Environmental Protection Agency
Office of Inspector General

Department of Agriculture
Office of Inspector General

Evaluation Report:

Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources

EPA OIG Report No. 2007-P-00004
USDA OIG Report No. 50601-10-Hq

November 20, 2006

About This Joint Report

The Offices of Inspector General for the U.S. Environmental Protection Agency and the U.S. Department of Agriculture jointly conducted this evaluation. The Chesapeake Bay Program is a partnership of Federal, State, and local governments, as well as non-profits and academia. We conducted this review jointly to identify areas of mutual concern and opportunities to enhance the Federal partnership as they relate to environmental and agricultural issues for the Chesapeake Bay Program.

Abbreviations

ARS	Agricultural Research Service
CBPO	Chesapeake Bay Program Office
CEAP	Conservation Effects Assessment Project
CRP	Conservation Reserve Program
CREP	Conservation Reserve Enhancement Program
CSREES	Cooperative State Research, Education, and Extension Service
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FS	Forest Service
FSA	Farm Service Agency
GAO	Government Accountability Office
NFCA	Non-Funded Cooperative Agreement
NFS	National Forest System
NRCS	Natural Resources Conservation Service
OIG	Office of Inspector General
USDA	U.S. Department of Agriculture

Cover photo: A Virginia pond serves as a reservoir to stock cattle's alternative water source (EPA OIG photo).

Environmental Protection Agency
Office of Inspector General

Department of Agriculture
Office of Inspector General

November 20, 2006

MEMORANDUM

SUBJECT: Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources
EPA OIG Report No. 2007-P-00004
USDA OIG Report No. 50601-10-Hq

TO: Donald S. Welsh
Regional Administrator
Region 3
U.S. Environmental Protection Agency

Mark Rey
Under Secretary
Natural Resources and Environment
U.S. Department of Agriculture

This is our report on the subject evaluation conducted by the Offices of Inspector General (OIG) of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA). This report contains findings that describe issues the EPA and USDA OIGs have identified and corrective actions recommended by both OIGs. This report represents the opinion of the OIGs and does not necessarily represent the final EPA or USDA positions. Final determinations on matters in this report will be made by Agency managers in accordance with established resolution procedures.

This evaluation was conducted to respond to the concern of U.S. Senator Barbara A. Mikulski from Maryland, that the goals to clean up the Chesapeake Bay may not be achieved. This evaluation is part of a series of evaluations that the EPA OIG is conducting to determine whether best management practices and other controls are adequate to achieve the Chesapeake Bay's long-term water quality goals. The EPA OIG requested the USDA OIG to partner in this particular evaluation because of its expertise in agricultural issues and programs.

Action Required

We held an exit conference with EPA on July 17, 2006, and EPA provided its written response on October 23, 2006. EPA concurred with our findings and recommendations, and its full response is in Appendix E. Based on EPA's response, we made changes to the report as appropriate. In accordance with EPA Manual 2750, EPA is required to provide a written response to this report on the status of recommendations within 90 calendar days. This is to

include a corrective action plan for agreed upon actions, including milestone dates. In addition to providing us with a paper copy of your response, EPA is requested to email an electronic version to fuller.linda@epa.gov. We have no objections to further release of this report to the public. The report will be available at http://www.epa.gov/oig. If you or any of your staff have any questions related to EPA issues, please contact Bill Roderick, Acting Inspector General, at (202) 566-0847; Dan Engelberg, Product Line Director, at (202) 566-0830; or Linda Fuller, Assignment Manager, at (617) 918-1485.

We held an exit conference with USDA on July 6, 2006, and USDA provided its written response on October 12, 2006. USDA also concurred with our findings and recommendations, and its full response is in Appendix F. The USDA response contained sufficient justification to reach management decisions on Recommendations 5, 6, and 7. We ask USDA to please follow Departmental and your internal agency procedures in forwarding final-action correspondence to the Director, Planning and Accountability Division, Office of the Chief Financial Officer. Excerpts from the USDA response and the Office of Inspector General's (OIG) position will be presented in a separate memorandum to USDA.

Based on the response, management decision has not been reached for Recommendation 4. The information needed to reach management decision is set forth in the OIG Position section after the recommendation. In accordance with Departmental Regulation 1720-1, please furnish a reply within 60 days describing the corrective actions taken or planned and the timeframes for implementation for those recommendations for which a management decision has not yet been reached. Please note that the regulation requires a management decision be reached for all recommendations within a maximum of 6 months from the date of report issuance. Final action on the management decisions should be completed within 1 year of the date of the management decisions to preclude being listed in the Department's annual Performance and Accountability Report.

This report will also be available to the public at http://www.usda.gov/oig/rptsaudits.htm. For questions related to USDA, please contact Robert W. Young, Assistant Inspector General for Audit, at (202) 720-6945, or Ernest M. Hayashi, Director, Farm and Foreign Agricultural Division, at (202) 720-2887.

We appreciate the courtesies and cooperation extended to us by EPA and USDA during this review.

Bill A. Roderick
Acting Inspector General
Office of Inspector General
U.S. Environmental Protection Agency

/s/
Phyllis K. Fong
Inspector General
Office of Inspector General
U.S. Department of Agriculture

cc: Congress
Senator Barbara A. Mikulski

EPA
Benjamin Grumbles, Assistant Administrator, Office of Water
Jon Scholl, Counselor to the Administrator for Agricultural Policy
Rebecca Hanmer, Chesapeake Bay Program Office
Lorraine Fleury, Audit Coordinator, Region 3
Michael Mason, Office of Water

USDA
Gale A. Buchanan, Under Secretary for Research, Education and Economics
Floyd Gaibler, Acting Under Secretary for Farm and Foreign Agricultural Services

Executive Summary

Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources

EPA OIG Report No. 2007-P-00004
USDA OIG Report No. 50601-10-Hq

November 20, 2006

Purpose of Review

We conducted this review at the request of U.S. Senator Barbara A. Mikulski of Maryland. Our overall objective was to identify principal barriers to achieving nutrient reduction goals in the Chesapeake Bay. This report, the first of several planned, is on agriculture issues. It was prepared through a partnership between the U.S. Environmental Protection Agency (EPA) and U.S. Department of Agriculture (USDA) Offices of Inspector General. The report concentrated on agricultural best management practices used to address nonpoint nutrient and sediment loading to the Chesapeake Bay watershed.

What We Found

Despite significant efforts to improve water quality in the Chesapeake Bay watershed, excess nutrients and sediment continue to impair the Bay's water quality. Improving water quality conditions in the Bay is necessary to support living resources throughout the ecosystem, which in turn supports commercial and recreational uses, such as fishing/shellfishing. At the current rate of progress, the watershed will remain impaired for decades. State-level partners have committed the agricultural community to making the largest nutrient reductions, but numerous practices abound and are generally performed on a voluntary basis. Few of the agricultural practices in the tributary strategies have been implemented because the agricultural community considers many of these practices as either being unprofitable or requiring significant changes in farming techniques. Although the State-level partners have provided substantial funding to implement these practices, one of the key State partners acknowledged substantial additional funding is still needed. At the Federal level, applications for USDA's technical and financial assistance programs went unfunded, making it difficult to expand incentives for Bay area agricultural producers.

EPA must improve its coordination and collaboration with its Bay partners and the agricultural community to better reduce nutrients and sediment entering the Chesapeake Bay watershed. However, members of the agricultural community have been reluctant to participate with EPA because of EPA's regulatory enforcement role. USDA, a Bay partner at the Federal level, could significantly assist EPA in implementing the needed conservation practices within the agricultural community. Given its many conservation programs, extensive field organization, and long experience working with the agricultural community, USDA's commitment and collaboration would significantly contribute to the EPA Chesapeake Bay Program Office's plan for long-term improvement to the Bay's water quality. However, USDA has not coordinated a Department-wide strategy or policy to address its commitment as a Bay partner.

What We Recommend

We recommend that EPA execute a new Memorandum of Agreement with USDA that specifically identifies tasks and timeframes for meeting mutually shared goals in the cleanup of the Bay. Further, the two agencies should agree to a method to track progress. Also, EPA, USDA, and the States, with assistance from land grant universities and agricultural organizations, should revisit State tributary strategies to ensure that an effective and cost-efficient combination of conservation practices are adopted and implemented. USDA should assign a senior level official to coordinate with EPA's Chesapeake Bay Program and review the feasibility of targeting USDA funds geographically. Although these steps will not by themselves solve the Bay's problems, they will significantly assist the Bay partners in cleaning up the Bay. EPA and USDA generally concurred with our findings and recommendations.

For further information, contact:

- **The U.S. Environmental Protection Agency Office of Inspector General at (202) 566-2391; or**
- **The U.S. Department of Agriculture, Office of Inspector General, at FOIASTAFF@oig.usda.gov**

To review the full report online, click on:

- **www.epa.gov/oig/reports/2007/20061120-2007-P-00004.pdf; or**
- **www.usda.gov/oig/rptsaudits.htm**

Table of Contents

Chapters

1 Introduction 1

Purpose 1
Background 1
Scope and Methodology 9
Structure of Report 9

2 Chesapeake Bay Watershed Will Not Be Restored by 2010 at Current Level of Effort 11

Establishing Water Quality Standards and an Equitable Allocation to Reduce Nutrients and Sediment First Priority 11
Despite Early Progress, Restoration Could Be Decades Away 13
Agricultural Community Key to Achieving Goals 15
Substantial Financial Commitment Needed to Implement Strategies 16
Better Partnership Needed 19

3 EPA Needs to Improve Its Coordination and Collaboration with the Agricultural Community 20

Agricultural Practices in Tributary Strategies Not Widely Implemented by Agricultural Community 20
EPA Needs to Engage the Agricultural Community to Commit to Implementing Tributary Strategies 23
Effective EPA-USDA Partnership Could Help Advance Alternative Practices.... 27

4 USDA Needs to Improve Coordination to Restore Chesapeake Bay 30

Role of USDA 30
Providing Leadership 31
Bringing USDA's Resources to Bear 32
Evaluating USDA's Performance 38

5 Conclusions and Recommendations 43

Conclusions 43
Recommendations 44
EPA and USDA Responses and OIGs' Comments 45

Appendices

A Agricultural Best Management Practices for Chesapeake Bay Watershed 46
B Details on Scope and Methodology 48
C Agricultural Best Management Practices' Progress and Challenges 50
D Alternative Agricultural Management Practices 54
E EPA Response to OIG Draft Report 57
F USDA Response to OIG Draft Report 58

Chapter 1
Introduction

Purpose

In 2000, the Chesapeake Bay partners agreed to improve water quality in the Bay and its tributaries to the level necessary to support aquatic life and be removed from the U.S. Environmental Protection Agency's (EPA's) impaired waters list by 2010. Bay stakeholders have questioned whether the needed nutrient reduction goals will be met, prompting interest from U.S. Senator Barbara A. Mikulski of Maryland. The Senator requested the EPA Office of Inspector General (OIG) to evaluate the progress being made by the Chesapeake Bay Program. The EPA OIG is evaluating progress in controlling both nonpoint and point source pollution. Control of nonpoint source pollution is being evaluated in three phases: agriculture, land use, and air deposition. For this report, EPA OIG partnered with the U.S. Department of Agriculture (USDA) OIG to evaluate best management practices proposed by Bay partners to control agricultural pollution. The EPA OIG has also examined the effectiveness of EPA grant funds in targeting Chesapeake Bay priorities.

For this evaluation, EPA OIG and USDA OIG sought to answer the following questions:

1. How are Bay stakeholders choosing and applying agricultural best management practices or conservation practices to address nonpoint nutrient and sediment loading to the Chesapeake Bay watershed?

2. What alternative approaches to reducing nutrient loadings have been proposed for the Chesapeake Bay and similar communities?

3. What challenges must be overcome to effectively implement the current and alternative best management practices in the Bay watershed?

4. What is the feasibility of implementing the short- and long-term management practices needed to reduce nutrient and sediment loading to the Chesapeake Bay?

Background

Bay Watershed Ecology and Geography

The Chesapeake Bay is North America's largest and most biologically diverse estuary, home to more than 16 million people and 3,600 species of plants, fish, and animals. For more than 300 years, the Bay and its tributaries have sustained the region's economy. The Bay watershed is also an important recreational and educational resource.

A watershed refers to a geographic area in which water drains to a common outlet. The Chesapeake Bay watershed includes not only the Bay and its tributaries, but also the surrounding land. The Chesapeake Bay watershed covers 64,000 square miles and includes parts of six States – Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia – and all of the District of Columbia (see Figure 1).

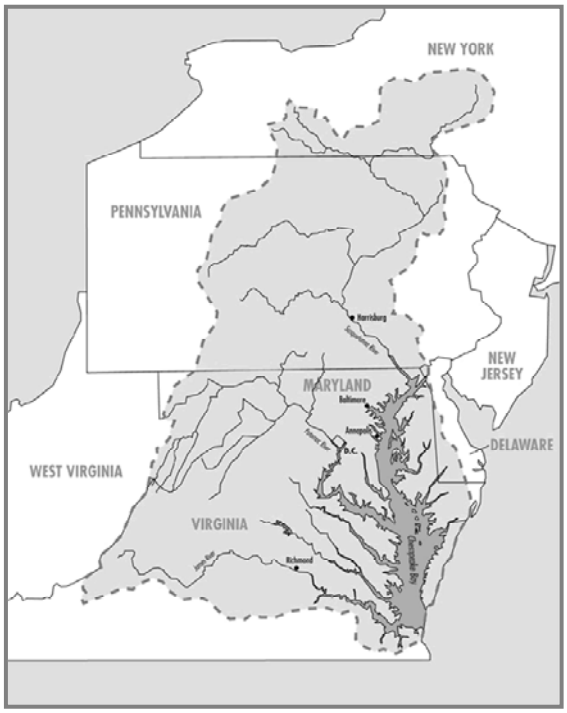


Figure 1: Map of Chesapeake Bay Watershed

The Bay watershed is comprised of approximately 23 percent agricultural land (crops, livestock, and pasture), 9 percent developed land, 58 percent forest cover, and 10 percent mixed open land. In this area, agriculture is characterized by smaller farms and a wider range of products than elsewhere in the United States (farms in the Bay watershed are approximately 180 acres while the U.S. average is 500 acres). However, poultry and hog operations in the Mid-Atlantic region tend to have more birds/animals per acre than farms elsewhere in the country.

Bay Pollution Sources and Impacts

Nutrient and sediment overload have been identified as the primary causes of water quality degradation and loss of aquatic life.

- **Nutrients** such as nitrogen and phosphorus aid in the growth of plants and, in water, can fuel large algae blooms that block sunlight and, as the algae die and decompose, deplete the oxygen in the water. Without sunlight, underwater bay grasses cannot grow and blue crabs and fish cannot live, depriving larger fish of food sources. Nutrients come from many sources, such as lawn fertilizer, sewage treatment plants, septic systems, cropland, livestock, and the air.

- **Sediment** refers to the loose particles of clay, silt, and sand that are suspended in a body of water and eventually settle to the bottom. Sediment reaches waterways primarily from stream and shoreline erosion, forests, and urban and agricultural lands. Sediment also prevents sunlight from reaching aquatic plants, and carries excess nutrients to water bodies.

Figures 2a to 2c show the relative contributions of nutrients (specifically, nitrogen and phosphorus) and sediment from various sectors:

Figure 2a: Sources of Nitrogen to Bay (2004)

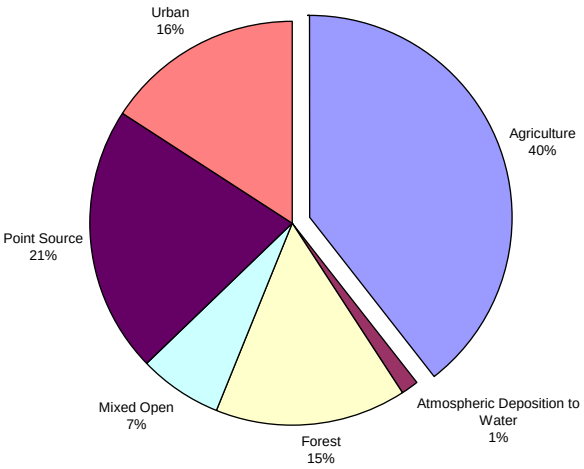


Figure 2b: Sources of Phosphorus to Bay (2004)

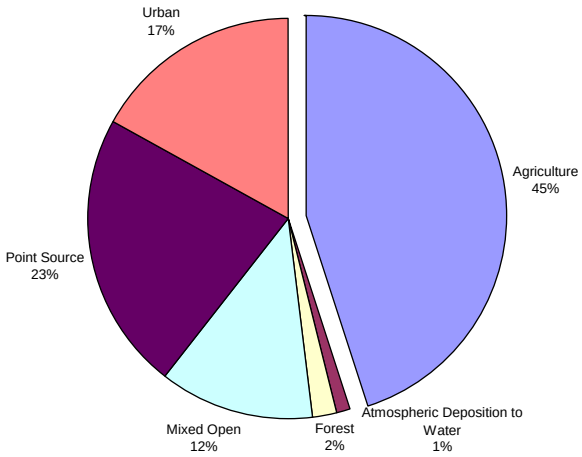
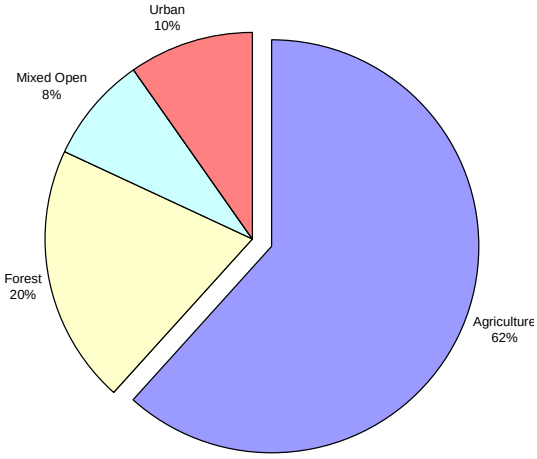


Figure 2c: Sources of Sediment to Bay (2004)



Source (all three charts): Chesapeake Bay Program

While the precise percentages have been questioned by stakeholders, the agricultural community is the largest contributor of nutrients and sediment to the Bay. Of the Chesapeake Bay modeled nutrient and sediment loads from agricultural sources, the signatory States of Maryland, Virginia, and Pennsylvania contribute approximately 87 percent of nitrogen and phosphorus and 89 percent of sediment; the headwater States of Delaware, New York, and West Virginia contribute the remainder. Although agriculture employs only about 4 percent of the labor force in the Mid-Atlantic region, sub-watersheds in southern New York, northern and southeastern Pennsylvania, western Maryland, and western Virginia rank in the top 10 percent of U.S. watersheds for manure nitrogen runoff and leaching, manure nitrogen loadings from concentrated animal feeding operations, and soil loss from erosion. Further, watersheds in southeast Pennsylvania and the southern

Virginia coast rank in the top 10 percent of U.S. watersheds for nitrogen loadings from commercial fertilizer application. These high levels of runoff and loadings are due to a combination of factors, including rainfall, soil characteristics, and on-farm management practices including manure application.[1]

Stakeholders in Chesapeake Bay Restoration

The Chesapeake Bay Program is a regional partnership of State and Federal agencies, academic institutions, and non-government organizations formed in 1983 to lead and direct restoration of the Chesapeake Bay. It supports the goals of the Chesapeake Bay Agreements (1983, 1987, and 2000) signed by the States of Maryland, Pennsylvania, and Virginia (referred to as the "signatory States"); the District of Columbia; the Chesapeake Bay Commission (a tri-state legislative advisory body); and EPA. The Program is comprised of numerous committees and sub-committees responsible for technical and administrative actions. They work under the umbrella of the Chesapeake Executive Council, which consists of the governors of the signatory States; the Mayor of the District of Columbia; the Chair of the Chesapeake Bay Commission;[2] and the EPA Administrator, who represents the Federal Government on the council.

