standard process by which partnership subcommittees will meet with the CBP Implementation Committee to assess progress toward realistic annual targets and longer-term goals. Such review is expected to yield benefits such as:
  - The CBP Implementation Committee will be better able to recommend tactical changes to the implementation effort with the intent of achieving the partnership's targets and goals.

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  - CBP's operations and purpose likely will place new responsibilities on the Implementation Committee and subcommittees to plan their activities, to review such plans with appropriate partners and other important entities, to focus on the data used to assess the progress of implementation, and to strive toward the improvements and efficiencies that a partnership is intended to support.

- Committing to Shared Leadership CBP partners view the enhanced transparency of partner activities as a catalyst for fostering shared leadership within the program. With the development of its activity integration plan, CBP will be able to determine which partners are taking explicit actions and making resource investments in specific topic areas. This information is expected to yield benefits such as:
  - CBP committees and subcommittees should be better equipped to assign coordinating responsibilities for goal and topic areas to individual CBP partners, thereby increasing accountability and better integrating partners into the program. This type of leadership is essential for making the most of the opportunities afforded by CBP's new management tools and for steering the cooperating partners in a particular goal or topic area toward meeting realistic annual targets or longer-term goals.
  - A broad group of CBP partners should become more strongly involved in program leadership and accountability, and the adaptive management system should provide the partners with a framework for making such leadership effective and meaningful.

- Inspiring Individual Partner Alignment As the CBP adaptive management process establishes milestones for accountability on data submission and individual implementation areas, individual partners may opt to align their own operations with the CBP process. This progression may produce benefits such as:
  - Individual CBP partners may rethink how they engage with the program, adjust parts of their program related to CBP, and lead change to facilitate interactions with the CBP partnership.
  - Greater alignment of CBP partners with the program as a whole should strengthen CBP and will amplify all the benefits of the adaptive management process discussed in this report.

CBP's Scientific Grounding

Scientific knowledge, along with resource information and implementation measurement, is a key component of a successful adaptive management process for CBP. The adaptive management framework will call for CBP's science programs to focus additional effort on where and how to best deliver services, how program targets are developed, whether the targets are appropriate, and whether meeting those targets makes a positive difference in the Bay watershed. Specific efforts under this approach to CBP's scientific grounding may include:

- Improved Modeling Tools to Support Decision Making The CBP partners have some existing models that are mostly focused on testing water-quality manage-

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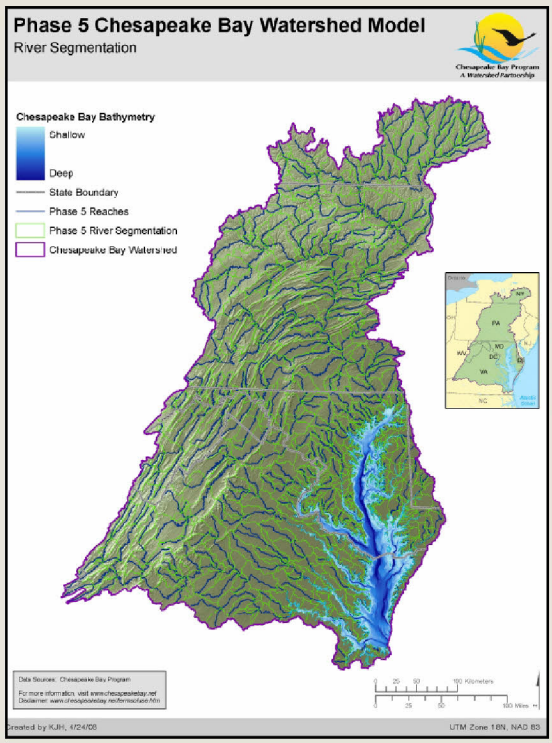
ment scenarios and predicting water-quality response. These models include the Phase 5 Watershed Model (see Sidebar), an estuary water-quality model to predict response to nutrient reduction, and the SPARROW model to show ranges of nutrient loads to better focus locations of management actions. The adaptive management process will drive the development of additional tools, such as:

- CBP partners are developing a land-change model to forecast changes in land-use and couple with the Phase 5 Watershed Model to predict changes in water quality. Additional models are being developed to address fisheries and habitat; and
- CBP partners should be involved in improved efforts to collect data to support its models. One example of this is a need for CBP to continually update its assessment of factors affecting observed free-flowing rivers, river input, and tidal water trends. Given the dynamic nature of individual water bodies and the multiplicity of factors that affect their quality, CBP will need to continually review whether the information its partners gather is sufficient to promote more efficient decision making.

The CBP Watershed Model

The Chesapeake Bay watershed covers an area more than 12 times the size of the Bay itself. The Chesapeake Bay Phase 5 Community Watershed Model was developed to simulate flow and to project nutrient and sediment loads to the Bay. Phase 5 is the fifth-generation model of the Chesapeake Bay watershed since 1982. The model's nutrient inputs are fertilizer and manure application, point sources, septic, and atmospheric deposition. The major processes simulated include rain precipitation, infiltration, evapotranspiration, plant uptake, water and material movement by surface runoff or groundwater, and discharge into rivers or tidal waters. The Phase 5 model takes advantage of recent and expanded monitoring and allows land use to change annually over the calibration period. Phase 5's improved detail includes an expansion of land uses to 13 types of cropland, two types of woodland, three types of pasture, four types of urban land, and other special land uses such as surface mines and construction land uses. The Phase 5 Model simulates physical, chemical, and biological processes for all land uses. For more information, please visit http://www.chesapeakebay.net/model_phase5.aspx.



Chesapeake Bay Phase 5 Community Watershed Model

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- *Improved Understanding of Ecosystem Response* CBP partners have various monitoring programs in the watershed and estuary that are primarily focused on water quality conditions for large geographic areas. This information and other data are used to develop the annual *Chesapeake Bay Health & Restoration Assessment*. Improvements to monitoring efforts under the adaptive management approach may include:
  - CBP partners may consider conducting additional monitoring to better assess effectiveness of management actions and other ecosystem components (fisheries, habitat, and land-use change); and
  - With better monitoring, CBP may engage in enhanced analysis of the factors affecting measurable water quality trends in the Bay (as summarized in the *Health & Restoration Assessment*) and develop procedures for assessing the impacts of inputs from the Bay watershed to the Bay itself.
- *Developing Integrated Decision-support Tools* The adaptive management process is largely about making better decisions about program implementation. Integrated decision-support systems can be critical to effective adaptive management. CBP may wish to improve the sorts of decision-support tools it currently possesses. Such enhancements may include:
  - CBP likely will continue to develop the Chesapeake Online Assessment Support Tool (COAST) for water-quality activities. COAST is a series of web-enabled tools and information to allow managers to map nutrient loads to better focus management actions; test alternative scenarios to implement different types of management actions; assess water-quality change and progress; and better understand the factors affecting water quality.
  - CBP should seek a broader diversity of information for making decisions. Committing to a broader view of information inputs to support decision making will allow CBP's science partners to fill gaps in the evaluation of partner implementation efforts and provide a broader perspective on the effectiveness of those efforts. The adaptive management process provides a framework for testing and improving such evaluation methods over time.

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CHAPTER 6

Conclusion

The partners of the Chesapeake Bay Program have developed the Chesapeake Action Plan as an adaptive and responsive management system more appropriate for a dynamic, implementation-oriented, partner-based organization. The CBP partners believe this approach will allow the organization to improve and accelerate implementation of efforts to protect and restore the Bay. Given the adaptive nature of the management system, the partners expect that CBP will continue to change and refine its approach to fulfilling its mission.

Congress and GAO were instrumental in identifying the types of tools that would lead CBP to better and quicker implementation of actions necessary to improve the Bay, and the CBP partners believe that these tools—including the CBP strategic framework, activity integration plan, and dashboards—are the appropriate ones to achieve these goals. The CBP partners actively participated in the development of the tools, and identified the need for an adaptive management framework to unify the use of the tools and to continually improve upon the partnership's existing and new tools. The nature of adaptive management implies that the process itself will continue to be improved and refined. The CBP partners look forward to making these improvements for the betterment of the Chesapeake Bay.

The CBP partners have identified five CAP-related actions to be addressed immediately upon the delivery of this Report to Congress. Those actions include:

- Enhancing Future Versions of the CAP Throughout the design and development of this version of the Chesapeake Action Plan, various partners have identified possible enhancements. These enhancements could maximize the CAP's utility for both the CBP partnership and for individual partner needs. As the CAP is refined, CBP will revisit the basic design of the CAP, particularly the database, to ensure that the effort yields the maximum utility for all CBP partners.
- Expanding the Scope of the CAP to Include Additional Watershed Partners The CBP partnership encompasses an array of partners who contribute to the mission of protecting and restoring the Chesapeake Bay and its watershed. The current version of the CAP focused on the signatory CBP partners, headwater states, and a few other partners. Future iterations of the CAP will address a larger array of partners and their respective implementation efforts. This emphasis on an expanded involvement of partners will enhance opportunities for coordination and collaboration. CBP's Local Government Advisory Committee, in particular, has a strong interest in having local government actions and resources reflected in the CAP. This is one example of how the scope of the CAP can be enhanced.
- Improving the CAP Activity Integration Plan Database The CAP activity integration plan database is a dynamic tool that can be continually improved upon in terms of its content and its form. To those ends, the CBP partners will work together

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to identify new and easier ways of providing information to the database, enhancing the functionality of the system for all partners, and integrating the outputs of the system into CBP's daily operations. Building on the data quality and assurance and data access and security procedures established for the first version of the CAP (see Appendix F), the CBP partners also will strive to improve the quality and quantity of the data in the database.

- Defining the Details of the Adaptive Management System As mentioned above, CBP's adaptive management process will include regular reviews of partner activities and of the partnership itself. CBP partners are now engaged in a series of conversations about redefining the functions of the CBP committees and subcommittees to orient them toward continual improvement. CBP looks forward to sharing the outcomes of these discussions in the very near future.
- Sharing the Successes of the CAP CBP is one of many estuary and watershed programs in the United States. The CBP partners believe that the CAP and the lessons learned during the development and implementation of the CAP may be valuable for other programs, and intend to generate documentation of this process for the benefit of others. Such information may provide useful ideas to other programs and help them develop similar approaches to the protection and restoration of their water bodies and watersheds. In such transfer of information, the CAP may have a lasting value outside of the Chesapeake Bay.

The coordination and integration of activities to protect and restore the Bay has been a goal of the Bay partners since they first met to discuss the condition of the Bay. The Chesapeake Action Plan is a vital step toward full realization of that goal. The CAP is the right set of tools for the CBP partnership, and is essential if the partners are to accelerate their already positive effects on the condition of the Chesapeake Bay and its watershed.

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Appendices

Appendix A CBP Strategic Framework Summary

Appendix B Status of *Chesapeake 2000* Commitments

Appendix C Reviews of CBP

Appendix D Realistic Annual Targets Background

Appendix E CBP Dashboards

Appendix F Quality Assurance Activities for the Chesapeake Action Plan

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APPENDIX A

CBP Strategic Framework Summary

Chesapeake Action Plan – Strategic Framework for Restoring & Conserving the Chesapeake Watershed

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Purpose

This document summarizes the vision of a restored and conserved Chesapeake Bay and watershed set out in the *Chesapeake 2000* agreement, provides the overarching strategic framework for achieving that vision, and sets out the goals, necessary results, and specific strategies for carrying out the framework.

This framework is intended to guide all Chesapeake Bay Program (CBP) implementation actions, including an activity integration plan, and reconcile and align the multitude of separate planning documents that formerly supplied direction for CBP.

A Shared Vision

In June 2000, the Chesapeake Bay Program Executive Council adopted the *Chesapeake 2000* agreement, setting out a forward-looking vision of the future of the Chesapeake watershed:

> *We have a shared vision of a system with abundant, diverse populations of living resources, fed by healthy streams and rivers, sustaining strong local and regional economies, and our unique quality of life.*

Chesapeake 2000 recognized five major factors necessary for achieving this vision: sustainable fisheries, vital habitat, clean water, sound land use, and citizen and community stewardship. These factors, along with program leadership, form the basis for the overarching strategic framework for conserving and restoring the Chesapeake Bay and watershed.

Overarching CBP Strategic Framework

Chesapeake 2000 acknowledged that the conditions of fisheries, habitat, and water bodies are inextricably linked to conditions on the land and stewardship actions taken by citizens and communities. This document describes the CBP strategic framework for restoring and conserving the Bay watershed based upon this linkage by including work by many CBP partners towards six interconnected goals depicted in Framework for Restoring and Conserving the Chesapeake Watershed on the next page and in the summary descriptions that follow.

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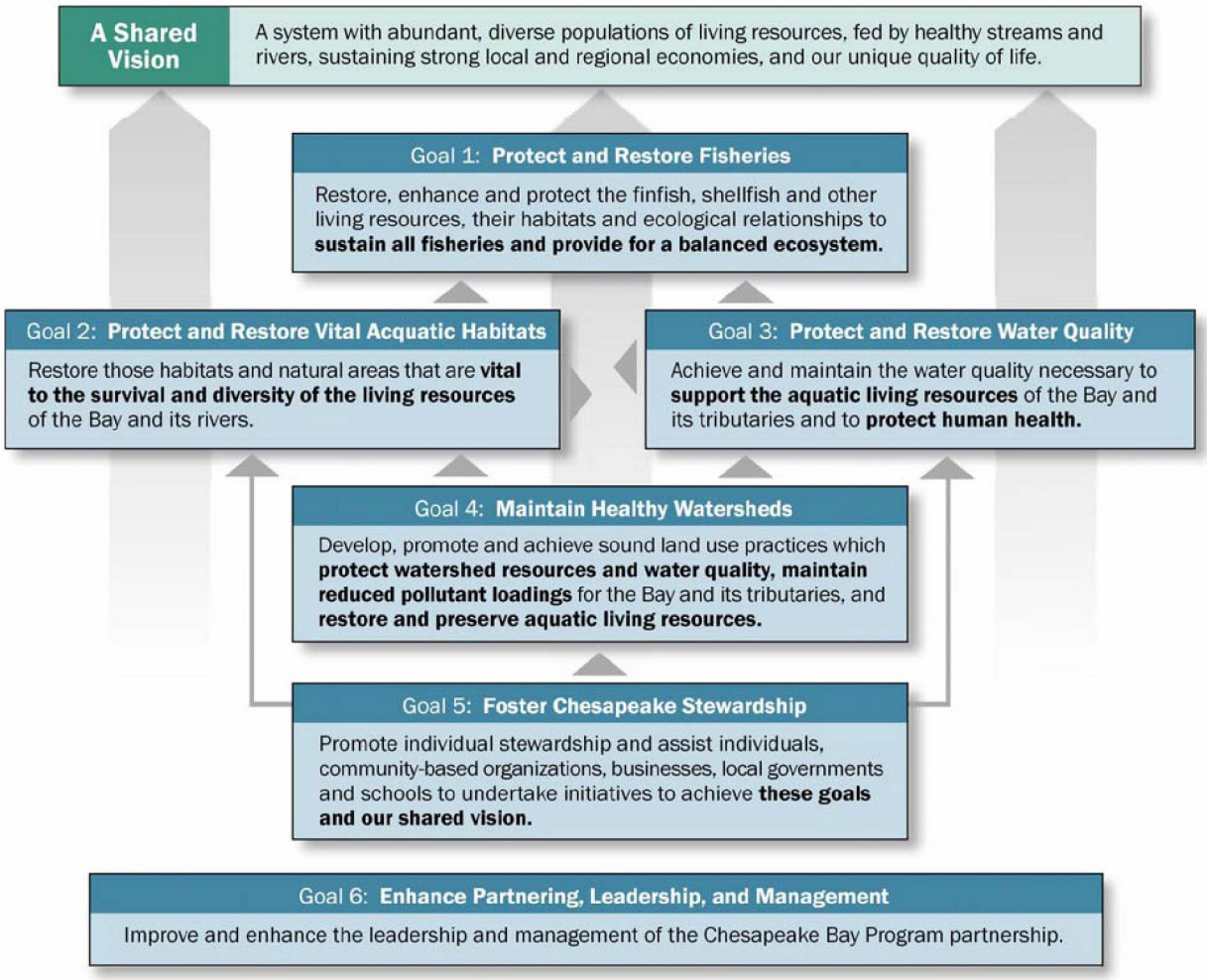
Framework for Restoring and Conserving the Chesapeake Watershed



Protect and Restore Fisheries

Restore, enhance and protect the finfish, shellfish and other living resources, their habitats and ecological relationships to sustain all fisheries and provide for a balanced ecosystem.

The Chesapeake Bay and its tributaries have long been renowned for their significant fisheries—oysters, blue crabs, rockfish, shad, menhaden, and other species. These have been the basis for a great part of the region's culture, heritage, food supply, and economy. Yet, most of these fisheries are significantly less healthy and less abundant than in the past. Fisheries are indicators of the health of the habitat on which they depend, the water in which they live, the land from which that water flows, and how well the fisheries are managed.

Protecting and restoring healthy fisheries depends upon both sound fisheries management and an ecosystem-based approach to restoration and conservation. While spe-

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cific strategies are detailed in this document for managing fisheries, overall restoration of healthy fisheries is also dependent upon achieving each of four other elements of the conservation and restoration framework described below.

Protect and Restore Vital Aquatic Habitats

Restore those habitats and natural areas that are vital to the survival and diversity of the living resources of the Bay and its rivers.

All living things have certain basic requirements: oxygen to breathe, food to eat, and sheltered places to rest and reproduce. Habitats are considered healthy if they are able to meet these needs. In the Chesapeake Bay, the needs of living resources are being impacted due to excessive quantities of nutrients and sediment. Compounding this are the pressures on habitats from development impacts. Remaining habitats are often fragmented and susceptible to invasive species which crowd out native fauna and flora and decrease the overall diversity of life.

Restoring these vital habitats is essential for achieving healthy fisheries and the shared vision of a healthy Chesapeake watershed. While specific strategies are detailed in this document for restoring habitat, overall restoration—and long-term conservation and maintenance—is also dependent upon achieving each of the three following elements of the strategic framework described below.

Protect and Restore Water Quality

Achieve and maintain the water quality necessary to support the aquatic living resources of the Bay and its tributaries and to protect human health.

People, fisheries, and other living resources depend on clean, healthy water for life. Waters are considered healthy when their chemical and physical attributes support the ecological needs for robust populations of living resources such as fish, crabs, and oysters. The Chesapeake Bay and its tidal tributaries are listed as impaired waters under the Clean Water Act, and CBP partnership's mission to restore the health and vitality of the Bay's living resources hinges largely on efforts to protect and restore water quality. Since the *Chesapeake 2000* agreement, CBP partners have developed more specific water quality restoration goals; strategies to accelerate implementation actions necessary to reduce nutrient, sediment, and chemical contaminants loads to the tidal waters; and enhanced monitoring to document water-quality improvements.

Protecting and restoring water quality is essential for achieving all aspects of the shared vision. While specific strategies are detailed in this document for protecting and restoring water quality, overall restoration—and achieving the shared vision—depends upon not only habitat restoration, but also on achieving each of the two other elements of the strategic framework described below.

Maintain Healthy Watersheds

Develop, promote and achieve sound land use practices which protect watershed resources and water quality, maintain reduced pollutant loadings for the Bay and its tributaries, and restore and preserve aquatic living resources.

All land drains to streams, rivers, and the Bay. The use of land directly affects water quality and thus the health of people, habitat, and all fisheries and other living re-

sources. Healthy watersheds in the Chesapeake Bay region contain extensive forests, wetlands, and other resource lands that absorb storm water like a sponge, thereby regulating stream flow and filtering polluted runoff before it reaches streams and other water bodies. As land is developed and used, these critical resources can be altered or destroyed, eliminating their ability to provide their vital ecological functions upon which people, habitat, fisheries, and clean water depend.

