MARYLAND

Conservation Reserve Enhancement Program

Final Programmatic Environmental Assessment

February 2005

U.S. Department of Agriculture, Farm Service Agency
in partnership with the Maryland Department of Agriculture, the Maryland Department of Natural Resources and Natural Resources Conservation Service

USDA

Abstract

Mandated Action: The U.S. Department of Agriculture, Commodity Credit Corporation (USDA/CCC) and the State of Maryland have agreed to implement the Maryland Conservation Reserve Enhancement Program (CREP), a component of the national Conservation Reserve Program (CRP). CREP is a voluntary program for agricultural landowners.

USDA is authorized by the provisions of the Food Security Act of 1985, as amended (1985 Act) (16 U.S.C. 3830 *et seq*.), and its regulations at 7 CFR Part 1410. In accordance with the 1985 Act, USDA/CCC is seeking authorization to enroll lands into CREP through December 31, 2007.

Type of Document: Programmatic Environmental Assessment

Lead Federal Agency: U.S. Department of Agriculture, Farm Service Agency

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The *Maryland Conservation Reserve Enhancement Program Programmatic Environmental Assessment* has been prepared pursuant to the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321-4347); the Council on Environmental Quality regulations (40 CFR Parts 1500-1508); USDA-Farm Service Agency draft environmental regulations (**7** CFR Part 799.4, Subpart G); and USDA-Farm Service Agency *1-EQ, Revision 1, Environmental Quality Programs*, dated November 19, 2004.

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LISTING OF ACRONYMS

BMPs	Best Management Practices
CASA	Chesapeake Alliance for Sustainable Agriculture, Future Harvest
CBA	Chesapeake Bay Agreement
CCC	Commodity Credit Corporation
CD	Conservation District
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COC	County Office Coordinator
COMAR	Code of Maryland Regulations
CP	Conservation Practice
CRP	Conservation Reserve Program
CREP	Conservation Reserve Enhancement Program
CWA	Clean Water Act
EAC	Early Action Compact
EBI	Environmental Benefits Index
ECP	Emergency Conservation Program
EI	Erodibility Index
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act of 1973
EWPP	Emergency Watershed Protection Program
EWRP	Emergency Wetland Reserve Program
FIP	Forestry Incentive Program
FONSI	Finding of No Significant Impact
FSA	Farm Service Agency
FWS	U.S. Fish & Wildlife Service
HEL	Highly Erodible Land
MACS	Maryland Agricultural Water Quality Cost Share
MALPF	Maryland Agricultural Land Preservation Foundation
MBSS	Maryland Biological Streams Survey
MDA	Maryland Department of Agriculture
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MDP	Maryland Department of Planning
MOA	Memorandum of Agreement
NHL	National Historic Landmark
NNL	National Natural Landmark
NEPA	National Environmental Policy Act of 1969
NRCS	Natural Resources Conservation Service
PDA	Public Drainage Association
PDR	Purchase of Development Rights
PEA	Programmatic Environmental Assessment
PEIS	Programmatic Environmental Impact Statement

PIP	Practice Incentive Payment
P.L.	Public Law
POS	Program Open Space
ppt	parts-per-thousand
RFB	Riparian Forest Buffer
RLA	Rural Legacy Area
RLP	Rural Legacy Program
SCD	Soil Conservation District
SEP	State Enhancement Program
SHPO	State Historic Preservation Office
SIP	Signing Incentive Payment; also State Implementation Plan
SWCD	Soil and Water Conservation District
TAP	Tree Assistance Program
TDR	Transfer of Development Rights
TMDL	Total Maximum Daily Load
TSP	Technical Service Provider
TSS	Total Solids Suspended
U.S.C.	U.S. Code
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WHIP	Wildlife Habitat Incentive Program
WIP	Woodland Incentives Program
WQIA	Water Quality Improvement Act of 1998
WRP	Wetlands Reserve Program

NOTE TO READERS

In November 2004, a draft Programmatic Environmental Assessment (PEA) was prepared on the Maryland Conservation Reserve Enhancement Program (CREP) and was posted on the USDA-Farm Service Agency website at http://www.fsa.usda.gov/dafp/cepd/epb/assessments.htm. Notices of Availability announcing the publication and availability of the draft PEA were published in the *Delmarva Farmer* on November 30 and December 14, 2004, and in the *Mid-Atlantic Farm Chronicle* on November 29, 2004. The draft PEA was available for agency and public review for 30 days. Three comments were received from two agencies and one private citizen. These comments and the FSA responses are presented in **Appendix I**. Changes to the draft text in response to these comments are focused in **Chapter 4, sections 4.6 and 4.9**, and are highlighted in ***bold italic*** font.

Executive Summary

Congress recognized the Chesapeake Bay as a natural resource of national significance when it designated the bay a CRP national conservation priority and an area of special environmental sensitivity. In response to this recognition, the USDA-CCC and the State of Maryland entered into a Memorandum of Agreement (MOA) on October 20, 1997, to expand and improve upon CRP and their commitment to the Chesapeake Bay Agreement by proposing to enroll up to 100,000 acres of environmentally sensitive agricultural land in a new program, called the Conservation Reserve Enhancement Program (CREP). FSA, the Maryland Department of Agriculture (MDA) and the Maryland Department of Natural Resources (MDNR) were designated as the lead administrators for CREP in Maryland. The initial term for MD CREP was through December 2002, which was later extended to February 29, 2004.

The primary purpose of CREP is to address the water quality issues caused by agricultural practices to the Chesapeake Bay and its tributaries, as well as affirm the State's commitment to the Chesapeake Bay Agreement. The initial CREP authorized a maximum of 100,000 acres for enrollment into the program. On June 1, 2000, an amendment to the MOA was executed that expanded the initial provisions of the program and specified reducing nitrogen by 5,750 tons, phosphorus by 550 tons and sediments by 200,000 tons annually.

In addition to these nutrient level reductions, the program focused on increasing the survivability, distribution and abundance of targeted fish, wildlife and plant species in the Chesapeake Bay region by converting marginal agricultural land to forestland, grasslands and wetlands. Emphasis was placed on high-priority species listed under the *North American Waterfowl Plan* and State and federally protected species, such as bald eagles, bog turtles, Delmarva fox squirrel, dwarf wedge mussel, glassy darter and harparella. Measurable objectives were established for these resource lands by establishing or enhancing—

- 35,000 acres of riparian forested habitat,
- 55,000 acres of grassland habitat and
- 10,000 acres of wetland habitat

Using successful conservation practices as tools for improving the land, the following targeted acreages for enrollment were identified:

- 70,000 acres to be enrolled in either CP21 (Filter Strips) or CP22 (Riparian Buffers);
- 5,000 acres to be enrolled in CP 23 (Wetland Restoration) and 5,000 acres in CP9 (Shallow Water Areas for Wildlife) to achieve nutrient and sediment reductions and wildlife habitat enhancement and to assist the Governor in achieving his goal of restoring 60,000 acres of wetlands in the State.
- 20,000 acres to be enrolled of Highly Erodible Land (HEL) with a weighted Erodibility Index (EI) of ≥8 and located within 1,000 feet of a waterbody.

The initial CREP was highly successful, enrolling more than 71 percent (71,208.5 acres) into the program and permanently protecting 4,398.25 acres in conservation easements. Of the 100,000 acres authorized for the program, landowners could place up to 25 percent, or 25,000 acres, under permanent conservation easements, particularly for lands that adjoined existing CREP lands.

Cost-share agreements were established with CCC paying half the reimbursable costs of installing eligible conservation practices and the State paying up to 87.5 percent of the remaining costs. Special incentive payments were approved for CREP land above the maximum soil rental rates applicable for CRP land. These incentives were provided to landowners in exchange for land that would be planted in riparian and grassy buffers, restored wetlands and stabilized HEL.

On February 29, 2004, the initial CREP agreement for Maryland expired and a new agreement was proposed through December 2007. As a Federal agency, the USDA must comply with the requirements of the National Environmental Policy Act of 1969 (NEPA), as amended, (42 U.S.C. 4321-4347), the Council on Environmental Quality regulations (40 CFR Parts 1500-1508), *1-EQ, Revision 1, Environmental Quality Programs*, dated November 19, 2004, and FSA's draft environmental regulations (**7** CFR Part 799.4, Subpart G), which mandate and guide the preparation of a programmatic environmental assessment (PEA). The purposes of the PEA are to provide policy decisionmakers with sufficient information on the MD CREP to make sound decisions, to consider alternatives to continuing the program, and to evaluate these alternatives to determine the benefits and effects of the program on the natural, cultural and social environment. In addition, FSA is to disclose any findings to other agencies and the public, and solicit input to help improve the program should it be continued in the future.

As part of the scoping process for this project, FSA announced plans to prepare a PEA in July 2004, and solicited open comments for approximately 2-3 weeks. Public announcements were placed in the *Delmarva Farmer,* the Maryland Farm Bureau *The Spotlight*, and the *Mid-Atlantic Farm Chronicle*. FSA mailed approximately 170 letters to Federal, State and local agencies, congressional representatives, universities, nonprofit organizations and interested individuals, requesting comments and input on the program. In response, approximately 14 written comments were received. A summary of scoping comments by issue and FSA responses are provided in **Chapter 1, Table 1-5**.

FSA and the State of Maryland propose to restore the health of the Chesapeake Bay ecosystem by improving agricultural land management practices throughout the State. Through a renewed Maryland CREP, FSA proposes to enroll up to 100,000 acres of eligible land into CREP contracts, which includes enrollments from the previous CREP. Up to 25 percent of that total, or 25,000 acres, may be placed under permanent easements by the Maryland DNR. The purpose of Maryland CREP is to reduce runoff and pollutants from agricultural lands into the Chesapeake Bay and to increase the viability of targeted fish, wildlife and plant populations throughout the Bay's watershed. The goals of the proposed CREP are to—

- reduce nutrient pollution from agricultural lands by approximately 5,750 tons of nitrogen and 550 tons of phosphorus annually;
- reduce sediment loading into streams by 200,000 tons annually; and
- increase targeted fish, wildlife and plant species in the Chesapeake Bay region by establishing or enhancing 93,000 acres of riparian habitat, 5,000 acres of wetland habitat and 2,000 acres of habitat for declining species.