EPA

As the representative of the Federal Government, EPA and its Chesapeake Bay Program Office (CBPO) coordinate partner activity and implementation of strategies to meet the restoration goals of the Chesapeake Bay. The EPA/CBPO, headquartered in Annapolis, Maryland, is part of EPA's Region 3. Since 1991, the EPA/CBPO budget has remained stable at approximately $20 million annually. In Fiscal Year 2006, the funds were distributed as follows:

- $8 million to States in implementation grants,
- $2 to $3 million in watershed-wide monitoring and modeling efforts,
- $6 million for special projects/staffing, and
- $3.5 to $4.0 million for administrative support.

EPA's mission is to protect human health and safeguard the natural environment – air, water, and land. EPA was established to consolidate a variety of Federal research, monitoring, standard-setting, and enforcement activities to ensure environmental protection. The EPA Administrator provides overall supervision of the Agency and is responsible directly to the President of the United States. The EPA Administrator is supported by nine Assistant Administrators overseeing

[1] *Chesapeake Bay Futures, Choices for the 21st Century*, Chapter 7, page 86, prepared by Chesapeake Bay's Scientific and Technical Advisory Committee.

[2] The Chesapeake Bay Commission was formed in 1980 and serves the General Assemblies of Maryland, Pennsylvania, and Virginia, guiding them in cooperatively managing the Chesapeake Bay. Each State has a seven-member delegation consisting of five State legislators, the governor or their designee, and a citizen representative.

administrative, financial, enforcement/compliance, and specific environmental programs related to air, water, and land. In addition, the Counselor to the Administrator for Agricultural Policy advises the EPA Administrator on agricultural issues and serves as a liaison to the agricultural community, including agricultural organizations and agencies.

EPA's organizational structure includes a national headquarters and 10 regional offices, each of which is responsible for several States (and territories as appropriate). Each regional office is responsible within its States for the execution of the Agency's environmental programs. EPA delegates responsibility for issuing permits and for monitoring and enforcing compliance to States and tribes, and provides direct support through grants to State environmental programs. EPA also relies on partnerships with public and private entities to solve environmental problems not generally addressed by laws and regulations. Partnership efforts require reaching out to various stakeholder groups, such as the agricultural community. For example, to assist in such communication, EPA Region 3 has an agricultural liaison.

EPA's 2003-2008 Strategic Plan includes goals related to the Chesapeake Bay Watershed, with targets for nutrient and sediment reduction and increased growth of submerged aquatic vegetation. However, the plan notes that improving Bay water quality is a partnership effort and that more specific goals guiding Bay restoration are delineated in the Chesapeake 2000 Agreement. See next section, "Chesapeake Bay Cleanup Approach," for additional information on Bay restoration goals.

USDA

Among the many Federal agencies that provide expertise and resources to the Chesapeake Bay restoration effort is USDA. The Secretary and Deputy Secretary of Agriculture lead USDA in achieving its mission to provide leadership on food, agriculture, natural resources, and related issues based on sound public policy, the best available science, and efficient management. To accomplish this mission, USDA activities are performed under 7 mission areas with 17 agencies as shown in Table 1 that follows.

Table 1: USDA Missions

USDA Mission Area	USDA Agency
Farm and Foreign Agricultural Services	Foreign Agricultural Service (FAS) Farm Service Agency (FSA) Risk Management Agency (RMA)
Food, Nutrition and Consumer Services	Food and Nutrition Service (FNS)
Food Safety	Food Safety and Inspection Service (FSIS)
Marketing and Regulatory Programs	Agricultural Marketing Service (AMS) Animal and Plant Health Inspection Service (APHIS) Grain Inspection, Packers and Stockyards Administration (GIPSA)
Natural Resources and Environment	Forest Service (FS) Natural Resources Conservation Service (NRCS)
Research, Education and Economics	Agricultural Research Service (ARS) Cooperative State Research, Education and Extension Service (CSREES) Economic Research Service (ERS) National Agricultural Statistics Service (NASS)
Rural Development	Rural Business-Cooperative Services (RBCS) Rural Housing Service (RHS) Rural Utilities Service (RUS)

Source: USDA

Each mission area is under the direction of an under secretary. However, leadership and authorities are limited to their unique mission areas.

The organizational structure of USDA's agencies is diverse. Some agencies operate with one nationwide office (e.g., CSREES), some agencies operate with national and regional or area offices (e.g., ARS), and other agencies operate with national, State and local offices (e.g., NRCS and FSA). Agencies within the Natural Resources and Environment mission area (NRCS and FS) are characterized by decentralized management, delegating significant responsibilities and management decisions to the State and local offices. Agencies within the Farm and Foreign Agricultural Services mission area (e.g., FSA) retain policy making and other managerial decision making processes closer to the agency's headquarters. In agricultural communities, USDA has positioned "USDA service centers" which provide a single location where customers can access the services provided by FSA, NRCS, and Rural Development. Like EPA, USDA agencies also rely heavily on partnerships with both State and other governmental entities and non-governmental organizations to accomplish their mission. NRCS' approximately 2,900 field offices are often co-located with State and local conservation offices in an effort to

better serve the customer. Customers accessing services provided by NRCS' 11,251 permanent Federal field employees may work with a combination of Federal, local, or State employees – and not perceive any distinction. FSA's 2,350 service centers are staffed with a combination of 4,287 permanent Federal employees and 9,008 permanent non-Federal FSA employees.

The two USDA agencies providing the largest amount of conservation funds in the Chesapeake Bay area are NRCS and FSA. NRCS allocates its funds to each NRCS State office based on a number of factors, including natural resource concern, resource base, performance incentive, and State-specific concerns. Once funds are allocated to the State NRCS offices, the State Conservationist, with the advice of the State Technical Committee (representatives of various stakeholders), in turn allocates the funds across the State. NRCS expects the State Conservationist to allocate funds to achieve the greatest environmental impact. Consequently, in the Chesapeake Bay States, the majority of funds may be allocated to land within the Chesapeake Bay watershed. In contrast, FSA funding for conservation practices is through nationwide competition. However, FSA recognized the Chesapeake Bay watershed as a conservation priority area and has effectively increased funding to the watershed by making all land within the Chesapeake Bay eligible for enrollment. FSA further augments its contribution to the watershed through its Conservation Reserve Enhancement Program (CREP) partnerships with State governments, which are used to focus funds on local environmental issues. Each of the six Chesapeake Bay States has a CREP agreement with FSA.

Through its technical services, research, outreach, and cost-share programs, USDA can significantly affect producers' agricultural practices. The goal of USDA's conservation programs is to support agricultural productivity while helping to sustain environmental quality by encouraging practices to reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. These conservation programs are offered on a voluntary, incentive-based approach. USDA (as a department or through its agencies) has agreements with the Chesapeake Executive Council expressing USDA's commitment, as a partner organization, to manage the watershed as a cohesive ecosystem and to achieve the goals of the Chesapeake 2000 Agreement. Details on the major USDA agencies and programs that support Chesapeake Bay restoration efforts can be found in Chapter 4.

USDA has created a strategic plan to implement its vision. The framework of this plan depends on these key activities: expanding markets for agricultural products and supporting international economic development; further developing alternative markets for agricultural products and activities; providing financing needed to help expand job opportunities and improve housing, utilities, and infrastructure in rural America; enhancing food safety by taking steps to reduce the prevalence of foodborne hazards from farm to table; improving nutrition and health by providing food assistance and nutrition education and promotion; and managing and protecting America's public and private lands working cooperatively with other

levels of government and the private sector. A copy of the USDA strategic plan can be found at: http://www.usda.gov/ocfo/usdasp/usdasp.htm

Chesapeake Bay Cleanup Approach

In 2000, with an agreement known as the Chesapeake 2000 Agreement, the Chesapeake Bay Program partners recommitted to their overall mission of Bay restoration and established new goals. The agreement provided for the goal of improving water quality in the Bay and its tributaries so that these waters may be removed from EPA's impaired waters list by 2010 when Section 303(d) of the Clean Water Act would require the calculation and allocation of a total daily maximum load among the States. At this time, the non-signatory Bay watershed States of New York, Delaware, and West Virginia also agreed to nutrient and sediment goals.

All the States within the Bay watershed either have or are expected to prepare tributary strategies. These strategies are river-specific cleanup plans that include specific best management practices to be employed to reduce the amount of nutrients and sediment flowing into the Bay. These strategies are designed to work on a watershed-by-watershed basis to reduce pollution from point and nonpoint sources.

EPA/CBPO uses the term "best management practices" to describe practices used by all sectors to reduce nonpoint source pollution. While State tributary strategies delineate practices for all sectors, agricultural best management practices include conservation tillage, nutrient management, buffer strips, and other activities that reduce soil loss, prevent runoff, and provide for the proper application rates of nutrients to cropland. In USDA, the analogous term is "conservation practices." For the purposes of this report, these terms are interchangeable. Following are some examples of agricultural best management practices. Appendix A shows each of the 26 agricultural best management practices for which Maryland, Virginia, and Pennsylvania have set implementation goals. As explained in our Scope and Methodology section, we limited our review of practices to the signatory States.

Table 2: Selected Agricultural Best Management Practices for Chesapeake Bay Watershed

Practice	Description
Cover Crops	Non-harvested crops (e.g., rye, wheat, barley) are planted to maintain vegetative cover on cropland, holding nutrients at the root zone. Trapped nitrogen can be released and used by the crops.
Riparian Forest Buffers	Linear wooded areas are located along rivers, streams, and shorelines. Buffers filter nutrients, sediment, and other pollutants from runoff and remove nutrients from groundwater.
Nutrient Management Plan Implementation	Plans recommend appropriate rates of nutrient application, timing of applications, and placement of nutrients to result in economically optimum crop yields while managing the level of nutrient loss.
Off-stream Watering with Fencing	Limits livestock access to streams with fencing and by providing an alternative drinking water source.

Source: Chesapeake Bay Program

Scope and Methodology

We conducted our evaluation from May 2005 through February 2006 in accordance with *Government Auditing Standards*, issued by the Comptroller General of the United States. This evaluation was conducted jointly by the EPA OIG and USDA OIG. We reviewed the progress the Chesapeake Bay Program partners had been making in reducing nutrients from 1985 to 2004, and the activities the Bay partners had taken in meeting the agricultural nutrient reduction goals resulting from the Chesapeake 2000 Agreement until the end of 2005.

We interviewed EPA and USDA staff representing various Federal programs, State staff involved in developing and implementing State tributary strategies, agricultural producers, and experts from academia and other fields involved in Chesapeake Bay restoration. We reviewed the Chesapeake 2000 Agreement, State tributary strategies, data from the Chesapeake Bay Program Watershed Model, and other related documents. We did not audit the reliability of the data included in these reports.

Appendix B provides further details on our scope and methodology, including prior evaluations of this program.

Structure of Report

Regarding the four questions in our "Purpose" section, we found the following regarding each:

Question 1: Agricultural producers have chosen conservation practices that have been deemed cost effective, eligible for USDA cost share funding, and/or required by Federal/State regulations.

Question 2: A number of alternative approaches were identified, but there is no one approach or practice that can address the area's nutrient imbalance. EPA/CBPO is working with USDA's Agricultural Research Service on developing new approaches.

Question 3: While each practice has its own challenge, generally, many of the conservation practices included in the State Tributary Strategies were not cost effective for the producer or suitable to the region.

Question 4: Current management practices will fail to achieve Chesapeake Bay goals due to Bay partners' insufficient financial support and coordination.

These issues are discussed in further detail in the subsequent chapters of this report. These subsequent chapters are broken up as follows:

Chapter 2: The overall progress of Bay partners in achieving nutrient/sediment goals.
Chapter 3: EPA's efforts to coordinate with the agricultural community.
Chapter 4: USDA's role as a Bay partner.

Due to the overlapping nature of the issues discussed in those three chapters, we are providing an overall conclusion and all of our recommendations in Chapter 5.

Chapter 2
Chesapeake Bay Watershed Will Not Be Restored by 2010 at Current Level of Effort

Despite significant efforts to improve water quality in the Chesapeake Bay watershed, excess nutrients and sediment continue to impair the Bay's water quality. At the current rate of progress, the watershed will remain impaired for decades, exceeding the 2010 cleanup deadline. Improving water quality conditions in the Bay is necessary to support living resources throughout the ecosystem, which in turn supports commercial and recreational uses, such as fishing/shellfishing. Establishing water quality standards and determining an equitable method to distribute the load reductions among partners were initially priorities. Now, more than half-way to the 2010 deadline for attaining their goals, States are just beginning to prepare implementation plans, and are finding that available resources are unlikely to support substantial financing needed to implement all the practices included in their strategies. Federal programs can contribute resources, but the current level of funding cannot be expected to fill the gaps. In their tributary strategies, States committed the agricultural community to making the largest nutrient reductions. However, no one method is used to achieve reductions, numerous practices abound, and implementation of these practices is carried out by thousands of land owners primarily on a voluntary basis. As the lead Federal agency responsible for coordinating project efforts, EPA/CBPO needs to strengthen its partnership not only with the agricultural community, but also with its Federal and State partners to utilize that extensive field organization. By doing so, EPA/CBPO will be able to obtain greater commitment from all sectors.

Establishing Water Quality Standards and an Equitable Allocation to Reduce Nutrients and Sediment First Priority

The Bay partners set the nutrient and sediment reduction goals based on the need to improve water quality so that the Bay and its tributaries could be removed from the impaired waters list by 2010. Accordingly, the Bay partners' first priority was to develop and agree to an equitable allocation for reductions by each partner and set water quality standards. EPA's 2003 *Strategy for Water Quality Standards and Criteria* provides that "water quality standards and criteria are the regulatory and scientific foundation of programs established under the Clean Water Act to protect the Nation's waters." However, completing the standards, tributary strategies, and implementation plans took the partners more than half-way through their 10-year timeframe. While these activities are a major accomplishment for the Bay partners, the implementation phase will likely take decades before the ultimate goal of a clean Bay is achieved.

With the signing of the Chesapeake 2000 Agreement, the Bay partners agreed to:

- 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;

- By 2001, 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 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.

On March 21, 2003, and April 15, 2003, the Chesapeake Bay Program Principals' Staff Committee and representatives of the headwater States adopted the nutrient and sediment cap load allocations and submerged aquatic vegetation restoration goals for the Chesapeake Bay. EPA/CBPO defined the water quality conditions in its April 2003 *Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity, and Chlorophyll a for the Chesapeake Bay and Its Tidal Tributaries*. This document provided EPA/CBPO's recommendations to the Chesapeake Bay States for use in establishing their water quality standards. In October 2003, EPA/CBPO issued *Technical Support Document for Identification of Chesapeake Bay Designated Uses and Attainability* to assist the States in development and adoption of refined water quality standards.

The State partners with tidal waters agreed to revise their water quality standards and submitted revisions to EPA for approval as shown in Table 3:

Table 3: EPA Approval of Water Quality Standards

State	Date Standards Submitted to EPA	Date Approved by EPA
Delaware	07/2004	12/2004
District of Columbia	11/2005	02/2006
Maryland	08/2005	08/2005
Virginia	06/2005 *	06/2005
	01/2006 *	01/2006

*Virginia did not include chlorophyll a in the tidal James until its 2006 submission

Source: Chesapeake Bay Program

Through a six-State memorandum of understanding, the headwater and signatory States adopted cap load allocations for nitrogen, phosphorus, and sediment that not only were expected to be achieved, but also to be maintained even in the face of increasing development in the watershed. The Bay partners need to ensure that increasing development is well planned. Development increases impervious surface cover and destroys open space, which reduces the capacity of the watershed to store and use nutrients and sediment.