There are, however, ways of developing and using land that minimize or eliminate impacts to water quality, aquatic habitat, and forests, wetlands, and other resource lands while achieving the benefits of development. Maintaining healthy watersheds through sound land use practices is necessary and essential for achieving all aspects of the shared vision. While specific strategies are detailed in this document for maintaining healthy watersheds, long-term success is dependent upon a stewardship ethic and practice fostered by the element of the strategic framework described below.

Foster Chesapeake Stewardship

Promote individual stewardship and assist individuals, community-based organizations, businesses, local governments, and schools to undertake initiatives to achieve these goals and our shared vision.

As leaders in the Bay restoration effort, CBP partners understand that accomplishing a comprehensive restoration and conservation plan for an ecosystem as complex as the Chesapeake Bay depend on the active engagement of restoration leaders, stakeholder groups, and citizens throughout the watershed.

Action is necessary at all levels—individual, community, state, and watershed-wide—to achieve the goals and vision described above. Fostering Chesapeake stewardship is a foundation for the other goals and depends on long-term efforts to connect people with Chesapeake resources, build understanding of stewardship needs and options, and stimulate an active and engaged citizenry dedicated to long-term restoration and conservation of the Chesapeake watershed.

Enhance Partnering, Leadership, and Management

Improve and enhance the leadership and management of the Chesapeake Bay Program partnership.

When Congress established the Chesapeake Bay Program, it recognized the importance and value in coordinating work, providing leadership to CBP, and providing necessary infrastructure and support to the CBP partners so that the common vision for a restored Bay could be achieved. This goal strategy acknowledges that the structure to support the work of the CBP partners to implement the goal strategies is an important component of the work itself. Establishing and maintaining an effective infrastructure, supporting the organizational management structure that coordinates the activities of the various committees and subcommittees, providing and managing resource allocations to demonstrate environmental results, and institutionalizing a process for improving accountability and coordination are vital to having an effective partnership. Ensuring accurate and timely reporting to Congress and the citizens of the Bay about the progress being made and the work that remains is paramount to building and maintaining the base

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of support necessary to drive changes in individual and collective actions.

Goals – Desired Results and Strategies

The strategic framework described in summary form above is further detailed in the following pages and in Figure 4 of *Report to Congress: Strengthening the Management, Coordination, and Accountability of the Chesapeake Bay Program Partnership*. Each of the six goals includes a rationale and major desired results, with a list of the strategies for achieving those results. Specific actions to carry out each strategy are not included in this Plan.

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GOAL 1

Protect and Restore Fisheries

Restore, enhance and protect the finfish, shellfish and other living resources, their habitats and ecological relationships to sustain all fisheries and provide for a balanced ecosystem.

Rationale

Recognizing the complex interactions among aquatic species, water quality, and habitats in the Chesapeake watershed, and the economic and ecological importance of fish, CBP set a path toward ecosystem-based fisheries management. Central to this is an operational knowledge of species interactions, habitats, and water quality to ensure that effective resource management plans can be developed and implemented.

Toward this end, the National Oceanic and Atmospheric Administration's Chesapeake Bay Office coordinated a collaborative effort by fisheries experts to develop *Fisheries Ecosystem Planning for Chesapeake Bay* (FEP). The FEP provides guidance for ecosystem-based fisheries management in the Bay and coastal region, including a compilation of existing information on the structure and function of the ecosystem such as key habitats and species interactions. The FEP is designed to increase awareness of how management decisions can affect the ecosystem, and to facilitate use of ecosystem-based principles, goals, and policies in fisheries management. It provides a framework for refining single-species management and makes recommendations for incremental steps toward ecosystem-based fisheries management. In November 2005, the Chesapeake Executive Council formally adopted an ecosystem-based approach to fisheries management and endorsed the FEP as strategic guidance.

Protecting and restoring healthy fisheries in the Chesapeake Bay and its tributaries depends on ongoing ecosystem-based planning and management, using as an interim step single-species management for five priority species, but also continued transitioning to ecosystem-based fisheries management involving multiple species. These desired results are described below.

Desired Result 1a

Effective Fisheries Ecosystem-based Planning and Management

Better fisheries management will help assure sustainable fisheries. CBP recognizes that successful efforts to reduce nutrient loads, improve water quality, re-establish submerged aquatic vegetation, and restore migratory fish spawning habitat should bring about healthier, more abundant stocks of fish, crabs, and oysters, ultimately leading to higher fisheries yields from the Bay. To date, single-species fisheries management has formed the mainstay of the Bay's fisheries programs in which regulation of amounts caught and fishing effort form the primary management tools. Such single-species management is the common practice globally, although the fisheries community widely recognizes that more effective fisheries

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management could result from a multispecies approach that explicitly considers interactions among predators and prey and their effects on sustainable fisheries yields.

When CBP formally adopted multispecies management as a goal in its *Chesapeake 2000* agreement, it emphasized the need for greater understanding of species interactions, habitats, and water quality before effective multispecies plans can be implemented. Full consideration of such factors in management plans will provide an ecosystem approach to fisheries management. This approach builds on single-species management within an ecosystem context.

Strategies for achieving effective ecosystem-based management include: building out the scientific infrastructure of the FEP to improve understanding of ecosystem processes and to enable managers to make informed, holistic natural resource management decisions; improving fisheries; governance structure and process; developing new or revised ecosystem-based fisheries and habitat management plans; and implementing those plans in an adaptive management framework.

Desired Result 1b

Increased Oyster Population (Interim Management)

The Eastern or American oyster (*Crassostrea virginica*) was once so plentiful in the Chesapeake Bay that annual landings were in the millions of bushels. As recently as 100 years ago, oyster reefs were so massive that they posed a navigational hazard to ships. These filter feeders perform functions vital to the Bay ecosystem.

Filtering up to five liters of water per hour, oysters consume phytoplankton and detrital particles with sequestered nutrients; provide habitat for communities of animals, such as worms, snails, sponges, small crabs, and fish through the varied surfaces of oyster reefs; and supply food for bird species.

Today's Bay oyster population has dropped to about 1% of its historic level. Factors contributing to this decline include: historic fishing practices, which removed huge volumes of large oysters and oyster shells and destroyed reef habitat and suitable sites for oyster spat settlement; two parasites lethal to oysters within the first two years of life (MSX and Dermo); loss of habitat due to sedimentation and accelerated eutrophication which depletes oxygen in deeper waters and may impede development of oyster larvae; pollutants such as metals which are toxic to vulnerable juvenile oysters; siltation from developed land, farm fields, and forest logging, which may smother oysters or prevent them from feeding; and a host of natural predators[13].

Strategies for achieving a healthy and sustainable native oyster stock include: monitor the status of the Chesapeake Bay stock; increase hatchery production; develop disease-resistant oysters; identify, establish, enhance, and seed oyster reefs; establish a network of permanent sanctuaries throughout the Bay; support aquaculture; enforce oyster management laws and regulations; and implement adaptive management.

[13] Chesapeake Bay Program Oyster Management Plan, 2004

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Desired Result 1c

Increased Blue Crab Population (Interim Management)

Blue crab landings from the Chesapeake Bay accounted for approximately half of the national total from the 1950s through the mid 1980s. Since then, the proportion has decreased, and Chesapeake Bay landings now account for roughly one-third of the national harvest. This species has the highest value of any commercial fishery in the Bay and supports a robust recreational fishery. Blue crab numbers fluctuate annually and are dependent upon the previous years' fishing activity and recruitment of small crabs into the Bay's numerous habitats.

The viability of the Bay's blue crab fishery is a cause for concern. Since 2001, Maryland, Virginia, and the Potomac River Fisheries Commission have shared a conservation goal of limiting annual blue crab harvest to no more than 46% of the population. Scientists estimate that more than 60% of the Bay's adult blue crab population was harvested in 2007. The current abundance of adult blue crabs is 120 million crabs, which is slightly above the established minimum safe threshold of 86 million crabs, 70% lower than 1990 levels, and well below the recently adopted conservation target of 200 million crabs. A variety of factors including overfishing, poor water quality, loss of habitat such as SAV and oyster reefs, and changing climate conditions have contributed to the decline of the blue crab population in Chesapeake Bay.

Strategies for achieving a healthy and sustainable blue crab stock include: long-term monitoring to establish and track population and stock health metrics; targeting dedicated research activities to address critical knowledge gaps; periodically assessing population structure and status as a direct measure of stock condition and an indirect indicator of habitat suitability; facilitating science-based stock and habitat management; and using an adaptive resource management paradigm that will take into consideration the efficacy of management alternatives.

Desired Result 1d

Increased Striped Bass Population (Interim Management)

The striped bass, or Rockfish, has been one of the most sought-after commercial and recreational finfish in the Chesapeake Bay since colonial times. Striped bass is an anadromous species and migrates along the Atlantic coast. Adult fish return to tidal tributaries to spawn in spring months. The Chesapeake Bay forms the largest nursery for juvenile striped bass on the Atlantic coast, serving as spawning and nursery grounds for 70–90% of the Atlantic population.

Following record high catches in the early 1970s, reported catches from commercial and recreational fisheries declined precipitously. Declines in striped bass landings, abundance, and recruitment levels were attributed primarily to overfishing, which may have made the population more susceptible to stresses from pollution and natural environmental variability. In response to this downturn, Congress passed the Atlantic Striped Bass Conservation Act and several states imposed fishing moratoria in the late 1980s. The Chesapeake Bay fishery reopened in 1990 after stocks rebounded, and as a testament to the success of the management actions, the fishery was declared

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"restored" in 1995. Although fishing mortality remains tightly controlled in the present fishery, concerns exist regarding striped bass health and condition, due to environmental and nutritional stressors and the prevalence of the disease mycobacteriosis.

Strategies for achieving and maintaining a healthy and sustainable striped bass stock include: long-term monitoring to establish and track population and stock health metrics; targeting dedicated research activities to address critical knowledge gaps; periodically assessing population structure and status as a direct measure of stock condition and an indirect indicator of habitat suitability; facilitating science-based stock and habitat management; and using an adaptive resource management paradigm.

Desired Result 1e

Increased Alosines Populations (Interim Management)

American shad, hickory shad, alewife, and blueback herring, collectively termed "Alosines," are important anadromous species that historically supported large commercial fisheries along the east coast of the United States. American shad once supported the most valuable finfish fishery in the Chesapeake Bay. Alosines play an important ecological role in freshwater, estuarine, and marine food webs. Through their return migrations as adults, they may also play a significant role in the transfer of nutrients from the marine system to freshwater rivers.

Stocks of Alosines in the Chesapeake and along the Atlantic coast are low relative to historic levels and no longer support robust commercial fisheries. These declines have been attributed to overfishing, habitat loss due to impediments (dams and blockages), spawning migrations, and poor water quality. Recent indications, however, suggest that greater numbers of American shad and hickory shad are returning to Chesapeake Bay spawning tributaries. Factors contributing to the increases are dam removals, stocking of hatchery-reared shads, construction of fish passages, and restrictions on Atlantic coastal intercept fisheries.

Strategies for achieving and maintaining healthy and sustainable Alosine stocks include: long-term monitoring to establish and track population and stock health metrics; targeting dedicated research activities to address critical knowledge gaps; periodically assessing population structure and status as a direct measure of stock condition and an indirect indicator of habitat suitability; facilitating science-based stock and habitat management; and using an adaptive resource management paradigm.

Desired Result 1f

Increased Menhaden Population (Interim Management)

The Atlantic menhaden is a schooling fish in coastal and estuarine waters and is both economically and ecologically important in Chesapeake Bay and coastwide. The Bay's commercial purse seine fishery is one of the most productive on the Atlantic coast. The adult menhaden is a filter feeder that grazes on plankton and forms an important link in the coastal marine food chain, influencing the conversion and exchange of energy and organic matter within the coastal ecosystem. Menhaden is a favored forage species for many predatory fish including striped bass.

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Due to Atlantic menhaden's ecological importance, concern has grown over the effect of intensive fishing and potential for population decline. Although the spawning stock is currently considered healthy, recruitment levels have dropped over the past 15 to 20 years and are now contributing to a decline in stock size (numbers and biomass). Causes of recruitment declines remain unknown, although scientists have cited changing environmental conditions in ocean or estuary nursery areas, possible increases in predation mortality, and heavy fishing on adult stock as contributing factors.

Strategies for achieving and maintaining a healthy and sustainable menhaden stock include: long-term monitoring to establish and track population and stock health metrics; targeting dedicated research activities to address critical knowledge gaps; periodically assessing population structure and status as a direct measure of stock condition and an indirect indicator of habitat suitability; facilitating science-based stock and habitat management; and using an adaptive resource management paradigm.

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GOAL 2

Protect and Restore Vital Aquatic Habitats

Restore those aquatic habitats and natural areas that are vital to the survival and diversity of the living resources of the Bay and its rivers.

Rationale

Habitats of particular importance to Chesapeake watershed fisheries and other living resources are wetlands, submerged aquatic vegetation, and in-stream fish habitat. These provide the most vital sheltering, feeding, and breeding environments for fisheries.

Healthy, vital habitats are reliant upon addressing habitat degradation on two fronts: (1) elimination of the causes of the problem, or "stressors," combined with (2) restoration efforts to help jump-start the "response" of vital habitats. This long-term restoration goal focuses on achieving results and implementing strategies for the latter of these fronts, as Goal 4 (Maintain Healthy Watersheds) encompasses strategies for the former.

Successful restoration relies on significant federal, state, local, and nongovernmental participation in large- and small-scale restoration efforts in targeted areas, combined with both incentive and grant programs for restoration on private lands, and government-sponsored restoration on public lands.

Achievement of this goal depends on habitat restoration results in four areas: healthy and abundant migratory fish habitat, healthy and abundant submerged aquatic vegetation, restored streams, and restored wetlands providing habitat and water quality. These desired results are described below.

Desired Result 2a

Healthy and Abundant Migratory Fish Habitat

Chesapeake Bay tributaries were once crucial habitat for migratory (anadromous and catadromous) fish species. The installation of dams and other barriers along all major streams blocked these migratory routes, vastly diminishing the abundance of these species. Yet, progress is being made towards opening up these routes. Of particular importance is restoring habitat for American shad, as nearly 50% of the species' potential restoration in the Chesapeake Bay lies in the waters upstream of the Conowingo Dam on the Susquehanna River and the Boshers Dam on the James River.

Strategies for achieving healthy and abundant migratory fish habitat focus on: completing dam removal projects that restore as many habitat and stream functions as possible; prioritizing fish passage in the Susquehanna and James Rivers/watersheds; helping federal and state dam owners to set the example for fish passage projects at their own facilities; using federal and state engineers to provide low-cost dam removal designs for Chesapeake Bay watershed projects; regulating installation of new dams and other blockages; and ensuring streams can support fish populations.

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Desired Result 2b

Healthy and Abundant Submerged Aquatic Vegetation (SAV)

Underwater Bay grasses, or submerged aquatic vegetation (SAV), provide critical sheltering, feeding, and/or breeding habitat for blue crabs and other Bay fish species. Bay grasses have declined significantly over decades, primarily as a result of declines in water clarity due to high nutrient and sediment pollution in Bay waters.

Restoration of Bay grasses depends first and foremost on restoring water clarity in areas for SAV growth. Water quality criteria reflect the light requirements for growth and maintenance of SAV populations throughout the shallow waters of the Chesapeake Bay and its tidal tributaries. Restoration of water quality, including water clarity, is addressed separately in goal three below.

In addition, however, strategies for restoration are needed to provide adequate SAV habitat: accelerating the protection of existing SAV beds; restoring SAV through planting and transplantation; enhancing public communication and education regarding SAV; and conducting research to support SAV protection and restoration.

Desired Result 2c

Healthy and Abundant Wetlands

Wetlands are unique, as they provide multiple benefits in addition to their vital habitat value: buffering shorelines from storm damage; mitigating flooding; and absorbing and filtering storm water. In particular, healthy and abundant wetlands help maintain water quality, making their restoration and conservation a double priority.

This result focuses primarily on wetlands restoration and includes strategies for restoring wetland acreage and restoring the function of degraded wetlands. In both cases, these strategies employ geographically focused efforts aimed towards areas with high wetland restoration potential, high potential benefit to water quality, and habitat value for living resources.

Desired Result 2d

Restore Stream Health

Streams provide the interconnection between people's activities in the 64,000 square-mile watershed and conditions in the Bay. Restoring the health of streams will provide (1) improved conditions for fish and living resources in local watersheds, (2) reduced amounts of nutrients, sediment, and contaminants being delivered to the Bay, and (3) safer drinking water quality for people. There needs to be improved coordination of efforts to implement actions to remove local streams from the "impaired water lists," reduce pollutants to the Bay, and address the increased numbers of fish kills and observations of poor fish health in streams and rivers of the Bay watershed and the Bay itself.

Strategies for restoring stream health include: focus actions to reduce nutrients, sediment, and contaminants in watersheds that will provide optimum benefits to improve local stream quality and reduce loads to the Bay; understand the causes of fish kills and poor fish health in streams to develop management solutions; and implement stream restoration actions to improve hydrologic conditions and decrease sediment erosion.

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GOAL 3

Restore Water Quality

Achieve and maintain the water quality necessary to support the aquatic living resources of the Bay and its tributaries and to protect human health.

Rationale

The *Chesapeake 2000* agreement set the following objective: "By 2010, correct nutrient- and sediment-related problems in the Chesapeake Bay and its tidal tributaries sufficiently to remove the Bay and tidal portion of tributaries from the list of impaired waters under the Clean Water Act."

Chesapeake Bay water quality standards, adopted into state regulations in Maryland, Virginia, Delaware and the District of Columbia in the last several years, define the water quality conditions necessary to support rockfish, crabs, oyster, underwater Bay grasses and other aquatic organisms found in the Bay's tidal waters. The partners used a combination of scientific research findings, long term monitoring results and computer model simulations to determine what level of reductions in nutrient and sediment pollutants were necessary to meet these water quality standard regulations.

These nutrient and sediment pollutants emanate from a series of pollution source sectors. Strategies in this plan are prioritized into the sectors where they can produce the most cost-effective and greatest nutrient and sediment reductions: agricultural lands and wastewater treatment plants. As a focus area, the CBP partnership is relying on these two source "sectors" to achieve about 80% of the nutrient reductions necessary to restore the Bay while providing additional benefits of reducing the loads of chemicals[14]. With permitting of all the significant wastewater discharging facilities well underway and upgraded treatment systems coming on-line, reaching the parallel set of reduction goals for agricultural lands by working with farmers and producers is a major focus of the partnership.

In addition, partners are working to: control loads of nutrients, sediments, and chemical contaminants that originate from developed lands by using regulatory and voluntary strategies; reduce nitrogen loads from on-site and septic systems; reduce nutrient and sediment loads into streams by expanding forest buffers; control streambed and shoreline sediment sources; manage air pollution emissions that generate airborne nitrogen deposits; and reduce acid mine drainage impact on streams.

All of these core actions needed to improve water quality conditions have been identified, but may be modified in the future based on improved monitoring, assessment of the effectiveness of management actions, and potential influences of climate change and variability. Desired results are described below.

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[14] Chesapeake Bay Commission. 2004. Cost-Effective Strategies for the Bay: Six Smart Investments for Nutrient and Sediment Reductions. Annapolis, Maryland.

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Desired Result 3a

Reduced Loads from Municipal and Industrial Wastewater

Discharges from 483 significant municipal and industrial wastewater treatment facilities represent more than 95% of the total flow from all treatment facilities in the Bay watershed, and currently contribute 20% of the nitrogen and 22% of the phosphorus loads entering the Chesapeake Bay.

CBP's priority is to fully implement the basinwide National Pollutant Discharge Elimination System (NPDES) permitting approach that calls for permit limits on annual nutrient loads from these 483 facilities. Load reductions will be achieved through constructing nutrient reduction technology upgrades and implementing nutrient trading programs. A related priority is to provide treatment facility operators with information on how to reduce releases of certain chemicals from wastewater facilities while implementing their treatment technology upgrades.