The need for CREP is based upon a collaborative commitment by States within the Chesapeake Bay Watershed and Federal, State and local agencies to develop strategies to continue the reduction of nutrients, phosphorus and sedimentation into the Bay's tributaries. Conservation practices, prescribed by CREP, include planting riparian buffers, establishing shallow-water areas for wildlife, restoring and enhancing wetlands, and permanently vegetating highly erodible lands (HEL).

Alternatives evaluated in the Maryland CREP PEA are:

1. *No Action Alternative (Existing Program)*. This alternative provides a baseline for measuring change from the existing program and conditions. Under the No Action Alternative, existing programmatic conditions for CREP are evaluated. This program expired in February 2004 and no additional land can be enrolled until the public has had an opportunity to provide comments on the program and the PEA and FONSI have been approved.
2. *Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)*. This alternative would extend CREP in Maryland through December 2007 and would continue practices that are aimed at reducing agricultural runoff, sediments and nutrients from entering the Chesapeake Bay, and enhancing wildlife habitat for Maryland's declining species.

The proposed CREP would provide landowners with an opportunity to continue to voluntarily enroll marginal land into the program and install eligible conservation practices through a 10- 15-year contract with FSA. Permanent protection through conservation easements would continue to be available. In exchange, landowners would receive annual rental payments plus financial incentives for enrolling marginal cropland into the program and establishing and maintaining conservation practices that result in environmental benefits. With cost-share support from the MDA, landowners may also be reimbursed up to 87.5 percent for the cost of installing conservation practices, such as establishing riparian buffers, planting vegetative buffers and grass filter strips, or retiring HEL from cultivation.

Since the program's inception in 1997, a total of 5,191 CREP contracts, comprising 71,208.5 acres, have been issued, leaving a balance of 28,791.5 acres available for future enrollment. More than 4,398 acres have been permanently protected through CREP conservation easements. An estimated $5.7 million has been approved by the Board of Public Works to establish these easements.

The principal changes in the proposed program include a greater emphasis on establishing riparian buffers along waterways, increasing the erodibility index from ≥8 to ≥16 for HEL and establishing or enhancing habitat for declining species in the State. Eligibility requirements for enrolling land into the program are—

- Cropland that has been planted to an agricultural commodity for four of six years (1996-2001), hayland, and marginal pastureland adjacent to a perennial or intermittent stream, wetland or waterbody.
- HEL (EI ≥16) within 1,000 feet of a stream, wetland or water body, which is suitable for planting trees, shrubs and grasses
- Prior converted wetlands or areas capable of supporting wetland hydrology or creating shallow-water habitats
- Cropland that is suitable for habitat restoration to benefit declining species

In November 2004, FSA published the draft PEA and announced its availability in *The Delmarva Farmer* (November 30 and December 14, 2004) and in the *Mid-Atlantic Farm Chronicle* (November 29, 2004). Three comments were received from two agencies (U.S. Fish and Wildlife Service and the Maryland Department of Housing and Community Development, Maryland Historical Trust) and from one private citizen. These comments are summarized in **Appendix I.**

CHAPTER 1.0 PURPOSE OF AND NEED FOR ACTION

1.1 History and Background

1.1.1 Conservation Reserve Program (CRP)

The Conservation Reserve Program (CRP) was initially authorized by Congress in Title XII of the Food Security Act of 1985, as amended (16 U.S.C. 3830 *et seq*.), and was reauthorized by the Farm Security and Rural Investment Act (2002 Farm Bill) through the year 2007. Administered by the U.S. Department of Agriculture's Farm Service Agency (FSA) through the Commodity Credit Corporation (CCC), CRP is the largest and most comprehensive conservation program ever undertaken by the Federal Government. The program authorizes a maximum enrollment of 36.4 million acres nationwide.

The purpose of CRP is to assist landowners and farm operators in conserving land through implementation of conservation practices designed to minimize soil erosion, improve water quality and enhance wildlife habitat on eligible cropland. Eligible cropland includes cropland that is both of the following:

- Planted or considered planted to an agricultural commodity during four of the six crop years from 1996 through 2001, and
- Physically and legally capable of being planted in a normal manner to an agricultural commodity.

Today, CRP is a voluntary, agricultural conservation program that offers landowners an annual, per-acre rent, plus reimbursement for half the cost of establishing permanent land cover types, such as grasses or trees. In exchange, the landowner agrees to enroll environmentally sensitive cropland into the program for 10 to 15 years. Highly erodible and other environmentally sensitive land, once dedicated to cultivation, is converted to a long-term resource conservation cover, such as native grasses, trees and riparian buffers. These covers help stabilize soils and minimize erosion, reduce runoff into streams and improve water quality flowing into the Chesapeake Bay, provide important wildlife benefits and improve air quality.

To determine eligible land for conservation, a new Environmental Benefits Index (EBI) was developed to select areas and acreages offering the greatest environmental benefits. The EBI consists of the following factors:

- Wildlife habitat benefits
- Water quality benefits from reduced erosion, runoff and leacheate
- On-farm benefits of reduced erosion and long-term soils retention
- Air quality benefits from reduced wind erosion
- Location in a Conservation Priority Area, if applicable[1]
- Cost of enrollment per acre

[1] Conservation Priority Areas are regions targeted for enrollment, such as the Chesapeake Bay and other valuable designated areas. In addition, FSA may designate up to 10 percent of its remaining cropland in any given State as a Conservation Priority Area.

For certain high-priority conservation practices yielding highly desirable environmental benefits, producers may sign up for the program at any time without waiting for an announced sign-up period. Continuous sign-up offers farmers the flexibility to implement certain conservation practices on their cropland. These practices are designed to achieve significant environmental benefits, giving program participants a chance to help protect and enhance wildlife habitat, improve air quality and improve the condition of water resources. These conservation practices (CPs) include, but are not limited to, planting trees; establishing grass filter strips, riparian buffers, shelter belts, and grass waterways; and constructing shallow-water areas for wildlife.

Of the total acres enrolled in the CRP nationwide, 2.5 million have been planted to trees and 2 million acres have been converted to wildlife habitat and shallow-water areas. In addition, there are approximately 8,500 miles of CRP filter strips along waterbodies and 32.3 million acres planted in grass cover.[2]

1.1.2 Conservation Reserve Enhancement Program (CREP)

The Conservation Reserve Enhancement Program (CREP) sprung from CRP in 1997, as the CCC and FSA joined with States to meet specific conservation and environmental objectives. CREP is a results-oriented, community-based conservation partnership program between the FSA and States that aims to address specific State and nationally significant water quality, soil erosion and wildlife habitat issues related to agriculture. CREP differs from CRP in the following ways[3]:

- CREP is a joint undertaking between Federal government, States and local stakeholders;
- CREP focuses conservation practices on high priority environmental concerns;
- CREP requires States to establish measurable objectives and conduct monitoring; and
- CREP offers more flexibility regarding local legal constraints and environmental conditions.

CREP is administered by the FSA and funded through the CCC. The program provides incentives to landowners to develop conservation practices that protect environmentally sensitive land, decrease erosion, restore wildlife habitat and improve water resources. Farmers voluntarily enroll in 10- 15-year contracts with FSA and the State and agree to convert cropland to native vegetation and establish riparian buffer zones, plant trees and grasses, restore wetlands and enhance wildlife habitat.

1.1.3. Maryland Conservation Reserve Enhancement Program (CREP)

On October 20, 1997, USDA joined with the State of Maryland to expand and improve upon CRP by allowing up to 100,000 acres of environmentally sensitive land along Maryland's streams and rivers to be set aside and maintained with the goal of improving water quality and protecting the health of the Chesapeake Bay, while enhancing habitat for wildlife.

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[2] "History of The CRP,"http://www.fsa.usda.gov/dafp/cepd/12crplogo/history.htm
[3] Sutton, Adrienne, "Effectiveness of Maryland's CREP…" Horn Point Laboratory.

Through a Memorandum of Agreement (MOA) between CCC and the State of Maryland signed on October 17, 1997, Maryland became the first State to participate in a State Enhancement Program (SEP), which later evolved to become CREP. The MOA established that FSA, the MDA and MDNR would serve as lead Federal and State administering agencies for CREP in Maryland. The MOA focused on improving water quality by enrolling marginal agricultural land into the program and installing Best Management Practices (BMPs) in areas previously cultivated (refer to **Appendix A** for a listing of approved BMPs). BMPs are conservation practices that accomplish water quality goals while balancing the needs of crop and livestock production. The initial CREP MOA expired on February 29, 2004.

On June 1, 2000, Amendment No. 1 to the MOA was executed and focused on the following objectives—

- reduce nitrogen runoff from agricultural lands by 5,570 tons and phosphorous runoff by 550 tons annually
- reduce sediment loading into streams from agricultural lands by 200,000 tons annually and
- increase the survivability, distribution and abundance of targeted fish, wildlife and plant species in the Chesapeake Bay region by establishing or enhancing 35,000 acres of riparian forested habitat, 55,000 acres of grassland habitat and 10,000 acres of wetland habitat. Emphasis was given to high-priority species listed under the *North American Waterfowl Plan* and State and federally listed threatened or endangered species, such as bald eagles, bog turtles, dwarf wedge mussel, glassy darter and harparella.

CREP is based on a two-tier system to accomplish these improvements. First the landowner enters into a 10- 15-year contract agreement with FSA to enroll land into the program and install eligible conservation practices. For some land, permanent protection through CREP easements is available. MDNR, land trusts or Soil Conservation Districts (SCDs) acquire these easements from interested landowners and hold them in perpetuity. The Board of Public Works approves the MOA, easement program and county acreage values paid for the easements.

1.1.4. Chesapeake Bay Agreement

The Chesapeake Bay Agreement (CBA), initially signed in 1987, is an interagency and multi-state agreement for restoring the Chesapeake Bay's ecosystem. This unique partnership includes the Commonwealths of Virginia and Pennsylvania, the State of Maryland, the District of Columbia, the Chesapeake Bay Commission, and various Federal agencies that are led by USEPA.