In making their allocation decisions, the partners factored in both equity and feasibility of achieving reductions. This systematic process conducted during 2003 established Bay-wide 2010 loading goals of 183 million pounds of nitrogen, 12.8 million pounds of phosphorus, and 4.15 million tons sediment per year. These levels were the amounts the Bay could accept while meeting water quality goals. Subsequently, allocations of nitrogen, phosphorus, and sediment loading were assigned to each State and each tributary basin within each State. Leaders of each State agreed to reduce nutrients and sediment to its target load allocation. Table 4 shows the 2004 loading to the Bay by State (including Washington, DC) and the 2010 loading allocated to each partner jurisdiction.

Table 4: Reductions Needed from 2004 Loading to 2010 Allocation Goals

	Nitrogen (million pounds/year			Phosphorus (million pounds/year)			Sediment (million tons/year)		
Jurisdiction	**2004**	**2010 Goal**	**Reductions Needed**	**2004**	**2010 Goal**	**Reductions Needed**	**2004**	**2010 Goal**	**Reductions Needed**
Pennsylvania	107	72	35	3.6	2.3	1.4	1.14	0.99	0.14
Maryland	57	37	20	3.8	2.9	0.9	0.99	0.71	0.28
Virginia	74	51	23	9.2	6.0	3.2	2.27	1.94	0.33
Washington, DC	4	2	1	0.1	0.3	None	0.01	0.01	0.00
New York	17	13	5	0.9	0.6	0.4	0.14	0.13	0.00
Delaware	5	3	2	0.4	0.3	0.1	0.05	0.04	0.01
West Virginia	7	5	2	0.7	0.4	0.3	0.32	0.32	0.00
Bay-Wide [1]	**270**	**183[2]**	**87**	**18.7**	**12.8**	**6.2**	**4.92**	**4.15**	**0.78**

[1]Totals may not add up exactly due to rounding.
[2] Includes 8 million pounds of nitrogen from air deposition; EPA has committed to reducing this load through its air program controls. The total nitrogen load allocated to the State jurisdictions is 175 million pounds (with a reduction of 79 million pounds needed).

Source: Chesapeake Bay Program

Based on Table 4, Bay partners must reduce approximately 87 million pounds of nitrogen, 6.2 million pounds of phosphorus, and almost 0.8 million tons of sediment from entering the Bay each year from 2004 levels. However, these cuts are so great that the implementation levels needed to meet their cap load will not be possible with current programs and resources.

The CBPO and its partners accomplished much in establishing a scientifically sound basis for reducing nutrients to the Bay during the 5 years following the signing of the 2000 Agreement. CBPO's Associate Director for Science stated that in 2000, when the 2010 commitment was made, the partners did not know the full scope of the restoration challenge. He further noted that when the processes were largely completed and initial estimates of cost and effort were made, "local governments found the magnitude of the effort to meet Chesapeake Bay water quality standards sobering."

Despite Early Progress, Restoration Could Be Decades Away

By the year 2000, Bay partners had achieved approximately 80 percent of the nutrient goal set forth in the 1987 Chesapeake 2000 Agreement. Though that goal had not been met, the

2000 Agreement set new, more ambitious goals. However, attaining these new goals is unlikely by the Agreement's deadline of 2010 because the current rates of reduction fall short of the amount needed. In fact, it could take decades to reach target loads and even longer to reach ecological restoration goals.

The Chesapeake Bay Program estimated that between 1985 and 2004, modeled loads of nitrogen, phosphorus, and sediment to the Bay have been reduced as detailed in Table 5:

Table 5: Bay-Wide Progress from 1985 to 2004

Pollutant	Estimated Reductions*	Percent of Goal Reached
Nitrogen	67 million pounds	41%
Phosphorus	8 million pounds	58%
Sediment	1 million tons	54%

* Accounts for increased loads due to population growth

Source: Chesapeake Bay Program

These reductions are attributed to improved nutrient removal technology by wastewater treatments plants, State bans on phosphates in detergents, and the various best management practices implemented to control nonpoint source pollution. The above progress represents net reductions throughout the watershed based on loads from all sectors. Therefore, overall reductions have been made in the face of population growth.

Based on the modeled loading rates, the Bay partners will not meet their 2010 goals for reducing those loads. For example, based on EPA/CBPO estimates of nitrogen reductions between 1985 and 2004, loads decreased at a rate of 3.4 million pounds annually. However, meeting the Bay loading goals by the 2010 deadline would require a reduction rate of 16 million pounds of nitrogen each year from 2004 to 2010. Achieving the remaining reductions may be even more challenging because the easier problems have been addressed. Therefore, it is not likely the Bay partners will reduce nitrogen by 2010 to the extent necessary; it may be decades before this level of reduction can be reached. Based on EPA/CBPO's modeled nutrient and sediment loading to the Bay between 1985 and 2004, we calculated annualized rates of reductions (additional units reduced per year) to determine an estimate of a timeframe to meet the 2010 cap loads. Details for annualized modeled load reductions for nitrogen, phosphorus, and sediment are in Table 6.

Table 6: 1985-2004 Annualized Reduction Rates for Meeting Goals to Reduce Loads

	Nitrogen (million pounds)	Phosphorus (million pounds)	Sediment (million tons)
Annualized reduction rate (additional units reduced per year)	3.4	0.4	0.05
Time to reach 2010 loading cap at annualized rate	28 years	15 years	15 years

Source: OIG analysis of Chesapeake Bay Program data

Meeting loading goals alone does not mean the Bay's water quality and aquatic resources will be immediately restored to desired conditions. Even if modeled load goals are met, Chesapeake Bay Program staff note that it could take another 10 years for pollution control practices to result in Bay water quality improvement. Further, since actual loads vary greatly based on a given year's rainfall, modeled load reductions may not be apparent in the short term. Therefore, while it may be decades before reduction targets are reached, ecological restoration will take even longer.

Agricultural Community Key to Achieving Goals

Agricultural operations are by far the largest source of nutrient and sediment loads to the Bay, representing over 40 percent of the nutrient load and 60 percent of the land-based sediment load. In developing their tributary strategies, State partners committed the agricultural community to reducing approximately 60 percent of the total nutrient loading and 90 percent of the sediment loading through the application of best management practices on cropland and animal operations, according to EPA/CBPO. This represents reductions of approximately 54 million pounds of nitrogen, 3.3 million pounds of phosphorus, and 0.67 million tons of sediment from 2004 levels by 2010.

Aside from being a major source of nutrients and sediment to the Bay, another reason for placing an ambitious goal on the agricultural community is that implementation of agricultural practices has been determined to be cost effective. The Chesapeake Bay Commission evaluated a number of best management practices for the agriculture and urban sectors and selected six practices it deemed "most cost-effective and widely applicable." (The information about practice costs and efficiencies was assembled by the CBPO.) One practice identified was wastewater treatment plant upgrades (the subject of a subsequent OIG review) while the other five were agricultural practices:

- Diet and feed adjustments
- Traditional nutrient management
- Enhanced nutrient management
- Conservation tillage
- Cover crops

If these five practices were implemented to the maximum extent possible, the Chesapeake Bay Commission estimated that Bay stakeholders could achieve nitrogen, phosphorus, and sediment reductions of 44, 30, and 100 percent, respectively, at an estimated cost of $630 million per year. This cost is far lower with greater benefits in comparison to other sectors and practices.

Figure 3a shows each sector's relative responsibility for achieving the Bay-wide nitrogen reduction goal (i.e., percent of the Bay-wide nitrogen reduction goal that each sector is expected to assume). Figure 3b shows the estimated relative cost associated with implementation in each sector.

Figure 3a: Nitrogen Reduction Per Tributary Strategies

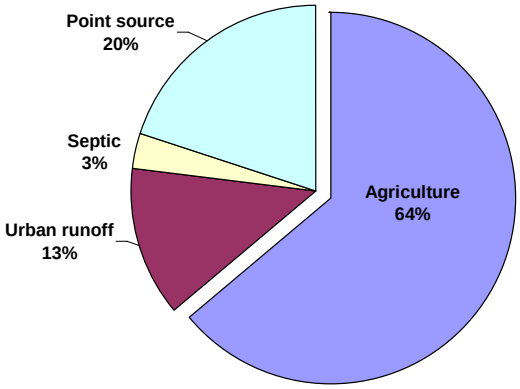
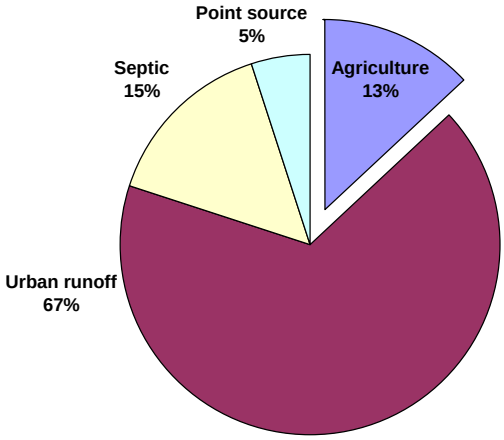


Figure 3b: Annualized Cost Per Tributary Strategies



Source: Chesapeake Bay Program

The figures show that while States expect implementation of agricultural practices in the tributary strategies to make up 64 percent of reductions from all sectors, the estimated cost to achieve this goal is only 13 percent of the total cost, indicating the cost benefit of implementing the agricultural practices.

Substantial Financial Commitment Needed to Implement Strategies

Despite the general cost-effectiveness of agricultural best management practices, the cost of implementing them to the level necessary to achieve nutrient and sediment goals is significant. Implementing tributary strategies will require a substantial financial commitment from the States, which have recently started to identify and generate funding sources. Federal funding can help States, but needs to be better coordinated with tributary strategy goals (see Chapters 3 and 4). However, Federal funding at current levels cannot be expected to fill all the gaps.

In their tributary strategies, States estimated capital costs for implementing agricultural practices at over $2 billion. See Table 7 for cost estimates by State (Maryland's tributary strategy was not clear on how its total agricultural costs were calculated).

Table 7: State Agricultural Cost Estimates

State	Estimated Cost (millions)
Maryland	$651

Pennsylvania	$593
Virginia	$740
West Virginia	$179
Total	**$2,163**

Sources: States' Tributary Strategies

Figures for New York and Delaware are not available because these States have not yet completed their tributary strategies. Maryland determined that it will only be able to fund $280 million of its agricultural costs, leaving a shortfall of $371 million, or 57 percent. Shortfall estimates for the other States were not available.

EPA/CBPO expected the State partners to develop implementation plans identifying how the best management practices in the tributary strategies were to be funded and implemented, along with any funding gaps. More than half-way to the 2010-year goal, only Maryland and West Virginia had issued draft implementation plans.

Despite the lack of plans or comprehensive funding strategies, Maryland, Pennsylvania, and Virginia have instituted or proposed various funding mechanisms to support Bay commitments. However, the new revenues must also support other needed investments, such as upgrading wastewater treatment facilities. For example, in 2004, Maryland established the Chesapeake and Atlantic Coastal Bays Restoration Fund supported by a $2.50 monthly fee on sewer bills and an annual $30 fee on septic system owners. The sewer fees will be used to upgrade wastewater treatment plants while the septic fees will provide $3 to $4 million annually for planting approximately 100,000 acres of cover crops to prevent nutrient runoff. Cover crops, such as rye, wheat, or barley, maintain a vegetative cover holding nutrients to the root. Nonetheless, these additional funds do not come close to funding cover crop planting. According to Maryland's tributary strategy coordinator, at least 300,000 acres must be planted before Maryland can see an impact in water quality. Maryland's tributary strategy goal for cover crops is 600,000 acres.

While the Federal Government provides funding for agricultural programs it cannot fill the gap. The amount of Federal funding is limited and some Federal programs limit benefits. For example, in the case of cover crops, USDA limits funding of this activity up to a maximum of 3 years to encourage agriculture producers to test its applicability to their long-term goals. To be effective, cover crops need to be planted on a continuous basis. EPA provides substantially less funding for agricultural practices than USDA, and does so generally just for demonstration projects.

While USDA provides substantial funding and technical assistance to farm and forest landowners as well as conservation organizations in the Chesapeake Bay watershed, the Department does not specifically target its funding to meeting the Chesapeake Bay goals (see Chapter 4). Other Federal program funding is not as significant, must be shared between urban and agricultural sector projects, and is usually for demonstration projects. These programs include: the Chesapeake Bay Small Watershed Grants and Targeted Watersheds Grants Programs administered by the National Fish and Wildlife Foundation in cooperation with EPA/CBPO, and the Nonpoint Source Management Grants Program (Clean Water Action Section 319) administered by EPA Region 3.

Funding for the Small Watershed Grants comes primarily from EPA with additional funding from USDA's Forest Service and Natural Resources Conservation Service, the National Oceanic and Atmospheric Administration, the Chesapeake Bay Trust, and the Keith Campbell Foundation for the Environment. In 2005, 88 projects from both urban and agricultural sectors were selected to receive $3.06 million from the Small Watershed Grants program. The Chesapeake Bay Targeted Watersheds Grant Program was introduced in 2005 with a budget of $7.9 million and a subsequent budget of $6 million in 2006. The 2005 grant funds were awarded in 2006 as follows: $4.3 million for crop and manure management, $1.5 million for market-based incentive projects, and $1.3 million for urban/suburban stormwater management projects. The 2006 funds will be awarded in 2007.

EPA's Region 3, in which most of the Chesapeake Bay watershed is located, administers the Section 319 program that provides grants to control nonpoint source pollution. Again, these grants are directed at a variety of sectors, not just agriculture or the Chesapeake Bay watershed specifically. Participation in this program is voluntary. Some typical agricultural activities funded under these grants include: salaries for technical assistants, construction of animal waste storage structures, and stream bank stabilization.

An animal waste storage tank (EPA OIG photo).

Table 8 shows how much funding the signatory States of Maryland, Pennsylvania, and Virginia distributed to agricultural projects from 2003 to 2005. This funding was awarded for Statewide activities, not just within the Chesapeake Bay watershed. The amount of funding differs by each State and year. From 2003 to 2005, Virginia generally awarded 50 percent of the Section 319 funds to agricultural projects, Maryland a third or less, and Pennsylvania a high of 17 percent in 2003.

Table 8: EPA Section 319 Funding for Agricultural Projects

Year	Total 319 Funds Awarded to Signatory States	Total Dollars to Agricultural Projects	Percent to Agricultural Projects
2003	$14,416,000	$4,402,506	31%
2004	14,460,700	3,505,163	24%
2005	12,573,500	3,250,827	26%
Totals	**$41,450,200**	**$11,158,496**	**27%**

Sources: Maryland, Virginia, and Pennsylvania Nonpoint Source Programs

For the same period of time, USDA provided over $250 million to Maryland, Virginia, and Pennsylvania for Statewide activities through its cost-share programs.

EPA's Section 319 Nonpoint Source Management Program is also limited to funding demonstration projects. The grants essentially function as seed money; they do not support ongoing practices. With some exceptions, USDA cost-share programs support practices for a longer period of time. EPA issued guidelines in 2003 to facilitate the integration between Section 319 program goals and USDA conservation programs. The guidelines noted that the 2002 Farm Bill has provided more conservation funding for agricultural producers than any previous Farm Bill.

As the lead Federal Agency, EPA/CBPO needs to coordinate the limited Federal funds, which often have different or competing missions and objectives, to ensure that they are used more effectively to accomplish the Bay goals. The EPA/CBPO is currently in the process of doing this. On January 10, 2005, the Chesapeake Bay Executive Council issued Directive 04-2, *Meeting the Nutrient and Sediment Reduction Goals - Next Steps*, with the purpose to address next steps that will advance Tributary Strategy implementation and identify measures to implement actions that can be taken quickly. The steps include:

- Determining Funding Priorities
- Engaging the Department of Agriculture
- Finding Opportunities in the Farm Bill
- Establishing a Watershed Funding Network
- Improving Coordination of Federal Agencies
- Managing Urban Stormwater
- Implementing and Enforcing Air and Water Laws

The Chesapeake Bay Program recently established a mechanism – the Chesapeake Bay Watershed Assistance Network – to improve coordination among available Federal and State funding sources. The mandate has been written and contacts established, and the 2006 work plan is to develop information from the major Federal sources about how to improve access to their funding programs for tributary strategy implementation. A report is being developed for presentation to the Fall 2006 Federal Principals' meeting of the 17 agencies that signed Directive 04-2.

Better Partnership Needed

EPA recognizes that USDA is an influential partner in the agricultural community because of its extensive field organization and experience with the community and its many conservation programs. At the Federal level, EPA and USDA are key to accomplishing the environmental goals of the Chesapeake Bay watershed. However, in the past, their relationship has been one of two independent entities, often constrained by their mandated goals and directions, rather than partners with a common objective. Chapter 3 discusses how EPA can better coordinate Bay activities with USDA and other organizations, and Chapter 4 discusses how USDA can become a more visible and active presence in encouraging conservation practices in the Bay watershed. While this report focuses on activities of these two major Federal partners, EPA also needs to strengthen its relationship with other partners within the agricultural community, such as land grant universities, State

agricultural agencies, and professional agricultural organizations. These other organizations need to complement the efforts by EPA and USDA. Overall conclusions and recommendations are in Chapter 5.