Strategies for achieving this desired result include: issuing new annual nitrogen and phosphorus cap load limits in the NPDES permit for each respective significant municipal or industrial wastewater treatment facility by 2010 during the five-year permit renewal cycle starting in August 2005; funding the necessary facility-specific nutrient reduction technology upgrades or undertaking nutrient credit exchanges to achieve and maintain the facility-specific permitted limits; determining the schedule for individual treatment facility upgrades (through 2030) for each of the 483 significant facilities; and quantifying the loading contributions from non-significant facilities, then proceeding to cap their loads into the future.

Desired Result 3b

Reduced Loads from Agricultural Lands and Animal Operations

The six Chesapeake Bay watershed states are calling for getting two-thirds of the nutrient reductions needed to restore Bay water quality from the agricultural sector. This sector contributes over 42% of the nitrogen, 47% of the phosphorus and 76% of the sediment loads to the Bay.

Partners will work to reduce loads from agricultural lands and animal operations, implementing conservation practices on 6.5 million acres of agricultural lands. The partners will prioritize implementation of conservation practices in those watersheds where agricultural nutrient and sediment reductions can make a significant contribution to restoring valuable Chesapeake Bay living resources. Emphasis will also be placed on accelerating implementation of the most cost-effective conservation practices that will result in the greatest nutrient and sediment reductions, while not contributing increased pesticide loadings.

Strategies for achieving this desired result include: setting priorities for specific practices in watersheds where reductions can make a significant contribution to restoring water quality; accelerating implementation of the most cost-effective conservation practices that produce the greatest nutrient reductions; pursuing sustainable nutrient and sediment reductions such as animal feed and diet management, enhanced nutrient management, and development of niche markets for products that are produced in a

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Bay-friendly way; continuing expanded implementation of the Strategy for Managing Surplus Nutrients from Agricultural Animal Manure and Poultry Litter in the Chesapeake Bay Watershed; coordinating major federal funding programs to focus efforts in priority watershed areas; seeking long-term and consistent funding for state agricultural incentive programs; and engaging the corporate sector in defining how agricultural products are produced, backed up with third party verification and direct economic consequences for the producer.

Desired Result 3c

Reduced Loads from Developed Lands

Developed lands contribute nutrients (16% of the nitrogen, and 32% of the phosphorus) as well as 24% of the sediment loads to the Chesapeake Bay. The Chesapeake Bay Program partnership seeks to: (1) reduce and then cap nutrient and sediment loads from developed lands at 44.3 million pounds of nitrogen, 3.7 million pounds of phosphorus, and 0.6 million tons of sediment; and (2) ultimately achieve "no net increase" in nutrient and sediment loads from developing lands.

Strategies for achieving reductions on developed lands include: controlling storm water from existing development with no or failing storm water management (through a combination of regulatory programs and redevelopment projects); and evaluating federal, state, and local storm water regulations and programs to strengthen the links between these programs and local/regional water quality goals.

Significantly, loads from developing lands represent a growing source sector. Strategies for controlling loads from developing lands are detailed within Goal 4.

Desired Result 3d

Reduced Loads from Onsite and Septic Systems

Relative contributions from onsite and septic systems will continue to grow due to reductions in other sources and an overall expansion in the numbers of systems installed. With a cap on loads being put in place for hundreds of significant municipal wastewater treatment facilities, many local and state agencies are concerned about the potential for developers and homeowners to turn to installation of septic systems or onsite treatment systems for small groups of homes as local municipal treatment facilities reach their caps on loads.

Strategies for achieving this desired result include: getting a better understanding of existing local requirements and restrictions governing installation and maintenance of these treatment systems, and providing mandates and incentives for installation of new systems with denitrification capabilities.

Desired Result 3e

Reduced Loads from Streamside and Tidal Shoreline Riparian Areas

Storm events carry nutrients and sediment across the land areas along streams and shorelines and into water bodies. Restoring and conserving forest buffers along streams and shorelines significantly reduces these nutrient and sediment flows, while also providing other habitat benefits.

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Chesapeake Bay Program partners seek to expand riparian forest buffers, particularly in those areas of highest value to restoring or protecting water quality. Strategies for expanding riparian forest buffers include: targeting riparian buffer restoration towards those areas that will give the best water quality benefits and are most vulnerable to loss from development; and increasing incentives to plant and maintain riparian forest buffers.

Strategies for conserving existing forest buffers are detailed in Goal 4.

Desired Result 3f

Reduced Sediment Loads from Streambanks and Tidal Shorelines

In 2003, the Chesapeake Bay Program partners agreed to a basinwide cap on sediment loads of 4.15 million tons from the current estimated 5.83 million tons per year. Achieving this goal will help improve Bay water clarity and assist in the restoration of 185,000 acres of SAV.

The long transport times of sediment from the watershed to the estuary, and the multiple sources of sediment to the estuary, have implications for targeting management actions to improve water clarity. In general, sediment reduction to improve conditions in the estuary should be focused at sources that are closest to tidal waters or deliver the finest sediments. The partners are currently focusing sediment reduction strategies on implementing non-point source best management practices, such as agricultural cover crops and states' erosion and sediment control programs in the upland/watershed areas, as part of achieving the needed phosphorus load reductions. In the tidal areas, the focus is on establishing living shorelines and SAV plantings. However, a better understanding of the sources of sediment is needed for the partners to further target implementation actions.

Strategies for achieving this desired result include: identifying watersheds and associated streams with high sediment delivery potential to tidal waters and targeting them for sediment reduction and stream restoration actions; improving scientific understanding and modeling tools necessary to refine sediment reduction targets and better focus management approaches at areas that significantly contribute to water clarity and SAV degradation; piloting a Regional Sediment Management approach within the Chesapeake Bay watershed; and targeting implementation of "living shorelines."

Desired Result 3g

Reduced Loads from Air Emissions

The Chesapeake Bay watershed receives nitrogen compounds via air deposition from an airshed of 570,000 square miles encompassing 17 states. Atmospheric deposition is estimated to contribute 22% of the nitrogen load delivered to the Bay.

Additional air pollution controls are expected for meeting human health-based air quality standards, and the states are revising their federally-approved State Implementation Plans accordingly. CBP partners determined that implementation of such regulations would achieve nitrogen reductions of about 15 million pounds annually by 2010.

Strategies for achieving this desired result include: fully implementing the federal Clean Air Interstate Rule and state air regulatory programs required to meet air quality stan-

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dards; completing research on practices to reduce agricultural ammonia emissions from animal operations; developing new management practice definitions and efficiencies for agricultural ammonia emissions from animal operations; and incorporating new management practices into the states' tributary strategies along with establishing the necessary cost share and technical support delivery systems for their widespread implementation.

In addition, implementation of land management practices (e.g., forest buffer restoration, stormwater management using natural systems, agricultural conservation practices) reduces the transfer of atmospheric nitrogen from land to water bodies. These practices are addressed in other sections of this strategic framework.

Desired Result 3h

Reduced Acid Mine Drainage Impacts on Stream Nutrient Cycling

There is a growing body of scientific evidence that supports the conclusion that a healthy stream—one with abundant, balanced aquatic life—can actively remove nitrogen and assist with needed downstream nutrient reductions. A healthy stream's aquatic life, usually in the form of attached benthic algae, can uptake excess nitrogen. These algae, in turn, would either be consumed within the stream's food web and be retained in the local stream's biological community, or decomposing algal nitrogen would undergo the natural process of denitrification and be released as gas back to the atmosphere.

Strategies for achieving this desired result include: supporting the ongoing research efforts to better quantify the nutrient reduction benefits of restoring streams impacted by acid mine drainage into ecologically healthy streams; and using that information to both credit and geographically target such stream restoration efforts for multiple local and downstream benefits.

Desired Result 3i

Reduced Chemical Contaminant Loads

Currently less than 33% of the monitored tidal waters contain no impairment for chemical contaminants[15]. Of the more than 67% with chemical impairments, nearly all (95%) identify PCBs as the source. Additionally, the health of fish in the Bay and nontidal rivers is adversely impacted by chemical contaminants. Many of the same wastewater treatment and non-point source reduction actions that are needed for nutrients and sediments apply to reducing chemical contaminants because they share many of the same sources and conveyance mechanisms (i.e., stormwater runoff, wastewater discharge, and atmospheric deposition).

Strategies for achieving this desired result include: identifying management actions that will provide concurrent reduction of nutrients, sediment, and chemical contaminants to the estuary and in the watershed; and identifying the priority areas where management actions will have the greatest benefit for improving water quality conditions for living resources in the estuary and fish populations in the watershed.

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[15] Additional information on monitored tidal waters is available at www.chesapeakebay.net/status_chemicalcontaminants.aspx.

GOAL 4

Maintain Healthy Watersheds

Develop, promote and achieve sound land use practices which protect watershed resources and water quality, maintain reduced pollutant loadings for the Bay and its tributaries, and restore and preserve aquatic living resources.

Rationale

What happens on the land has a direct effect on water quality and living resources, especially in the Chesapeake Bay watershed where the land area to water volume ratio is extremely high. While Goals 2 and 3 above focus on *reducing* pollutants from existing land uses and *restoring* certain ecological functions, this goal addresses *prevention* of future harm and *maintenance* of existing ecological functions.

A growing source of nutrient and sediment pollution in the watershed stems from the conversion of existing forest, wetlands, and other resource lands to developed, hardened surfaces and the subsequent disruption of these lands' natural filtration and absorption capabilities. This problem can be addressed with three key strategy areas: permanent preservation of valuable resource lands that have the greatest value for maintaining water quality and protecting living resources; minimizing the conversion of forests, wetlands, and working farms; and minimizing the disruption of pre-development hydrology during land development. Desired results are described below.

Desired Result 4a

Preserved Valuable Resource Lands

Key resource lands—especially forests and wetlands—are vital to maintaining water quality. For example, forests prevent millions of pounds of nitrogen and other pollutants from reaching the Bay each year. While trends vary locally, the watershed has lost 100 acres of forest land per day since the mid-1980s. Every acre of forest converted to other uses means more nutrients enter the Bay, making it more difficult to mitigate development impacts and resulting in additional loss and fragmentation of forest habitat. If this forest loss continues, nitrogen loads alone will increase by 1,300 pounds per day to the Bay.

Retaining forests across the watershed is a cost-effective strategy for maintaining caps on nutrients in the future. It would be costly to replace with technology
the services that forests provide naturally for free, such as drinking water source filtration, flood control, stormwater management, energy conservation, and greenhouse gas and air pollution control.

Strategies for preserving valuable resource lands include: supporting local preservation planning with educational, technical, and financial assistance; protecting lands of national value for conservation and recreation

purposes; and providing financial support for state and local land protection.

Desired Result 4b

Minimized Conversion of Forest, Wetlands and Working Farms

Just as it is vitally important to permanently preserve those lands of highest value for maintaining water quality, it is equally important to conserve other resource lands that help maintain healthy watersheds—forests, working farms, and wetlands. These lands allow rain and melting snow to slowly percolate into the ground, filtering the water and replenishing ground water supplies. They reduce the rate and flow of unmanaged stormwater into streams, rivers, and the Bay, and consequently directly reduce in-stream nutrient and sediment levels.

The conversion of these lands to impervious cover—hardened surfaces created during development—is a significant source of increasing nutrient and sediment pollution. Water flows rapidly off impervious surfaces carrying pollutants into streams, rivers, and the Bay. This can be addressed through minimizing the conversion of forests, wetlands, and working farms to developed uses (as well as paying attention to the specific practices of development addressed separately under 4c below).

Strategies for achieving this desired result include: supporting local conservation planning and implementation with educational, technical, and financial assistance; supporting small private forest management and conservation with technical assistance; making effective use of available funding for working forest conservation in Farm Bill programs; and facilitating the development of ecosystems services markets.

Desired Result 4c

Minimize Impacts on Pre-Development Hydrology

The human population in the Chesapeake Bay watershed has more than doubled since 1950, from 8 million to over 16.7 million. The population in the watershed is now growing by 130,000 residents annually. This trend is expected to continue. Between 1990-2000, population increased 8% while impervious cover increased by 41%. This increased imperviousness of the watershed has resulted in increased stormwater runoff, changes to flows in local streams, increased flooding, decreased forest and vital riparian habitat, and increased nutrient and sediment loads to the Chesapeake Bay.

In 2005, members of the Executive Council acknowledged the need to control increasing loads from new development and signed Directive 04-2 “Meeting the Nutrient and Sediment Reduction Goals.” The directive urged the CBP to develop a prevention- and preservation-oriented approach to stormwater and new development, with regulatory and incentive tools to encourage environmentally sensitive development practices that incorporate natural site features into stormwater management.

Strategies for achieving this result include: providing community level nutrient and sediment allocations; strengthening states’ federal regulatory programs (e.g., NPDES and Section 404); strengthening requirements for using federal Clean Water Act state implementation funds to support stormwater reduction; establishing a minimum develop-

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ment impact model and standards; recognizing and certifying minimum impact development; promote design and implementation of green infrastructure; supporting local implementation of codes and ordinances with educational, technical, and financial assistance; implementing minimum impact development in federal projects; and expanding Urban Tree Canopy goals.

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GOAL 5

Foster Chesapeake Stewardship

Promote individual stewardship and assist individuals, community-based organizations, businesses, local governments and schools to undertake initiatives to achieve these goals and our shared vision.

Rationale

Stewardship of the Chesapeake watershed depends on fostering and maintaining an ethic of personal and collective responsibility for the Bay and its waters. This is essential, as the individual and collective actions of the citizenry of the watershed define its water quality. Accomplishing a comprehensive restoration plan for an ecosystem as complex as the Chesapeake Bay depends on the engagement of restoration leaders, stakeholder groups, and citizens throughout the watershed.

By providing an array of opportunities, CBP partners can optimize their ability to connect with and inform restoration leaders, citizens, and stakeholder groups in the context of their interests, values, and current level of understanding or motivation. CBP partners foster Chesapeake stewardship through: enhanced public access, high-quality watershed education, citizens connected to Chesapeake values, and increased engagement of citizens and communities. Desired results are described below.

Desired Result 5a

Enhanced Public Access

Public access points are places anyone can visit to swim, hike, paddle, or simply enjoy the history and natural beauty of the Chesapeake. Providing access to natural areas helps the public build a connection with the rivers, forests, and wildlife of the Bay watershed. Chesapeake Bay Program partners are committed to providing all citizens with recreational access to the Bay and its tributaries. Public access is a vital part of Bay restoration and the future of the resource.

CBP's state and federal partners are working with local governments and other stakeholder organizations to enhance a system of public access points to the Bay and its tributaries.

Strategies for achieving this result include: enhancing public access through the Captain John Smith Chesapeake National Historic Trail (CAJO); enhancing and expanding the ability of Chesapeake Bay Gateways and Watertrails to provide public access; and developing a Bay-wide Access Plan.

Desired Result 5b

High Quality Watershed Education

There are approximately 3 million students in 329 school divisions in the Chesapeake watershed. Each of these students lives just minutes from one of the 100,000 streams and rivers that drain to the Bay, but many are unaware of this critical connection.

CBP partners seek to increase the quality and quantity of experiential learning about

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the Chesapeake watershed through meaningful watershed educational experiences (MWEEs). Increasing knowledge and literacy through such experiences will create opportunities for in-depth investigation and analysis that enhance a deeper understanding of ecological concepts, environmental interrelationships, and human implications. Student matriculation and teacher turnover means that the MWEEs commitment depends on ongoing support.

Strategies for achieving this result include: increasing and improving MWEE implementation throughout the watershed; providing technical and financial assistance to environmental education organizations and professionals; ensuring availability of best resources for educators; increasing thoughtful use of technology in the delivery of MWEEs; and ensuring that unique expertise and extensive resources of government and research partners are utilized in delivering MWEEs.

Desired Result 5c

High-Quality Interpretation of the Watershed and Its Values

There is a rich natural and cultural heritage that has long filled many Chesapeake citizens with a deep appreciation of the special qualities of the region and its resources. Maintaining this appreciation is a crucial element in fostering Chesapeake stewardship. Many studies demonstrate that this occurs most strongly through place-based interpretive experiences. Interpretation facilitates connections between the meaning of the resource and the interests of the visitor.

CBP partners strive to provide opportunities for informal education and meaningful experiences with the cultural, historic, natural, and recreational richness of the Chesapeake Bay and its watershed.

Strategies for achieving this result include: supporting place-based interpretation at partner sites and along trails; creating Bay-wide interpretive materials, media, and programming; increasing and improving informal educational and lifelong learning opportunities; and enhancing Heritage Tourism marketing and product development.

Desired Result 5d

Increased Citizen and Community Engagement

Providing comprehensive public information and building the broad base of awareness of Bay health and ecological issues forms the basis for support of the comprehensive restoration plan and furthers engagement of all stakeholders. Such information, technology, skills, and increased confidence—through collaboration, training, technical assistance, and mentoring—not only help increase engagement, but also enhance the ability of citizens and community groups to participate in Bay restoration activities on their properties and in their watersheds.

Strategies for achieving this result include: developing a comprehensive strategic communications plan to address all aspects of citizen and community engagement; executing year-round, timed public relations initiatives year round that proactively build public understanding of Bay program partner science and restoration work; developing social marketing initiatives targeted to specific audiences; providing technical assistance to targeted audiences to promote best practices; supporting localized, citizen-based vol-

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unteer conservation and restoration activities; executing an internal communications structure; facilitating public participation through the citizens advisory committee; developing a public involvement plan; and coordinating the CBP partnership communications staffs.

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GOAL 6

Enhance Partnering, Leadership, and Management

Improve and enhance the leadership and management of the Chesapeake Bay Program Partnership.

Rationale

CBP was created in 1983 on the fundamental basis of a partnership among the State of Maryland, the Commonwealths of Virginia and Pennsylvania, the District of Columbia, the Chesapeake Bay Commission, and the U.S. Environmental Protection Agency, representing the federal government. In 1987, Congress authorized the creation, and in 2000, the subsequent continuance, of CBP through Section 117 of the Clean Water Act. Referred to as a "comprehensive cooperative program," CBP was authorized by Congress to perform the following critical coordinating functions:

- Implementing and coordinating science, research and monitoring
- Reporting on the environmental quality and living resources of the Chesapeake Bay and its watershed
- In cooperation with other federal, state and local authorities, assisting in developing and implementing specific action plans
- Coordinating the actions of EPA with those of other federal, state, and local authorities
- Implementing outreach programs for public information, education, and stewardship

While not explicitly identified in *Chesapeake 2000*, this sixth goal is set forth to acknowledge the important roles of coordination, leadership, infrastructure and governance that are central to the effective management of the CBP partnership. Desired results related to sustaining and improving CBP's effectiveness are described below.

Desired Result 6a

Effective Infrastructure Systems

CBP provides critical infrastructure support and services that are the foundation for the partnership. The infrastructure includes facilities, administrative support, and information technology services that contribute vitally to the overall work of the partnership.

Strategies for maintaining and improving this infrastructure and support include: maintaining an integrated "campus" reflecting the full spectrum of partners; advancing "green" qualities of current and future facilities; providing superior information technology support for resident staff and partners; and continuing to enhance the quality and delivery of administrative support and services to CBP partners.

Desired Result 6b

Responsive and Effective Organizational Management

The CBP partnership is supported by a robust and evolving organizational structure that provides for leadership, direction, implemen-

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tation, and deliberation among the various watershed CBP partners and stakeholders. This structure currently includes:

- The Chesapeake Executive Committee (i.e., Governors of MD, VA, and PA, Mayor of DC, EPA Administrator, and the Chair of the Chesapeake Bay Commission, a tri-state legislative body), which meets annually to set the broad direction of the Program;
- The Principals' Staff Committee (i.e., State Secretaries, EPA Regional Administrator), which meets quarterly to oversee strategy development and implementation;
- The Implementation Committee, which meets monthly to guide and coordinate implementation efforts of the CBP partners;
- Three independent Advisory Committees (Citizens, Local Government, and Science and Technical); and
- Numerous subcommittees and working groups.

Strategies for maintaining and improving the organization of the partnership include: integrating adaptive management principles into the culture and structure of the organization; continuing to enhance meeting management to optimize progress and results; relying on consensus, where necessary, yet also fostering new strategies that encourage partner leadership and innovation; and implementing program enhancements to improve the partnership's effectiveness.