In 1998, the Federal partners, including USDA, signed the *Chesapeake Ecosystem Unified Plan*, which targeted CREP funds to the Bay's watershed states in support of efforts to protect farmland and forests and reduce nutrient inputs to the Chesapeake Bay. In addition, NRCS agreed to work to integrate opportunities to benefit the Bay through existing Federal initiatives, such as USDA's Environmental Quality Incentives Program (EQIP) and the Wetlands Reserve Program (WRP).

In 2000, reauthorization of the CBA was implemented through the signing of *Chesapeake 2000* by the Federal and State partners. This agreement outlines goals to restore the health of the Bay's living resources and remove the Chesapeake and its tributaries from EPA's 303(d) list of impaired waters. To accomplish these goals, the following objectives were established:

- Restore, enhance and protect the finfish, shellfish and other living resources, their habitats and ecological relationships to sustain all fisheries and provide for a balance ecosystem;
- Preserve, protect and restore those habitats and natural areas that are vital to the survival and diversity of the living resources of the Bay and its rivers;
- Achieve and maintain the water quality necessary to support the aquatic living resources of the Bay and its tributaries and to protect human health;
- Develop, promote and achieve sound land use practices which protect and restore watershed resources and water quality, maintain reduced pollutant loadings for the Bay and its tributaries, and restore and preserve aquatic living resources; and
- Promote individual stewardship and assist individuals, community-based organizations, businesses, local governments and schools to undertake initiatives to achieve the goals and commitments of this agreement.

Chesapeake 2000 highlights voluntary goals for land preservation, riparian forest buffers and other resource protection strategies. The agreement calls for regional reductions in the conversion of forests and agricultural lands to development, and further calls for establishing new water quality goals. The CBA targets restoration of the Bay's living resources by 2010.

As part of *Chesapeake 2000*, agencies have agreed to continue their cooperative efforts to achieve and maintain the 40-percent nutrient reduction goal originally agreed to in 1987. *Chesapeake 2000* commits to, *"By 2010, correct the nutrient- and sediment-related problems in the Chesapeake Bay and its tidal tributaries to sufficiently remove the Bay and the tidal portions of its tributaries from the list of impaired waters under the Clean Water Act."* The Chesapeake Bay Watershed jurisdictions have developed restoration plans called Tributary Strategies that outline the actions they will take to meet this goal.

1.1.5. Maryland's Tributary Strategy

The Chesapeake Bay Watershed's annual nutrient loading goals are 175 million pounds of nitrogen and 12.8 million pounds of phosphorous. Maryland's portion is 37.25 million pounds for nitrogen and 2.92 million pounds for phosphorous. Achieving these goals will require more than a 50-percent reduction in harmful nutrient runoff levels from all sources. Through Maryland's Tributary Strategy, these goals are to be maintained in order to sustain improved water quality in the Bay.

The original nutrient reduction strategy only planned through the year 2000, and the restoration of the Bay had not been achieved. Consequently, Maryland, along with its partners, committed to develop a new Tributary Strategy to achieve the nutrient reduction goals established in *Chesapeake 2000*. This strategy includes basin-specific nutrient and

sediment control actions necessary to reduce nutrient pollution from every source, including agricultural fields, urban and suburban lands, and waste-water treatment plants. As part of Maryland's Tributary Strategy, the agricultural component includes a plan to work with Maryland's farm communities to implement a range of BMPs on farmland across the watershed that reduce nutrient and sediment loads. This new strategy has significantly expanded BMP options, including more than 23 different practices that work to protect the soil and natural resources (**Appendix A**).

The Maryland Tributary Strategy recognized the importance of agriculture as a major source of nutrients into the Chesapeake Bay and therefore concentrated on pollution reduction efforts from agriculture. In 2002, the Maryland Tributary Strategy showed that agriculture contributed 39 percent of the nitrogen and 43 percent of the phosphorus to the Bay in Maryland. Between 1985 and 2002, agricultural contributions were reduced by 31 percent for nitrogen and 41 percent for phosphorus. Full implementation of the Agricultural Strategy is expected to reduce nitrogen runoff by 64 percent and phosphorus runoff by about 58 percent from 1985 levels. The remaining reductions will come from wastewater treatment plants, industries, septic systems, and urban areas.

1.2 Proposed Federal Action

FSA, CCC and the State of Maryland, in cooperation with other Federal, State and local authorities seek to take actions to reduce the occurrence of runoff, sediment and nutrients into the Chesapeake Bay and promote enhanced wildlife habitat, particularly for the State's declining species. Through Maryland CREP, FSA would enroll up to 100,000 acres of eligible land into CREP contracts. Up to 25,000 acres, or 25 percent of that total CREP land, may be placed under permanent easements by the Maryland DNR.

Maryland CREP establishes voluntary contractual agreements between USDA and private landowners, who agree to plant specific types of native vegetation near streams and rivers in exchange for rental payments and other financial incentives. Under CREP, landowners would contract with USDA through their local FSA for 10 to 15 years, and, in exchange, receive annual rental payments, plus bonuses, for taking marginal land out of production and implementing eligible conservation practices in areas adjacent to waterways. USDA would pay for 50 percent of the reimbursable costs of establishing eligible conservation practices. Landowners are also provided the option of selling a permanent conservation easement on their land to the State, a Soil Conservation District or a land trust.

MDA's Water Quality Cost-Share Program (MACS) would provide landowners with 37.5 percent, which would reimburse landowners up to 87.5 percent to install BMPs on lands that they enroll in CREP. Reimbursable costs paid to the eligible landowners cannot exceed 100 percent of the owner's eligible out-of-pocket expenses. Incentive payments valued at 40 percent of the cost of installing certain practices are also offered. Vegetative and forested buffers along streams, stream protection measures and wetlands restoration improvements are conservation practices eligible for reimbursement in this program. New practices proposed include establishing habitat for Maryland's declining species, as well as wetland and habitat buffers on marginal pastureland.

Landowners may also voluntarily place a permanent conservation easement on their land and receive an additional bonus payment if they agree that certain conservation practices will be retained through perpetuity. The focus of these conservation practices is on establishing riparian forest buffers, grass filter strips and shallow-water areas for wildlife; restoring wetlands; and retiring highly erodible agricultural lands from cultivation. These practices conform to the programmatic goals set forth in the reauthorized CRP, *Chesapeake 2000* and *Maryland's Tributary Strategy.*

As the 1997 CREP agreement with the State of Maryland expired on February 29, 2004, FSA proposes to renew this agreement with the State. The proposed MOA is intended to further the programmatic administration of the CRP provisions of the Food Security Act of 1985, as amended, and CRP regulations at 7 CFR Part 1410. Enrollments under the proposed agreement would be authorized through December 31, 2007.

The MDA would be authorized to pay cost share and provide in-kind services under the Annotated Code of Maryland Agricultural Article 8-(701-705). MDNR would be authorized to implement the CREP easement program and provide in-kind services under Annotated Code of Maryland Agricultural Article 5-903(e)(2) and 5-1202(a).

1.2.1 Purpose of and Need for Action

Human impacts, such as development, stormwater runoff (agricultural, industrial and urban/suburban development) and stream channelization, have impaired the Chesapeake Bay Watershed through the drainage of excessive nutrients, phosphorus, and sediments into the Bay. Each year, excessive nutrient loading to the Chesapeake Bay has increased harmful algal blooms, caused extensive anoxia/hypoxia and depleted sea grass communities.

Congress has recognized the Chesapeake Bay as an area of special environmental sensitivity and declared the Bay a natural resource of national significance. This congressional recognition is primarily based on the fact that the Chesapeake Bay is home to more than 3,600 species of plants, fish and animals, and more than 300 species of migratory waterfowl, songbirds and birds of prey inhabit or visit the shallow coastal bays.

Prior to the end of the 19th century, oysters were so abundant in the Bay that some oyster reefs posed navigational hazards to boats. However, over time, human disturbance and over-usage, land conversion and agricultural practices, including increased use of agricultural wastes, fertilizers, pesticides and other chemicals, have altered the Bay's ecosystem. Fish, shellfish, marine mammals and aquatic vegetation have suffered and declined as a result of the adverse effects that these practices have had on oxygen and salinity levels, water temperatures, and habitat and food sources. Excessive runoff, sedimentation and nutrient loading into the Chesapeake Bay has led to—

- increased occurrence of harmful algal blooms,
- extensive anoxia/hypoxia, and
- loss of sea grass communities.

Maryland CREP was initiated in 1997 to meet the needs of improving the health and ecosystem of the Chesapeake Bay. The purpose of Maryland CREP is to help reduce nutrient pollution and sediment loading into the Chesapeake Bay's tributaries from agricultural lands and to increase the viability of targeted fish, wildlife and plant populations throughout the Bay's watershed. Nutrient reduction goals have been established by all States located within the Chesapeake Bay Watershed. The goals of Maryland CREP are to—

- reduce nutrient pollution from agricultural lands by approximately 5,750 tons of nitrogen and 550 tons of phosphorus annually;
- reduce sediment loading into streams by 200,000 tons annually; and
- increase targeted fish, wildlife and plant species in the Chesapeake Bay region by establishing or enhancing 93,000 acres of riparian habitat, 5,000 acres of wetland habitat and 2,000 acres of habitat for declining species.

The need for CREP is based upon a collaborative commitment by States within the Chesapeake Bay Watershed and Federal, State and local agencies to develop strategies to reduce nutrients, phosphorus and sedimentation into the Bay's tributaries. Conservation practices, prescribed by CREP, include planting riparian buffers, establishing shallow water areas for wildlife, restoring and enhancing wetlands and permanently vegetating highly erodible lands. The objectives of these practices are to reduce or minimize soil erosion; contain nutrients, phosphorus and sediments; increase riparian and wildlife habitat; provide greater recreational opportunities; and meet the State's commitment to *Chesapeake 2000*.