Chapter 3
EPA Needs to Improve Its Coordination and Collaboration with the Agricultural Community

EPA must improve its coordination and collaboration with the agricultural community to assist the Bay partners in realizing the nutrient and sediment reductions needed to clean up the Chesapeake Bay watershed. State partners developed tributary strategies relying heavily on the agricultural community to reduce nutrients and sediments. However, few of the agricultural practices included in the strategies have been reported as implemented because they are either unprofitable or require significant change in farming techniques. The Clean Water Act states that EPA shall provide support to carry out the Chesapeake 2000 Agreement. To meet the aggressive schedule of the Chesapeake 2000 Agreement, EPA will need to coordinate and collaborate with its other Federal partners as well as the State agencies, universities, and non-governmental organizations to work with the approximately 87,000 farms in the Bay watershed to adopt, on a long-term basis, the various practices in the tributary strategies. USDA, one of EPA's Federal partners, could significantly assist in obtaining greater participation by the agricultural community. However, these Federal partners have been constrained by their mandated missions and have not significantly worked together to mesh their goals for the overall benefit of the Bay watershed. Furthermore, EPA will need to rely and build upon the extensive field operations and experience these other partners, including USDA, already have with the agricultural community. Without leveraging these resources, experience, and access available to these partners, EPA will miss the opportunity to achieve its overall goals.

Agricultural Practices in Tributary Strategies Not Widely Implemented by Agricultural Community

As of 2004, only 3 of the 26 agricultural best management practices for which State implementation goals were set were close to being met or had exceeded their 2010 targets. It is up to individual producers to implement the practices and, with few exceptions, producer implementation is voluntary. Producers face multiple challenges in implementing best management practices (see Appendix C for progress and challenges). If the producer does not believe a practice will be beneficial or technically feasible, the practice is less likely to be adopted. Likewise, practices that are supported by Federal and State cost share programs and perceived as profitable are more widely implemented. Without producer acceptance of practices, nutrient reductions will be limited, thus preventing Bay cleanup.

In developing their tributary strategies, States chose a mix of best management practices from a menu of practices that could either be measured by the Chesapeake Bay watershed model or were in the process of peer review. States do not receive credit in the model for implementation of practices that have not been fully defined or peer reviewed. Signatory States developed implementation goals in their strategies for 26 of the practices that are either credited in the model or still under peer review, though not all States committed to goals for each best management practice.

As of 2004, though goals for 3 practices were nearly met or exceeded, 46 percent of the practices included in the strategies (12 of the 26) were reported as not being implemented at all. Table 9 shows the progress in best management practice implementation as of 2004.

Table 9: Reported Best Management Practice Implementation Progress - 2004

Percent of Goal Implemented	Number of Practices	Proportion of 26 Practices*
0%	12	46%
1% - 25%	7	27%
26% - 50%	0	0%
51% - 75%	3	12%
76% - 100%	2	8%
Over 100%	2	8%

*Percentages do not add up to 100 due to rounding

Source: OIG analysis of Chesapeake Bay Program data

The figures in Table 9 represent only the percentage of goal achieved in units implemented (e.g., acres), not pounds of nutrients or sediment reduced. Actual reductions vary by soil characteristics and other best management practices applied on the same land.

EPA/CBPO staff stated all but 1 of the 12 practices identified as not being implemented are being applied to some degree in the Bay watershed, as a pilot-project or at small scales. They believe current tracking cannot identify smaller-scale projects in a 64,000-square-mile watershed. Without further evidence, we cannot change the above results. However, being able to adequately track the project's progress is a critical program activity. This is an activity that the EPA/CBPO, States, and USDA may wish to collaborate on as part of our recommended task force.

Based on our review of various studies of producers' preferences with regard to adopting conservation practices, we determined that the likelihood of producers implementing best management practices is based on whether the practices are:

- Profitable
- Environmentally effective
- Required by Federal or State regulations
- Financed at least in part by government or other cost-share programs
- Easy to implement

The three practices with the most success in being implemented (conservation tillage, off-stream watering with fencing and rotational grazing, and nutrient management plans) meet the producer criteria of profitability, being required by regulation, and/or having financial support available. Conservation tillage saves a producer costs in time and equipment by requiring as little as one trip across a field for planting. Nutrient management plans and off-stream watering with fencing can be eligible for USDA cost-share programs. Nutrient management plans may also be required by law depending on the State.

A significant percentage of the best management practices still have a zero rate of implementation because producers do not recognize many of the practices as being cost-effective, technically feasible, or in their long-term interests. For example, alternative crops such as switch grass used for carbon sequestration currently have no market, so it would not make sense for a producer to raise such a crop. Similarly, to plant cover crops, a producer must incur seed, herbicide, and labor costs, but cannot harvest or sell the crops. Planting commodity cover crops, also known as small grain enhancement, could help address the financial barrier to implementation in that these types of cover crops may be harvested and sold. According to EPA/CBPO's Associate Director for Science, this practice is under research and is advocated in Maryland. Of the Bay partners, only Maryland has set a goal for commodity cover crops in its tributary strategy, but no implementation is reported as of 2004. The Maryland Department of Agriculture has introduced a new commodity cover crop program to its 2006-2007 cost share program.

As stated earlier in this report, State or Federal funds are available in some areas to assist producers with cover crop planting costs. However, feasibility also plays a role in adoption of practices. For cover crops, efficiency depends highly on the timing of planting; nitrogen uptake and trapping diminishes rapidly if crops are planted too late in the Fall. Producers have difficulty getting cover crops planted early enough to be efficient due to weather and time of harvest, and because optimal planting time coincides with a farmer's busiest time of year. State tributary strategy goals (i.e., cap loads) rely on early planting of cover crops on 76 percent of available acres.

Other practices included in the strategies – such as continuous no-till, precision agriculture, dairy precision feeding, and ammonia emissions reduction – are new and complex in nature, require investment in new equipment, or involve change in farming technique. A January 2001 USDA study, *Adoption of Agricultural Production Practices: Lessons Learned from the U.S. Department of Agriculture Area Studies Project*, reported that experienced farmers are less likely to implement newer, technologically complex practices because either they believe they have sufficient knowledge to manage crop nutrients and/or they are reluctant to switch practices they have used for years. Many in the agricultural population are nearing retirement age, and the next generation may not continue to farm the land.[3] The high land value in the Chesapeake Bay watershed area means that developers may offer producers an attractive sum of money for their land, further hindering adoption

[3] USDA's analysis of national figures on farm succession indicated "mixed signals." While 37.7 percent of all farms reported multiple farm operators, an indication of succession potential, most of these other operators were most likely spouses. USDA estimated that probably only 9.1 percent of farms nationally had evidence of a succession plan.

of practices that require long-term investment. Therefore, it is important that the Bay partners identify how they will provide the technical or financial assistance necessary to encourage practices that result in economic benefits to producers as well as environmental improvement.

EPA Needs to Engage the Agricultural Community to Commit to Implementing Tributary Strategies

The Chesapeake Bay partners are relying on the agricultural community to make the largest share of reductions. Yet there is little evidence that the agricultural community is committed to carrying out many of the practices included in the tributary strategies to the level needed to significantly reduce nutrients. There are approximately 87,000 farms covering about 23 percent of the watershed. In operating their farms, agricultural producers rely on a variety of experts for technical advice, including veterinarians, feed suppliers, land grant university professionals, State agricultural office staff, cooperative extension agents, and USDA conservation staff. Therefore, if the Bay goals are to be met, EPA needs to mobilize the assistance of these experts and parties in obtaining greater commitment by the agricultural community in implementing the practices called for in the tributary strategies. Specifically, EPA needs to strengthen its partnership with USDA, including obtaining the attention of senior level USDA management and working with them to consider significant program or policy changes in USDA activities. EPA also needs to strengthen its working relationship with the other Bay partners.

While not the only partner, USDA is a critical partner within the agricultural community. USDA agencies such as the Natural Resources Conservation Service (NRCS), Farm Service Agency, and Forest Service have earned the trust of the agricultural community over the decades by providing significant technical and financial assistance to producers. EPA has recognized the critical role USDA can play in the restoration effort and USDA has participated in the Bay program at the staff level. While EPA has been successful in obtaining USDA technical staff assistance, obtaining high-level USDA interest has not been as forthcoming (see also Chapter 4). This is a concern because to get the amount of nutrient reductions from the agricultural community within the aggressive time frame of the strategies may require USDA consideration of innovative practices or policy changes. For example, the Chesapeake Bay Watershed Blue Ribbon Finance Panel[4] reported that USDA-authorized cost-share levels are not being used to their maximum levels, are not allowed to be geographically targeted, and do not include all commodities or conservation practices. Examining these policy issues requires involvement of senior level management.

USDA entered into a Memorandum of Agreement with the Chesapeake Executive Council on January 25, 1994, that provided for an Agricultural Steering Committee and high level management participation. The EPA/CBPO Director said the USDA Secretary did not designate a senior level policy maker to the Steering Committee and the Agricultural Steering Committee was not established. However, the EPA/CBPO staff stated that USDA does provide technical expertise to the Nutrient Subcommittee, Modeling Subcommittee,

[4] The Chesapeake Bay Watershed Blue Ribbon Finance Panel was established by the Chesapeake Executive Council to identify funding sources sufficient to implement basin-wide cleanup plans.

Land Growth and Stewardship Subcommittee, Tributary Strategy Workgroup, Forestry Workgroup, Scientific and Technical Advisory Committee, Regional Manure and Litter Use Task Force, and others.

On October 31, 2002, the Chesapeake Executive Council (made up of the governors of Maryland, Pennsylvania, and Virginia; the Mayor of Washington, DC; the EPA Administrator; and the Chesapeake Bay Commission Chair) issued a *Resolution to Enhance the Role of the United States Department of Agriculture in the Chesapeake Bay Partnership*. The resolution "urged" USDA to "make the Chesapeake Bay watershed a priority objective by heightening coordination efforts with other Federal departments and agencies." It was not until June 2005 that the USDA/NRCS East Regional Assistant Chief began attending meetings of the Chesapeake Executive Council's Principals Staff Committee (State and Federal agency representatives serving as policy advisors to the Executive Council).

Some additional actions to improve the EPA and USDA partnership were highlighted by EPA/CBPO. The NRCS Chief, representing the USDA Deputy Under Secretary, attended the Federal Principals Meeting in October 2005. This meeting resulted in the issuance of the *Resolution to Enhance Federal Cooperative Conservation in the Chesapeake Bay Program*, which was signed by the USDA Deputy Under Secretary. Also, the USDA Deputy Under Secretary signed the Chesapeake Bay's manure strategy and met with State governors in November 2005. In late July 2006, the EPA/CBPO's Associate Director for Science expanded its contact with USDA/NRCS' State Conservationists beyond Maryland, to Virginia and Pennsylvania. But these initial contacts with the USDA/NRCS State Conservationists in the Bay watershed need to be followed up with attendance at the State technical committee meetings, which are open to all interested stakeholders and provide advisory feedback to the State Conservationists. We believe that these are good steps in EPA/CBPO's understanding of how local priorities are established, especially in areas of the watershed that are further away from the Chesapeake Bay.

We commend EPA's and USDA's recent efforts in improving their partnership. But these actions are working within the current program structure. In our opinion, to meet the significant reductions needed from the agricultural community, EPA and USDA should reexamine their priorities and consider policy changes. Such significant changes will need to be negotiated by high-level managers from both agencies. We believe the two agencies could start this process by developing mutual goals and measures that could benefit the Bay's water quality and the agricultural producers.

We identified some common elements to an effective partnership as follows:

- Common goals and objectives
- Partners' recognition of benefit
- Mutual ownership of the goal and outcome
- Clearly stated terms and defined roles
- Trust and credibility
- Understanding each other's perspective

- Ability to monitor, evaluate, and measure performance of the outcome of the partnership efforts

We found that the EPA and USDA partnership lacks these common elements. Section 117(b)(2)(B)(iii) of the Clean Water Act states that EPA/CBPO shall provide support to the Chesapeake Bay Executive Council "in cooperation with appropriate Federal, State, and local authorities, assisting the signatories to the Chesapeake 2000 Agreement in developing and implementing specific action plans to carry out the responsibilities of the signatories to the Chesapeake 2000 Agreement." As the lead Federal agency for the Chesapeake Bay project, EPA needs to take the initiative to address these partnership weaknesses. EPA and its partners spent a lot of time defining water quality and negotiating and determining an equitable allocation to reduce nutrients and sediment to the Bay. Now these partners need to develop mutual goals and measures for the implementation phase. Key partners need to have their roles clearly defined. The agricultural community as a whole needs to know and accept its role in the cleanup of the Chesapeake Bay. USDA, State agricultural agencies, land grant universities, and professional organizations can assist in this endeavor.

Mutual goals

A key component of an effective partnership is having mutual goals and measures. Also, each partner should be able to recognize the benefit of the partnership. EPA is focused on improving water quality on a watershed basis. The agricultural community is concerned with soil erosion, water quality protection, and maintaining a viable agricultural presence in the region. USDA/NRCS stated that it works through an established partnership to help private landowners meet their conservation goals. These goals are compatible. However, as previously stated, some of the practices included in the tributary strategies identified as a means to improve the water quality of the Bay may not be viewed as economically beneficial by a producer. If EPA and its partners hope to gain greater participation from the agricultural community, they need to:

(1) identify and promote practices that may be more readily accepted; and/or

(2) assist producers in minimizing their financial burden in implementing practices that may significantly reduce nutrient pollution but may not be cost-effective.

Trust

EPA does not enjoy the trust of the agricultural community and will need to establish relationships with the various agricultural organizations to promote the Bay's cleanup goals. Though most of the practices in the tributary strategy would be implemented on a voluntary basis, the agricultural community is concerned that EPA as a regulatory agency may use this information to take enforcement actions. USDA/NRCS stated that it does not want to jeopardize the trust it has developed over the decades with private landowners and the agricultural community by a closer alignment with EPA because of the latter's greater focus on the regulatory approach in addressing corrective actions. It stressed its responsibility as enacted by Congress to maintain the confidentiality of farmers' and

ranchers' conservation plans and related resource information. It indicated that farmers would be unwilling to take voluntary steps to improve their operation if they felt that information could be used for future regulatory enforcement for purposes of the Clean Air Act or the Clean Water Act. One step in gaining trust is for EPA to better understand USDA's mission and priority setting-process, and consider how it can incorporate USDA's goals of assisting landowners and producers into the Bay's cleanup goals. EPA will also need to explain its perspective to the agricultural community; it cannot assume that its goals are self-evident.

Ability to monitor, evaluate, measure performance

Providing an accurate picture of the progress the agricultural community is making in controlling nutrient pollution is a project on which EPA/CBPO and USDA should collaborate. The agricultural community believes it has done much to reduce nutrient pollution and questions its nutrient contribution as calculated by EPA/CBPO. Additionally, EPA/CBPO indicated that more practices are being implemented than are tracked and reported. We believe that both EPA/CBPO and USDA share the same mutual goals of restoring the Chesapeake Bay and, therefore, share comparable performance measures and outcomes. However, because measurement of nutrient and sediment runoff is not an easy task, these two Federal partners need to pool their resources and expertise to develop models that are mutually compatible yet address each of their program's mandated goals and performance measures. Working together to develop compatible but distinct measurement tracking systems could overcome the often competing agenda that has characterized their past working relationship.

EPA/CBPO developed a sophisticated quantitative best management practices tracking and crediting system. EPA/CBPO relies on the watershed model as the primary means to develop and track best management practice implementation and nutrient reduction goals and progress. Program staff in USDA indicated they questioned EPA/CBPO watershed model. In 2004, the Bay Program's Scientific and Technical Advisory Committee identified weaknesses in best management practice efficiency assumptions and implementation estimates. For example, the current phase of the watershed model gives full nutrient reduction credit for nutrient management plans written without assurance that the plans are implemented. EPA/CBPO staff reported that they are addressing these weaknesses in its next version – Phase 5 of the model – and will continue improvements in the future as new information becomes available. They stated that the Phase 5 watershed model, currently being calibrated, accounts for all manure and chemical fertilizer nutrient inputs – making mostly irrelevant plans written versus plan implemented. In our opinion, EPA/CBPO could further develop trust by the agricultural community if it coordinated its modeling efforts with USDA.

Roles/Expectations

The EPA and USDA partnership could benefit greatly from establishing clearly stated terms and defined roles in meeting the goals of cleaning up the Chesapeake Bay. EPA/CBPO's Director indicated that they were considering proposing that USDA sign a

Memorandum of Agreement. If USDA agrees to do this, this document should be very explicit, describing activities and timeframes expected from both parties. For example, EPA/CBPO stated that it would like to see technical assistance provided for enhanced nutrient management.

Another tool that EPA/CBPO could use in enhancing its partnership with USDA is EPA's own National Strategy for Agriculture issued in April 2006. The Strategy's implementation goals include:

- EPA will identify the impact of EPA's rules, policies, etc., on agriculture as part of its routine practice.
- EPA will work with the agricultural sector through collaboration, innovative and voluntary programs, financial incentives, and traditional regulatory approaches.
- EPA will develop an effective communication strategy and marketing network to better communicate with agriculture, assist with technology transfer, and show environmental results.
- EPA will identify existing environmental measures and, where needed, modify them or develop new ones to demonstrate environmental improvements that can be achieved through new practices or technologies. Additionally, EPA should identify and assess environmental improvements related to agriculture and, where appropriate, use performance measures similar to or in harmony with those used by USDA.

We believe that these are all good practices that EPA/CBPO needs to incorporate in strengthening its working relationship with all of its Bay partners, yet at the same time acknowledging the mandated mission of each agency, if it is to further the overall effort of cleaning up the Chesapeake Bay.

While USDA can make a major contribution to the Bay's cleanup, EPA/CBPO should not rely on USDA alone to assist in garnering the agricultural community's commitment. Many of the practices require long-term commitment or a change in current farming operations. It is up to the individual producer to decide which practices to implement. EPA/CBPO does have a relationship with the local land grant universities which provide technical assistance to producers and should continue this relationship. EPA/CBPO should also cultivate ongoing relationships with professional agricultural organizations to better understand the business side of agricultural operations in order to move toward goals of both improved water quality and a productive and sustainable agricultural sector in the region.