Desired Result 6c

Effective Coordination, Accountability, and Evaluation

CBP includes an extensive range of federal, state, local, non-governmental, and other partners who share a common mission to restore and protect the Chesapeake Bay and its watershed. Each partner utilizes different tools, resources, and authorities in implementing actions to restore the Bay. To optimize the delivery, implementation and effectiveness of these actions, the Chesapeake Action Plan provides a new mechanism for the partners to optimize delivery of and to coordinate programs, activities and implementation actions in ways never before possible. The CAP will also enhance accountability for these actions and results.

CBP's partnership also values independent feedback and evaluation from its own Advisory Committees and from external sources. In the period from 2003 to 2008, the Chesapeake Bay Program was the subject of over 20 evaluations, studies and reports (Appendix C). These efforts provide important feedback for improving CBP.

Strategies for enhancing coordination, accountability, and evaluation include: evolving and employing the Chesapeake Action Plan as a tool to coordinate partner actions, enhancing accountability and depiction of progress; tailoring the CAP to address the needs of state partners to the greatest extent possible; and implementing approaches to foster ongoing, independent evaluation of the CBP partnership's efforts.

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Desired Result 6d

Effective Reporting on Health and Restoration Progress and Results

CBP coordinates the science, monitoring, and analysis that underpin the ongoing reporting of the health of the Bay. Annually, CBP develops and issues a comprehensive assessment of the health and restoration progress in the watershed and Bay. Together with other periodic CBP reports, these serve as a key means of informing the public and others on actions, progress, and results.

Strategies for effectively reporting on health and restoration progress and results include: continuing development of the annual Chesapeake Bay Health and Restoration Assessment; and using the annual assessments to inform CBP partners' efforts to adaptively manage the program.

Desired Result 6e

Effective Grants, Contracts, and Interagency Agreements Management

Of the funds provided by Congress to the EPA CBP Office, over $15 million annually is for grants to support implementation efforts by states and others. CBP plays a key role in the effective management of grants, contracts, and interagency agreements. In 2006, EPA's Inspector General evaluated CBP's grant management efforts and issued a report providing no recommendations for improvement.

Strategies for achieving this result are: continuing to follow EPA procedures and protocols that demonstrate environmental results and are linked to EPA's Strategic Plan; and developing work plans that contain well-defined outputs and outcomes that relate to improved aquatic health of the Chesapeake Bay.

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APPENDIX B

Status of *Chesapeake 2000* Commitments

Subsection	Ref. No.	Commitment	Due Date	Complete
Living Resource Protection and Restoration				
Oysters	1.1.1.1	By 2010, achieve, at a minimum, a tenfold increase in native oysters in the Chesapeake Bay, based upon a 1994 baseline.	2010	No
	1.1.1.2	By 2002, develop and implement a strategy to achieve this increase by using sanctuaries sufficient in size and distribution, aquaculture, continued disease research and disease-resistant management strategies, and other management approaches.	2002	Yes
Exotic Species	In 2000, establish a Chesapeake Bay Program Task Force to:			
	1.2.1.1	Work cooperatively with the U.S. Coast Guard, the ports, the shipping industry, environmental interests and others at the national level to help establish and implement a national program designed to substantially reduce and, where possible, eliminate the introduction of non-native species carried in ballast water.	2000	Yes
	1.2.1.2	By 2002, develop and implement an interim voluntary ballast water management program for the waters of the Bay and its tributaries.	2002	Yes
	1.2.2.1	By 2001, identify and rank non-native, invasive aquatic and terrestrial species, which are causing or have the potential to cause significant negative impacts to the Bay's aquatic ecosystem.	2001	Yes
	1.2.2.2	By 2003, develop and implement management plans for those species deemed problematic to the restoration and integrity of the Bay's ecosystem.	2003	Yes
Fish Passage and Migratory and Resident Fish	1.3.1	By June 2002, identify the final initiatives necessary to achieve our existing goal of restoring fish passage for migratory fish to more than 1,357 miles of currently blocked river habitat by 2003 and establish a monitoring program to assess outcomes.	2002	Yes
	1.3.2	By 2002, set a new goal with implementation schedules for additional migratory and resident fish passages that addresses the removal of physical blockages. In addition, the goal will address the removal of chemical blockages caused by acid mine drainage. Projects should be selected for maximum habitat and stock benefit.	2002	Yes
	1.3.3	By 2002, assess trends in populations for priority migratory fish species. Determine tributary-specific target population sizes based upon projected fish passage, and current and projected habitat available, and provide recommendations to achieve those targets.	2002	Yes
	1.3.4	By 2003, revise fish management plans to include strategies to achieve target population sizes of tributary-specific migratory fish.	2003	No
Multi-species Management	1.4.1	By 2004, assess the effects of different population levels of filter feeders such as menhaden, oysters and clams on Bay water quality and habitat.	2004	Yes
	1.4.2	By 2005, develop ecosystem-based multi-species management plans for targeted species.	2005	No
	1.4.3	By 2007, revise and implement existing fisheries management plans to incorporate ecological, social and economic considerations, multi-species fisheries management and ecosystem approaches.	2007	No
Crabs	1.5.1	By 2001, establish harvest targets for the blue crab fishery and begin implementing complementary state fisheries management strategies Baywide. Manage the blue crab fishery to restore a healthy spawning biomass, size and age structure.	2001	Yes

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Subsection	Ref. No.	Commitment	Due Date	Complete
Vital Habitat Protection and Restoration				
Submerged Aquatic Vegetation	2.2.1	Recommit to the existing goal of protecting and restoring 114,000 acres of submerged aquatic vegetation (SAV).		Yes
	2.1.2	By 2002, revise SAV restoration goals and strategies to reflect historic abundance, measured as acreage and density from the 1930s to the present. The revised goals will include specific levels of water clarity that are to be met in 2010. Strategies to achieve these goals will address water clarity, water quality, and bottom disturbance.	2002	Yes
	2.1.3	By 2002, implement a strategy to accelerate protection and restoration of SAV beds in areas of critical importance to the Bay's living resources.	2002	Ongoing
Watersheds	2.2.1	By 2010, work with local governments, community groups and watershed organizations to develop and implement locally supported watershed management plans in two-thirds of the Bay watershed covered by this Agreement. These plans would address the protection, conservation and restoration of stream corridors, riparian forest buffers and wetlands for the purposes of improving habitat and water quality, with collateral benefits for optimizing stream flow and water supply.	2010	No
	2.2.2	By 2001, each jurisdiction will develop guidelines to ensure the aquatic health of stream corridors. Guidelines should consider optimal surface and groundwater flows.	2001	Yes
	2.2.3	By 2002, each jurisdiction will work with local governments and communities that have watershed management plans to select pilot projects that promote stream corridor protection and restoration.	2002	Ongoing
	2.2.4	By 2003, include in the "State of the Bay Report," and make available to the public, local governments and others, information concerning the aquatic health of stream corridors based on adopted regional guidelines.	2003	Yes
	2.2.5	By 2004, each jurisdiction, working with local governments, community groups and watershed organizations, will develop stream corridor restoration goals based on local watershed management planning.	2004	Ongoing
Wetlands	2.3.1	Achieve a no-net loss of existing wetlands acreage and function in the signatories' regulatory programs.		Yes
	2.3.2.1	By 2010, achieve a net resource gain by restoring 25,000 acres of tidal and non-tidal wetlands.	2010	No
	2.3.2.2	To do this we commit to achieve and maintain an average restoration rate of 2,500 acres per year basin wide by 2005 and beyond. We will evaluate our success in 2005.	2005	Yes
	2.3.3.1	Provide information and assistance to local governments and community groups for the development and implementation of wetlands preservation plans as a component of a locally based integrated watershed management plan.		Ongoing
	2.3.3.2	Establish a goal of implementing the wetlands plan component in 25% of the land area of each state's Bay watershed by 2010. The plans would preserve key wetlands while addressing surrounding land use so as to preserve wetland functions.	2010	No
	2.3.4	Evaluate the potential impact of climate change on the Chesapeake Bay watershed, particularly with respect to its wetlands, and consider potential management options.		Yes
Forests	2.4.1.1	By 2002, ensure that measures are in place to meet our riparian forest buffer restoration goal of 2,010 miles by 2010.	2002	Yes
	2.4.1.2	By 2003, establish a new goal to expand forest buffer mileage.	2003	Yes
	2.4.2	Conserve existing forests along all streams and shorelines.		No

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Subsection	Ref. No.	Commitment	Due Date	Complete
	2.4.3	Promote the expansion and connection of contiguous forests through conservation easements, greenways, purchase and other land conservation mechanisms.		Yes
Water Quality Protection and Restoration				
Nutrients and Sediments	3.1.1	Continue efforts to achieve and maintain the 40% nutrient reduction goal agreed to in 1987, as well as the goals being adopted for the tributaries south of the Potomac River.		No
	3.1.2	By 2010, correct the nutrient - and sediment - related problems in the Chesapeake Bay and its tidal tributaries sufficiently to remove the Bay and the tidal portions of its tributaries from the list of impaired waters under the Clean Water Act. In order to achieve this:	2010	No
	3.1.2.1	By 2001, define the water quality conditions necessary to protect aquatic living resources and then assign load reductions for nitrogen and phosphorus to each major tributary.	2001	Yes
	3.1.2.2	Using a process parallel to that established for nutrients, determine the sediment load reductions necessary to achieve the water quality conditions that protect aquatic living resources, and assign load reductions for sediment to each major tributary by 2001.	2001	Yes
	3.1.2.3	By 2002, complete a public process to develop and begin implementation of revised Tributary Strategies to achieve and maintain the assigned loading goals.	2002	Yes
	3.1.2.4	By 2003, the jurisdictions with tidal waters will use their best efforts to adopt new or revised water quality standards consistent with the defined water quality conditions. Once adopted by the jurisdictions, the Environmental Protection Agency will work expeditiously to review the new or revised standards, which will then be used as the basis for removing the Bay and its tidal rivers from the list of impaired waters.	2003	Yes
	3.1.2.5	By 2003, work with the Susquehanna River Basin Commission and others to adopt and begin implementing strategies that prevent the loss of the sediment retention capabilities of the lower Susquehanna River dams.	2003	Ongoing
Chemical Contaminants	3.2.1	We commit to fulfilling the 1994 goal of a Chesapeake Bay free of toxics by reducing or eliminating the input of chemical contaminants from all controllable sources to levels that result in no toxic or bioaccumulative impact on the living resources that inhabit the Bay or on human health.		No
	3.2.2	By fall of 2000, reevaluate and revise, as necessary, the "Chesapeake Bay Basinwide Toxics Reduction and Prevention Strategy."	2000	Yes
	3.2.2.1	Complementing state and federal regulatory programs to go beyond traditional point source controls, including nonpoint sources such as groundwater discharge and atmospheric deposition, by using a watershed-based approach; and	2000	Yes
	3.2.2.2	Understanding the effects and impacts of chemical contaminants to increase the effectiveness of management actions.	2000	Yes
	3.2.3.1	Through continual improvement of pollution prevention measures and other voluntary means, strive for zero release of chemical contaminants from point sources, including air sources.		Ongoing
	3.2.3.2	Particular emphasis shall be placed on achieving, by 2010, elimination of mixing zones for persistent or bioaccumulative toxics.	2010	No
	3.2.4	Reduce the potential risk of pesticides to the Bay by targeting education, outreach and implementation if Integrated Pest Management and specific Best Management Practices on those lands that have higher potential for contributing pesticide loads to the Bay.		Ongoing

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Subsection	Ref. No.	Commitment	Due Date	Complete
Priority Urban Waters	3.3.1	Support the restoration of the Anacostia River, Baltimore Harbor, and Elizabeth River and their watersheds as models for urban river restoration in the Bay basin.		No
	3.3.2	By 2010, the District of Columbia, working with its watershed partners, will reduce pollution loads to the Anacostia River in order to eliminate public health concerns and achieve the living resource, water quality and habitat goals of this and past Agreements.	2010	No
Air Pollution	3.4.1	By 2003, assess the effects of airborne nitrogen compounds and chemical contaminants on the Bay ecosystem and help establish reduction goals for these contaminants.	2003	Ongoing
Boat Discharge	3.5.1.1	By 2003, establish appropriate areas within the Chesapeake Bay and its tributaries as "no discharge zones" for human waste from boats.	2003	Yes
	3.5.1.2	By 2010, expand by 50% the number and availability of waste pump-out facilities.	2010	No
	3.5.2	By 2006, reassess our progress in reducing the impact of boat waste on the Bay and its tributaries. This assessment will include evaluating the benefits of further expanding no discharge zones, as well as increasing the number of pump-out facilities.	2006	Ongoing
Sound Land Use				
Land Conservation	4.1.1	By 2001, complete an assessment of the Bay's resource lands including forests and farms, emphasizing their role in the protection of water quality and critical habitats, as well as cultural and economic viability.	2001	Yes
	4.1.2	Provide financial assistance or new revenue sources to expand the use of voluntary and market-based mechanisms such as easements, purchase or transfer of development rights and other approaches to protect and preserve natural resource lands.		Ongoing
	4.1.3.1	Strengthen programs for land acquisition and preservation within each state that are supported by funding.		Ongoing
	4.1.3.2	Target the most valued lands for protection.		No
	4.1.3.3	Permanently preserve from development 20% of the land area in the watershed by 2010.	2010	No
	4.1.4	Provide technical and financial assistance to local governments to plan for or revise plans, ordinances and subdivision regulations to provide for the conservation and sustainable use of the forest and agricultural lands.		Ongoing
	4.1.5	In cooperation with local governments, develop and maintain in each jurisdiction a strong GIS system to track the preservation of resource lands and support the implementation of sound land use practices.		Ongoing
Development, Redevelopment, and Revitalization	4.2.1	By 2012, reduce the rate of harmful sprawl development of forest and agricultural land in the Chesapeake Bay watershed by 30% measured as an average over five years from the baseline of 1992-1997, with measures and progress reported regularly to the Chesapeake Executive Council.	2012	No
	4.2.2	By 2005, in cooperation with local government, identify and remove state and local impediments to low impact development designs to encourage the use of such approaches and minimize water quality impacts.	2005	Ongoing
	4.2.3	Work with communities and local governments to encourage sound land use planning and practices that address the impacts of growth, development and transportation on the watershed.		Ongoing
	4.2.4	By 2002, review tax policies to identify elements which discourage sustainable development practices or encourage undesirable growth patterns. Promote the modification of such policies and the creation of tax incentives which promote the conservation of resource lands and encourage investments consistent with sound growth management principles.	2002	Yes

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Subsection	Ref. No.	Commitment	Due Date	Complete
	4.2.5	The jurisdictions will promote redevelopment and remove barriers to investment in underutilized urban, suburban and rural communities by working with localities and development interests.		Ongoing
	4.2.6	By 2002, develop analytical tools that will allow local governments and communities to conduct watershed-based assessment of the impacts of growth, development and transportation decisions.	2002	Yes
	4.2.7	By 2002, compile information and guidelines to assist local governments and communities to promote ecologically-based designs in order to limit impervious cover in undeveloped and moderately developed watershed and reduce the impact of impervious cover in highly developed watersheds.	2002	Yes
	4.2.8	Provide information to the development community and others so they may champion the application of sound land use practices.		Ongoing
	4.2.9	By 2003, work with local governments and communities to develop land-use management and water resource protection approaches that encourage the concentration of new residential development in areas supported by adequate water resources and infrastructure to minimize impacts on water quality.	2003	Yes
	4.2.10	By 2004, the jurisdictions will evaluate local implementation of stormwater, erosion control and other locally-implemented water quality protection programs that affect the Bay system and ensure that these programs are being coordinated and applied effectively in order to minimize the impacts of development.	2004	Yes
	4.2.11	Working with local governments and others, develop and promote wastewater treatment options, such as nutrient reducing septic systems, which protect public health and minimize impacts to the Bay's resources.		Ongoing
	4.2.12	Strengthen brownfield redevelopment. By 2010, rehabilitate and restore 1,050 brownfield sites to productive use.	2010	No
	4.2.13	Working with local governments, encourage the development and implementation of emerging urban storm water retrofit practices to improve their water quantity and quality function.		Ongoing
Transportation	4.3.1	By 2002, the signatory jurisdictions will promote coordination of transportation and land use planning to encourage compact, mixed use development patterns, revitalization in existing communities and transportation strategies that minimize adverse effects on the Bay and its tributaries.	2002	Yes
	4.3.2	By 2002, each state will coordinate its transportation policies and programs to reduce the dependence on automobiles by incorporating travel alternatives such as telework, pedestrian, bicycle and transit options, as appropriate, in the design of projects so as to increase the availability of alternative modes of travel as measure by increase use of those alternatives.	2002	Yes
	4.3.3	Consider the provisions of the federal transportation statutes for opportunities to purchase easements to preserve resource lands adjacent to rights of way and special efforts for stormwater management on both new and rehabilitation projects.		Ongoing
	4.3.4	Establish policies and incentives which encourage the use of clean vehicle and other transportation technologies that reduce emissions.		Ongoing
Public Access	4.4.1	By 2010, expand by 30% the system of public access point to the Bay, its tributaries and related resource sites in an environmentally sensitive manner by working with state and federal agencies, local governments and stakeholder organizations.	2010	No
	4.4.2	By 2005, increase the number of designated water trails in the Chesapeake Bay region by 500 miles.	2005	Yes
	4.4.3	Enhance interpretation materials that promote stewardship at natural, recreational, historical and cultural public access points within the Chesapeake Bay watershed.		Ongoing

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Subsection	Ref. No.	Commitment	Due Date	Complete
	4.4.4	By 2003, develop partnerships with at least 30 sites to enhance place-based interpretation of Bay-related resources and themes and stimulate volunteer involvement in resource restoration and conservation.	2003	Yes
Stewardship and Community Engagement				
Education and Outreach	5.1.1	Make education and outreach a priority in order to achieve public awareness and personal involvement on behalf of the Bay and local watersheds.		Ongoing
	5.1.2	Provide information to enhance the ability of citizen and community groups to participate in Bay restoration activities on their property and in their local watershed.		Ongoing
	5.1.3.1	Expand the use of new communications technologies to provide a comprehensive and interactive source of information on the Chesapeake Bay and its watershed for use by public and technical audiences.		Ongoing
	5.1.3.2	By 2001, develop and maintain a web-based clearing house of this information specifically for use by educators.	2001	Yes
	5.1.4	Beginning with the class of 2005, provide a meaningful Bay or stream outdoor experience for every school student in the watershed before graduation from high school.	2005	No
	5.1.5	Continue to forge partnerships with the Departments of Education and institutions of higher learning in each jurisdiction to integrate information about the Chesapeake Bay and its watershed into school curricula and university programs.		Yes
	5.1.6	Provide students and teachers alike with opportunities to directly participate in local restoration and protection projects, and to support stewardship efforts in schools and on school property.		Yes
	5.1.7	By 2002, expand citizen outreach efforts to more specifically include minority populations by, for example, highlighting cultural and historical ties to the Bay, and providing multi-cultural and multi-lingual educational materials on stewardship activities and Bay information.	2002	Yes
Community Engagement	5.2.1	Jurisdictions will work with local governments to identify small watersheds where community-based actions are essential to meeting Bay restoration goals—in particular wetlands, forested buffers, stream corridors and public access—and work with local governments and community organizations to bring an appropriate range of Bay program resources to these communities.		Ongoing
	5.2.2	Enhance funding for locally-based programs that pursue restoration and protection projects that will assist in the achievement of the goals of this and past agreements.		Ongoing
	5.2.3	By 2001, develop and maintain a clearing house for information on local watershed restoration efforts, including financial and technical assistance.	2001	Yes
	5.2.4	By 2002, each signatory jurisdiction will offer easily-accessible information suitable for analyzing environmental conditions at a small watershed scale.	2002	Yes
	5.2.5	Strengthen the Chesapeake Bay Program's ability to incorporate local governments into the policy decision making process. By 2001, complete a reevaluation of the Local Government Participation Action Plan and make necessary changes in Bay program and jurisdictional functions based upon the reevaluation.	2001	Ongoing
	5.2.6	Improve methods of communication with and among local governments on Bay issues and provide adequate opportunities for discussion of key issues.		Yes
	5.2.7	By 2001, identify community watershed organizations and partnerships. Assist in establishing new organizations and partnerships where interest exists. These partners will be important to successful watershed management efforts in distributing information to the public, and engaging the public in the Bay restoration and preservation effort.	2001	Ongoing