To reaffirm the State's commitment to restoring the health of the Bay, Governor Robert L. Erhlich, Jr. directed State agencies to meet the land preservation goals established in *Chesapeake 2000* and the prime agricultural land preservation goals set forth in Senate Joint Resolution 10 (SJ10), which established a State policy to protect Maryland's prime agricultural land. In December 2003, SJ10 was passed, demonstrating Maryland's commitment to restoring the Chesapeake Bay and its tributaries. This State land preservation policy focused conservation programs on the most strategic lands to protect.

Table 1-1 compares the land preservation goals established under the *Chesapeake Bay Agreement* (CBA), the MD CREP goals and the goals established for prime agricultural land under Maryland's major land conservation programs and SJ10.

Table 1-1: Comparison of Land Preservation Goals Established by *Chesapeake 2000*, Maryland CREP and Senate Joint Resolution 10

Chesapeake 2000	**Acres**
Permanently preserve 20% of the Bay Watershed by 2010	1,241,605
Applied to the total State land area (93.8% of the State is in the Bay watershed)	6,208,025
Total protected land as of July 2003 (19.13%)	1,187,849
Remaining Acreage Goal by 2010	**53,756**
Maryland CREP	**100,000**
Riparian buffers	93,000
Wetland restoration	5,000
Habitat for declining species	2,000
Acres in existing CREP contracts (as of 3/2004)	**71,208.5**
Acres permanently protected by CREP Easements (as of 7/7/2004)	**4,398.25**
Remaining Acreage Goal by 2007	**24,393.25**
Senate Joint Res. 10, 2002, Prime Agricultural Land	**Acres**
Protect three times more farmland than was protected in April 2002 by State land preservation programs[a] and Local Purchase of Transfer of Development Rights by 2022	1,303,000
Acres protected by MALPF, RLP, GP & counties as of FY 2003	393,552
Remaining Acreage Goal by 2022	**636,448**

[a] MALPF, Rural Legacy Program, GreenPrint

Source: *Maryland's Land Conservation Programs, Protecting the Chesapeake Bay Watershed,* Dec. 2003; Office of the Governor www.dnr.state.md.us/dnrnews/pressrelease2003.

1.2.2 Legislative Mandates and Compliance Requirements

The Maryland CREP PEA was prepared in accordance to the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321-4347), the Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), the FSA/CCC environmental regulations (**7** CFR Part 799), ***and FSA** 1-EQ (rev. 1), Environmental Quality Programs.* Other pertinent statutory requirements, include section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470); the Fish and Wildlife Coordination Act (48 Stat. 401), as amended; section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543), *section 307 of* ***the Coastal Zone Management Act,*** and the Maryland Wildlife, Threatened and Endangered Species Act (COMAR Title 08.03.08). ***The Migratory Bird Treaty Act (16 U.S.C. 703-711) and Executive Order 13186 are also applicable to this proposed action.***

The Food Security Act of 1985 (16 U.S.C. 3830 *et seq.*), as amended by the Federal Agriculture Improvement and Reform Act of 1996, authorizes the CCC to perform all activities related to the CRP in Maryland, as specified in the Agreement between CCC and the State of Maryland. The provisions of this Act are codified in 7 CFR Part 1410. CCC is authorized to enter into agreements with States and to use the CRP in a cost-effective manner to address specific conservation and environmental objectives of a State and the nation. Programmatic changes to the CRP in 2003 incorporated provisions from the 2002 Farm Bill into the CRP regulations.

The Maryland Water Pollution Control Law (Md. Code Ann. Env. §4-413(a)) prohibits soil or sediment pollution, except for agricultural activities conducted in accordance with agricultural soil conservation and water quality plans. Agricultural land managed under an approved soil conservation and water quality plan is not liable for emission of soil or sediment into waters of the State or placement of silt or sediment in areas where runoff could occur.

The Maryland Water Quality Improvement Act of 1998 (WQIA) requires that all agricultural operations in the State of Maryland with annual incomes greater than $2,500 or with more than eight animal units (one animal unit equals 1,000 pounds live weight) must implement a nitrogen and phosphorus-based nutrient management plan. This Act requires that anyone "who, in operating a farm, uses chemical fertilizer" must have a nitrogen and phosphorus-based plan by December 31, 2001, that must be implemented by December 31, 2002. WQIA also requires that persons using sludge or animal manure must have implemented nitrogen-based plans by the same dates as those using commercial fertilizers. Those using sludge or animal manure must prepare a nitrogen and phosphorus-based nutrient management plan that must be implemented by July 1, 2005.

Appendix B, Table B-1, summarizes applicable Federal requirements related to implementing CREP. ***Pursuant to the requirements of the National Environmental Policy Act of 1969, the Council on Environmental Quality regulations (40 CFR Parts 1500-1508) and the USDA draft environmental regulations, the Maryland CREP must comply with the Fish and Wildlife Coordination Act; section7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543; section 106 of the National Historic Preservation Act of 1966, as amended; and section 307 of the Federal Coastal Zone Management Act of 1972.***

Section 307 of the Federal Coastal Zone Management Act of 1972, as amended, requires that proposed Federal activities be consistent, to the maximum extent practicable, with the State's federally approved Coastal Zone Management Program (CZMP). The Maryland Department of the Environment (MDE) determined that the Maryland CREP is consistent with the State's CZMP, as required by section 307 (refer to Appendix I).

1.2.3 Other Partnerships and Conservation Programs

The success of MD CREP is due to the partnerships among Federal, State, and local agencies and private organizations. Partners are actively promoting CREP and have field staff assisting with planning and implementing CREP practices. Local land trusts are also important in the development and execution of the State's easement component of CREP. Cooperating partners involved in Maryland's CREP in Maryland include:

- Maryland Department of Agriculture
- Maryland Department of Natural Resources
- Maryland Soil Conservation Districts
- University of Maryland
- USDA-Farm Service Agency
- USDA-Natural Resources Conservation Service

- U.S. Environmental Protection Agency-Chesapeake Bay Program
- Ducks Unlimited and Quail Unlimited
- Chesapeake Bay Foundation
- U.S. Fish & Wildlife Service
- Future Harvest, Chesapeake Alliance for Sustainable Agriculture (CASA)
- The Nature Conservancy

Land trusts and county soil conservation districts have partnered with MDNR to promote CREP easements and to jointly hold easements. The following is a listing of a few of these land conservation groups—

- Somerset Soil Conservation District
- Washington Soil Conservation District
- Maryland Environmental Trust
- Chesapeake Wildlife Heritage
- The Potomac Conservancy
- Lower Shore Land Trust
- Eastern Shore Land Conservancy
- The Conservancy of Charles County
- The Conservation Fund
- Trust for Public Lands
- Maryland Agricultural Land Preservation Foundation

Table 1-2 lists other Federal agricultural conservation programs and their respective agency sponsors, and **Table 1-3** identifies Maryland conservation programs.

Table 1-2: Federal Agricultural Conservation Programs in Maryland

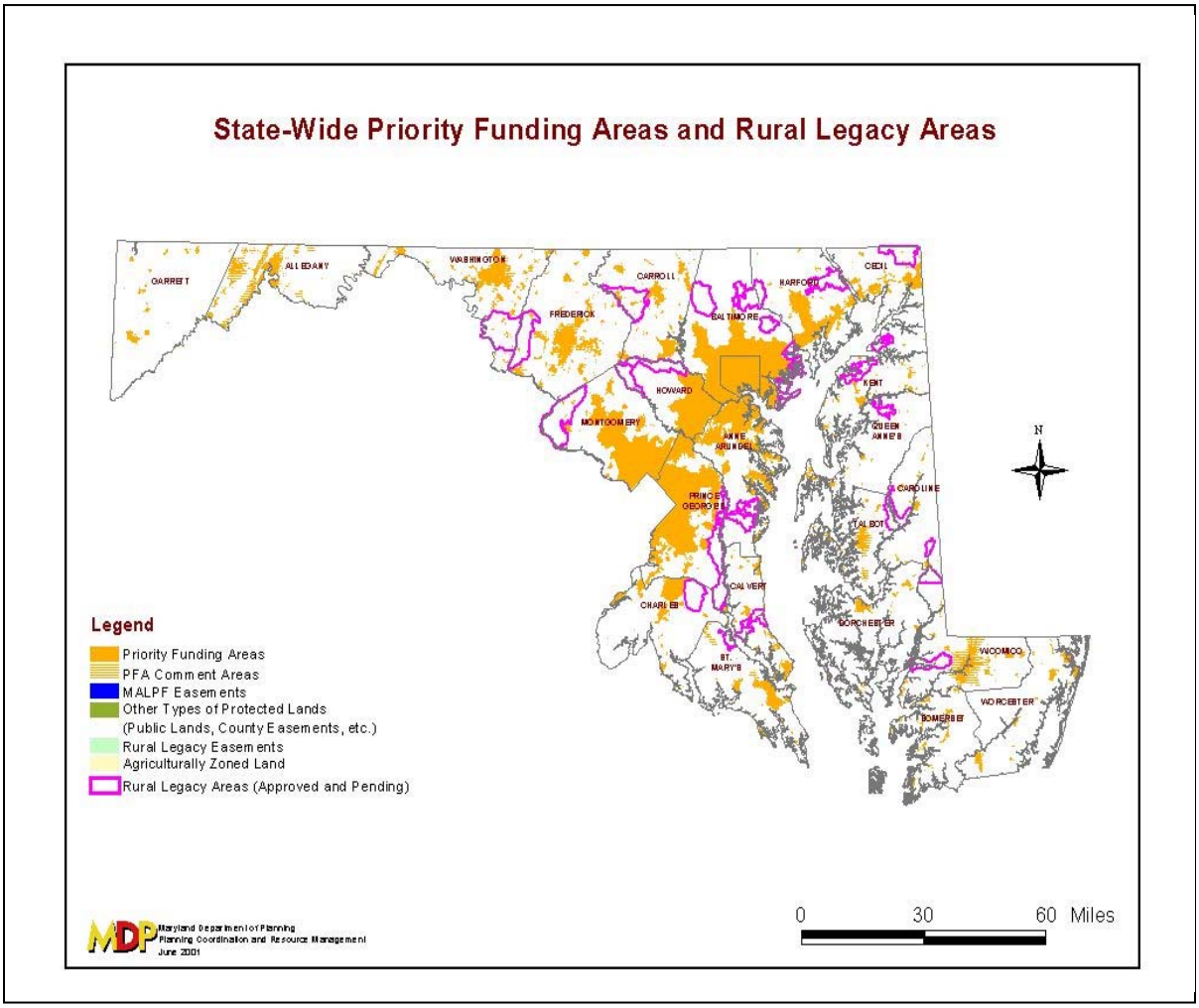
Federal Agricultural Conservation Program	Agency Sponsor
Environmental Quality Incentives Program (EQIP)	USDA-NRCS
Wildlife Habitat Incentive Program (WHIP)	USDA-NRCS
Wetlands Reserve Program (WRP)	USDA-NRCS
Emergency Conservation Program (ECP)	USDA-FSA
Emergency Wetlands Reserve Program (EWRP)	USDA-NRCS
Emergency Watershed Protection Program (EWPP)	USDA-NRCS
Farmland Protection Program (FPP)	USDA-NRCS
Tree Assistance Program (TAP)	USDA-FSA
Pasture Recovery Program (PRP)	USDA-FSA
Grassland Reserve Program (GRP)	USDA- FSA
Forestry Incentive Program (FIP)	USDA-Forest Service
Stewardship Incentive Program (SIP)	USDA-Forest Service