Effective EPA-USDA Partnership Could Help Advance Alternative Practices

An effective EPA and USDA partnership could help further research, dissemination of information, and adoption of promising alternative practices.

Dry manure compost ready to be used as a soil additive (EPA OIG photo)

There is an imbalance of agricultural nutrients in the Chesapeake Bay watershed. That is, the total nutrient inputs, including manure, chemical fertilizer, and atmospheric deposition, exceed crop uptake. In the regions of the Chesapeake Bay watershed with intensive animal agriculture, more manure is generated than can be applied as fertilizer to meet crop needs, and the excess nutrients enter the Bay and its tributaries. State tributary strategies outline best management practices to manage this excess. However, given the rate of nutrient reduction progress to date, the substantial reductions still to be achieved, and the challenges associated with the current practices outlined in the strategies, sharply reducing nutrient and sediment loads to the Bay will require technological advances and systemic changes.

Though a regional strategy and research agreement have been initiated to coordinate and research innovative approaches to managing excess nutrients, EPA and USDA must take actions to ensure that effective approaches reach and are accepted by their intended audience.

EPA is attempting to address the nutrient imbalance at a regional level with a manure management strategy, signed by the Chesapeake Executive Council and USDA in November 2005. The 2005 strategy identified opportunities for better managing manure nutrients in the Bay watershed, such as reducing surplus nutrients by adjusting animal diets and building markets and technologies for alternative uses of manure and poultry litter. The strategy calls on the participation of EPA and Chesapeake Bay Program Committee members, State agricultural and water quality agencies, and USDA agencies to provide education and outreach, technical assistance, and/or financial resources.

Also, EPA/CBPO has signed an agreement with USDA to better coordinate research efforts. EPA/CBPO, USDA's Agricultural Research Service, and the Mid-Atlantic Water Quality Program of the Land Grant Universities signed a 5-year, Non-Funded Cooperative Agreement on October 5, 2005, to strengthen the cooperation among its signatories to reach the Chesapeake 2000 commitments and work together to reach goals of mutual interest in research, outreach, and education. However, the participants did not include specific projects or milestones in the agreement showing how the commitments would be achieved.

Though the results of the strategy and agreement remain to be seen, the academic community, private industry, and USDA's Agricultural Research Service have developed a variety of alternative products and approaches to deal with the abundance of manure, such as anaerobic digestion, a process that generates energy from manure (see Appendix D). As mentioned earlier, practices that are technologically advanced are not easily accepted by

producers. Key stakeholders have recognized the need for demonstration projects to not only identify and develop viable new conservation practices but to serve as a starting point to evaluate their economic feasibility and then promote their launching.

Overall conclusions and recommendations are in Chapter 5.

Chapter 4
USDA Needs to Improve Coordination to Restore Chesapeake Bay

While USDA has long been a Federal partner in the Chesapeake Bay Program, it has not significantly influenced the formulation and implementation of policy to address the environmental problems faced by the Program. Even though USDA agencies have been encouraging science-based conservation practices in the region for years, they have not significantly adapted their strategies to meet the specific needs of the Chesapeake Bay. In other words, USDA has approached the Bay's unique environmental problems as if they were similar to the problems of any other region. This "business as usual" model will not suffice to see Chesapeake Bay removed from the impaired waters list by 2010. If this goal is to be accomplished, USDA working with the EPA must better communicate and coordinate its conservation efforts to better address the Chesapeake Bay's unique needs.

Role of USDA

Because many of the environmental problems faced by the Chesapeake Bay are related to farming practices, their solutions involve the implementation of environmentally progressive agricultural policies and models. The adoption of these policies and models requires the consent of individual producers and landowners – many of whom may not see an immediate incentive to cooperate. Thus, the ultimate success of the Chesapeake Bay Program depends upon encouraging landowners to adopt farming and natural resources conservation practices consonant with the Bay's long-term environmental health.

Of all the agencies in the Federal Government, USDA may be best positioned to persuade farming producers to adopt progressive agricultural practices and to help communities and private landowners conserve natural resources. The Chesapeake Bay's 41 million acres of land consist of 24 million acres of forests and 12 million acres of farms – nearly 80 percent of this land is privately owned. The Forest Service is the largest Federal land manager in the Bay watershed with 1.2 million acres of National Forest System land. Moreover, USDA has an extensive field office organization with about 200 field service offices manned by staff providing technical and financial assistance to producers and landowners.

During the 10-year period prior to fiscal year 2005, three USDA agencies provided significant funding to encourage landowners and communities to voluntarily adopt and install conservation practices in the Chesapeake Bay area: $305 million from the Natural Resources Conservation Service (NRCS); $287 million from the Farm Service Agency (FSA); and $61 million from the Forest Service (FS). Annual Departmental spending, in total dollars unadjusted for inflation, for conservation practices in the States involved in the Chesapeake Bay watershed has increased from $27 million in fiscal year 1995 to $142 million in fiscal year 2004. Since the signatory States have projected they will not be

able to meet the costs for implementing environmentally sound agricultural policies by 2010, it is essential that Federal funds spent in this watershed contribute to the goals of the Chesapeake Bay Program.

Providing Leadership

USDA has not implemented a coordinated Departmentwide approach to addressing the Bay's unique environmental needs. Although USDA agencies have devoted significant funds to projects that will improve water quality in Chesapeake Bay, they have continued previously existing conservation programs.

USDA has signed two agreements directly with the Chesapeake Executive Council. In January 1994, the USDA Assistant Secretary for Natural Resources and Environment signed a memorandum of agreement between USDA and the Chesapeake Executive Council.[5] This agreement committed USDA conservation agencies to work with State, local, and other Federal agencies to develop and implement the concept of total resource management planning on agricultural lands. This agreement also committed USDA's science agencies to efficiently coordinate watershed-based research, and funding for that research, among Federal, State, and private entities. Six months later, in July 1994, USDA's Deputy Secretary, along with the EPA Administrator, the Secretary of the Interior, and others, committed the Federal Government's executive agencies to work with the Chesapeake Executive Council to improve water quality in the Chesapeake Bay watershed.[6] These agreements express USDA's commitment, as a partner agency, to manage the watershed as a cohesive ecosystem and to achieve the goals of the Chesapeake 2000 Agreement. But these agreements do not commit USDA to any specific action. As a result, USDA has continued, for the most part, to implement programs in the Chesapeake Bay watershed that, presumably, it would have implemented similarly without entering into these agreements at all.

Without discounting the conservation efforts of USDA agencies, USDA, at the Departmental level, has done little to coordinate actions needed to directly fulfill these agreements. USDA did create a Water Quality Working Group – comprised of agency representatives from the conservation, science, and budget agencies – to exchange information between USDA agencies on water quality issues across the United States. While the Chesapeake Bay is part of the group's activities, this group has a national function and thus the Bay would only be a small part of its deliberations.

As a partner in the Chesapeake Bay Program, USDA is also indirectly a party to other agreements and directives signed by the Executive Council. Though some of these agreements call for actions that fall within USDA's purview, there has not been a coordinated Department-wide strategy or policy on addressing this commitment. These agreements include the Chesapeake 2000 Agreement, signed in June 2000 by the Chesapeake Bay Program partners, which guides the restoration efforts throughout the Bay

[5] *Memorandum of Agreement between the United States Department of Agriculture and the Chesapeake Bay Executive Council.*
[6] *Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay*.

watershed. Built on the foundation of Bay agreements signed in 1983 and 1987, Chesapeake 2000 is the most comprehensive and far-reaching agreement in the Bay Program's history.

In 2005, after a recommendation by the Blue Ribbon Finance Panel to the Chesapeake Executive Council, USDA appointed a deputy under secretary as a high-level official to the Chesapeake Executive Council's Principals' Staff Committee. This position was immediately delegated to the NRCS Regional Chief, with the Maryland NRCS State Conservationist as the alternate representative. The NRCS Regional Chief is a high-level official within NRCS but has limited official authority beyond NRCS and the Natural Resources and Environment mission area. Delegating this duty in this way effectively meant that the position no longer possessed high-level influence through the Department and could not provide the Department-wide leadership needed to address the Bay's environmental problems. Although the NRCS Regional Chief may be appropriately positioned to be the USDA high-level official appointed to the Chesapeake Executive Council's Principals' Staff Committee, this position lacks the authority that comes with Departmental standing. This authority is crucial to providing coordination for all USDA agencies, as other agencies in other mission areas will look only to the Department for guidance. A senior FSA manager, an agency under a different mission area, reported that his agency could not follow direction from NRCS or any another agency from a different mission area.

While other USDA activities may have gone undocumented, it is clear that the Department has not provided the coordination necessary to fulfill the spirit of its agreements with the Chesapeake Executive Council. In such circumstances, the relevant agencies have continued to conduct "business as usual." Remedying this situation will involve appointing a high-level, Departmental official to participate in the Chesapeake Executive Council and to coordinate, direct, and oversee the activities of the USDA agencies working in the watershed. Among that official's initial tasks will be taking steps to help bring USDA's conservation resources to effectively complement the ongoing restoration of the Chesapeake Bay watershed as a regional problem, and improving the relevant agencies' ability to report useful performance data.

Bringing USDA's Resources to Bear

USDA agencies contribute to the Chesapeake Bay Program's conservation efforts in two broad categories – producer/landowner assistance and research funding. FS also contributes through direct natural resource management of public lands and through partnership building with communities and watershed groups. NRCS, FSA, and FS all provide financial assistance to encourage producers/landowners to become better stewards of the land. The Agricultural Research Service (ARS), Cooperative State Research, Education, and Extension Service (CSREES), and FS provide research, or funding for research, promoting the best available agricultural science and enhancing urban and rural forest ecosystems and their management.

Financial Assistance for Producers

Although NRCS, FSA, and FS expend significant resources in the Chesapeake Bay watershed, all three agencies, to varying degrees, tend to follow nationwide program goals that are not necessarily well adapted to the regional needs of the Bay. The diverse array of USDA programs (e.g., Environmental Quality Incentives Program, Farmland Preservation, etc.) could clearly accomplish more for the Bay if guidelines for their implementation were adjusted to maximize water quality and ecological benefits. The Chesapeake Bay Program was created presupposing that the Bay's environmental problems can best be addressed *regionally* and *geographically*; however, because USDA's agencies are Federal and are therefore designed to operate nationally (and to treat all States equally), they tend to resist the kind of regional planning the Chesapeake Bay Program represents. Nevertheless, we believe that the lessons learned in the Chesapeake Bay would be applicable in this and other major watersheds and estuaries, such as the Mississippi River delta and the Great Lakes regions.

NRCS

NRCS' relationship to the Chesapeake Bay Program exemplifies this problem. As the largest USDA conservation agency in the watershed, NRCS helps producers identify which science-based conservation practices are needed to maintain and improve their natural resources, and then assists them financially in implementing those practices. NRCS does not, however, permit the establishment of geographic priorities in its allocation methodologies; instead, it tends to emphasize conservation from the perspective of the individual producer on a discrete piece of land.

EPA's Chesapeake Bay Program addresses similar problems, but approaches those problems from the perspective of an entire watershed. Early in the program's history, natural resources agencies and local stakeholders devised "tributary strategies" to reduce the amount of nutrients and sediment flowing from producers' land into tributary rivers and then into the Bay; these strategies constitute a long-term plan that will provide the most effective and efficient means of repairing the environmental damage to the Chesapeake Bay.

While USDA managers participated in the creation of these tributary strategies, USDA agencies are not necessarily committed to implementing them. Officials at NRCS regard that agency's role as continuing to meet agricultural producers' needs with its available conservation practices, i.e., to do what is best for the individual producer based on that producer's discrete piece of land. Although the causes for the environmental problems facing the Bay are regional in scope, NRCS officials do not have enough flexibility to implement the Chesapeake Bay Program's tributary strategies

because of their agency's prohibition against funding particular geographic regions.

Consequently, NRCS has not augmented its conservation program funding in the Bay's watershed. Nationwide, NRCS conservation programs have been turning away producers due to a lack of funding. In fiscal year 2005, NRCS did not fund about 2,000 Environmental Quality Incentives Program (EQIP) applications and 1,500 other conservation program applications in the six States comprising the Chesapeake Bay watershed. Each of these unfunded applications is a missed opportunity to help restore the Chesapeake Bay's water quality.

NRCS has also been turning away many applications for technical assistance. Technical assistance is the vehicle NRCS uses to provide a substantive level of technical expertise, background, and support for Federal, tribal, State, and local conservation programs. This technical base enables other NRCS programs by facilitating conservation planning, interagency coordination, technical consultations, and collaboration with agricultural decision makers. We found that NRCS conservation district employees often did not have the time to record requests they knew could not be funded. As a result, although technical assistance is vital, we were unable to identify the exact number of requests for technical assistance in the Chesapeake Bay States that went unfunded.

To meet the needs of unfunded conservation programs in the Chesapeake Bay region, NRCS would need to target or redirect funds to the States in the Bay's watershed. However, NRCS officials repeatedly and consistently told us that they cannot allocate funds for a particular region's geographic needs. Although there is no legislative requirement preventing NRCS from targeting funds in this way, simply because NRCS *could* target funds geographically does not mean NRCS *should* do so. Barring the possibility of a budget increase, NRCS would have to shift funds away from other States to those in the Chesapeake Bay watershed. NRCS officials have explained that shifting funds from one area to another entails major economic and political ramifications. Moreover, they stated that if they allowed geographic considerations to enter into their allocation process, they would be inundated with requests for special consideration from many regions. While we found NRCS' program allocation methodologies reasonable, we question how NRCS can remain an effective Chesapeake Bay Program partner if it cannot fund States to support the program's tributary strategies and it will not allocate funds to support the unique geographical needs of the Chesapeake Bay watershed.

We conclude that how NRCS allocates its funds is a difficult issue, and one that should be resolved by high-level cooperation between USDA officials. In some instances, USDA does recognize the Chesapeake Bay's special

needs and has specifically targeted funding to address those needs. In 2005 NRCS made $20 million in EQIP funds available for the Conservation Innovation Grants, and has specifically targeted $5 million toward proposals demonstrating the use of innovative technologies or approaches, or both, to address one or more of the natural resource concerns within the Chesapeake Bay watershed. Additionally, we note that NRCS has directed some funding to provide liaison staff co-located with the EPA Chesapeake Bay Program.

Whatever the difficulties involved, given the Federal Government's decision to identify Chesapeake Bay as a priority for environmental cleanup, some corresponding priority for funding must also be arrived at.

FSA

Unlike NRCS, FSA has recognized the unique needs of the Chesapeake Bay watershed and has tailored its programs to meet those needs. FSA's contribution to water quality in the Chesapeake Bay watershed is largely through its Conservation Reserve Program (CRP). CRP is a voluntary program for agricultural landowners and includes the Conservation Reserve Enhancement Program (CREP). In exchange for annual rental payments and cost-share assistance, landowners agree to establish long-term, resource-conserving cover crops on eligible farmland. Permanent cover crops significantly reduce sedimentation and generally do not require fertilizer, making CRP compatible with the Chesapeake Bay Program's goals.

FSA created and recognized the Chesapeake Bay watershed as a conservation priority area and devoted additional resources to it. As a result, the acreage in the Chesapeake Bay watershed devoted to FSA's CRP has grown from 189,000 acres to 366,000 acres. FSA CRP rental payments and cost-share assistance have also increased proportionately over a 10-year period. In sum, FSA has grown its CRP in the watershed by 177,000 acres, at an approximate 10-year cost of $287 million, of which $122 million was for CREP rental and incentive payments in the Chesapeake Bay watershed.

Much of FSA's CRP growth has been through CREP. CREP is a partnership between USDA's Commodity Credit Corporation and State governments to fund riparian buffers, grass filter strips, wildlife habitat, and to restore wetland and other conservation practices on environmentally sensitive land. CREP came into existence in 1997 in large part due to the adoption of the Bay buffer goals in 1996 with Maryland as the first State in the program. All six Chesapeake Bay States (New York, Pennsylvania, Delaware, Maryland, West Virginia, and Virginia) are USDA partners in this program. The two primary objectives of CREP are to coordinate Federal and non-Federal resources to address specific conservation objectives of a State and the nation in a cost-effective manner, and to

improve water quality, erosion control, and wildlife habitat related to agricultural use in specific geographic areas.

There are four important ways in which CREP differs from CRP. First, CREP is targeted to specific geographic areas. It is designed to focus conservation practices on addressing specific environmental concerns. Second, CREP is a joint undertaking among States, the Federal Government, and other stakeholders who have an interest in addressing particular environmental issues. Third, it is results oriented, and requires States to establish measurable objectives and conduct annual monitoring to measure progress toward implementing those objectives. Fourth, it is flexible, within existing legal constraints, and can be adapted to meet local conditions on the ground.

FS

The role of the Forest Service (FS) differs significantly from both NRCS and FSA since FS programs do not focus primarily on farmers and agricultural producers or on the delivery of incentives for landowners. The FS provides assistance to State forestry agencies and nongovernmental organizations, which in turn provide services directly to farmers and forest landowners. The FS also works through various partnerships to serve urban communities. The agency's contributions to Bay restoration involve natural resource management including private forest land, forest research, and public land management.

Because of the vital role of trees and forests in sustaining high water quality, the FS addresses the dual objectives of conserving and managing existing forests as well as using trees and forests as solutions to water quality problems associated with agricultural and urban lands. Many farmers are also forestland owners or tree farmers. As a result, FS works with States to expand forests in agricultural areas – particularly as buffers in riparian areas – since these buffers can substantially reduce the rate of nutrient and sediment flow from farmland while also providing habitat for wildlife.