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Subsection	Ref. No.	Commitment	Due Date	Complete
	5.2.8	By 2005, identify specific actions to address the challenges of communities where historically poor water quality and environmental conditions have contributed to disproportional health, economic or social impacts.	2005	No
Government by Example	By 2002, each signatory will put in place processes to:			
	5.3.1.1	Ensure that all properties owned, managed or leased by the signatories are developed, redeveloped and used in a manner consistent with all relevant goals, commitments and guidance of this Agreement.	2002	Ongoing
	5.3.1.2	Ensure that the design and construction of signatory-funded development and redevelopment projects are consistent with all relevant goals, commitments and guidance of this Agreement.	2002	Ongoing
	5.3.2	Expand the use of clean vehicle technologies and fuels on the basis of emission reductions, so that a significantly greater percentage of each signatory government's fleet of vehicles use some form of clean technology.		Ongoing
	5.3.3	By 2001, develop an Executive Council Directive to address stormwater management to control nutrient, sediment and chemical contaminant runoff from state, federal and District owned land.	2001	Yes
Partnerships	5.4.1	Strengthen partnerships with Delaware, New York and West Virginia by promoting communication and by seeking agreements on issues of mutual concern.		Ongoing
	5.4.2	Work with non-signatory Bay states to establish links with community-based organizations throughout the Bay watershed.		Ongoing

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APPENDIX C

Reviews of CBP

External Reviews

Despite Progress, EPA Needs to Improve Oversight of Wastewater Upgrades in the Chesapeake Bay Watershed, EPA Office of the Inspector General, Report No. 08-P-0049, January 8, 2008
Development Growth Outpacing Progress in Watershed Efforts to Restore the Chesapeake Bay, EPA Office of the Inspector General, Report No. 2007-P-00031, September 10, 2007
Federal Facilities in Chesapeake Bay Watershed Generally Comply with Major Clean Water Act Permits, EPA Office of the Inspector General, Report No. 2007-P-00032, September 5, 2007
EPA Relying on Existing Clean Air Act Regulations to Reduce Atmospheric Deposition to the Chesapeake Bay and its Watershed, EPA Office of the Inspector General, Report No. 2007-P-00009, February 28, 2007
Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources, EPA Office of the Inspector General, Report No. 2007-P-00004 and USDA OIG Report No. 50601-10-Hq, November 20, 2006
EPA Grants Supported Restoring the Chesapeake Bay, EPA Office of the Inspector General, Report No. 2006-P-00032, September 6, 2006
Congressionally Requested Review of EPA Region 3's Oversight of State National Pollutant Discharge Elimination System Permit Programs, EPA Office of the Inspector General, Report No. 2005-S-00002, October 29, 2004
Chesapeake Bay Program: Improved Strategies Are Needed to Better Assess, Report, and Manage Restoration Progress, GAO-06-96 Washington, D.C., July 12, 2006
Taking Environmental Protection to the Next Level: An Assessment of the U.S. Environmental Services Delivery System, National Academy of Public Administration, April 2007
Chesapeake Bay Program Assessment, Office of Management and Budget, 2006, Program Assessment Rating Tool, Program Code #10004302
Mississippi River Water Quality and the Clean Water Act: Progress, Challenges, and Opportunities, National Research Council, 2008
Saving a National Treasure: Financing the Cleanup of the Chesapeake Bay, A Report to the Chesapeake Bay Executive Council, Chesapeake Bay Blue Ribbon Finance Panel, October 27, 2004
Chesapeake Bay Blues: Science, Politics, and the Struggle to Save the Bay, by Howard Ernst, Rowman and Littlefield Publishers, Inc., June, 2003
Turning the Tide: Saving the Bay, by Tom Horton, Island Press, July, 2003

Internal Reviews

Requested Review of Procedures for the MAWQ/UMD Best Management Practices Project, CBP Scientific and Technical Advisory Committee, July, 2007
Chesapeake Bay Fisheries Ecosystem Advisory Panel, National Oceanic and Atmospheric Advisory Chesapeake Bay Office, 2006
Recommendations for Refinement of a Spatially Representative Non-tidal Water Quality Monitoring Network for the Chesapeake Bay Watershed, CBP Scientific and Technical Advisory Committee, August, 2005
Review of the Chesapeake Bay Watershed Modeling Effort, CBP Scientific and Technical Advisory Committee, June, 2005

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Cost Effective Strategies for the Bay: Smart Investments for Nutrient and Sediment Reduction, Chesapeake Bay Commission, December, 2004.
Chesapeake Futures: Choices for the 21st Century, Chesapeake Bay Program's Scientific and Technical Advisory Committee, July, 2003
Technical Review of the Chesapeake Bay Program's Basinwide Monitoring Program, CBP Scientific and Technical Advisory Committee, December, 2000
Review of the Chesapeake Bay Water Quality Model, CBP Scientific and Technical Advisory Committee, February, 2000
"Chesapeake Renewal Project Findings," prepared by Lisa Keir under contract to the Alliance for the Chesapeake Bay, submitted to the 2000 Chesapeake Bay Agreement Planning Committee of the Chesapeake Bay Program.

APPENDIX D

Realistic Annual Targets Background

Topic Area	Measure	Goal	Background Information on Development of the Goal	Base Year	Baseline	2007 Progress	2008 Annual Target	2009 Annual Target	2010 Annual Target	Background Information on Development of the Realistic Annual Target
Basinwide Nitrogen Reduction	Implementation of nitrogen reduction practices	By 2010, 162.5 million pound reduction from 1985 levels to achieve an annual cap load of 175 million lbs (based on long-term average hydrology simulations)	Goal generally stated in *Chesapeake 2000*. Specific numbers derived from allocations agreed to by state partners and EPA as documented in March 2003 memorandum and the OMB PART for CBP.	1985	0% of goal achieved (0 pound reduction)	47% (75.6 M lb reduction)	50% (81.19 M lb reduction)	52% (84.44 M lb reduction)	54% (87.69 M lb reduction)	Targets are based on the assessment used to develop ambitious yet realistic targets for the OMB PART. The PART targets were based on an assessment conducted in 2005 using historic progress, historic funding, and new funding anticipated at the time. Additional data and information available since 2005 were used to refine the Targets for 2008-2010. These refinements will be reflected in future targets for PART.
Basinwide Phosphorus Reduction	Implementation of phosphorus reduction practices	By 2010, 14.36 million pound reduction from 1985 levels to achieve an annual cap load of 12.8 million lbs (based on long-term average hydrology simulations)	Goal generally stated in *Chesapeake 2000*. Specific numbers derived from allocations agreed to by state partners and EPA as documented in March 2003 memorandum and the OMB PART for CBP.	1985	0% of goal achieved (0 pound reduction)	62% (8.90 M lb reduction)	64% (9.19 M lb reduction)	66% (9.48 M lb reduction)	68% (9.76 M lb reduction)	Targets are based on the assessment used to develop ambitious yet realistic targets for the OMB PART. The PART targets were based on an assessment conducted in 2005 using historic progress, historic funding, and new funding anticipated at the time. Additional data and information available since 2005 were used to refine the Targets for 2008-2010. These refinements will be reflected in future targets for PART.
Basinwide Sediment Reduction	Implementation of sediment reduction practices	By 2010, 1.69 million ton reduction from 1985 levels to achieve an annual cap load of 4.15 million tons (based on long-term average hydrology simulations)	Goal generally stated in *Chesapeake 2000*. Specific numbers derived from allocations agreed to by state partners and EPA as documented in March 2003 memorandum and the OMB PART for CBP.	1985	0% of goal achieved (0 ton reduction)	64% (1.07 M ton reduction)	67% (1.13 M ton reduction)	71% (1.20 M ton reduction)	74% (1.25 M ton reduction)	Targets are based on the assessment used to develop ambitious yet realistic targets for the OMB PART. The PART targets were based on an assessment conducted in 2005 using historic progress, historic funding, and new funding anticipated at the time. Additional data and information available since 2005 were used to develop Targets for 2009-2010.

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Topic Area	Measure	Goal	Background Information on Development of the Goal	Base Year	Baseline	2007 Progress	2008 Annual Target	2009 Annual Target	2010 Annual Target	Background Information on Development of the Realistic Annual Target
Municipal and Industrial Waste Water	Waste water nitrogen reduction	By 2010, 49.9 million pound reduction from 1985 levels.	Goal generally stated in *Chesapeake 2000*. Specific numbers derived from allocations agreed to by state partners and EPA as documented in March 2003 memorandum and the OMB PART for CBP.	1985	0% of goal achieved (0 pound reduction)	69% (34.29 M lb reduction)	74% (36.92 M lb reduction)	79% (39.42 M lb reduction)	84% (41.91 M lb reduction)	Targets are based on the assessment used to develop ambitious yet realistic targets for the OMB PART. The PART targets were based on an assessment conducted in 2005 using historic progress, historic funding, and new funding anticipated at the time. Additional data and information available since 2005 were used to refine the Targets for 2008-2010. These refinements will be reflected in future targets for PART.
Municipal and Industrial Waste Water	Waste water phosphorus reduction	By 2010, 6.16 million pound reduction from 1985 levels.	Goal generally stated in *Chesapeake 2000*. Specific numbers derived from allocations agreed to by state partners and EPA as documented in March 2003 memorandum and the OMB PART for CBP.	1985	0% of goal achieved (0 pound reduction)	87% (5.36 M lb reduction)	89% (5.48 M lb reduction)	91% (5.61 M lb reduction)	93% (5.73 M lb reduction)	Targets are based on the assessment used to develop ambitious yet realistic targets for the OMB PART. The PART targets were based on an assessment conducted in 2005 using historic progress, historic funding, and new funding anticipated at the time. Additional data and information available since 2005 were used to develop Targets for 2009-2010.
Agricultural Lands and Animal Operations	Implementation of agricultural nitrogen reduction practices	By 2010, 96.99 million pound reduction from 1985 levels.	Goal generally stated in *Chesapeake 2000*. Specific numbers derived from allocations agreed to by state partners and EPA as documented in March 2003 memorandum.	1985	0% of goal achieved (0 pound reduction)	48% (46.57 M lb reduction)	50% (48.49 M lb reduction)	52% (50.43 M lb reduction)	54% (52.37 M lb reduction)	Targets are based on the assessment used to develop ambitious yet realistic targets for the OMB PART. The PART targets were based on an assessment conducted in 2005 using historic progress, historic funding, and new funding anticipated at the time. Additional data and information available since 2005 were used to develop Targets for 2009-2010.
Agricultural Lands and Animal Operations	Implementation of agricultural phosphorus reduction practices	By 2010, 6.48 million pound reduction from 1985 levels.	Goal generally stated in *Chesapeake 2000*. Specific numbers derived from allocations agreed to by state partners and	1985	0% of goal achieved (0 pound reduc-	51% (3.29 M lb reduction)	52% (3.37 M lb reduction)	53% (3.43 M lb reduction)	54% (3.50 M lb reduction)	Targets are based on the assessment used to develop ambitious yet realistic targets for the OMB PART. The PART targets were based on an assessment conducted in 2005 using historic progress, historic fund-

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Topic Area	Measure	Goal	Background Information on Development of the Goal	Base Year	Baseline	2007 Progress	2008 Annual Target	2009 Annual Target	2010 Annual Target	Background Information on Development of the Realistic Annual Target
			EPA as documented in March 2003 memorandum.		tion)					ing, and new funding anticipated at the time. Additional data and information available since 2005 were used to develop Targets for 2008-2010.
Agricultural Lands and Animal Operations	Implementation of agricultural sediment reduction practices	By 2010, 2.55 million ton reduction from 1985 levels.	Goal generally stated in *Chesapeake 2000*. Specific numbers derived from allocations agreed to by state partners and EPA as documented in March 2003 memorandum.	1985	0% of goal achieved (0 ton reduction)	48% (1.21 M ton reduction)	50% (1.28 M ton reduction)	52% (1.33 M ton reduction)	54% (1.38 M ton reduction)	Targets are based on the assessment used to develop ambitious yet realistic targets for the OMB PART. The PART targets were based on an assessment conducted in 2005 using historic progress, historic funding, and new funding anticipated at the time. Additional data and information available since 2005 were used to develop Targets for 2009-2010.
Streamside Tidal Shoreline Riparian Areas	Riparian Forest Buffers Planted	10,000 miles restored between 1996 and 2010.	Goal is generally stated in *Chesapeake 2000*. Chesapeake Executive Council adopted expanded forest buffers goal in 2003.	1995	0% of goal achieved (0 miles)	57% (5,722 miles, cumulative	62% (6,182 miles, cumulative	65% (6,522 miles, cumulative	68% (6,837 miles, cumulative	MD: NRCS, FSA, and MD DNR used current planting season contracts, assumption of no policy changes in 2008, and current rate of approximately 20 miles per year in 2006 and 2007 to develop targets. VA: NRCS, VA DCR and VA Department of Forestry assessed current contracts, amount of funding for 2009, and recent implementation progress (86 miles in 2006 and 48 miles in 2007) to develop targets. PA: NRCS and PA DEP assessed their recent implementation (615 miles in 2006 and 315 miles in 2007) to develop targets.
Wetlands	Wetland Restoration Efforts	MD, VA, PA, DC, and NY to restore 28,500 acres between 1998 and 2010	Goal derives from *Chesapeake 2000*, with the addition of acres from the headwater states.	1997	0% of goal achieved (0 acres)	49% (13,999 acres, cumulative)[1]	53% (15,171 acres, cumulative)	57% (16,343 acres, cumulative)	61% (17,516 acres, cumulative)	Target is the average of 2005 and 2006 accomplishments (excluding DC).
SAV	Submerged Aquatic	Accelerate SAV restoration by	Goal is generally stated in *Chesapeake*	2002	0% of goal	14% (140	15% (153 acres,	16% (160 acres,	17% (167 acres,	Targets are the sum of what SAV partners identify as realistic for their

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Topic Area	Measure	Goal	Background Information on Development of the Goal	Base Year	Baseline	2007 Progress	2008 Annual Target	2009 Annual Target	2010 Annual Target	Background Information on Development of the Realistic Annual Target
	Vegetation Planting	planting 1,000 acres of new SAV beds between 2003 and 2008.	*2000*. Chesapeake Executive Council adopted submerged aquatic planting goal in 2003.		achieved (0 acres)	acres, cumulative)	cumulative)	cumulative)	cumulative)	organizations.
Oysters	Oyster Reef Restoration	Implement oyster restoration practices on 2,466 acres of oyster bar and reef habitat between 2007 and 2010.	Goal is proposed and derived from partner consensus.	2007	0% (0 acres)	32% (776 acres	53% (1,306 acres, cumulative	75% (1,836 acres, cumulative	100% (2,466 acres, cumulative)	Targets are the sum of what the oyster partners identify as realistic for their organizations.
Fish Passage	Fish Passage Restoration	2,807 miles reopened between 1989 and 2014 and 100 projects completed between 2005 and 2014.	Goal is generally stated in *Chesapeake 2000*. Chesapeake Executive Council adopted new numeric goal in 2005.	1988 for miles and 2005 for projects	0% of goal achieved (0 miles and 0 projects)	81% (2,266 miles; 40 projects, cumulative)	85% (2,376 miles; 50 projects, cumulative)	89% (2,486 miles; 60 projects, cumulative)	92% (2,596 miles; 70 projects, cumulative)	Project targets are based on partners' evaluation of what is attainable. Mileage targets assume an average number of miles opened per project, based on past efforts.
Blue Crab	Blue Crab Ecosystem-based Fishery Management	By 2007, revise and implement existing fisheries management plans to incorporate ecological, social and economic considerations, multi-species fisheries management and ecosystem approaches.	Goal is stated in *Chesapeake 2000*.	2004	0% of goal achieved	56%	56%	56%	56%	Actions taken in the past three years have yielded no increases in the Blue Crab Ecosystem-based Fishery Management Effort Index, so near-term future increases are not anticipated.
Land Preservation	Forest Land Protection	Permanently protect 695,000 additional acres by 2020	Goal is generally stated in *Chesapeake 2000*. Chesapeake Executive Council adopted numeric goal in 2007.	2007	0 acres	0%	7% (50,200 acres, cumulative)	15% (101,000 acres, cumulative)	23% (157,200 acres, cumulative)	The Forest Land Protection target stems from the Response to Directive 06-1, signed December 5, 2007, which includes the commitment to protect 695,000 acres of high-value forest for water quality that is also vulnerable to development. State forestry contacts provided realistic

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Topic Area	Measure	Goal	Background Information on Development of the Goal	Base Year	Baseline	2007 Progress	2008 Annual Target	2009 Annual Target	2010 Annual Target	Background Information on Development of the Realistic Annual Target
										forest land protection estimates for 2008, 2009, and 2010.
Watershed Education	Meaningful Watershed Educational Experience	100% of students receive a MWEE by their high school graduation	Goal is stated in *Chesapeake 2000*.	2005	79% of students	80% of students[2]	81% of students	82% of students	84% of students	State partners provided data to determine the percentage of their students receiving an MWEE before graduation. Each jurisdiction made targets for their student populations. These were used to create a weighted average for the targets.

[1]2007 progress is different from that reported in the 2007 *Health and Restoration Assessment*, as it includes additional commitments and efforts by New York and Delaware.

[2]2007 progress is different from that reported in the 2007 *Health and Restoration Assessment* due to corrected data provided by Pennsylvania.

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APPENDIX E

CBP Dashboards

The Chesapeake Bay Program (CBP) has developed preliminary dashboards to summarize and synthesize information from the CBP activity integration plan and goal strategies so the program partners can understand at a glance the progress CBP has made in key program areas. The dashboards include measures of progress, information about the resources CBP partners have dedicated to the efforts described, and strategic analyses of what needs to be done to improve implementation.

The dashboards provide vital information to the CBP partners to support decision making. When used within CBP's adaptive management system, the dashboards will allow CBP partners to identify opportunities for strengthening efforts toward achieving annual and longer-term goals. The dashboards themselves are also subject to change as CBP refines its targets, goals, strategies, and other components of program implementation under its adaptive management system.

The dashboards synthesize data submitted by CBP partners to the CBP activity integration plan database. As such, the dashboards are subject to the limitations of the submitted data. CBP is aware that the submitted data include certain systematic limitations, including:

- The data were reported in April 2008. CBP partners may have revised their plans and budgets since data were submitted.
- The dashboards reflect only the activities of the partners who provided data to the CAP activity integration plan database. The future inclusion of additional partners will increase the amount of activities reflected in the dashboards. The dashboards also do not reflect the priority assigned to specific activities by individual CBP partners.
- The dashboards are a component of adaptive management and therefore are dynamic in nature. Subsequent dashboards will reflect changes resulting from implementation of CBP adaptive management system.
- The dashboards represent a subset of restoration effort measures tracked by CBP. For information about additional measures of restoration effort, refer to *Chesapeake Bay 2007 Health and Restoration Assessment* (http://www.chesapeakebay.net/indicatorshome.aspx).

Data on activities for 2007 are generally more complete than for later years. The data submitted to the CBP activity integration plan database in April 2008 account for $1.1 billion of activities in 2007. The data for 2008 and 2009 were incomplete due to several factors:

- Activities funded in 2007 have been implemented, allowing CBP partners more reliable accounting for the year.
- Activities and funding for 2008 and 2009 are subject to ongoing planning and budgeting, as well as the inability of some CBP partners to make activity and funding projections for future years.