Source: *Emergency Conservation Program, Final Programmatic Environmental Impact Statement*, USDA-FSA, pp. 3-29 to 3-31.

Several programs throughout the Chesapeake Bay Watershed have been initiated to focus on restoring the health of the Bay, including the U.S. Environmental Protection Agency-Chesapeake Bay Program. The Bay Program is a unique collaborative partnership involving Federal and State agencies, academic institutions, scientific research institutions and nonprofit organizations (refer to **Appendix C** for a listing of the Chesapeake Bay Program partners.)

Maryland is prominent in the field of farmland preservation, as more than 360,000 acres of farmland and open space are protected through voluntary easement programs, Purchase of Development Rights (PDRs) and Transferable Development Rights (TDRs). MALPF and Rural Legacy are State PDR programs. **Figure 1-1** illustrates the priority funding areas and Rural Legacy Areas in Maryland. **Table 1-3** summarizes the purposes of Maryland's prominent land conservation programs, including agricultural and woodland programs.

Figure 1-1: Statewide Priority Funding Areas and Rural Legacy Areas



Source: Maryland Department of Planning, http://www.dnr.state.md.us/education/growfromhere/LESSON2/LESSON2_4.HTM

Table 1-3: State of Maryland Land Conservation Programs

State Program	Purpose
Program Open Space (POS)	MDNR grants funding for county parkland acquisition and development projects, while Bay Access and Waterway Improvement grants help provide public access to the Chesapeake Bay and its tributaries.
Rural Legacy Program (RLP)	RLP protects natural areas, agricultural lands, forests and environmental resources by curtailing sprawl, and encourages local governments and private land trusts to identify Rural Legacy Areas (RLAs). Local governments and land trusts are encouraged to develop innovative strategies to protect rural land, to identify areas for concentrated preservation efforts and to apply for funds to implement land protection strategies.
Maryland GreenPrint Program	Conserves the State's significant natural resources and sustains resource-based industries through conservation easements of riparian buffers and wetlands, use of BMPs and conservation of agricultural, woodland and other natural resources.
Maryland Environmental Trust (MET)	Established to "conserve, improve, stimulate and perpetuate the aesthetic, natural, health and welfare, scenic and cultural qualities of the environment…"
Maryland Agricultural Land Preservation Foundation (MALPF)	Preserves farmland and woodland for production of food and fiber; curbs the expansion of random urban development, protects wildlife habitat and enhances the environmental qualities of the Chesapeake Bay and its tributaries. Focuses on preserving farms with high quality soils and forested lands.
Maryland Agricultural Water Quality Cost Share Program (MACS)	Provides cost share payments to farmers who install BMPs that improve water quality, soil erosion and nutrient movement.
Chesapeake Bay Critical Area Program (Md. Code Ann. Nat. Res. §8-1808(c)(6))	Establishes buffers along shorelines within 1,000 feet of tidal waters or wetlands, allowing for agriculture to occur provided that BMPs are implemented in these areas.
Maryland Natural Heritage Program	Identifies significant natural areas and establishes priorities to protect these resources.
Maryland Waterfowl Restoration Program	Improves wetland habitat to meet the biological needs of wetland-dependent species and provides technical assistance to landowners for developing and managing habitats for breeding, migrating and wintering waterfowl.
Forest Legacy Program	Identifies and protects environmentally important private forest lands through the use of perpetual conservation easements.
Forest Stewardship Program	Provides financial assistance for landowners with ≥5 acres of land and who voluntarily seek to manage the property by enhancing wildlife, fisheries, streams, wood production, recreation, water quality, soil protection or aesthetic enjoyment.

State Program	Purpose
Maryland Tree Farm Program	Landowners with ≥10 acres used for tree farming are required to develop a management plan for increased wood production, wildlife habitat, watershed protection, recreation and aesthetic benefits.
Maryland Woodland Incentives Program (WIP)	Provides up to 50 percent cost-share payments to private, nonindustrial woodland owners for management of woodlands, including forested wetlands. WIP goals include enhancing environmental, aesthetic and wildlife benefits provided by private woodlands.

Source: *Maryland's Land Conservation Programs, Protecting the Chesapeake Bay Watershed*, December 2003.

Table 1-4 summarizes the goals and accomplishments of Maryland's land conservation programs.

Table 1-4: Summary of Maryland Land Conservation Goals and Accomplishments, 2003

Goal	Statewide Goals		Program Goals		
	Chesapeake 2000	**Prime Agricultural Land [a]**	**POS[b]**	**RLP[c]**	**CREP (permanent easements)**
Acres to protect	1,241,605	1,030,000	n/a	200,000	25,000
Target year	2010	2022	n/a	2012	2007
Acres protected[d]	1,187,849	393,552	250,716	40,129	4,398.25
% of State	19.13%	6.34%	4.04%	0.65%	0.06%
Additional acres needed for goal	53,756	636,448	n/a	159,871	20,601.75
Years remaining after FY 03	7	19	n/a	9	4
Annual acres needed[e]	7,680	33,497	14,618	17,763	7,042[f]

[a] Senate Joint Resolution 10, Governor Ehrlich's Land Preservation Policy, 2003
[b]Program Open Space.
[c]Rural Legacy Program.
[c]As of the end of FY 2003, except for CREP acreages, which were as of 7/7/2004.
[e]POS annual goal based on annual amount of land developed in past 5 years (MDP).
[f] Calculated using annual assumption of 2004-2007.
Source: *Maryland's Land Conservation Programs, Protecting the Chesapeake Bay Watershed*, Dec. 2003.

1.3 Scoping

To comply with the requirements set forth in §1501.7 of CEQ's regulations involving scoping and to provide agencies and the public with an early opportunity to comment on the program, FSA announced plans to prepare a PEA on the Maryland CREP in the *Delmarva Farmer*, the Maryland Farm Bureau *The Spotlight*, and the *Mid-Atlantic Farm Chronicle*. These announcements were published in July 2004. The comment period extended for approximately 3 weeks.

On July 14, 2004, FSA mailed approximately 170 letters to Federal, State and local agencies, congressional representatives, universities, nonprofit organizations and interested individuals requesting comments and input to the Maryland CREP PEA. The

FSA scoping letter, prepared in July 2004, identified the CREP area, its goals and alternatives under consideration, and outlined the provisions of the program. In response to these announcements, 14 written comments were received. A summary of comments by issue and FSA responses is provided in **Table 1-5**.

1.3.1 Summary of Issues Identified During Scoping

Of the 14 comments submitted during the scoping period, 12 commenters fully supported the program and its proposed modifications. **Table 1-5** summarizes the issues identified during the scoping process and summarizes responses to these comments.

Table 1-5: Maryland CREP Scoping Comments and Responses, 2004

Scoping Issue	Comment	FSA Response
Issue Regarding CREP Acreage Goal	*Clarify CREP acreage: 100,000 acres total in program or additional 100,000 acres.*	A total of 100,000 acres are authorized for Maryland CREP.
	Goal to enroll 100,000 acres in CREP is too high. Producers who grow hay, vegetables, grain, etc. are losing their land to a government program that pays too much to landowners.	The goal of Maryland CREP is to protect a total of 100,000 acres of environmentally sensitive agricultural lands statewide. This goal was established in conjunction with the needs to reduce agricultural runoff, including nutrients, phosphates and sediments, from entering surface waters flowing into the Chesapeake Bay. The MD CREP acreage goal was established by using satellite imagery and aerial photography. Potential acres by practice by county, as well as allocations for each county as a portion of the 100,000-acre goal were delineated.

Scoping Issue	Comment	FSA Response
Programmatic Issues Related to Organization and Function	*Tenant farmers are in direct competition with FSA for farmland. Tenant farmers under sharecrop and cash rent agreements are forced off the land without compensation. Referred specifically to FSA review of Critchlow-Akridge Farm as an example.*	FSA's guidance (*Handbook 2-CRP, rev. 4*) addresses tenant concerns and provides them with an opportunity to participate in the process and not allow landlords to disrupt tenants when land is enrolled in the program. Landlords who violate these provisions shall be ineligible to earn CRP payments. The FSA regulations also allow for tenants participating in CRP to maintain tenancy throughout CRP-1, but may be removed for cause by the COC. After approval of CRP-1, the tenant may be removed when there is cause, as determined by COC, after State Office consultation, requests in writing are sub-mitted, tenant dies, or tenant files for bankruptcy and fails to affirm CRP-1. If a landlord legally removes a tenant from the farm, COC shall determine whether the tenant may be removed from CRP-1. The landlord must revise CRP-1 and continue CRP-1 as owner and receive all payment and acquire a new tenant who may become a successor in interest to CRP-1. The former tenant has the right to appeal (*Handbook 2-CRP*, §86, p.5-9). In March 2003, FSA reviewed the Critchlow-Akridge farm contracts and concluded that all eligibility requirements had been met. As part of this review, NRCS, USFWS and Ducks Unlimited were consulted. The review concluded that the CREP contracts on this property met the eligibility requirements.