Since the early 1990s, FS has maintained a small staff stationed at the EPA/CBPO; this staff has served in a leadership and coordination role for forestry. The Chesapeake Bay Watershed Forestry Program was established through this office to provide leadership specifically on Bay agreements as they relate to forestry, to coordinate forestry programs on a regional basis, and to develop strategies in collaboration with the EPA for using forestry to address water quality issues. This staff has contributed to policy initiatives by the Chesapeake Executive Council (FS supported the Riparian Forest Buffer Directives of 1994, 1996, and 2003; the Chesapeake 2000 Agreement, and the Cooperative Conservation Resolution), has coordinated the Chesapeake Bay Program's Forestry Workgroup for 15 years, and

significantly advanced riparian buffer restoration, forest conservation, and the use of urban forestry for stormwater and air quality. The program also provides grant funding and technical assistance.

Although not directly responsive to the Bay restoration, the National Forests also conduct erosion control, management, and restoration projects that indirectly improve water quality in Bay tributaries. The Forest Service Research Program has implemented a limited number of reviews in direct response to Bay restoration issues.

The FS' primary contribution to water quality in the Chesapeake Bay watershed is through its grants to State Forestry agencies and nongovernmental partners under the Forest Stewardship Program, Urban and Community Forestry Program, and Forest Legacy Program authorized by the Cooperative Forestry Assistance Act. State Forestry grants support many forest management and protection activities that are directly or indirectly oriented to improving Bay water quality. Over the 10 years ending in fiscal year 2004, FS spent $61 million in the Chesapeake Bay watershed. Approximately $11 million of the $61 million FS spent was over and above routine spending and directly targeted to improving water quality or addressing other Bay restoration goals.

Funding for Research

A similar contradiction exists between the national objectives of USDA's science agencies and the regional needs of the Chesapeake Bay Program. Neither ARS nor CSREES has any means of providing funding specifically for the Bay. In other words, CSREES and ARS do not perform or fund water quality research within the Chesapeake Bay watershed with any higher priority than they do elsewhere. Both CSREES and ARS share national responsibility for conducting water quality research. Land grant institutions within the Chesapeake Bay watershed use CSREES funds for regional and national research, just as ARS conducts research in other parts of the U.S. that is applicable to water quality within the Chesapeake Bay. Within USDA, research funding for Chesapeake Bay watershed studies competes with other research projects nationwide, including the need to assess nutrient loads that exacerbate harmful algae blooms in the Gulf of Mexico, containment loading studies within the Colorado and Rio Grande (and many other river basins), and research on how to mitigate and slow the decline of water resources in U.S. aquifers. Such water quality research may apply to many bodies of water, including the Chesapeake Bay. Land grant institutions within the watershed use CSREES funds for vital research,[7] just as ARS performs research applicable to water quality in Chesapeake Bay. But neither agency can demonstrate any research funded to better understand or resolve a problem specific to the

[7] During the 10-year period ending in fiscal year 2004, CSREES provided almost $7 million for research on issues that are consistent with the Chesapeake Bay Program goals.

Chesapeake Bay, and neither agency has the flexibility to change its mission to address EPA's tributary strategies.

In October 2005, ARS signed a "Non-funded Cooperative Agreement" (NFCA) with the EPA Chesapeake Bay Program and the Mid-Atlantic Regional Water Quality Program of the Land Grant Universities. The stated purpose of the NFCA is to strengthen cooperation among the parties to fulfill the commitments of the Chesapeake 2000 Agreement.

One of USDA's challenges in providing stronger leadership within the Chesapeake Bay Program is enabling its agencies to reasonably allocate resources to resolve regional challenges. Although the existence of the Chesapeake Bay Program indicates that EPA has moved to confront environmental problems by watershed, USDA does not, in general, work in similar terms. The institutional difficulty involved in reorienting these agencies to address watersheds – rather than States – as the fundamental unit for environmental cleanup is formidable; however, by making the Chesapeake Bay a high priority we believe that the Federal Government has indicated that this reorientation is essential.

Evaluating USDA's Performance

Because strengthening USDA's role in the Chesapeake Bay Program requires identifying how different agencies within USDA can contribute to the program and coordinating those agencies' contributions, it is vital that the Department be able to evaluate the relative success of its different programs. Although several agencies are running programs contributing to the Chesapeake Bay Program's goals, they have not developed effective processes for collecting and summarizing accomplishment data. In other words, these agencies are able to cite the number of conservation projects they have funded in the Chesapeake Bay watershed, but not how those projects have contributed to the Bay's water quality. USDA thus cannot evaluate how its programs are contributing to the goals of the Chesapeake Bay Program. Without this information, effective overall coordination of Bay restoration efforts is difficult, if not impossible.

Since the Government Performance and Results Act of 1993, the Federal Government has begun to move away from evaluating its programs' performance based on *how much* they do, and towards evaluating *how effectively* their actions accomplish clearly defined goals – i.e., away from evaluating *output* and towards evaluating *outcome*. Instead of stating, for instance, how many acres of agricultural land in a watershed have been taken out of production (output), FSA would be expected to state how effectively these actions have improved water quality in that watershed (outcome). Though implementing these results-oriented performance measures is a challenging process, agencies will be expected, over time, to identify high-quality outcome measures, accurately monitor the performance of programs, and begin integrating this information with the costs associated with their actions. Since achieving the Chesapeake Bay Program's goals involves evaluating how effectively a variety of programs are improving the water quality of the Bay and allocating resources accordingly, it is imperative that the participating agencies develop useful outcome-based performance measures.

Although NRCS, FSA, and FS each have goals that include working to improve water quality in the Chesapeake Bay, these agencies have not yet developed and implemented performance measures capable of providing useful, outcome-oriented information. Until they have done so, they cannot state the degree to which their programs have succeeded. Likewise, without accurate performance information, USDA can have little assurance that agencies' reported performance reflects their actual performance.

Evaluating NRCS' Performance

At the time of our fieldwork, NRCS had four strategic goals: "enhance natural resource productivity to enable a strong agricultural and natural resource sector," "reduce the unintended adverse effects of natural resource development to ensure a high-quality environment," "reduce risks from drought and flooding to protect individual and community health and safety," and "deliver high quality services to the public to enable natural resources stewardship." Among its 11 objectives to support these strategic goals, NRCS aims to protect water and air resources from agricultural nonpoint sources of pollution, and maintains, restores, or enhances wetland ecosystems and fish and wildlife habitats by:

- providing areawide planning and coordinating assistance in watersheds with nonpoint source pollution problems;
- intensifying efforts to protect rivers and streams from the effects of nutrient loading; and
- promoting stream, bank restoration, and riparian area establishment.

To gauge how well NRCS is achieving its goals, the agency identified performance measures that associate program activities with appropriate units of input; these units measure how many acres or miles have been treated with a given conservation practice rather than how effectively that practice has improved water quality. In other words, these units do not measure outcome, but output. Thus, NRCS can reasonably show the number of conservation practices completed or the number of acres in the Wetland Reserve Program, but it cannot show the effect of the first acre or mile on water quality. Without outcome-based performance measures, NRCS cannot confidently state the degree to which its programs have succeeded.

To correct this shortcoming, NRCS is developing the Conservation Effects Assessment Project (CEAP). The agency asserts that CEAP will provide scientifically credible estimates of the environmental benefits obtained from NRCS conservation programs. Begun in 2003, CEAP is collecting data to determine the best methodology and remains a work in progress. CEAP results will be supported with data from up to five components (cropland, wetland, wildlife, livestock, and grazing). NRCS anticipates releasing the final data results on the cropland component of CEAP, which is furthest along in testing and gathering data, by January 2008. However, preliminary cropland component data may be available as soon as January 2007.

While NRCS' conservation practices have almost certainly resulted in some improvement in Chesapeake Bay's water quality, the agency cannot quantify any given practice's effect on water quality – precisely the information USDA and EPA need for planning purposes.

In May 2006, NRCS published a new strategic plan for 2005 – 2010 entitled, *Productive Lands - Healthy Environment NRCS Strategic Plan*. The new strategic plan has six new goals (High Quality, Productive Soils; Clean and Abundant Water; Healthy Plant and Animal Communities; Clean Air; An Adequate Energy Supply; and Working Farm and Ranch Lands) with outcome-based performance measures. For example, for the Clean and Abundant Water goal, NRCS has a clear outcome-based performance measure that addresses agricultural sediment and nutrient influence on water quality, The performance measure calls for agricultural producers to reduce potential delivery of a specific number of tons of sediment and nutrients from their operations. Specifically, agricultural producers are to reduce sediment delivery from agricultural operations by 70 million tons (of a total 970 million tons from agricultural operations in 2003); reduce delivery of nitrogen from agricultural operations by 375,000 tons (of an estimated 6 million tons in 2003); and reduce delivery of phosphorus from agricultural operations by 70,000 tons (of an estimated 360,000 tons in 2003). Once these performance measures are fully implemented, they will provide USDA with useful outcome-based data concerning the success of NRCS' programs in the Chesapeake Bay watershed area.

Evaluating FSA's Performance

FSA has three strategic goals: "supporting productive farms and ranches," "supporting secure and affordable food and fiber," and "conserving natural resources and enhancing the environment." To accomplish this third goal, FSA strives to reduce erosion rates, reduce ground and surface water contamination, increase the populations of targeted species, and sequester more tons of carbon dioxide. To gauge how well FSA is accomplishing its goals, the agency has identified a number of performance measures, including:

- maintaining or increasing the percentage of acres in compliance with highly erodible land and wetland provisions;
- increasing the percentage of conservation acres with invasive species controls;
- increasing acres managed under Continuous Conservation Reserve Program sign-up;
- increasing CRP acres of riparian and grass buffers; and
- increasing CRP-restored wetlands acres.

Like NRCS' performance measures, FSA's performance measures record how many acres or miles have been treated with a given conservation practice rather than how effectively that practice has improved water quality. In other words, FSA can show the number of acres enrolled in CRP or the number of miles of riparian

buffers enrolled in CRP, but it cannot show the effect of the first acre or mile on water quality. Without outcome-based performance measures, FSA cannot state the degree to which its programs have succeeded.

To correct this shortcoming, FSA officials informed us they will soon announce a new system to quantitatively show the achievement of its outcomes. Currently, however, this new system remains a work in progress.

While FSA's conservation practices have almost certainly resulted in some improvement in Chesapeake Bay's water quality, the agency cannot quantify any given practice's effect on water quality – precisely the information USDA and EPA need for planning purposes.

Evaluating FS' Performance

Among its national strategic goals, FS aims to "increase the area of forest and grassland watersheds in fully functional and productive condition." To achieve that goal, FS determined that it should focus on the following objectives:

- assess and restore high-priority watersheds and maintain riparian habitat in these watersheds;
- monitor water quality impacts of activities on National Forest System lands;
- restore and maintain native and desired nonnative plant and animal species diversity in terrestrial and aquatic ecosystems; and
- reduce the rate of species endangerment by contributing to species recovery.

To gauge how well it is achieving its objectives, FS identified several performance measures, including determining:

- the number of inventoried forest and grassland watersheds in fully functioning condition as a percent of all watersheds;
- acres of nonindustrial private forest land under approved stewardship management plans;
- the percent of projects on National Forest System lands fully implementing best management practices;
- allotment acres and percent administered to 100 percent of standard;
- terrestrial and aquatic habitats enhanced to achieve desired ecological conditions; and
- the value of partnership contributions that support habitat enhancement.

Like NRCS and FSA, FS is currently developing a more comprehensive system of measures to better quantify how well its programs are meeting goals. Although these measures are still being developed, it appears they will continue to report primarily how many acres or miles have been treated with a given conservation practice rather than how effectively that practice has improved water quality. FS asserts that it currently makes rough estimates of the water quality and other

benefits of its tree planting practices – these are not, however, outcome-based performance measures.

While FS' conservation practices have almost certainly resulted in some improvement in the Chesapeake Bay's water quality, the agency cannot quantify the effect on water quality of the majority of its actions – precisely the information USDA and EPA need for planning purposes.

One of USDA's challenges to providing stronger leadership within the Chesapeake Bay Program will be to establish effective, outcome-based performance measures for evaluating how its conservation efforts are improving the Bay's water quality. Though the significant sums spent on conservation over the past 10 years have almost certainly improved the quality of water in the Bay, the Department does not have adequate information to evaluate their impact or to plan future efforts.

Overall conclusions and recommendations are in Chapter 5.

Chapter 5
Conclusions and Recommendations

Conclusions

The Chesapeake Bay watershed partners have measurably reduced nutrients flowing to the Bay since 1985, primarily by improving wastewater technology. However, their current rate of progress in reducing nutrients does not approach what is needed to remove the Bay and its tributaries from EPA's impaired waters list by 2010. Most likely it will take decades to achieve the Bay water quality restoration goals.

The latest nutrient reduction allocation relies on the agricultural community to voluntarily make the most significant contributions. For example, the agricultural community is expected to assume 64 percent of the Bay watershed's total nitrogen reduction goal. The States prepared tributary strategies that were overly ambitious in reaching the 2010 deadline and have not determined how all the practices will be financially supported. Most of the agricultural practices included in State tributary strategies have not been widely implemented by Bay farm producers. While the practices may be environmentally sound, they may not be economically beneficial to a business with a limited profit margin. USDA, a Bay partner, with its many conservation assistance programs and its extensive field offices and experience working with producers and landowners, can play a key role in recommending, developing, and implementing conservation practices that will help the agricultural community meet the Bay goals. To date, USDA and its many programs have not emphasized achieving the Bay goals. Even though USDA has expressed its commitment in signing two agreements with the Chesapeake Executive Council, there has not been a coordinated Department-wide strategy or policy on addressing this commitment. Furthermore, the Department has not been able to fully meet the requests by producers and landowners in the Bay watershed for technical assistance and other conservation assistance that could help meet the Bay Goals.

EPA is responsible for obtaining the support of the appropriate State and Federal officials in achieving the objectives of the Chesapeake 2000 Agreement using a combination of regulatory authorities and consensus agreements among the partners. While EPA has achieved success coordinating goals with environmental programs (e.g., developing consistent water quality standards across State lines; a basinwide National Pollutant Discharge Elimination System regulatory permitting approach), EPA is still grappling with how to effectively coordinate with the agricultural community. The agricultural community has reduced nutrient runoff, but this sector will still have to substantially cut loads to meet expectations set in the tributary strategies. Current practices and policies are not resulting in the significant nutrient reductions needed to improve the Bay. Therefore it is crucial, at the Federal level, for EPA and USDA to partner to identify workable strategies and coordinate available resources. The partnership of EPA and USDA will also need to identify and fast-track the use of alternative practices to obtain the level of effort needed to

meet the current goals. EPA needs to be more aggressive in engaging the highest level of USDA management to identify new policies and practices that can both improve water quality and be compatible with agricultural operations. Continuing business as usual will not result in the substantial reductions required to restore the Bay.

Recommendations

We recommend that the EPA Administrator:

1. Propose executing a Memorandum of Agreement with the USDA to assist the Bay partners in meeting their nutrient reduction goals by:

    a. Identifying conservation practices USDA will promote with either technical assistance or cost-share programs.

    b. Developing procedures for promoting and fast-tracking alternative practices for cost-share programs and technical assistance.

    c. Establishing a task force to identify how USDA cost-share programs can better assist the States in carrying out their tributary strategies.

    d. Establishing demonstration projects to emphasize producer benefits, not just environmental benefits of best management practices in tributary strategies.

    e. Conducting research to quantify accurately the nutrient load reductions from alternative best management practice strategies to ensure these practices are the best for removing nutrients and to improve the models.

    f. Developing a tracking system to determine a more accurate picture of the agricultural community's commitment to implementing the tributary strategies.

We recommend that the EPA Region 3 Regional Administrator instruct EPA/CBPO to:

2. Work with USDA, the States, local governments, land grant universities, and agricultural organizations to revisit State tributary strategies to ensure that the mix of best management practices chosen are those most suitable to the area, have the greatest potential for implementation, and can effectively reduce nutrient and sediment loss.

3. Include development of implementation plans as a special condition in Chesapeake Bay Program grant agreements for States that have not submitted an implementation plan.

We further recommend that the USDA Secretary or Deputy Secretary:

4. Assign a senior level Departmental official to coordinate USDA goals and programs with EPA and the Chesapeake Bay Program. Delegate to that official authority to direct and coordinate goals and programs across USDA mission areas and agencies, and to monitor USDA actions to meet the Chesapeake Bay Program goals.

5. Review the feasibility of targeting or redirecting USDA funds (or allocating USDA funds) on a regional and/or geographical basis to coordinate with the environmental restoration of the Chesapeake Bay, including the possibility of linking the availability of financial and technical assistance to proximity to the Chesapeake Bay watershed.

6. Direct USDA agencies to expedite the development and implementation of outcome-based performance measurements for evaluating the effectiveness of their conservation efforts and programs.

We also recommend that the USDA NRCS Chief:

7. Develop a tracking system for maintaining a list of technical assistance and financial assistance requests from landowners and agricultural producers that cannot be completed due to limited funding.

EPA and USDA Responses and OIGs' Comments

EPA and USDA generally concurred with the findings, conclusions, and recommendations. EPA said it is continuing to work with its USDA partners to further enhance their collective efforts directed toward restoring Chesapeake Bay water quality. USDA will address the USDA responses and OIG position, as well as USDA actions needed to achieve final action, in a separate memorandum. See Appendices E and F for the entire responses.