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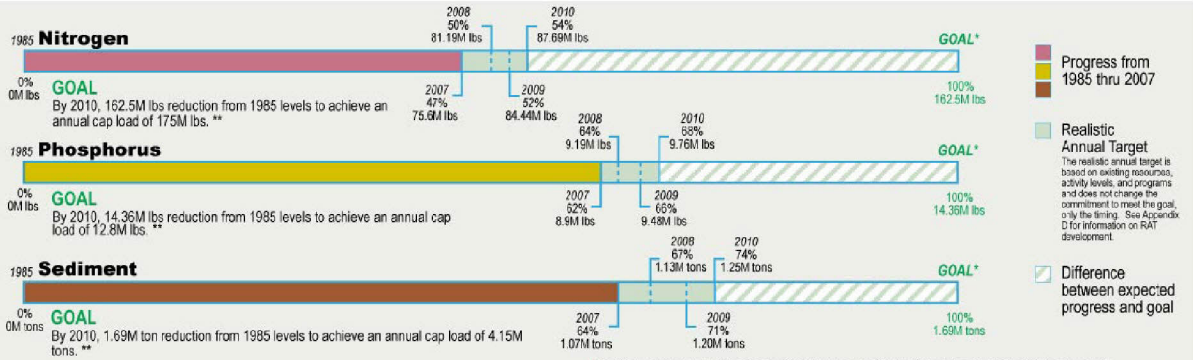
The submission of additional data will allow CBP to more fully understand and explain year-to-year changes in activity and funding level.

Implementation of Pollution Reduction Practices

CAP version 1.0
Produced on May 19, 2008

Performance



For more information on the start date, progress, and data, refer to:
http://www.chesapeakebay.net/status_reducingpollution.aspx

** Goal is generally stated in **Chesapeake 2000**, however, specific numbers derived from allocations agreed to by state partners and EPA as documented in March 2003 memorandum and OMB PART of the CBP.*

*** All goals based on long-term average hydrology simulations.*

Strategic Analysis

Background

The Chesapeake Bay Program partners have agreed that reducing and then capping nutrient and sediment loads at 175 million pounds of nitrogen, 12.8 million pounds of phosphorus, and 4.15 million tons of sediments will result in restoration of Bay water quality. To date, the watershed's farmers, local, state, and federal governments, watershed organizations, and many others have collectively implemented almost half of the nitrogen and two-thirds of the phosphorus and sediment pollution load reduction actions, practices, and technologies required for restoring Bay water quality. Pollution reduction includes efforts in agriculture and wastewater. Most reductions occurred in wastewater pollution prevention and opportunity exists for increased reductions from agriculture.

Strategy

To address this shortfall, the partnership must act strategically to:

- Reduce nitrogen and phosphorus loads from municipal and industrial wastewater;
- Reduce nitrogen, phosphorus, and sediment loads from agricultural lands and animal operations;
- Reduce nitrogen, phosphorus, and sediment loads from developed lands;
- Reduce nitrogen loads from onsite and septic systems;
- Reduce nitrogen, phosphorus, and sediment loads from streamside and tidal shoreline riparian areas via forest buffers;
- Reduce nitrogen loads from air emissions;
- Reduce sediment loads from streambanks and tidal shorelines;
- Reduce acid mine drainage impacts on streams; and
- Reduce chemical contaminant loads. BMPs that reduce nutrients and sediments also reduce chemical contaminants.

Challenges

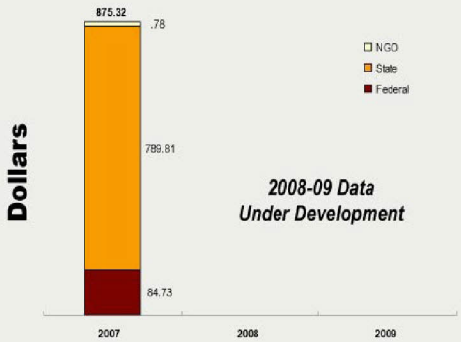
There remain significant challenges to overcome in order to not only continue past reductions in nutrient and sediment loads in the face of continued population growth in the watershed (130,000 new people every year), but to accelerate the rate of on-the-ground implementation. More capital investments in advanced wastewater treatment technologies, increased cost sharing of agricultural conservation practices, expanded technical assistance to agricultural and developing lands sectors, and dramatic changes in how we develop into the future are some of the principal challenges.

Action Needed

- Compare current year actions with annual targets and understand reasons behind the shortfalls or exceedances.
- Forecast alternative implementation scenarios to more strategically choose management actions.
- Identify and evaluate opportunities for coordination, integration, and leveraging of individual partners' actions.
- Assess whether partners are taking the most cost-effective, outcome-efficient actions.
- Factor these findings and opportunities into state, federal, and eventually local implementation programs' annual operating plans.

Partner Funding

Current Funding (Millions) *



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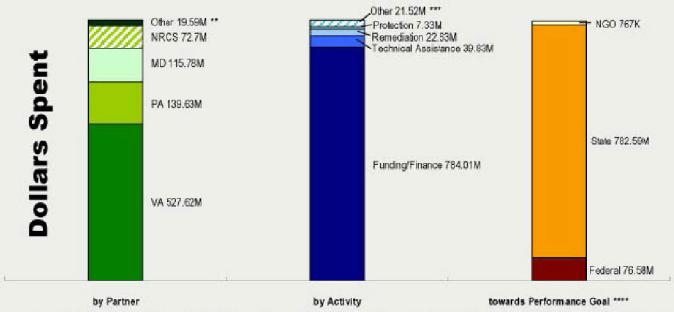
2007 Funding



** Other includes: EPA/CBPO, EPA/Region 3, DE, NY, EPA/OW, CBT, USFS, ARS, USACE, WV, FWS, NOAA/CBO, CBC, DC, and FHWA

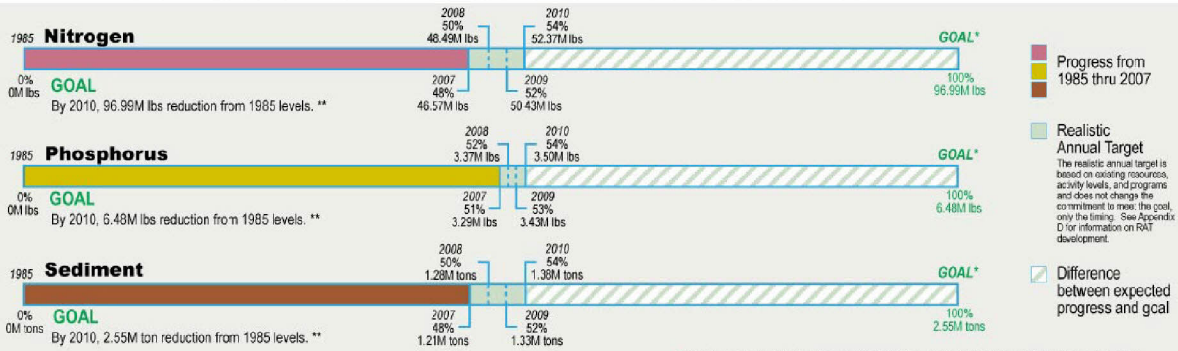
*** Other includes: Program Management, Habitat, Technical Support, Restoration, Assessment, Monitoring, Research, Education, TMDL Development, Engage Partners, Management Tool Development, Enforcement, Enhancement, Information Management, Regulation, and Targeting

**** Included Activities: Funding/Finance, Remediation, Protection, Restoration, Regulation, Mitigation, Trading/Credit, and Technical Assistance

Implementation of Agricultural Pollution Reduction Practices

CAP Version 1.0
Produced on May 19, 2008

Performance



For more information on the start date, progress, and data, refer to:
http://www.chesapeakebay.net/status_agriculture.aspx

** Goal is generally stated in **Chesapeake 2000**; however specific numbers derived from allocations agreed to by state partners and EPA as documented in March 2003 memorandum.*

*** All goals are based on long-term average hydrology simulations.*

Strategic Analysis

Background

The six Chesapeake Bay watershed states are calling for getting two-thirds of the nutrient reductions needed to restore Bay water quality from the agricultural sector. The Chesapeake Bay watershed's farmers, in partnership with local, state, and federal conservation agencies, will have implemented about half of the practices needed to achieve the loads of nitrogen, phosphorus, and sediments loads from agricultural lands to Bay tidal waters to the required level. These efforts are accounted for in the pollution reduction practices measures.

Strategy

To address this shortfall, the partnership must act strategically to:

- Prioritize implementation of specific agricultural practices in specific watersheds where agricultural nutrient and sediment reductions can make a significant contribution to restoring water quality.
- Accelerate implementation of the most cost effective conservation practices that will result in the greatest nutrient reductions.
- Seek opportunities to employ nutrient and sediment reductions that will result in sustainable reductions and farming.
- Coordinate and increase collaboration among the major federal funding programs.
- Seek long-term and consistent funding for implementing the state agricultural incentive programs.
- Engage the corporate sector.

Challenges

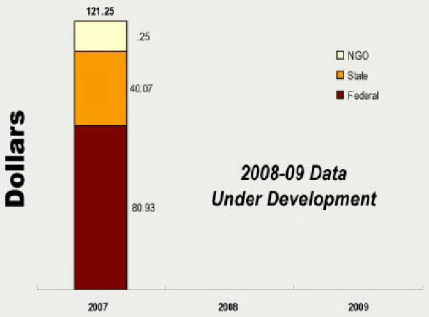
- With more than 87,000 independent and privately operated farms basin-wide, achieving substantial nutrient and sediment reductions by obtaining voluntary implementation of unprecedented levels of conservation practices will be a challenge.
- Greatly enhanced cost share and technical assistance programs will be required, among other changes to current delivery systems.

Action Needed

- Reach agreement among the partners on a set of tools to assist the partners in prioritizing implementation of specific agricultural practices in specific watersheds where agricultural nutrient and sediment reductions can make a significant contribution to restoring water quality for the Chesapeake Bay living resources.
- Continue expanded implementation of the Strategy for Managing Surplus Nutrients from Agricultural Animal Manure and Poultry Litter in the Chesapeake Bay Watershed, focusing on the three primary management areas for litter and manure: reducing nutrient content through feed management, developing new markets and technology for alternative products, and coordinating manure management programs across the watershed.
- Increase collaboration among the U.S. EPA's Chesapeake Bay Implementation Grants and Section 319 Nonpoint Source Grants programs, National Fish & Wildlife Foundation's Chesapeake Bay Small and Targeted Watershed and Grants Programs, the USDA-NRCS's EQIP, CSP, AMA and CIG programs and the USDA-FSA's CRP program, to focus efforts in the priority watershed areas and technical assistance programs.

Partner Funding

Current Funding (Millions) *



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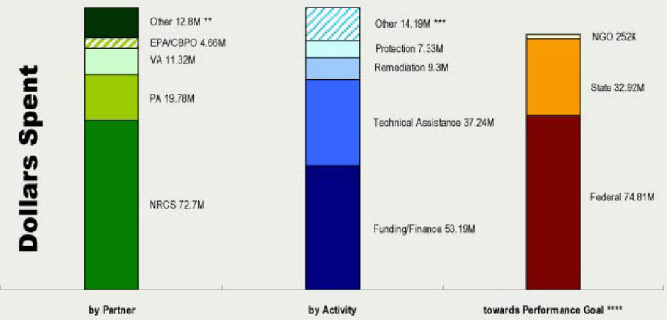
2007 Funding



** Other includes: MD, NY, DE, WV, EPA/OW, ARS, CBT, EPA/Region 3, and CBC

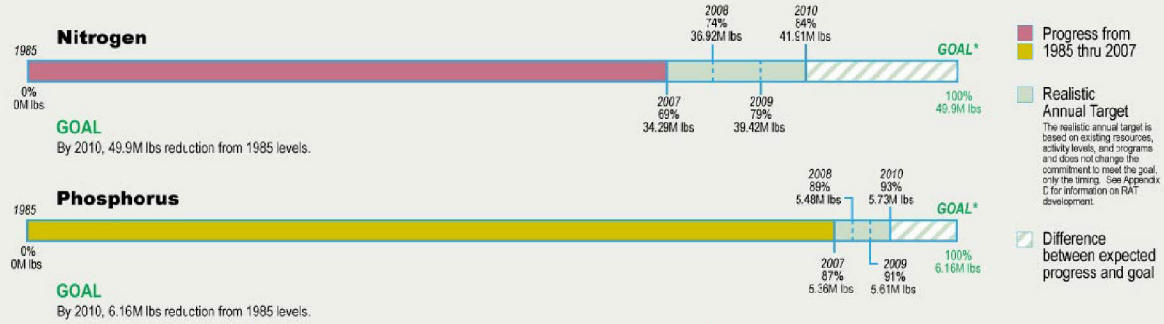
*** Other includes: Program Management, Habitat, Technical Support, Assessment, Research, Education, Restoration, Engage Partners, TMDL Development, Enforcement, and Targeting

**** Included Activities: Funding/Finance, Remediation, Protection, Restoration, Regulation, Mitigation, Trading/Credit, and Technical Assistance

Wastewater Pollution Prevention

CAP version 1.0
Produced on May 19, 2008

Performance



For more information on the start date, progress, and data, refer to:
http://www.chesapeakebay.net/status_wastewater.aspx

* *Goal is generally stated in **Chesapeake 2000**; however, specific numbers derived from allocations agreed to by state partners and EPA as documented in March 2003 memorandum and the OMB PART for CBP.*

Strategic Analysis

Background

In the Chesapeake watershed there are currently 483 facilities designated as significant dischargers. The total effluent flow from these significant facilities represents more than 95% of the total flow from all wastewater treatment facilities in the Bay watershed and currently contributes 20% of the nitrogen and 22% of the phosphorus loads entering the Chesapeake Bay. The Chesapeake Bay Program partners are 69% and 87% towards achieving the required reductions in nitrogen and phosphorus wastewater loads, respectively, to Bay tidal waters. These efforts are accounted for in the pollution reduction practices measures. As the Chesapeake Bay watershed's population continues to grow, the volume of waste requiring treatment will grow as well, requiring ongoing investment to maintain achievement of the goal.

Strategy

To address this shortfall, the partnership must act strategically to:

- Issue the new annual nitrogen and phosphorus cap load permit limits to each significant municipal or industrial wastewater treatment facility by 2010;
- Fund the necessary facility-specific nutrient reduction technology upgrades;
- Undertake the required nutrient credit exchanges in order to achieve and maintain the facility-specific permitted limits; and
- Determine the schedule for individual treatment facility upgrades and/or anticipated nutrient credit exchanges (through 2030) for each of the 483 significant facilities to ensure maintenance of the facility-specific and tributary basin wastewater treatment nitrogen and phosphorus cap load allocations.

Challenges

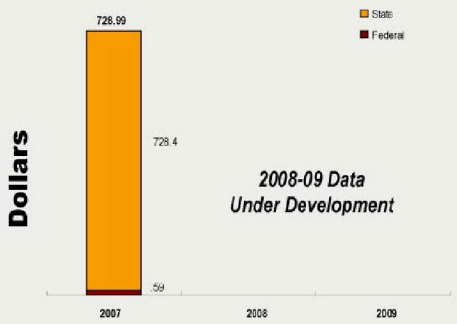
Maintaining the cap on loads in the face of continued population growth will require facility upgrades, process changes, operational modifications or enhancements, nutrient trading with other facilities and non-point sources, land application, and recycling/reuse of treated effluents.
Enhancing treatment operations will require specialized training and information sharing to optimize the treatment performance and efficiency of the nutrient reduction systems.

Action Needed

- Issue nitrogen and phosphorus cap load permit limits to the remaining significant municipal and industrial facilities by 2010.
- Ensure completion of treatment upgrades to be operational by 2010 at the facilities across the six-state watershed.

Partner Funding

Current Funding (Millions) *



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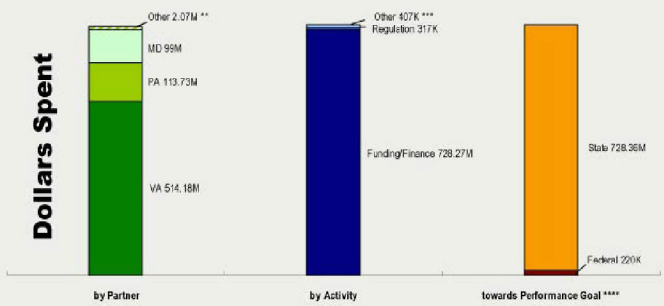
2007 Funding



** Other includes: EPA/CBPO, DE, NY, and EPA/Region 3

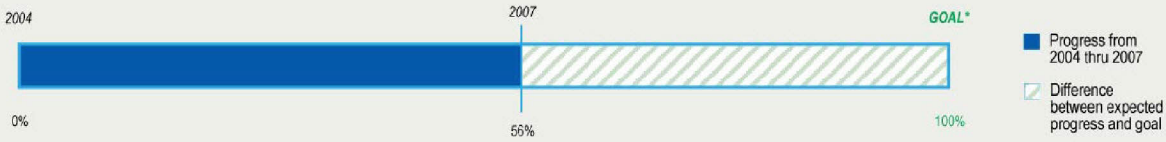
*** Other Includes: Assessment, Technical Support, Program Management, TMDL Development, and Information Management

**** Included Activities: Funding/Finance, Regulation, Mitigation, Trading/Credit, and Technical Assistance

Blue Crab Fishery Management

CAP version 1.0
Produced on May 19, 2008

Performance



GOAL

By 2007, revise and implement existing fisheries management plans to incorporate ecological, social, and economic considerations, multi-species fisheries management, and ecosystem approaches as stated directly in Chesapeake 2000.

** Goal is stated in general terms in **Chesapeake 2000**.*

For more information on the start date, progress, and data, refer to:
www.chesapeakebay.net/status_fisheriesmanagementindex.aspx

Strategic Analysis

Background
While some significant effort was undertaken to improve the management of Chesapeake Bay fisheries in 2007, very few of these efforts resulted in changes to fisheries management plans or implementation of these plans. The goal for blue crab fishery management reflects progress toward full implementation of ecosystem-based fisheries management for blue crabs; however, the activities described below focus on near-term actions to improve single-species management of blue crabs.

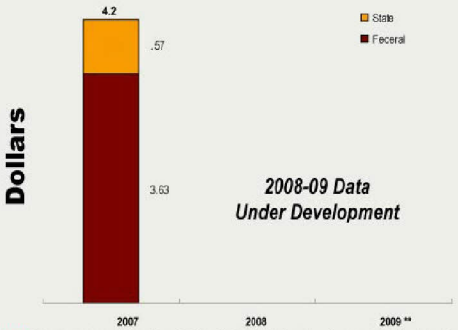
Strategy
To address the declining abundance of blue crabs, the partnership must act strategically to:
- Monitor stock status and habitat condition.
- Take management actions aimed at achieving the interim rebuilding target.
- Protect the female portion of the stock in a coordinated manner across jurisdictions.
- Produce population assessments based on monitoring data.
- Facilitate science-based management decision making.
- Carry out the adaptive management cycle.

Challenges
- Collaborative interjurisdictional management of blue crabs using common fisheries goals considerate of ecosystem dynamics.
- Effort control is an available means of reducing mortality in the fishery but perhaps not the most direct or effective method for controlling harvest due to latent effort.
- Variability in the annual estimates of abundance due to factors not controlled by fisheries managers (water quality, habitat, etc.).
- Need for additional coordinated monitoring that is designed to provide a robust index of summer abundance.

Action Needed
- Establish reliable population and stock health metrics.
- Draft and distribute an Annual Blue Crab Advisory Report.
- Coordinated Bay-wide management to meet interim rebuilding target.
- Establish a steering committee of managers, watermen, NGOs, and scientists to refine management objectives and options.
- Improvements in both fisheries management and water quality/habitat are needed to restore the fishery.