Scoping Issue	Comment	FSA Response
	Landowners remove farmers from the desired acres needed for enrollment and keep the monetary benefits for themselves, leaving farmers with no benefits.	In 2002, the Maryland State Executive Director reiterated USDA policy that County Executive Directors "are to ensure that all producers, landlords and tenants are fully informed at the time of CRP/CREP sign-up and that landlords violating the provisions will be ineligible to earn CRP/CREP payments." COC's are responsible for determining whether landlord tenant provisions have been violated. This determination shall be made by reviewing the documentation submitted with the contract and researching the tenant history on the farm. The COC shall not approve the CRP contract until the landlord and tenant have resolved the dispute. As of February 6, 2002, all CRP participants, landlord/ tenants, shall sign a copy of the CRP-1 appendix, indicating that they fully understand the agency's Landlord/Tenant Provisions found in *Handbook 2-CRP, rev. 4*, §86, p.5-9). The tenant may sign a statement voluntarily relinquishing his/her interest in the farm or CRP benefits allowing the landlord to offer land for CRP that has a history of a tenant if COC determines that the landlord has the necessary means to conduct the farm operation.

Scoping Issue	Comment	FSA Response
	Lack of a targeted, coordinated and unified approach among agencies (SCD, MDNR, Forest Service).	SCDs and MDNR are partners in Maryland CREP. NRCS and the U.S. Forest Service are active in Maryland CREP through the Chesapeake Bay Program, and the Forest Service assists through watershed events in forested watershed. The landowner, NRCS and a State forester, work together to develop the conservation plan, which must be accepted before a CREP contract is approved.
	Maryland Department of Agriculture should be active leader in CREP.	MDA is a principal partner in Maryland CREP and serves as co-chair of the CREP Advisory Committee. MDA participates in a cost share program and currently pays up to 87.5% for their share of the cost of CREP agreements.
	Questioned if all publicly owned lands that are applicable for CREP are participating in the program.	CREP is a voluntary conservation program that targets privately owned land, not publicly owned lands.
	Baltimore County buffer regulations restrict harvesting in riparian areas.	In the region including Baltimore County, CREP limits enrollment of land using riparian buffer practices with 100-300 foot widths for wildlife habitat or for water quality benefits derived from floodplains, HEL to 5,000 acres in the region. Up to 1,500 acres of CREP land that is enhanced habitat for declining species may be enrolled in Baltimore County.
	The shared amount should be set by the USDA and not determined through landowner and farmer negotiation.	Based on FSA's guidelines (*Handbook 2-CRP, rev.4)*, participants determine shares and the COC approves these shares. Payment shares do not need to be commensurate with other CRP annual rental payments.

Scoping Issue	Comment	FSA Response
	Program places greater emphasis and weights incentives to enrollment of the most sensitive lands.	The goal of MD CREP is to protect a total of 100,000 acres of environmentally sensitive agricultural lands statewide to reduce runoff, sediments and nutrients into the Chesapeake Bay and to enhance wildlife habitat for declining species in Maryland. Targeted land is often marginal pastureland or cropland.
	Ensure there is Eastern Shore representation on the CREP technical committees.	The Eastern Shore is represented on CREP technical committees.
	Consideration should be made to accept Christmas tree farms into CREP.	Christmas trees are not eligible crops under CREP's eligibility criteria and planting and harvesting these trees are not eligible CREP practices.
	Opportunities should be developed to permit the owner of an approved Christmas tree farm to apply for a conservation easement and manage the farm's operation continuously in such a fashion to permanently establish such an easement into perpetuity.	Christmas trees are not eligible crops under CREP, nor is planting Christmas trees for commercial purposes an eligible CREP conservation practice.
	Incentives should be considered (planting cost reimbursement, etc.) for farms willing to participate in a formal CREP.	Incentives are provided to landowners who enroll eligible land in a CREP contract or purchase a conservation easement.
	How is FSA going to ensure that it is meeting the needs for site treatment? Are TSPs required to consult with specialists?	FSA and NRCS personnel are available at no charge to the farmer to inspect the site and recommend practices that best meet the conservation needs of the site. Based on FSA *Handbook 2-CRP*, the TSP will complete a status review with the participant and a COC representative for each CRP-1 before the end of each fiscal year until all practices in the plan are applied and the approved cover is established.

Scoping Issue	Comment	FSA Response
	Proposed CREP addresses concerns about the retirement of productive cropland, especially on Maryland's Eastern Shore. Incentive payments target 100-foot riparian buffers, wetlands and highly erodible lands, which will reduce the competitive disadvantage faced by tenant farmers while protecting sensitive lands.	CREP does not compete with land costs offered by developers. CREP participants receive 50% of reimbursable costs of establishing eligible conservation practices. Landowners are paid 87.5% of reimbursable costs for installing eligible BMPs on CREP land.
	Essential that a critical mass of farmland be maintained in the State. Supports targeting payments to most sensitive resource areas and limitation on the eligibility of expanded buffers.	CREP does target the most environmentally sensitive areas such as riparian areas, floodplains and wetlands, and areas of HEL. A University of Maryland agricultural economist who has studied CREP states that there is no sign that enough acreage has been put in conservation to raise farm rental rates anywhere in the State. Nor, the economist states, is CREP threatening farming's "critical mass."[1]
	Federal and State governments place emphasis on reduction of nutrient pollution from agriculture lands and reduction of sediment loading into streams from agricultural lands, but they do not want to offer cost share assistance on the cleaning out of existing sediment ponds. Suggested adding a practice for pond restoration. Restoring the role these ponds have played would greatly reduce farm runoff, eliminate the need for spraying invasive species, compared with CP23, increase wildlife habitat and help meet FSA environmental objectives.	Although cleaning out sediment ponds is currently not an eligible conservation practice, this comment has been noted and will be considered in the future.

Scoping Issue	Comment	FSA Response
	Complex NRCS process.	Great benefits have been seen with the partnership between NRCS and FSA. The key for agricultural conservation programs to work will continue to be farmer contact. NRCS, SCD and FSA personnel are available without charge to assist landowners with the CREP process.
	CREP is not beneficial to farmers. Rates too high, tweaking enrollment criteria by NRCS to enroll more acreage, making personal visits to landowners to sway land away from farmers, and not holding landowners to the terms of the contract.	Based on comments received at the 2002 National CREP Forum, three main reasons landowners fail to enroll in CREP are: 1) resistance to change, 2) resistance of tenants who do not want farmable land taken out of production, and 3) concern among producers nearing the end of their career that placing land in easements will reduce their options in the future. Landowners enrolled in CREP are paid an annual soil rental rate plus an annual bonus, as a percent of the soil rental rate. Participants can choose to plant a streamside forest (100% bonus) or wetland (80%). Payments are made annually for the life of the contract (10-15 years). The annual rental payments for 15 years on 10 acres of streamside forest with an easement is approximately $1,105, bonus at sign-up for easement is $19,080, totaling $35,655 over 15 years. Used in conjunction with nutrient management and sediment and erosion control practices, streamside forests can benefit farmers by— ▪ Providing a dependable income to the farmer

Scoping Issue	Comment	FSA Response
		▪ Removing nutrients and sediments from shallow groundwater and surface water ▪ Reducing pesticides and herbicides into streams ▪ Providing important habitat for wildlife ▪ Supporting recreational hunting and fishing opportunities
Public Involvement and Program Process	*Little public involvement other than through newsletters.*	Announcement of the MD CREP programmatic EA occurred in three major farm publications and invited public comments for 3 weeks. Although no public meetings were conducted, the FSA contact person and telephone number, address and email were posted. National and State CREP Forums are conducted in which the public can attend and participate.
	Some of the most productive but least erodible cropland is accepted into CREP. There should be more farmer involvement before any existing cropland is removed from production.	CREP involves collaboration between the farmer and landowner. With the enactment of the Farm Bill, buffer widths were reduced reflecting a minimum width of 35 feet and a maximum width of up to 300 feet. Exceptions to these buffer widths are for areas on the Eastern Shore where buffers widths are proposed to range from 100-150 feet for HEL or for wildlife benefits, and for areas west of the Chesapeake Bay, where buffers may be a minimum width of 35 feet and maximum of 300 feet where additional water quality or wildlife benefits can be achieved. In response to farmers' concerns, the erodibility index for HEL was also increased from ≥8 to ≥16.

Scoping Issue	Comment	FSA Response
	Resistance of landowners to participate in government programs that require standards and inspections.	Monitoring and research are essential for accountability to Congress. During the National CREP Forum, States were advised to set specific, quantifiable goals and to develop an adaptive management approach that includes multiple levels of monitoring addressing habitat and site-specific needs, landscape level needs and regional monitoring.
Economic Impact Issues	*Uncomfortable with being the third poorest participant in CREP in Maryland.*	Suggest commenter consult with FSA, NRCS or SCD representative.
	Concern was expressed over setting the goal of enrolling 100,000 acres into CREP before the economic impact of losing that farmland was assessed.	Through various studies, including a study from the University of Maryland, economic analyses have been assessed on CREP. Local economic studies, particularly in high CREP counties, should be conducted. The general economic effects of CREP are addressed in Chapter 4.
	Agricultural support industries suffer loss of business and may be forced to close. CREP goal of 100,000 acres should not have been set without a cost-benefit analysis.	The direct effect on Maryland's agricultural support industries has not been directly assessed since CREP was initiated in 1997. An economic analysis of Maryland CREP has been recommended.
	CREP has adversely impacted farmers' slim profit margin.	CREP provides financial incentives to landowners for implementing eligible conservation practices in protecting environmentally sensitive areas. New CREP incentives are flat rates based on practice and buffer width. In some cases, CREP payments for landowners' less productive soils have kept some Eastern Shore farms from completely going out of production.