Agricultural Best Management Practices for Chesapeake Bay Watershed

Best Management Practice	Description
1. Conservation Tillage	Leaves crop residue (plant materials from past harvests) on the soil surface (minimum 30-percent cover). Reduces runoff and soil erosion, and keeps nutrients on the field.
2. Continuous No-Till	No-Till is a type of conservation tillage (above) where crop is seeded directly into vegetative cover so minimal soil surface is disturbed (see previous index). Continuous No-Till is the practice of no-till for each crop planting for up to 5 years.
3. Cover Crops (early only)	Non-harvested crops (e.g., rye, wheat, barley) planted to maintain vegetative cover on cropland, holding nutrients at the root zone. Trapped nitrogen can be released and used by the following year's crop.
4. Small Grain Enhancement -type of cover crop (early)	May be harvested for grain, hay, or silage. Some fertilizer is applied, but intent is to modify normal small grain production practices by eliminating Fall and Winter fertilization so that the crops scavenge available soil nitrogen.
5. Land retirement (on highly erodible land)	Takes marginal and highly erosive cropland out of production by planting permanent vegetative cover such as shrubs, grasses, and/or trees.
6. Riparian forest buffers	Linear wooded areas along rivers, stream, and shorelines (100-foot width recommended, 35-foot width required). Filter nutrients, sediments, and other pollutants from runoff and remove nutrients from groundwater.
7. Riparian grass buffers	Linear strips of grass or other non-woody vegetation maintained between the edge of fields and streams, rivers, or tidal waters (100-foot width recommended, 35-foot width required). Filter nutrients, sediment, and other pollutants from runoff.
8. Wetland restoration	Re-establishes the natural hydraulic condition in a field that existed prior to the installation of subsurface or surface drainage.
9. Tree planting	Includes any tree planting on agricultural land (riparian buffers not included), converting agricultural land to forest. Targets lands that are highly erodible or identified as critical resource areas.
10. Nutrient Management Plan Implementation	Plans are developed to match crop nutrient needs with the expected crop yield based on soil productivity data or site yield history. Plans recommend appropriate rates of nutrient application, timing of applications and placement of nutrients to result in economically optimum crop yields while managing the level of nutrient loss.
11. Yield reserve (Enhanced Nutrient Management)	Reduces nitrogen application 15 percent below nutrient management plan recommendation (recommendation is typically set 35 percent higher than crop needs). An incentive or crop insurance is used to cover the risk of yield loss.
12. Soil Conservation Plans	Plans that meet criteria of the USDA-NRCS Field Office Technical Guide. Includes cultural and structural practices that control erosion, such as grass waterways, terraces, diversions, sediment basins, or drop structures.
13. Managed precision agriculture	Uses multiple management systems beyond standard nutrient management practices to further minimize nutrient loss. Identifies variables such as soil types, weather conditions, and yield data to more specifically apply and vary nutrients within field areas.
14. Animal Waste Management Systems	Allow for collection and containment of waste generated by confined animals. They are designed for the proper handling, storage, and utilization of wastes. Lagoons, ponds, or steel concrete tanks are used for the treatment and/or storage of liquid wastes. Storage sheds or pits are common for solid wastes.
15. Phytase feed additive-poultry	Phytase is a manufactured enzyme that improves the digestibility of organic phosphorus compounds contained in corn, soybean meal, and other poultry feed. Manure phosphorus reductions occur because less phosphorus needs to be blended into feed.

Best Management Practice	Description
16. Phytase feed additive-swine	Same as above, but for swine.
17. Precision feeding – dairy	Reduces excess dietary nutrients in feed to reduce manure nutrient content.
18. Alternative uses of manure/ manure transport	Reduces excess nutrient application by transporting the manure outside of the watershed or finding an alternative use for the excess manure. Alternative uses include: fertilization of commercial tree plantations, new fuel technologies, and pelletizing for fertilizer.
19. Off-stream watering with fencing	Limit livestock access to streams with fencing and by providing an alternative drinking water source. Fences can be planted with trees or grass, but are typically not wide enough to constitute a buffer.
20. Off-stream watering without fencing	Use alternative drinking water systems that partially remove livestock and animal waste from streams.
21. Off-stream watering with stream fencing and rotational grazing (pasture)	Combines stream fencing and alternative watering with cross fencing to enable rapid grazing of small areas in sequence. Once an area is intensively grazed of most vegetation, animals are moved to another area to allow pasture recovery.
22. Precision rotational grazing	No Chesapeake Bay Program definition found.
23. Horse pasture management	Use of rotational grazing practices to minimize nutrient and sediment loss from horse pastures. Practices include: streambank fencing, cross-fencing, off-stream watering, and stabilization of heavy use areas.
24. Ammonia emissions reduction (poultry, swine, dairy)	Reduction in livestock housing ammonia emissions through use of capture or control technologies.
25. Non-urban stream restoration	Stabilizes stream channel by restoring a stream's natural hydrology and landscape.
26. Carbon sequestration	Conversion of cropland to hayland (warm season grasses) and managed as a permanent cover, providing a mechanism for sequestering carbon within the soil.

Sources: Chesapeake Bay Program, EPA's Watershed Academy Website, and Chester County (Pennsylvania) Tributary Strategy

Details on Scope and Methodology

We interviewed experts from academia and other fields involved in Chesapeake Bay restoration to identify areas of concern. We also interviewed staff from EPA Region 3's Chesapeake Bay Program Office to identify the program's goals, structure, and process. We interviewed staff from USDA's Natural Resources Conservation Service, Agricultural Research Service, Forest Service, and Farm Service Agency, and EPA's nonpoint source and concentrated animal feeding operation programs, to determine how these programs influenced agricultural activities in the Chesapeake Bay watershed. We interviewed environmental and agricultural staff from Maryland, Virginia, and Pennsylvania State agencies to determine how State tributary strategies were developed and implemented.

We reviewed State tributary strategies for Maryland, Pennsylvania, and Virginia to identify best management practices selected by the States and their implementation goals. We also reviewed data provided by the Chesapeake Bay Program Office showing the progress the States were making in meeting their implementation targets as of 2004. In our analysis of progress and challenges, we included the 26 agricultural best management practices for which one or more of these three States had set an implementation goal. We did not validate the implementation rates reported in the tributary strategies.

We also conducted site visits of farms implementing best management practices. These producers volunteered in response to a request by the Virginia State Department of Conservation and Recreation.

We also identified conservation practices not commonly used within the Chesapeake Bay watershed to determine whether these practices or technologies could be adopted in the Bay area. From the National Agricultural Library's *Conservation Effects Assessment Bibliography*, we selected 187 articles related to controlling nitrogen and phosphorus and improving water quality. We then selected 14 articles that merited further research. Additional alternative conservation practices were brought to our attention through interviews, conferences, and background reading. We then asked staff from the Chesapeake Bay Program Office and an agricultural expert from the University of Maryland to assess the benefits and limitations of the practices identified when applied to the Chesapeake Bay watershed.

Management Controls

Due to a concurrent review of the Chesapeake Bay's Program Office operations and watershed model by the Government Accountability Office, we limited our review of management controls to understanding EPA's and USDA's role in working with the agricultural community to encourage the use of best management practices. See Chapters 3 and 4. EPA reported in its 2005 Annual Performance and Accountability Report that current pollutant loads continue to exceed the level needed to meet water quality standards. See Chapter 2 on the progress being made by the

Chesapeake Bay partners in reducing nutrients and sediments. We did not audit the validity of financial data and other data used in our report for informational purposes. EPA financial data is subject to an annual audit by the Office of Inspector General. The Chesapeake Bay Program's Scientific and Technical Advisory Committee had reviewed assumptions used in the Bay's watershed model and these conclusions have been reported in Chapter 3.

Prior Reviews

The Government Accountability Office issued *Agricultural Conservation: State Advisory Committee's Views on How USDA Programs Could Better Address Environmental Concerns* (GAO-02-295) in February 2002. The Government Accountability Office found that programs targeted to specific environmental concerns were more effective at improving water quality than those programs that address environmental issues more generally.

The Government Accountability Office issued *Agricultural Conservation: USDA Needs to Better Ensure Protection of Highly Erodible Cropland and Wetlands* (GAO-03-418) in April 2003. The Government Accountability Office reported that, nationally, almost half the Natural Resources Conservation Service's field offices do not implement the conservation compliance provisions of the 1985 Food Security Act as required.

The Joint Legislative Audit and Review Commission of the Virginia General Assembly issued its *Review of Nutrient Management Planning in Virginia* on January 6, 2005. In this report, the Commission stated that nutrient management plans written were generally of good quality but implementation was mixed and enforcement weak.

The Government Accountability Office issued *Chesapeake Bay Program: Improved Strategies Are Needed to Better Assess, Report and Manage Restoration Progress* (GAO-06-96) in October 2005. The Government Accountability Office reported that the Chesapeake Bay Program (1) had not yet developed and implemented an integrated assessment approach for measuring progress; (2) did not effectively communicate the status of the health of the Bay to the public; and (3) did not have a comprehensive, coordinated implementation strategy to meet the goals of the Chesapeake 2000 Agreement.

Agricultural Best Management Practices' Progress and Challenges

Best Management Practice [8]	Percent of Goal Implemented Bay-Wide (2004)	Factors Affecting Implementation and Impact
1. Conservation Tillage	98.4%	Widely implemented, but decreases land available for manure transport/land application because it limits ability to incorporate manure into soil. Can increase infiltration and subsequent nutrient transport to groundwater.
2. Continuous No-Till	0.0%	Benefits may take several years to be realized. Therefore, implementation requires technical assistance and trust. Single year State contracts can hinder long term investment. Producers must invest in a no-till planter (~$15,000), expensive for a small farm and takes a higher level of management. Not practical for dairy farms because they use crop residue for silage.
3. Cover Crops (early only)	0.0%	According to Chesapeake Bay Commission, traditional cropping patterns and winter grain crops make it difficult to apply cover crops to more than about half of row crop acreage in the Chesapeake Bay region each year. Efficiency depends highly on timing of planting - nitrogen uptake and trapping diminishes rapidly if crops are planted too late in season. Producers have difficulty getting cover crops planted early enough to be efficient due to weather and time of harvest, and because optimal planting time coincides with a farmer's busiest time of year. Little economic incentive for cover crop planting - costs to producer include seed, herbicide, and labor, but crops are not harvested so there is no immediate economic benefit. Without an inherent benefit to the farmer, a consistent yearly funding source is necessary to obtain participation. For example, in Maryland, producers resisted implementation because funding was not sustainable. Now, a "flush tax" provides consistent funding, but funding is still substantially short of need.
4. Small Grain Enhancement - type of cover crop (early)	0.0%	This type of cover crop is also known as a "commodity cover crop" and thus may be harvested for grain, hay, or silage. This addresses the cost-effectiveness challenge of traditional cover crop implementation since the crop can be harvested to be used or sold, though upfront costs could hinder application. However, since fertilizer may be applied to these crops, its nitrogen reduction efficiency is less than that of traditional cover crops.
5. Land retirement (on highly erodible land)	53.6%	Takes land out of production; USDA provides cost-share to farmers to convert cropland to grassland and yearly per-acre payments to make up for lost income. Consistent funding from farmer's perspective (contracts are 10-15 years), but costs to government do not always result in ultimate behavior change.

[8] Though a goal was set for each of the practices above, several of these are part of a category of management options, and thus compete for the same available acreage. The goal is to convert one practice to another that can yield greater environmental benefit. For example, continuous no-till would replace conservation tillage, and enhanced nutrient management or precision agriculture would replace nutrient management implementation to achieve greater nutrient and sediment reduction. The off-stream watering practices 19, 20, and 21 and precision rotational grazing are considered pasture grazing best management practices and also compete with each other for the same available acres for implementation.

Best Management Practice [8]	Percent of Goal Implemented Bay-Wide (2004)	Factors Affecting Implementation and Impact
6. Riparian forest buffers	11.9%	Effective at controlling nutrient and sediment loss. Could be more effective when combined with other practices, though this concept is not always promoted. Significant up-front investment in plant materials, labor, and technical design, and several years of maintenance required, but buffers can then last with minimal management for many years.
7. Riparian grass buffers	19.7%	Cost effective, but some concern with land leasing agreements.
8. Wetland restoration	8.0%	Wet soils are taken out of production. Can serve to filter water and sequester carbon.
9. Tree planting	10.6%	Farmers may be reluctant to plant trees because of the effort it takes to convert back to cropland.
10. Nutrient Management Plan Implementation	Exceeds goal	Nitrogen-based plans will result in over-application of phosphorus because phosphorus is more prevalent in manure than is needed by crops. States are just now shifting to phosphorus-based plans. Difficult for producers to know how to comply and translate plan into practice Some producers believe the plan is unrealistic and prescribes insufficient nutrients for crops. Requires adequate enforcement and compliance to ensure effectiveness When excess manure is transported off-site, there is little control over application by those accepting manure.
11. Yield reserve (Enhanced Nutrient Management	0.0%	Agricultural community hesitant to adopt a practice that might reduce yields and profits. According to a Virginia official, the practice is "not field-friendly" Therefore, the practice would require generous incentive payments and crop risk insurance. Wide annual variability makes it difficult to control for other factors impacting yields, such as climate and pests. Despite limitations, practice is still under consideration in Virginia, but needs greater proof of correlation between practice and reductions to warrant payment.
12. Soil Conservation Plans	52.0%	Lack of technical assistance funding for plan revision/update.
13. Managed precision agriculture	0.0%	Though Pennsylvania has a target in its tributary strategy, stakeholders are unsure as to whether the goal can be achieved per the definition used on larger farms in Midwest. Other drawbacks include: perceived risk, labor and farm economics, high level of technical expertise required (and time and effort to learn new technology), cost/fear of a “leaky pipe” (i.e., if I buy this one piece of equipment, will I then need additional pieces?), and that the use of such technology may not ultimately change how and what decisions are made.
14. Animal Waste Management Systems	68.8%	Cost to farmer may be prohibitive even with cost share assistance.
15. Phytase feed additive- poultry	75.5%	Generally accepted and implemented at 16+% efficiency level for phosphorus; States have committed to a 30% reduction if science shows no harm to birds will occur. Phytase enzyme is widely utilized since it is introduced at feed mills and poultry industry is integrated (several company owners making all decisions regarding feed for the region). Phytase enzyme reduces phosphorus only; no equivalent for nitrogen has yet been introduced to the region.

Best Management Practice [8]	Percent of Goal Implemented Bay-Wide (2004)	Factors Affecting Implementation and Impact
16. Phytase feed additive- swine	0.0%	With the exception of Pennsylvania, Bay States have not set goals for swine phytase/ phosphorus reduction. Chesapeake Bay Program Office attributes this to the difficulty in tracking operations using phytase. The swine industry has a different marketing and distribution set-up than the poultry industry, which makes it difficult to determine which operations are using it. Although adopted by some swine producers, efficiencies are not well developed.
17. Precision feeding – dairy	0.0%	The dairy industry is not integrated like swine and poultry; each dairy producer makes individual decisions about feed with veterinarians and feed consultants. Thus, achieving behavior changes throughout the industry is a greater challenge. Further, any effort to effect such behavior change must address farmers' concerns regarding adverse impact on milk production. Also, this practice may not have an impact on cropland nutrient loss for small dairies since these operations tend to have a nutrient deficit for crops.
18. Alternative uses of manure/ manure transport	14.8% (Nitrogen); 11.7% (Phosphorus)	State subsidies in Maryland and Delaware cause displacement of markets (i.e., Pennsylvania haulers cannot compete, even in Pennsylvania); Virginia has subsidy program but only within Virginia. A pellet plant makes poultry litter easily transportable for fertilizer use where needed, but additional markets are needed. Pellets are not yet profitable; however, a plant representative indicated that Senator Mikulski has been assisting in getting pellet fertilizer on the Federal purchase list. Regardless of market development activities, majority of crop farmers (specifically those without livestock) are not willing to accept manure from animal feeding operations because nutrient content varies, cannot be easily verified (as opposed to commercial fertilizer in which the content is identified), and manure is not used by crops as efficiently as commercial fertilizer. Special equipment is needed to apply manure (cost) versus commercial fertilizer, which is more convenient to obtain and apply (application often included in delivery price). Manure is associated with odor and neighbors may complain. Manure application may bring the producer under scrutiny of State and Federal regulators. Competition from biosolids industry is also a significant limiting factor.
19. Off-stream watering with fencing	21.6%	This off-stream watering practice requires investment in developing off-site watering systems, though funding assistance is available. Other limiting factors include availability of water and labor required for maintenance and weed control.
20. Off-stream watering without fencing	12.0%	
21. Off-stream watering with stream fencing and rotational grazing (pasture)	Exceeds goal	
22. Precision rotational grazing	0.0%	Limiting factors similar to off-stream watering practice. Producer must be more involved in animal behavior. More management intensive, but less labor intensive than confined feeding. Though production may decrease, total profit may increase since the practice requires fewer inputs.
23. Horse pasture management	0.0%	Practice needed to manage horses at large facilities not the same as Bay model definition. Horse management is not considered under USDA jurisdiction, so pasture not eligible for Federal cost-share dollars. Owners often do not have an agricultural background and thus may not be familiar with proper manure management practices; technical assistance could promote better management.

Best Management Practice [8]	Percent of Goal Implemented Bay-Wide (2004)	Factors Affecting Implementation and Impact
24. Ammonia emissions reduction (poultry, swine, dairy)	0.0%	Included in strategy but not defined. High tech is now used on large farms in Midwest, but stakeholders are not yet sure how to adapt for small farms. Not economically feasible. Some pilot studies conducted, but there is yet no meaningful way to measure efficiencies. USDA's Natural Resources Conservation Service has a standard but it is new, broad, and not yet applied through tech assistance or other programs.
25. Non-urban stream restoration	0.0%	If implementation involves fending, farmer must provide alternate water source for livestock. Stream buffer must be certain width so cows can still graze with adequate protection for stream.
26. Carbon sequestration	0.0%	Currently no market for alternative crops, nor infrastructure to support the practice. Widespread implementation would require a major shift in markets and require incentives.