Partner Funding

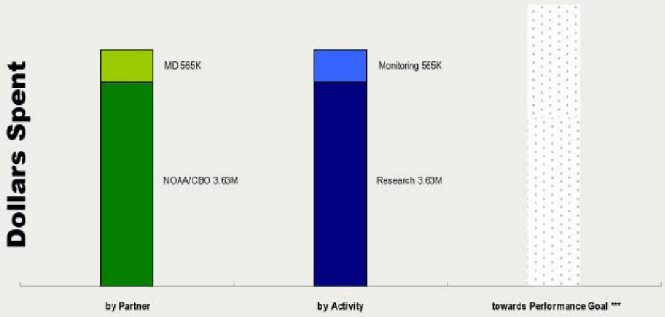
Current Funding (Millions) *



* NOTE: Data on activities and funding for 2007 are more complete than for later years because activities funded in 2007 have been implemented. Data on activities and funding for 2008 and 2009 are incomplete due to several factors (e.g., ongoing planning and budgeting and the inability, in some cases, to project future budgets) and are not summarized here. These data will be improved in future iterations of the CBP dashboards. Funding data as of April 25, 2008. Reporting organizations include NOAA and MD.

** No funding was reported for 2009.

2007 Funding



*** Activity level funding data was not available because the activities are focused on single species blue crab management and therefore do not show up as ecosystem based fisheries management activities.

Fish Passage Restoration

CAP version 1.0
Produced on May 19, 2008

Performance

GOAL

2,807 miles reopened between 1989 and 2014, and 100 projects completed between 2005 and 2014.

** Goal is generally stated in **Chesapeake 2000**: Chesapeake Executive Council adopted new numeric goal in 2005.*

For more information on the start date, progress, and data, refer to:
www.chesapeakebay.net/status_fishpassage.aspx

Strategic Analysis

Background

From 1988 through 2004, CBP Fish Passage Coordinators opened 1,838 miles of fish passage, surpassing their original 1,357-mile restoration goal. In 2005, Bay Program coordinators committed to increasing the restoration goal to 2,807 miles by 2014. During 2005 to 2007, an additional 427 miles of habitat were made available, bringing the cumulative total to 2,265 miles, 81% of the 2014 goal. From 2008 to 2010, the CBP coordinators agreed to a realistic annual target of completing 10 projects per year (equivalent to 110 miles per year).

Strategy

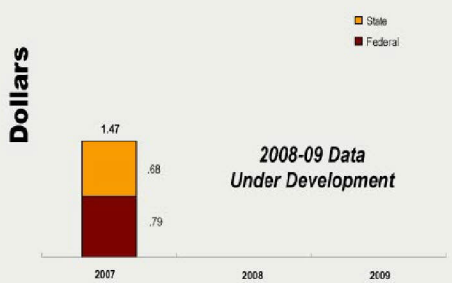
Continue to effectively open rivers to migratory fish passage:
- Complete fish passage projects at priority fish habitat sites with stream restoration, and watershed management and team assistance.
- Prioritize fish passage in the Susquehanna and James Rivers due to an abundance of known impediments such as dams and culverts.
- Lead by example with dam removal projects at state and federal dams.
- Consider using USFWS fish passage engineers to reduce project costs.

Challenges
- Identify and coordinate with watershed groups to develop dam removal projects.
- Educate dam owners on the benefits of dam removal.
- Implementation of state fish passage requirements to promote dam projects.
- Train existing USFWS engineers to design dam removals.
- Reduce removal costs to private dam owners.

Action Needed
- Improved access to state funding for dam removal projects.
- Implementation of state fish passage requirements to promote dam projects.
- Improved state agency coordination to identify and complete dam removal projects.

Partner Funding

Current Funding (Millions) *



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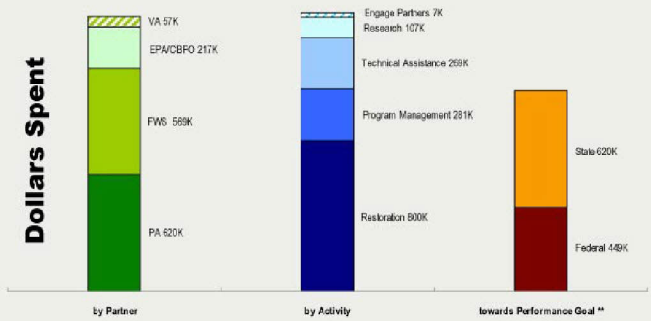
2007 Funding

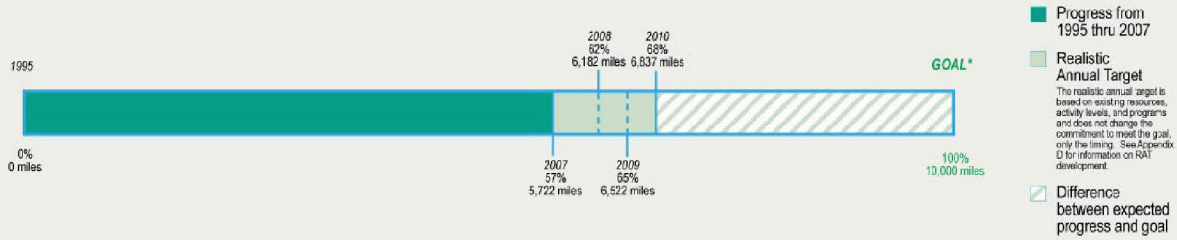


** Included Activities: Monitoring, Technical Assistance, Restoration, and Targeting

Riparian Forest Buffers Planted

CAP version 1.0
Produced on May 19, 2008

Performance



GOAL

10,000 miles restored between 1996 and 2010.

** Goal is generally stated in **Chesapeake 2000**; Chesapeake Executive Council adopted the expanded forest buffers goal in 2003.*

For more information on the start date, progress, and data, refer to:
www.chesapeakebay.net/status_forestbuffers.aspx

Strategic Analysis

Background
In 2003, CBP set a goal to restore 10,000 miles of riparian forest buffers along shorelines and streams in the Chesapeake Bay watershed. Currently 5,720 miles or 57% of the 10,000 miles goal has been achieved. Using the current rate of restoration, by 2010 the predicted miles of riparian forest buffers restored should reach 6,837 miles. This represents 68% of the 2010 goal. The accomplishment of this goal will lead to improved water quality for the Chesapeake Bay.

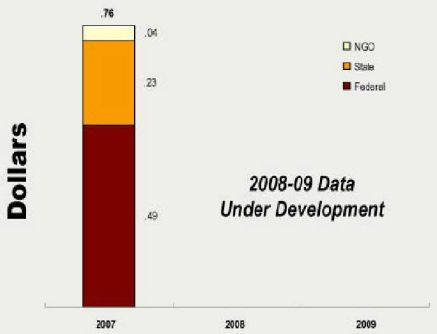
Strategy
Barriers to achievement of the 2010 goal are being addressed through:
- Educating technical service providers, landowners and state and local governments about forest buffer values and benefits.
- Targeting restoration for nutrient reduction effectiveness on local landscapes in high nutrient source watersheds.
- Improving the quality and quantity of buffer restoration in the Bay watershed through collaboration with key partners (NRCS, FSA, state forestry agencies).
- Increasing third party partnerships with non-profit organizations, particularly watershed groups and land trusts.

Challenges
Some of the challenges to increasing and improving riparian forest buffer implementation rest with state government due to the current state of the economy and oil prices. The challenges will not be reversible in the near future. Challenges that can be addressed are:
- Lack of technical service providers.
- Landowner resistance to crop conversion to forests.
- State cost share program inequity for agriculture versus forestry cost share practices.

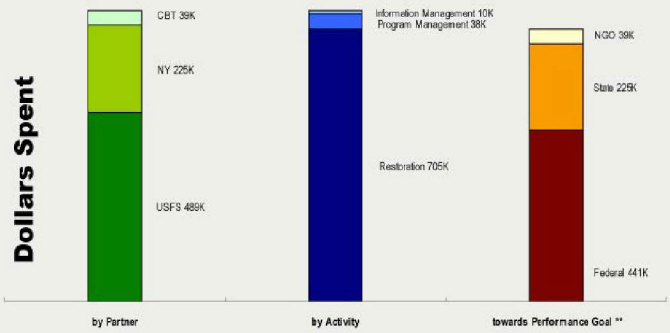
Action Needed
- Provide forest buffer educational opportunities and materials for land trusts and watershed groups in MD, PA and VA at annual meetings of the groups and organizations in an effort to increase technical service providers.
- Take part in Bay-wide meetings with NRCS, FSA and State forestry representatives to affect downward trends in forest buffer implementation by presenting individual state contributions to the 2010 Bay goal and create an environment for building capacity between the states for improvement of these contributions.
- Create improved forest buffer targeting tools that USFS, USGS, and CBP have initiated, the RBMapper and the hydrologic targeting template, each for improving forest buffer restoration effectiveness particularly in high source watersheds.
- Utilize MD, PA and VA planning and monitoring guides for landowners to improve forest buffer restoration longevity, providing these publications to farm bureaus, and soil and water conservation districts as a means of dissemination.
- Create a new riparian forest buffer publication to demonstrate for land owners and local government the values and benefits of restoring and retaining riparian forest buffers.

Partner Funding

Current Funding (Millions) *



2007 Funding



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** Included Activities: Restoration

Forest Land Protection

CAP version 1.0
Produced on May 19, 2008

Performance

GOAL
Permanently protect 695,000 additional acres by 2020.

** Goal is generally stated in **Chesapeake 2000**; Chesapeake Executive Council adopted new numeric goal in 2007.*

For more information on the start date, progress, and data, refer to:
www.chesapeakebay.net/status_landpreserved.aspx

Strategic Analysis

Background
Chesapeake forests prevent millions of pounds of nitrogen and other pollutants from reaching the Bay each year. While trends vary locally, the watershed has lost, on average, 100 acres of forest land per day since the mid-1980s. If this forest loss continues, nitrogen loads alone will increase by 1,300 pounds per day to the Bay. In 2007, CBP established a Forest Land Protection goal of 695,000 acres by 2020, in addition to taking steps that help landowners conserve their forests.

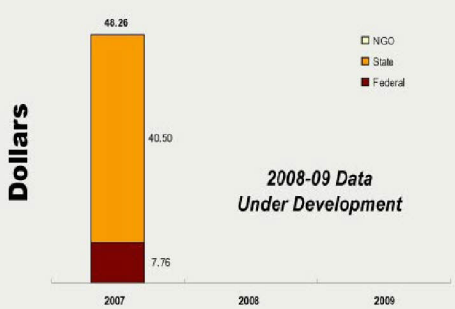
Strategy
The goal to protect priority forest land is new. There is a set of collective goals (applicable watershed-wide) and by 2008, each state, Washington DC, and the federal government will have an implementation plan for achieving this goal. Tracking toward the goal will be coordinated at CBP. Overall progress in maintaining tree cover will be intensively tracked on the local watershed scale using high-resolution imagery and an automated mapping tool. This will allow local governments to better assess and plan for the conservation of their forests.

Challenges
- The ability to acquire easements.

Action Needed
- Support and assess progress of jurisdictions with their Implementation Plans.
- Work with the Trust for Public Land to realize the potential for local funding for land protection.
- Conduct the Chesapeake Forest Land Conservation Summit (May 28-30, 2008) to identify itemized steps for working more effectively with forest landowners, land trusts, and local governments.
- Develop the self-service package that enables local governments and interested parties to assess the change in their forested landscape over time.

Partner Funding

Current Funding (Millions) *



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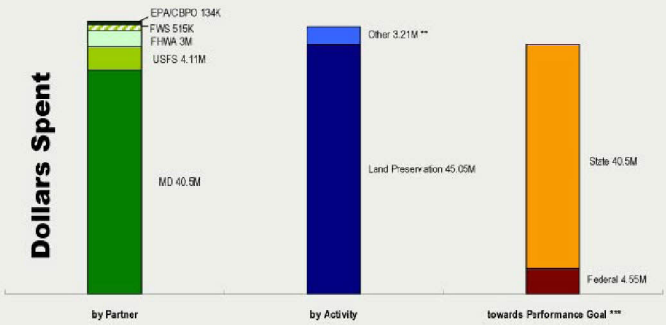
2007 Funding



** Other includes: Other, Engage Partners, Information Management, Technical Assistance, and Technical Support

*** Included Activities: Land Preservation

Oyster Reef Restoration

CAP version 1.0
Produced on May 19, 2008

Performance

Progress for 2007

Realistic Annual Target
The realistic annual target is based on existing resources, activity levels, and programs and does not change the commitment to meet the goal, only the timing. See Appendix D for information on RAT development.

GOAL

Implement oyster restoration practices on 2,466 acres of oyster bar and reef habitat between 2007 and 2010.

Note: Some acres will be double counted due to multiple treatments. Also, the unit of analysis is not a restored acre but rather an acre of restoration practice, hence total restored acres will be lower than 2,466.

** Goal is proposed and derived from partner consensus.*

For more information on the start date, progress, and data, refer to:
www.chesapeakebay.net/status_oysterrecovery.aspx

Strategic Analysis

Background

The CBP goal is to "By 2010, achieve, at a minimum, a tenfold increase in native oysters." Since 2000, achieving this baywide goal has not shown marked progress, but some local measurable increases in oyster abundance have been observed. Substantial efforts have been focused in sub-estuaries. By 2010, if restoration commitments continue, some increase in oyster abundance can be expected on a sub-estuary scale. Shifts in strategies may occur after three comprehensive reviews are completed in 2008.

Strategy

- Establish a network of permanent sanctuaries throughout the Bay.
- Increase hatchery production.
- Identify, establish, enhance, and seed oyster reefs.
- Expand efforts to achieve natural disease resistance
- Support aquaculture – address regulatory impediments, provide technical assistance.
- Enforce oyster management laws and regulations – protect all managed areas from poaching.
- Implement adaptive management – adjust strategies based on new information.
- Monitor the status of the stock – develop improved metrics, data, and analysis tools for evaluating progress.

Challenges

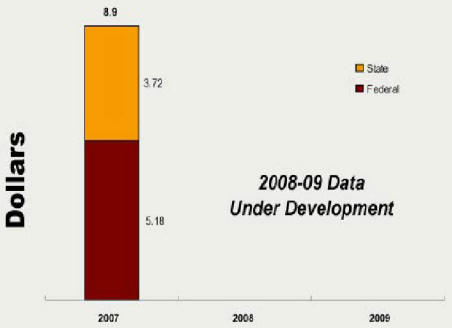
Disease, poor water quality, along with continued harvest pressure (including overharvesting when it occurs), and limited habitat challenge oyster restoration efforts. Another challenge is the allocation of limited resources between restoration for ecological benefits and management for economic benefits.

Action Needed

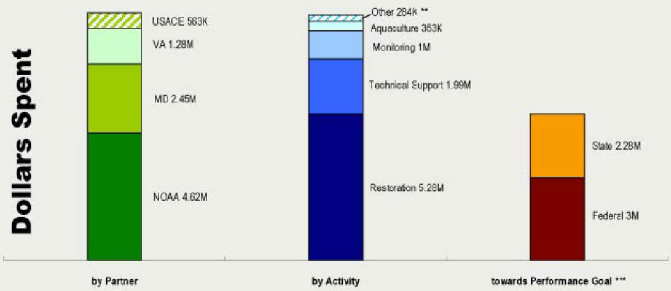
- Continued, sustained, long-term investment in oyster restoration and a network of sanctuaries.
- Completion of oyster restoration evaluations currently underway and modification of effort in light of evaluation findings.
- Training, technical assistance, and hatchery establishment to support oyster aquaculture.

Partner Funding

Current Funding (Millions) *



2007 Funding



* NOTE: Data on activities and funding for 2007 are more complete than for later years because activities funded in 2007 have been implemented. Data on activities and funding for 2008 and 2009 are incomplete due to several factors (e.g., ongoing planning and budgeting and the inability, in some cases, to project future budgets) and are not summarized here. These data will be improved in future iterations of the CBP dashboards. Funding data as of April 25, 2008. Reporting organizations include USACE, EPA, NOAA, MD, and VA.

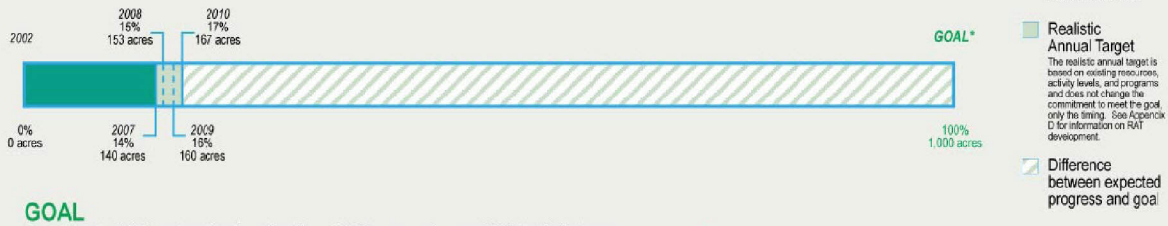
** Other includes: Research, Program Management, Information Management, and Communication

*** Included Activities: Restoration

Submerged Aquatic Vegetation Planting

CAP version 1.0
Produced on May 19, 2008

Performance



GOAL

Accelerate SAV restoration by planting 1,000 acres of new SAV beds between 2003 and 2008.

For more information on the start date, progress, and data, refer to:
www.chesapeakebay.net/status_baygrassesplanted.aspx

** Goal is generally stated in **Chesapeake 2000**: Chesapeake Executive Council adopted submerged aquatic planting goal in 2003.*

Strategic Analysis

Background

CBP partners have set a goal to plant 1,000 acres of Submerged Aquatic Vegetation (SAV). As of 2007, 14% of the goal has been achieved with 139.5 acres planted. Partners have committed to planting 27 acres of SAV between 2008 and 2010 (FY2008 – 13 acres; FY2009 – 7 acres; FY2010 – 7 acres).

Based on photographic evidence of the historic abundance of SAV in the Bay, CBP has established an SAV recovery goal of 185,000 acres by 2010. By 1984, SAV had shrunk to a low of about 38,000 acres, and by 2007 there were still only 64,911 acres of Bay grasses Bay-wide.

Strategy

To increase SAV abundance:
- Protect and restore water quality.
- Protect existing SAV beds.
- Accelerate restoration of SAV through planting and transplanting of SAV beds.
- Improve coordination of protection and restoration activities.

Challenges

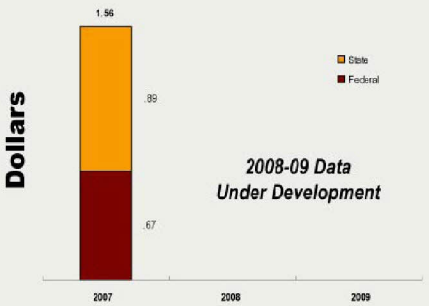
- SAV has not demonstrated significant recovery toward the 185,000-acre goal. Achieving this goal relies overwhelmingly on the natural expansion of beds that is highly dependent on adequate water quality.
- Planting has, as expected, contributed little to SAV recovery, but has demonstrated that new techniques can accelerate its recovery in areas where water quality is suitable.

Action Needed

- Continue water quality improvement programs Bay-wide.
- Research and improve site selection criteria.
- Research and develop new SAV propagation techniques.

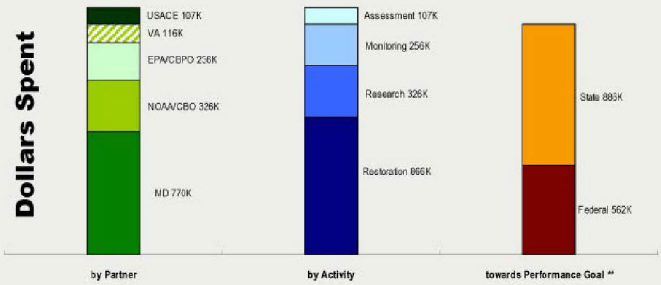
Partner Funding

Current Funding (Millions) *



* NOTE: Data on activities and funding for 2007 are more complete than for later years because activities funded in 2007 have been implemented. Data on activities and funding for 2008 and 2009 are incomplete due to several factors (e.g., ongoing planning and budgeting and the inability, in some cases, to project future budgets) and are not summarized here. These data will be improved in future iterations of the CBP dashboards. Funding data as of April 25, 2008. Reporting organizations include USACE, EPA, NOAA, MD, and VA.