Scoping Issue	Comment	FSA Response
	CREP has adversely impacted farmers' slim profit margin.	CREP provides financial incentives to landowners for implementing eligible conservation practices in protecting environmentally sensitive areas. New CREP incentives are flat rates based on practice and buffer width. In some cases, CREP payments for landowners' less productive soils have kept some Eastern Shore farms from completely going out of production.
	Landowner often receives a higher income under CREP than from the average returns produced from grain farming. Farmer is left with less farmable land and less income. CREP should include the farmer as an income partner in any payments when farmland is idle.	CREP follows CRP's Landlord and Tenant Provisions found in *Handbook 2-CRP, rev. 4*. These provisions require landlords to provide tenants with an opportunity to participate in the program and provide tenants with an interest in the CRP-1 acreage.
CREP Crop Issues	*Creates shading of crops.*	Planting of trees creates shade, but there are other conservation practices available that do not produce shading should that become an adverse effect. Although ideally trees should be planted, the farmer needs to plant what is best suited and adaptable to the site. Suggest working with NRCS and SCD personnel to determine best conservation practices.
Invasive Species Concerns	*Landowners disregard noxious weed control on CREP land; adjacent tillable land is also affected by the reintroduction of weeds. Suggest monthly monitoring with greater monetary penalties.*	All CREP contracts stipulate that noxious weeds and other undesirable plants, insects and pests must be controlled to avoid adverse impacts on surrounding land. Every CREP conservation plan includes required maintenance for weeds, insects and other pests (*Handbook 2-CRP,* rev. 4, par. 236).

Scoping Issue	Comment	FSA Response
	Weed control cost share should cover one pre-application, one application during planting and up to two post applications, which should be good for the life of the CREP contract.	Weed control measures are eligible for cost-share payments for practice establishment as provided in FSA *Handbook 2-CRP*, rev. 4). Cost-share payments cover 50 percent for the management practices after planting; cost-share may be authorized for one post-planting weed control application if applied within the first year after planting the cover.
	Weeds do not often appear until land is taken out of production. Approval of spot treatment for control of invasive or noxious weeds during the primary nesting season should be given to the local CD and CED.	Consultation with NRCS, USFWS and MDNR should be conducted prior to spraying during nesting season. Such spraying requires FSA County Committee approval and inclusion in the conservation plan.
	CP9 allows for managing water levels to control invasive species, such as phragmites and cattails.	CP9 requires that noxious weeds and other undesirable plants, insects and pests shall be controlled, including such maintenance as necessary to avoid an adverse impact on adjacent lands.
	Annual spraying is critical to control these invasive plant species though spraying seems to go against CREP with respect to wetland enhancement and wildlife values.	Consultation with NRCS and USFWS should be conducted prior to chemical spraying. Any use of chemicals must be federally, State and locally registered and applied strictly according to authorized registered uses.
	Insect populations, such as ticks, mites, grasshoppers, invade producing fields.	In addition to spraying, mowing helps control these pests.
	Some landowners do not control noxious weeds or have the skill to maintain the enrolled acreage.	Management measures must be in place to control invasive species and noxious weeds. CREP conservation practices include: “noxious weeds and other undesirable plants, insects and pests shall be controlled, including such maintenance as necessary to avoid an adverse impact on surrounding lands.”

Scoping Issue	Comment	FSA Response
Wildlife and Habitat Issues	*Wildlife populations that are out of control are becoming a burden to adjacent crop farmers.*	Reports have been received stating that CREP has helped keep deer off farmable land. The MDNR has prepared a deer management plan, if this is the wildlife problem.
	Crop damage by wildlife intensifies on remaining farmland as acres are taken from production and converted to habitat. Such crop damage is estimated at 10 percent of farmer's crop.	Refer commenter to MDNR for deer management plan.
	CREP creates increased deer "edge" habitat.	Reports have been received stating that CREP has helped keep deer off farmable land.
Water Quality Issues	*Water quality is a concern to all people. Farmers who use land in Maryland have made huge contributions to cleaner water by use of BMPs and nutrient management.*	A key objective of MD CREP is to improve water quality, particularly in waters flowing into the Chesapeake Bay. Use of BMPs and CPs, such as establishing riparian and grassy buffers, has significantly improved water quality.
	Solution to other sources of pollution, such as sewage water discharge, surface water runoff from roads, homeowners, golf courses and construction should be considered.	EPA, MDE, and local governments are addressing point source and non-point source pollution.
	Establishing a balance between preserving the long-term viability of agriculture and protecting water quality, soils and related natural resources.	CREP improves agricultural practices by reduction of nutrients and sediment loads into the Chesapeake Bay. Nutrients can be reduced by establishing grassy filter strips and riparian buffers adjacent to water bodies.
Issues Related to Specific CREP Conservation Practices	*CP23 is retiring productive farmland for very little conservation benefit especially on Eastern Shore.*	CP23 restores wetland functions and values that have been in agricultural use. The level of restoration shall be determined by the producer in consultation with NRCS.

Scoping Issue	Comment	FSA Response
	More acreage should be allowed into CP9 than in CP23.	Up to 5,000 acres to achieve water quality benefits and wildlife habitat enhancement are allowed using CP9 and CP 23. The proposed MD CREP limits acreage in CP9 (shallow water areas) to 50 acres per tract, with each tract limited to two CRP contracts, and these tracts must be designed to provide water quality benefits. Buffers around these areas shall average 35-100 feet wide.

[1]Tom Horton, *Baltimore Sun, June 7, 2002.*

Source: Maryland CREP Scoping Letters, July 2004, and FSA data.

CHAPTER 2.0 ALTERNATIVES ANALYSES

Chapter 2.0 describes the range of alternatives initially considered, provides reasons for dismissing any alternative because it was not determined feasible and more fully evaluates those alternatives that were considered reasonable.

2.1 Preliminary Alternatives Initially Considered

Three alternatives were initially considered for evaluation in renewing CREP in Maryland. These preliminary alternatives were:

1. *No Action Alternative (Existing Program)*. This alternative provides a baseline for measuring change from the existing program and conditions. Under the No Action Alternative, existing programmatic conditions for CREP are evaluated. Recognition is given to the expiration of this program in February 2004 and the fact that no additional land can be enrolled until completion and approval of the PEA has occurred and the public has had an opportunity to provide comments on the program. This alternative was considered reasonable and its existing programs and conditions will be evaluated more fully in the following section.
2. *Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)*. This alternative would extend CREP in Maryland to continue efforts to reduce agricultural runoff, sediment and nutrients from entering the Chesapeake Bay and to enhance wildlife habitat for declining species. This alternative was considered reasonable because it meets the goals established in *Chesapeake 2000*, Maryland's Tributary Strategy and the Food Security Act of 1985, as amended, and will be evaluated more fully in the following section.
3. *Shifting Acreage from Various Conservation Practices*—Consideration was initially given to shifting acreages from various other agricultural programs into conservation easements. This alternative was considered infeasible because administration of many of these programs were not under the authority of FSA, because this alternative did not contribute to meeting the goals of *Chesapeake 2000* or Maryland's Tributary Strategy and because the longevity of other programs could not be reasonably predicted. Therefore, no further evaluation of this alternative will be conducted.

2.2 Alternatives Analyses

2.2.1 Alternative 1-No Action (Existing Program)

Alternative 1 addresses the current MD CREP, which was established through a Memorandum of Agreement (MOA) between USDA-CCC and the State of Maryland in October 1997. MD CREP emerged from the success of CRP's initial State Enhancement Program (SEP), which was established for the State of Maryland. A Federal-State partnership was forged to link resources and share costs to meet conservation and environmental objectives toward improving the water quality of the Chesapeake Bay. USDA, MDA and MDNR, in cooperation with other Federal, State and local agencies, seek to reduce runoff, sediments and nutrients into the Chesapeake Bay and enhance

habitat for Maryland's declining species by enrolling up to a maximum of 100,000 acres of cropland into CREP.

As of March 10, 2004, 5,191 CREP contracts, comprising 71,208.5 acres, had been enrolled into the program. The existing MD CREP program expired on December 31, 2002, and was extended to February 29, 2004.

Program Objectives

The existing MD CREP program focused on the following objectives:

1. Reduction of nutrient pollution from agricultural lands by approximately 5,750 tons of nitrogen and 550 tons of phosphorous annually;
2. Reduction of sediment loading into streams from agricultural lands by approximately 200,000 tons of sediment annually; and
3. Increase the survivability, distribution and abundance of targeted fish, wildlife and plant species in the Chesapeake region by establishing or enhancing 35,000 acres of riparian forested habitat, 55,000 acres of grassland habitat and 10,000 acres of wetland habitat. Emphasis is placed on high-priority species listed under the *North American Waterfowl Plan* and State and federally protected species.

Acreage and Targeted Land for Enrollment

Under this alternative, targeted acreages are—

1) 70,000 acres for riparian buffers;
2) 5,000 acres for restoration of wetlands;
3) 5,000 acres for shallow water areas for wildlife; and
4) 20,000 acres for HEL with a weighted average EI ≥8 and located within 1,000 feet of a stream or waterbody

Cost-Share and Incentive Payments

CCC pays for 50 percent of the reimbursable costs of establishing eligible conservation practices and MDA pays for the remaining reimbursable costs up to 87.5 percent for eligible conservation practices. Reimbursable costs paid to the eligible producer cannot exceed 100 percent of the producer's eligible out-of-pocket expenses.

Maryland funds their share of CREP through MACS and permanent easement funding is appropriated through Program Open Space (POS) transfer tax funds. Since the program was enacted, the Maryland Board of Public Works has approved $7.5 million of CREP projects. Approximately $5.7 million has been approved for permanent CREP easements. **Table 2-1** shows Maryland's funding appropriations for CREP from 2001 to 2003.

Table 2-1: Maryland CREP Funding Appropriations, 2001-2003

Fiscal Year	Appropriation
2001	$2.5 million
2002	$2.5 million
2003	$2.5 million
TOTAL	**$7.5 million**

Source: *Maryland's Land Conservation Programs, Protecting the Chesapeake Bay Watershed,* Dec. 3, 2003.