Sources: For progress, OIG analysis of Chesapeake Bay Program data. For challenges, interviews with EPA and USDA staff, State environmental and agricultural agency staff, agricultural associations, experts, and agricultural producers; and search of literature sources.

Appendix D

Alternative Agricultural Management Practices

Practice	Benefits	Limitations	Comments
Whole farm nutrient budget			
Balanced nutrient inputs and outputs- penalties leveled	Producer's incentive - avoidance of tax if nutrient balance is not achieved.	Record-keeping burden on producers, lack of political will.	Mineral Accounting System program in the Netherlands, which required producers to balance nutrient flow, is now faltering.
Best management practices implemented as a suite of practices	Holistic approach - producers use modeling tools to calculate inputs and outputs.	Technical assistance on a farm-by-farm basis would be required.	Scientific and Technical Advisory Committee[9] Report recommends moving from individual best management practices to nutrient budget approach. New York and Pennsylvania have already developed modeling tools.
Forage systems			
Cropping systems with crop cycles	Forage cropping systems in two or three crop cycles as a means of removing nutrients.	Producer preference to grow more profitable feed crops. May be limited by climate.	
Specific plant species	1. Forage species such as legumes and Bermuda grass identified as having high nutrient uptake properties. 2. Warm season grasses grown for ethanol production. Root growth could be used for carbon credit system.	1. Lack of market for forage crops. Corn, wheat, and soybeans are most economically feasible feed crops. 2. Special equipment required, lack of infrastructure.	Need a pilot study to see if ethanol/ carbon credits are economically feasible
Haylage/other storage methods	1. Haylage as a method of preserving forage to reduce nitrate concentration in grasses. 2. Potential for higher quality livestock feed.	1. Increased production costs and greater risk of spoilage. 2. No significant advantage to using haylage versus other storage methods.	Top growth from cover crop cut, stored as haylage and used for animal feed.
Feeding regimes (Animals are inefficient at using nutrients – about 70-75 percent of the nutrients that they consume are eventually excreted.)			
Dairy cattle Significant reduction of phosphorus in diet	1. Reduces phosphorus excreted and causes no adverse response in dairy cattle. 2. Producer's incentive – cost of feed reduced. 3. Producer's incentive - compliance with environmental regulations.	Must get buy-in from veterinarians and nutritionists before changing diet.	Focus on education and outreach to veterinarians and nutritionists. New York, Pennsylvania, Virginia, and Maryland are working on dairy feed management.

[9] Scientific and Technical Advisory Committee drafted a report in 2004, *Innovation in Agricultural Conservation for the Chesapeake Bay: Evaluating Progress & Addressing Future Challenges*, that identified emerging science-based practices, programs, and policies that will aid nutrient reduction.

Practice	Benefits	Limitations	Comments
Dairy cattle Urea in milk (MUN) as measure of nitrogen in diet	Promising as a means for assessing nitrogen in diet. Would aid in making feed adjustments. Producer's incentive - reduced cost of feed.	• Must get buy-in from veterinarians and nutritionists before changing dairy diet. • Need to do a large-scale pilot project to assess economic feasibility.	Large-scale demonstration projects are needed.
Poultry and swine Phytase and further reductions of phosphorus in diet.	With the use of phytase as feed additive, amount of phosphorus can be reduced much further than initially predicted. Possible reductions 20% or more.	Must establish the minimum phosphorus needs in diet for each animal species	
Precision agriculture			
Real time monitoring and nutrient mapping	Application of less nutrients than the recommended rate.	Requires special equipment and a lot of technical assistance. May not be feasible for small farm operations.	
Fertilizer application based on hydrology to manage nitrogen leaching	Application of less nutrients than the recommended rate.	Requires equipment and a lot of technical assistance. May not be feasible for small farm operations.	
Bio-energy			
Anaerobic digestion	• Manure becomes a commodity. • Methane can generate energy and save energy costs for producer. • Work well with wet, harder – to-dispose dairy manure	• Further development of process and markets. • Lack of established infrastructure. • Disposal of byproduct - contains nutrients. • Burning poultry litter can release arsenic.	USDA Agricultural Research Service efforts are focused on bio-energy rather than feed adjustment. Generation of energy from biomass is very promising. More large-scale demonstration projects are needed.
Cellulosic ethanol production from switch grass and manure	1. Ethanol is a marketable product 2. Switchgrass removes more nutrients from the soil than feed crops.	• Lack of infrastructure; • Disposal of byproduct - contains nutrients; 1. Competition from corn ethanol industry; 2. Producers prefer to grow feed crops.	Great potential but needs investment and government subsidies. Cellulosic ethanol from switchgrass mentioned in the 2006 State of the Union Address.
Soil treatments and manure additives			
Injection method for manure application to no-till crops	Reduces atmospheric ammonia loss	• Application rate very slow. • Limited to dairy manure. • Costs for special equipment. • Phosphorus builds up in the plow layer so must mix every few years	
Synthetic soil amendments to reduce erosion	The addition of polymers are a way to reduce irrigation-induced erosion.	Expense. Byproduct of polymer degradation has been identified as a toxin.	

Practice	Benefits	Limitations	Comments
Co-blend aluminum, iron, or other materials with manure to bind phosphorus and make insoluble	1. Aluminum is already used by poultry industry in the litter to bind phosphorus 2. Gypsum as soil additive will bind phosphorus 3. Iron sulfate as a treatment for poultry litter will bind phosphorus.	1. Aluminum may be toxic to fish and associated with Alzheimer's 2. Gypsum only works for 5-10 years 3. Iron rejected by the poultry industry due to poultry health concerns; • Long term effects on birds, soil and humans unknown.	Alum proposed as best management practice by manufacturer.
Iron sulfate as soil amendment	Can be used as chemical buffer at edge of field will make phosphorus insoluble and reduce runoff.	• When used near poultry, may impact health. • Has not been adopted by producers	Need to set up a demonstration project for use of iron sulfate as chemical buffer.
Other			
Nutrient trading	• It can act as an incentive to achieve pollution reductions versus Total Maximum Daily Load caps. • Brings in money beyond the usual funding sources.	• Producer's liability and responsibility for doing a practice that is not verifiable. • Easiest practices done first so difficult practices may not be done. • Balancing the purchase of credits for practices with tributary strategy's goals may be problematic-consistency of credit estimations. • No trade transparency.	Pennsylvania is active in development of nutrient trading.
Algal systems to produce commercial fertilizer	• On-the-farm treatment for dairy manure and creation of an transportable fertilizer product. • Inexpensive and easy to set up for producer.	• Has not been tested in a large-scale pilot study • Establish infrastructure to manufacture and market end product.	Need to set up a demonstration project.
Phytoremediation-wetland to take up nutrients	Install wetland to take up nutrients	Economic impact to producers due to land taken out of production.	Wet areas in fields can be source of nutrient runoff. Test ideas such as planting hydrophilic species in wet areas instead of installing drains.

Sources: Online literature searches and interviews with EPA/CBPO and USDA staff, a Chesapeake Bay Program Scientific and Technical Advisory Committee agricultural expert, and Maryland Department of Natural Resources staff.

EPA Response to OIG Draft Report

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

OCT 23 2006

SUBJECT: EPA Response to September 12, 2006 Draft "Evaluation Report: Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources"

FROM: Donald S. Welsh, Regional Administrator , Region III

TO: Dan Engelberg, Director, Water Issues, Office of Program Evaluations, Office of Inspector General, U.S. Environmental Protection Agency

Robert W. Young, Assistant Inspector General for Audit
Office of Inspector General, U.S. Department of Agriculture

EPA acknowledges that the respective EPA and USDA Offices of Inspector General effectively addressed the extensive comments submitted by EPA and USDA on the May 2006 discussion draft evaluation report within the September 12, 2006 official draft.

We concur with the findings as described in the report in Chapters 1, 2, 3 and 5 as they relate to EPA and its mission. We concur with the three recommendations directed to EPA on page 43 as stated in the September 12, 2006 draft "Evaluation Report: Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources."

We are continuing to work with our USDA partners to further enhance our collective efforts directed towards restoring Chesapeake Bay water quality. If you or your staff have any questions related to our response to the draft report, please contact Rebecca Hanmer at 410-267-5709 or Richard Batiuk at 410-267-5731.

cc. Benjamin Grumbles, Assistant Administrator, Office of Water, EPA
Mark Rey, Under Secretary, Natural Resources and Environment, USDA
Jon Scholl, Counselor to the Administrator for Agricultural Policy, EPA
Rebecca Hanmer, Director, Chesapeake Bay Program Office, EPA
Jon Capacasa, Director, Region 3 Water Protection Division, EPA
Richard Batiuk, Associate Director for Science, Chesapeake Bay Program Office, EPA
Lorraine Fleury, Audit Coordinator, Region 3, EPA
Michael Mason, Audit Coordinator, Office of Water, EPA

3CB00
10/23/06

Printed on 100% recycled/recyclable paper with 100% post-consumer fiber and process chlorine free.
Customer Service Hotline: 1-800-438-2474

USDA Response to OIG Draft Report

USDA

United States Department of Agriculture

Office of the Secretary
Washington, D.C. 20250

OCT 1 2 2006

SUBJECT: Official Draft Office of the Inspector General (OIG) Report 50601-10-Hq, Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources

TO: Robert W. Young
Assistant Inspector General for Audit
Office of the Inspector General

Thank you for the opportunity to respond to the Official Draft OIG Report 50601-10-Hq, Saving the Chesapeake Bay Watershed Requires Better Coordination of Environmental and Agricultural Resources. This memorandum transmits the U.S. Department of Agriculture (USDA) response for recommendations 4 through 7. Unless stated in the response, all recommendations are scheduled for completion by September 30, 2007.

USDA works through cooperative conservation partnerships to aid agricultural producers with conservation plans and practices that contribute to a healthier Chesapeake Bay environment. USDA has devoted significant financial and technical assistance through a variety of programs, research, and grants. In addition, USDA recognizes the importance of this ecosystem and is pursuing such actions as manure management strategy implementation, sub-aquatic vegetation research and propagation techniques, and more collaboration with local, State, Federal and non-federal Chesapeake Bay partners.

Between 1995 and 2005, through USDA programs alone, over $650 million in technical and financial assistance has been invested to install practices and systems to reduce non-point source pollution to the Bay and its tributaries. Our partners in this effort–agricultural and forest owners and operators, State and local conservation agencies, and others–have contributed funds over that same time period. As noted in the report, the benefits of these conservation investments are delivered over the long term, in time periods of years or decades.

USDA has been an integral partner in developing and implementing the manure management strategy signed by the Chesapeake Executive Council in 2005. All six Chesapeake Bay watershed States have developed, or are developing, feed management/precision feeding conservation practice standards. The application of conservation practices and systems through these programs are adding significant benefits that will help to achieve Chesapeake Bay restoration. The Forest Service (FS) established the Chesapeake Watershed Forestry Program in 1992 to provide leadership specifically on Chesapeake Bay agreements as they relate to forestry, including riparian forest buffers. Since 1992, the FS championed the 1994, 1996, and 2003 Executive Council directives on Riparian Forest Buffers.

An Equal Opportunity Employer

While USDA concurs with the finding that more can be done to improve the condition of the Chesapeake Bay Watershed, the limitations of the predictive model used to estimate non-point source pollution and conservation effects are a source of concern. The report uses the Bay Program's "best management practices," and USDA's "conservation practices" interchangeably. It may seem that these terms are interchangeable, but they are not. A comparison of the Bay Program's best management practices list with USDA's conservation practice standards reveals significant definitional differences. These differences lead to inconsistencies and inaccuracies when States and the Bay Program attempt to account for Natural Resources Conservation Service (NRCS) and producer accomplishments through State Tributary Strategies and the watershed model. USDA and the Bay Program have initiated a collaborative approach to improve the accuracy of State conservation practice reporting. This would, in turn, improve the watershed model's measurement of agriculture's contributions to Bay restoration.

OIG recommends that the USDA Secretary or Deputy Secretary:

OIG RECOMMENDATION 4

Assign a senior-level Departmental official to coordinate USDA goals and programs with the Environmental Protection Agency (EPA) and the Chesapeake Bay Program. Delegate to this official the authority to direct and coordinate goals and programs across USDA mission areas and agencies, and to monitor USDA actions to meet the Chesapeake Bay Program goals.

USDA RESPONSE:

We recognize that collaboration between USDA agencies to address Chesapeake Bay issues can be strengthened. The Secretary has assigned leadership for coordination on Bay issues to the Under Secretary for Natural Resources and Environment (NRE). The NRE Under Secretary, in turn, assigned individuals to a number of key positions: an NRE Deputy Under Secretary has been designated as USDA's representative to the Chesapeake Executive Council, the NRCS East Regional Assistant Chief represents USDA on the Executive Council's Principals' Staff Committee, and the NRCS Maryland State Conservationist is a member of the Federal Agency and Implementation Committees.

In recognizing that more needs to be accomplished cooperatively to restore the Bay ecosystem, USDA continues to improve Chesapeake Bay coordination across all relevant Department agencies. NRCS has embarked on an effort to improve coordination of its conservation activities across the six Bay watershed States and the District of Columbia. Agency leaders from all six States are meeting on a regular basis to discuss issues of common concern and explore opportunities for regional cooperation. This is a new approach for NRCS, and one that has already yielded promising results. USDA is also working to improve and cultivate cooperative conservation efforts with non-government agencies, Federal and State government officials, and Chesapeake Bay

stakeholders. USDA agencies will also strengthen collaboration for watershed, cooperative conservation, and market-based approaches within the Bay watershed.

OIG RECOMMENDATION 5

Review the feasibility of targeting or redirecting USDA funds (or allocating of USDA funds) on a regional and/or geographical basis to coordinate with the environmental restoration of the Chesapeake Bay, including the possibility of linking the availability of financial and technical assistance to proximity to the Chesapeake Bay watershed.

USDA RESPONSE:

USDA has worked for decades to build relationships and credibility through its locally-led decision making process that includes farm and forest landowners as well as stakeholders in the natural resource conservation community. Local work groups and State Technical Committees provide programmatic advice and funding priority recommendations to USDA leadership in each State. Chesapeake Bay stakeholders are routinely invited to participate in this priority-recommendation process. Since the 2002 Farm Bill, NRCS has developed transparent natural resource-based funding formulas for its major programs that benefit the Bay. NRCS recently contracted with an independent third party selected competitively to examine the efficacy of its program allocation formulas. We anticipate the results of this independent assessment will yield information valuable to our further refinement of the allocation formulas in future years.

Furthermore, ARS and CSREES each have unique means of providing funding for research that is specifically relevant to the health of the Chesapeake Bay. Both CSREES and ARS have national responsibility for conducting water quality and quantity research. Land grant institutions within the Chesapeake Bay watershed use CSREES funds for vital regional and national research, just as ARS conducts research in other parts of the U.S. that is applicable to water quality within the Chesapeake Bay. Also, funding has become available to promote innovative conservation programs. In each of the past two years, the Bay region has received over $4 million, which is over 20 percent of nationwide funds available in NRCS Conservation Innovation Grants to promote such technology. In addition, NRCS uses local conservation through the State Technical Committees and Local Work Groups to ensure that funds are distributed in each State based on priority natural resource needs.

OIG RECOMMENDATION 6

Direct USDA agencies to expedite the development and implementation of outcome-based performance measurements for evaluating the effectiveness of their conservation efforts and programs.

USDA RESPONSE:

USDA agrees with this recommendation. USDA Agencies have a number of outcome oriented performance measures in place for their conservation programs, addressing resource concerns such as sediment and nutrient loss to water resources, water conservation, health and vigor of grasslands and forest ecosystems, and wildlife habitat quality and populations, among others. These measures are articulated in USDA and agency-level Strategic Plans as long-term objectives for conservation programs. In addition, most measures have been assessed and found acceptable through the Office of Management and Budget (OMB) Program Assessment Rating Tool (PART) process. While approaches exist to report results for many of these outcome measures, some are being refined to yield more reliable results and others are under development.

The Conservation Effects Assessment Project (CEAP) is a significant multi-agency effort designed to quantify the benefits of conservation practices implemented by private landowners participating in selected USDA conservation programs. The Agencies expect that CEAP will provide much needed data, methods, and information to improve measurement of program performance, and will also assist in development of improved measures that better reflect desired environmental outcomes. Five USDA agencies are collaborating in leading the national, regional, and watershed effects assessments. Another seven USDA and external agencies, including EPA are participating in various CEAP activities as well.

Table: Selected USDA Outcome Oriented Measures

Outcome Measure/Metric	Agency	In USDA/Agency Strategic Plan
Working cropland with soil condition improved	NRCS	Yes
Potential sediment delivery from agricultural operations reduced	NRCS, FSA	Yes
Potential nitrogen delivery from agricultural operations reduced	NRCS, FSA	Yes
Potential phosphorus delivery from agricultural operations reduced	NRCS	Yes
Water conservation	NRCS	Yes
Restore, create, or enhance wetlands	NRCS, FSA	Yes
Grassland and forest land condition, health, and productivity	NRCS, FSA, FS	Yes
Quality of fish and wildlife habitat for desired species and species of concern improved	NRCS, FSA, FS	Yes
Important lands retained in agricultural and forest uses	NRCS, FS	Yes

OIG also recommends that the USDA NRCS Chief:

OIG RECOMMENDATION 7

Develop a tracking system for maintaining a list of technical assistance and financial assistance requests from landowners and agricultural producers that cannot be completed due to limited funding.

USDA RESPONSE:

USDA agrees with this recommendation. Unfunded applications for financial assistance are already tracked by specific program. NRCS intends to develop a tracking system for technical assistance requests in fiscal year 2007.

If you have questions or need further assistance, please contact Daniel Runnels, Director, Operations Management and Oversight Division, at (202) 720-9135.

MARK REY
Under Secretary
Natural Resources and Environment