2007 Funding

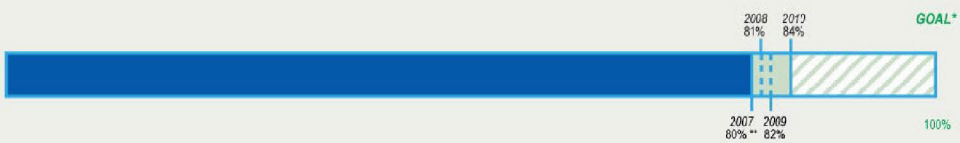


** Included Activities: Monitoring, Research, Restoration, and Targeting

Meaningful Watershed Educational Experience

CAP version 1.0
Produced on May 19, 2008

Performance



Progress from 2006 thru 2007

Realistic Annual Target
The realistic annual target is based on existing resources, activity levels, and programs and does not change the commitment to meet the goal, only the timing. See Appendix D for information on RAT development.

Difference between expected progress and goal

GOAL
100% of students receive a MWEE by their high school graduation.

** Goal derived from **Chesapeake 2000**.*

*** Please note, the 2006-2007 progress is different from that reported in the 2007 Assessment due to corrected data provided by PA.*

For more information on the start date, progress, and data, refer to:
www.chesapeakebay.net/status_education.aspx

Strategic Analysis

Background
In school year 2006-2007, 80% of the Meaningful Watershed Educational Experience (MWEE) goal was achieved. This number is different from that reported in the 2007 Assessment due to an improved data gathering protocol and the reporting of more reliable numbers by Pennsylvania (which were lower than previously reported). By 2010, CBP partners anticipate reaching 84% of the MWEE commitment. These numbers assume continued funding of federal and state MWEE programming. In 2007, an independent evaluation showed a significant increase in student environmental stewardship characteristics after completing MWEEs funded by NOAA B-WET.

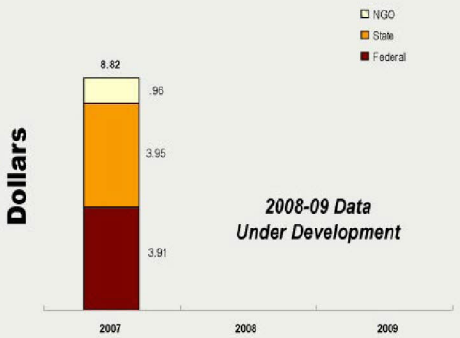
Strategy
CBP partners have successfully incorporated the elements of a MWEE into state learning standards; they now must work to have MWEE well-represented in testing protocols. To achieve long-term sustainability, CBP partners must also work with local school systems to systemically incorporate MWEEs into their local curricula and operating procedures. The nature of the commitment will also necessitate ongoing financial support.

Challenges
The success of this effort is influenced by external factors such as federal and state legislation and school system/local buy-in. Student matriculation and teacher turnover means that this commitment will require ongoing support to maintain the impressive levels that have been attained. While 100% implementation remains the spirit of the MWEE commitment, it is not practical to expect perfection to be reached and maintained in perpetuity.

Action Needed
- Work with school divisions to ensure systemic implementation, including alignment with curriculum and identification of funding.
- Ensure hands-on field experiences are part of full MWEEs for students.
- Provide training and support for environmental education providers.
- Secure participation of leadership of state departments of education in CBP to garner high-level support for MWEE commitment.

Partner Funding

Current Funding (Millions) *



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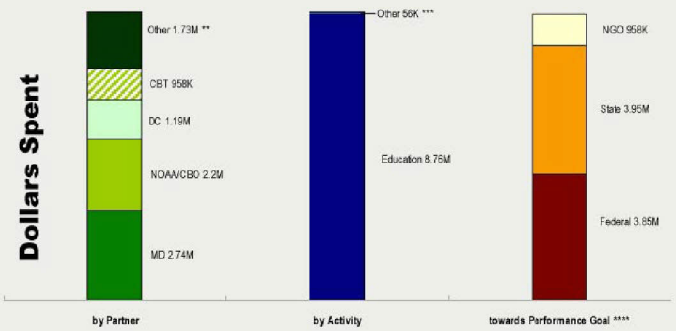
2007 Funding



** Other includes: Corporation for National and Community Services, EPA/CBPO, EPA/Region 3, FWS, NPS, and VA.

*** Other includes: Funding/Finance and Program Management

**** Included Activities: Education

Wetlands Restoration Efforts

CAP version 1.0
Produced on May 19, 2008

Performance

- Progress from 1997 thru 2007
- Realistic Annual Target — The realistic annual target is based on existing resources, activity levels, and programs and does not change the commitment to meet the goal, only the timing. See Appendix D for information on RAT development.
- Difference between expected progress and goal

GOAL

MD, VA, PA, DC, DE and NY to restore 28,500 acres between 1998 and 2010.

For more information on the start date, progress, and data, refer to:
www.chesapeakebay.net/status_wetlandsrestored.aspx

* *Goal is from that stated in **Chesapeake 2000**, with the addition of acres from the headwater states.*

** *Please note, the 2007 progress is different from that reported in the 2007 Assessment as it includes additional commitments and efforts by the states of NY and DE.*

Strategic Analysis

Background
Together, MD, VA, PA, DC, DE, and NY can realistically restore 1,172 acres of wetlands per year in the Chesapeake Bay Watershed. This is less than half (47%) of the 2,500 acres per year committed to by just three states (MD, VA, and PA) in the Chesapeake 2000 agreement.

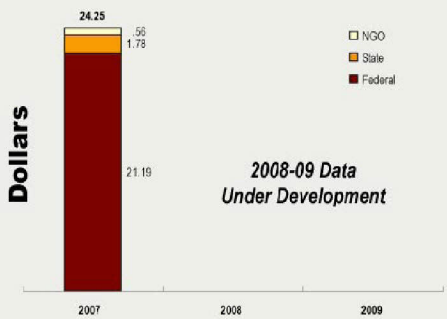
Strategy
To address this shortfall, the partnership must act strategically to:
- Accelerate restoration in areas with high potential for success.
- Protect existing high-quality wetlands through both voluntary and regulatory actions.
- Improve function of existing degraded wetlands.
- Strengthen avoidance of wetland impacts through effective and flexible compensatory mitigation.
- Strengthen permitting and enforcement under section 404 of the Clean Water Act.

Challenges
- Increased land values and demand for land make permanent conservation measures less financially attractive for landowners.
- Increased demand for biofuel makes it hard for publicly-funded incentive programs to compete with crop prices.

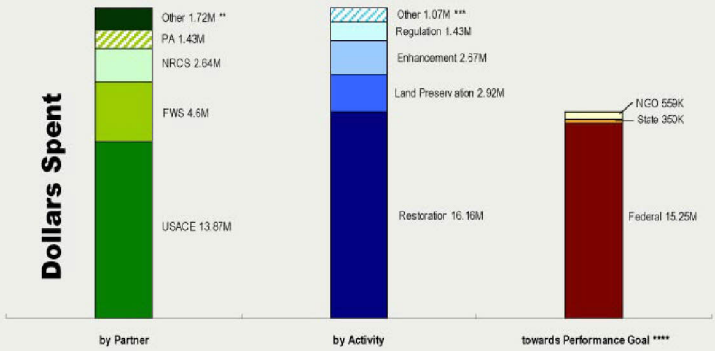
Action Needed
- Increase economic incentives for private landowners by eliminating out-of-pocket costs for conservation.
- Implement National Mitigation Rule in a way that promotes flexible and effective mitigation for regulated wetland impacts.
- Streamline Federal and State programmatic authorities, appraisals, and application processes for funding and technical assistance.

Partner Funding

Current Funding (Millions) *



2007 Funding



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** Other includes: Ducks Unlimited, EPA/Region 3, NY, USGS, ARS, CBT, and FHWA

*** Other includes: Assessment, Research, Habitat, Funding/Finance, Enforcement, Technical Support, and Mitigation

**** Included Activities: Restoration

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APPENDIX F

Quality Assurance Activities for the Chesapeake Action Plan

Overview

The Chesapeake Action Plan (CAP) serves many critical functions to enhance the coordination, management and accountability of CBP partner's actions to protect and restore the Chesapeake Bay and watershed. The CAP includes a comprehensive data system that captures extensive information about partners' efforts (e.g., implementation activities, resources, type of activity, location). In order to ensure accurate and reliable information, the design and development of the CAP contained extensive procedures, protocols, training and data security.

For example, to ensure quality of the data output, significant measures were taken to make data input both accurate and consistent across the partnership, including: detailed reporting guidance, development and communication of data entry conventions, a network of quality assurance experts at various levels of the partnership, data entry workshops for various reporting communities, and a Quality Assurance Report System (QARS) and data "freezing" process. The system includes many features to ensure the integrity of the data, including: password protected access, validation controls, selected domain values, a record cloning feature, authentication requirements, maintenance of auditing tables, and automated database backups.

This appendix highlights the quality assurance efforts that were integral in the design of the CAP.

Reporting System Design

The Chesapeake Action Plan Reporting System is a web-based application that allows CBP partners to enter information on implementation activities conducted for restoration and conservation of the Chesapeake Bay watershed. The system includes many features to ensure the integrity of the data entered into the application. Each organization receives a specific user name and password that allows access to the system. These user names and passwords are centrally managed by staff at the Chesapeake Bay Program Office.

In all possible cases, specific data domains are used that allow the reporting community to select the appropriate choice from within the domain values, typically through a drop-down control. Additional control validation is added to numeric fields to ensure the entered information matches the expected data type. Lastly, the latitude and longitude fields include additional validation that flag entries deemed to be outside the Chesapeake Bay watershed. The following table summarizes the data fields, control type, domain values and validation rules.

The reporting system also includes a record "cloning" feature that allows the reporting community to view and copy existing records. This feature is used to copy multi-year activities from one fiscal year to the next. Additionally, organizations that collaborate on projects can simply copy the activity record and add information specific to their organization. This feature allows the reporting community to quickly populate multiple years

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Reporting System Design Elements

Data Field	Control Type	Domain Values	Validation Rules
Pillar/Goal	Dropdown	Restoring Healthy Waters; Restoring Healthy Habitats; Ecosystem-Based Fisheries Management; Chesapeake Stewardship; Partnership, Leadership & Management	
Topic Area	Dropdown	Wastewater Treatment; Agriculture; Stormwater; Atmospheric Deposition; Riverine/Shore Erosion; Chemical Contaminants; Acid Mine Drainage; On-Sites & Septics; SAV; Wetlands; Fish Passage; Oysters; Striped Bass; Alosa Species; Menhaden; Blue Crab; Land Conservation; Development; Land Preservation; Public Access; Community & Citizen Engagement; Watershed Education; Place-Based Interpretation; Support; Other	
Activity Category	Dropdown	Monitoring; Regulation; Program Management; Information Management; Technical Support; Research; Funding/Finance; Mitigation; Trading/Credit; Remediation; Management Tool Development; Targeting; TMDL Development; Habitat; Communication; Restoration; Aquaculture; Land Preservation; Engage Partners; Protection; Enhancement; Education; Technical Assistance; Land Conservation; Enforcement; Assessment; Other	
C2K Commitment	Dropdown	102 C2K Commitments	
Activity Description	Free Text		
Lead Organization	Dropdown	Domain of reporting community organizations	
Point of Contact	Free Text		
Collaborating Orgs	Free Text		
Funding Status	Dropdown	Completed; Current; Planned	
Funding Year	Dropdown	2007; 2008; 2009	
Dollars	Free Text		Integer
FTEs	Free Text		Decimal (2)
State	Dropdown	Delaware, District of Columbia, Maryland, New York, Pennsylvania, Virginia, West Virginia	
Longitude	Free Text		Decimal (6)
Latitude	Free Text		Decimal (6)
Measure	Free Text		
Unit	Dropdown	Various	
Milestone Date	Date Picker		
Milestone Description	Free Text		

of funding for multi-year activities without loss of data integrity. As the reporting community enters data into the system, the credentials used to authenticate to the system are captured with each individual record. In order to edit or delete a record, the user must authenticate with the same credentials under which the record was originally entered.

The system maintains a detailed set of auditing tables that includes the authenticated

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user information, date/time stamps for each new record, and an audit trail for each deleted record or edited record. This allows for the retrieval of any previous state of the database should the need arise. Additionally, incremental database backups are conducted hourly during the reporting period with full database backups nightly. With this backup scheme, the maximum amount of data that could theoretically be lost would be that which was entered within a single hour.

Reporting Guidance

A detailed reporting guidance ("Reporting Guidance for the CAP Application Reporting System", March 17, 2008) was created to assist CBP partners with entering data. The full reporting guidance is available directly from the reporting system and will be available on the CBP CAP website. In addition, a context sensitive version of the reporting guidance is linked to the reporting system so that the reporting community can access specific sections of the guidance depending on their physical location within the reporting system form.

The reporting guidance provides background information on the CAP, a list of organizations that were invited to report, the reporting schedule, and a description of how the activity data will be used to support the partnership.

In addition to providing detailed instructions on entering activities into the reporting system, the reporting guidance contains a comprehensive list of system acronyms and detailed data element definitions. The definitions are critical to standardizing the use of the reporting elements across the reporting community.

The reporting guidance includes a detailed table of all the reporting elements which includes the element name, description, purpose, rules and guidance, and clear examples of the element's use. The appendices of the reporting guidance include community specific conventions that govern the standardized entry of activities across particular thematic communities.

Quality Assurance Roles and Responsibilities

CBP identified subject matter experts (SMEs) for each of the pillar/goal areas and topic areas to assist the various CBP partners. The SMEs were responsible for reviewing all activities entered into the reporting system. Their particular focus is ensuring the consistent and standard entry of activities across all partners. In addition, they are responsible for identifying any double counting of activities. The SMEs remained in close contact with the CBP partners throughout the reporting and Quality Assurance (QA) periods.

Each reporting organization has a corresponding organizational liaison (OL) at CBP. The role of the OL is to provide assistance to the reporting organization during the reporting period, conduct workshops with the organization as necessary, ensure entry of activities are completed per the schedule, validate the completeness of entries with the organization, and assist in the confirmation of the data entries.

The Chesapeake Bay Program's Data Center (CBPDC) is responsible for ensuring that the system was operational twenty-four hours per day, seven days per week. Additionally, the CBPDC is responsible for monitoring system performance, technical support, issuing credentials, system authentication and au-

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thorization, providing user assistance and ensuring the system is backed up according to a robust and backup schedule.

Workshops

Throughout the reporting process, the CAP Team conducted reporting community workshops for CBP partners to demonstrate the reporting system and train the reporting community on the appropriate use of the system. Two types of workshops were conducted: thematic workshops and organizational workshops.

Thematic workshops focused on subject aggregations of CBP partners who focus on a specific effort such as partners within the oyster community During these thematic workshops, partners adopted a specific reporting convention to standardize the reporting of activities across the community. The SMEs led these workshops and are the leads for documenting conventions agreed upon for data entry, which in turn facilitate consistency in reporting.

Organizational workshops focused on assisting CBP partners from a particular agency or organization. For example, specific workshops were conducted for Pennsylvania, Maryland, Virginia and also various partner agencies and organizations such as the U.S. Fish and Wildlife Service and Ducks Unlimited. These workshops were led by the OLs.

Reporting and Quality Assurance Schedule

Cross-functional quality assurance and analysis runs concurrently with the reporting period and is extending for a period of time beyond the data call closing date. For example, in 2008, the data call opened on March 17, 2008 and ran for five weeks, closing on April 18th with quality assurance and analysis extended to April 25, 2008.

Reporting Period

In addition to the reporting guidance, a CAP reporting system help desk is staffed during regular business hours during the reporting period. The help desk is responsible for fielding and responding to inbound calls for assistance. The CBP help desk staff handles calls for technical assistance for the system immediately. Questions related to community specific standards are forwarded to the appropriate SME.

Quality Assurance Report System

The CBPDC utilizes a web-based Quality Assurance Report System (QARS) that allows authorized users to view their data entries using a number of pre-determined QA reports. For example, the QARS allows authorized users to view their organizational data entries by year, by pillar/goal, by topic areas, and by activity category. While the reporting community can view their data entries, no changes can be made to the underlying data. Access to the system is tightly controlled by the CBPDC using the same credential, authorization and authentication scheme used by the CAP Reporting System.

Quality Assurance Procedures

At the end of each reporting period, the data is “frozen” by revoking the reporting community’s access to the system. Revoking access to the system is critical to managing QA activities – it is impossible to QA data while the reporting system is still open for new entries or modification to existing entries. The CBPDC is responsible for freezing the data

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and strictly controlling access during the QA period.

Each organization within the reporting community is responsible for "confirming" their data entries. The OL is responsible for coordinating this activity with their corresponding organizations. The reporting community is instructed to use the QARS to view and review their entries to ensure the system captured their activities as entered.

If an organization identifies issues with the data that prohibited them from confirming their entries, their access to the reporting system may be restored for a predetermined amount of time to make necessary changes. The process is closely monitored by the CBPDC. After making the necessary changes, the access is again revoked and the organization is responsible for confirming their data entries.

Once all the organizations confirm their data entries, a robust set of SME-led QA procedures are instituted. The SMEs received several hard copy reports from the QARS for their review. The pillar/goal area SMEs received two hard copy reports: one that identifies all activities that are characterized with "Other" for the topic area and one that identifies all activities that are included in the "Support" topic area for their respective pillar/goal areas. The pillar/goal SMEs are then instructed to closely review these entries to see if the activity was captured in the correct topic area. The SMEs work closely with the organization that entered the data to identify any necessary changes. These changes are marked up on the hard copy and delivered to the CBPDC for correction in the CAP reporting system.

The topic area SMEs received reports that include all activities for their respective topic area. The instruction to the topic area SMEs was to review all activities to ensure they were accurately captured and categorized. The SMEs work closely with the reporting organization when issues are identified. Any necessary changes are marked up on the hard copy and delivered to the CBPDC for correction in the CAP reporting system.

Organizational leads for the District of Columbia, Pennsylvania, Maryland and Virginia and the headwater states of Delaware, New York and West Virginia have the additional QA task of ensuring the states entered any necessary match to EPA implementation grants.

Necessary changes to the data are then delivered to the CBPDC on the hard copy spreadsheets. The CBPDC is responsible for making the necessary changes to the data system. These changes are captured in a detailed QA log that documents specific changes to the data as identified by the SMEs.

Once the SME reviews are complete, the QA activities are deemed complete. The frozen data is updated with all necessary changes by the CBPDC and documented in the QA log. The frozen data then becomes the authoritative source of funding information for the Chesapeake Bay Program and its partners.

First Version - Special Issues

Dashboards were developed for 11 key thematic areas. In most cases, the dashboards mapped directly to a topic area. This was not the case for the riparian forest buffer (RFB) and basinwide loads dashboards. In the case of riparian forest buffers, the SME was

required to review entries in the healthy watersheds pillar to identify activities that would be included on the RFB dashboard. The SME manually reviewed all data entries and flagged the appropriate activities for inclusion on the dashboard. The CBPDC inserted a special flag into the database to identify these activities as RFB activities and ensure they would not be counted on other dashboards.

Summing the activities across many topics of the healthy waters pillar created the nutrient loads dashboard. These included agriculture, wastewater treatment, stormwater, atmospheric deposition, on-sites and septics, riverine/shore erosion and support.

Activities documented in the CAP system were summarized by the fiscal year the funds were allocated. Fiscal years vary by organization and the CAP system does not reconcile the variations among state and federal fiscal years. For the purposes of reporting, this approach was agreed to be acceptable to the partnership.

Completeness

All CBP partners included in the first version of the CAP were able to enter detailed data for 2007. The fiscal year 2007 entries represent the most complete, comprehensive data for CAP activities. For 2008 and 2009, many of the organizations were unable to enter data for various reasons. In some cases, organizations were able to report an incomplete set of activities for 2008 and 2009. In other cases, the documented activities do not represent a comprehensive accounting of all program areas of the organization.

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