Special incentive payments are available to landowners, as a percentage of the CRP maximum annual cropland-based soil rental rate applicable to the soil types to be enrolled in CREP, in amounts that do not exceed the following percentages of such rates:

- 100 percent for riparian buffers;
- 80 percent for grass filter strips, wetland restoration and HEL

Alternative 1 allows for CCC to pay certain incentive payments for land approved for enrollment in CREP in addition to the maximum cropland-based soil rental rate applicable for CRP acreage. The State would pay a one-time $100.00 bonus payment for every acre enrolled in CREP, including all CREP acres enrolled into the program after October 20, 1997. Signing Incentive Payments and Practice Incentive Payments are also available to landowners for committing to implementing certain conservation practices.

Permanent Conservation Easements

Alternative 1 provides for up to 25 percent, or 25,000 acres, of CREP land to be placed under permanent conservation easements. The State may consider permanent easements acquired on lands adjoining those lands enrolled in CREP, when such lands are required to facilitate management or better meet the conservation objectives of the program. Such adjoining acreage for each easement may not exceed the number of acres enrolled in the CREP contract.

As of July 7, 2004, 4,398.25 acres were permanently protected under CREP easements, of which 1,058 acres are protected through the Rural Legacy Program. The Maryland Board of Public Works appropriated $7.5 million for CREP costs, and approved $5.7 million for permanent easements (see **Table 2-2).** As shown in **Table 2-2**, the strong CREP counties are located on the Eastern Shore of Maryland.

Table 2-2: Major Maryland Counties Holding CREP Easements, 2004

County	No. of Easements	Acres	Cost
Somerset	29	1,999	$1,640,185
Worcester	10	741	$1,045,630
Wicomico	9	483	$644,414
Queen Anne's	3	458	$583,333
Other counties[1]	--	717.25	$1,804,088
TOTAL	51	4,398.25	$5,717,650

[1] Estimated.
Source: Carol Council, MDNR, Aug. 2004.

2.2.2 Alternative 2-Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)

Alternative 2 would extend MD CREP through December 31, 2007, and would enable CCC and the State of Maryland to focus on completing the goal of enrolling up to 100,000 acres in CREP contracts, with the option of permanently protecting 25 percent of this land in CREP conservation easements. Enrollment of this acreage would work toward further reducing runoff, sediments and nutrients into the Bay and its tributaries, would improve water quality and would enhance important wildlife habitat for declining

species in the State. High priority would be placed on federally and State-protected species and species listed under the *North American Waterfowl Plan*. Since 1997, 5,191 CREP contracts, involving 71,208.5 acres, have been executed in Maryland.

Program Objectives

Alternative 2 focuses on the following objectives:

1. Reduction of nutrient pollution from agricultural lands by approximately 5,750 tons of nitrogen and 550 tons of phosphorous annually;
2. Reduction of sediment loading into streams from agricultural lands by approximately 200,000 tons of sediment annually; and
3. Increase the survivability, distribution and abundance of targeted fish, wildlife and plant species in the Chesapeake region by establishing or enhancing 93,000 acres of riparian forested habitat, 5,000 acres of wetland habitat and 2,000 acres of habitat for declining species. Emphasis is placed on high-priority species listed under the *North American Waterfowl Plan* and State and federally protected species, such as bald eagles, bog turtle, dwarf wedge mussel, glassy darter and harparella.

Acreage and Targeted Land for Enrollment

As the Chesapeake Bay was previously designated a CRP national conservation priority area, all cropland within that area is basically eligible for enrollment. Alternative 2 targets the following acreages, which include acres previously enrolled, with a minimum average width of 35 feet for enrollment in CREP—

1) Up to 77,000 acres of riparian areas located adjacent to streams, wetlands or other water bodies, each with a minimum average width of 35 feet, used in conjunction with the following conservation practices[1]:
    - CP4D (Permanent Wildlife Habitat)
    - CP21 (Filter Strips)
    - CP22 (Riparian Buffers)
    - CP29 (Marginal Pastureland Wildlife Habitat Buffers)
    - CP30 (Marginal Pastureland Wetland Buffers)

a. Alternative 2 allows for CREP enrollment of lands with riparian buffer practices up to 100 feet, based on average width, without any region-specific total enrollment restrictions, according to *Handbook 2-CRP, rev. 4*.
b. On the Eastern Shore, (Cecil, Kent, Queen Anne's, Caroline, Talbot, Dorchester, Somerset, Worcester and Wicomico Counties), combined, CREP allows a maximum regional enrollment of 1,000 acres for 100-150 foot wide buffers for HEL or land to be enhanced for wildlife benefits. (*This 1,000 total regional enrollment restriction for buffers in excess of 100 feet will only apply to contracts beginning if this Agreement is approved. The Maryland CREP Technical Committee shall develop suggested guidance and process related to preparing these applications for approval, including a wildlife management plan*).
c. In the region covering Harford, Baltimore, Carroll, Howard, Montgomery, Anne Arundel, Prince George's, Charles, Calvert, St. Mary's, Frederick, Washington,

[1] CP=CREP conservation practices which are listed in Appendix D.

Allegany and Garrett Counties, combined, CREP allows a maximum regional enrollment of 5,000 acres for buffer practices wider than 100 feet, up to a maximum of 300 feet, based on average width, which are established for wildlife benefits, or where additional water quality benefits would be derived from improvements to floodplains, hydric soils or HEL. (*This 5,000-acre total regional enrollment restriction for buffer offers in excess of 100 feet will only apply to contracts beginning if this Agreement is approved. Development of guidance related to approval of these applications, including a wildlife management plan will be conducted by the CREP Technical Committee*).

d. Buffers established along channelized intermittent streams and constructed drainage ditches will be eligible under CP21-Filter Strips, where buffer widths would not exceed a maximum average width of 35 feet, and would be established according to *Handbook 2-CRP, rev. 4* and NRCS FOTG standards.

2) Up to 5,000 acres of wetlands can be enrolled that result in water quality benefits for nutrient and sediment reduction and wildlife habitat, as well as meet the goal of restoring 25,000 acres of wetlands set by the Chesapeake Bay Agreement. Enrollment will be eligible under the following conservation practices:
   - CP9 (Shallow Water Areas for Wildlife)
   - CP23 (Wetland Restoration)

a. CREP enrollments under CP9 cannot exceed 50 acres per tract; each tract is limited to two CRP contracts (CRP-1's) and must be designed to have water quality benefits.
b. Buffers installed for CP9 can average 35-100 feet wide and must be constructed in accordance with *Handbook 2-CRP, rev. 4,* and NRCS FOTG standards.
c. Land eligible for CP23 (Wetland Restoration) must be cropland planted during 4 of the 6 crop years between 1996 and 2001; be capable of being planted in a normal manner; be prior converted wetlands and/or farmed wetlands with associated upland buffer acreage that can be restored; and must be established according to *Handbook 2-CRP, rev. 4,* and NRCS FOTG standards.

3) Up to 16,000 eligible acres, including acreage enrolled under the previous Maryland CREP agreement, characterized as HEL with a weighted average EI≥16 and located within 1,000 feet of a water body, can be enrolled using the following practices:
   - CP1 (Introduced Grasses/Legumes)
   - CP2 (Native Grasses/Legumes)
   - CP3 (Tree Planting)
   - CP3A (Hardwood Tree Planting)
   - CP4D (Permanent Wildlife Habitat)

4) Up to 2,000 acres, including acreage previously enrolled, of land designated for habitat for declining species, would be eligible for enrollment under the following practice:
   - CP25 (Habitat for Declining Species)

a. Up to 500 acres of habitat for declining species may be enrolled in Cecil, Kent, Queen Anne's, Caroline, Talbot, Dorchester, Somerset, Worcester and Wicomico Counties.
b. Up to 1,500 acres of habitat for declining species may be enrolled in Harford, Baltimore, Carroll, Howard, Montgomery, Anne Arundel, Prince George's, Charles, Calvert, St. Mary's, Frederick, Washington, Allegany and Garrett Counties.

Eligibility Criteria

The following eligibility criteria apply to lands that would be enrolled under Alternative 2:

- Cropland that has been planted or considered planted to an agricultural commodity for four of the last six years (1996-2001), hayland and marginal pastureland adjacent to a stream or water body.
- Physically and legally capable of being planted in a normal manner to an agricultural commodity, as determined by COC
- HEL (EI ≥16) within 1,000 feet of a stream or water body.
- Prior converted wetlands or areas capable of supporting wetland hydrology.

Acreage permanently under water, including acreage currently enrolled in CRP, is ineligible to be offered for enrollment, except for land dedicated to shallow water areas for wildlife. In addition, land currently enrolled in CRP that did not meet the cropland eligibility criteria when initially enrolled, but was allowed to continue in CRP under erroneous eligibility provisions, is not eligible for enrollment.

Costs and Incentive Payments

The average soil rental rate in Maryland is $75/acre. CCC would pay CREP participants 50 percent of the reimbursable costs for establishing eligible conservation practices, as provided in *Handbook 2-CRP*, rev. 4, and MDA would pay for the remaining reimbursable costs of up to 87.5 percent for these practices. Reimbursable costs paid to the eligible producer cannot exceed 100 percent of the producer's eligible out-of-pocket expenses. Maryland funds their share of CREP contract costs through MACS and funds permanent easements through Program Open Space (POS) transfer tax funds.

Incentive payments, made as a part of the CRP-1 annual rental payment, will be made by CCC, in addition to CRP maximum annual cropland-based soil rental rates applicable to the soil types to be enrolled in CREP, in amounts as follows:

1) For land to be enrolled under practice CP22 (Riparian Buffers):
   - $200/acre for the first 50 feet of buffer
   - $50/acre for 51-100 feet of buffer
   - $0/acre beyond 100 feet of buffer
2) For land to be enrolled under CP4D (Permanent Wildlife Habitat), CP21 (Filter Strips), CP29 (Marginal Pastureland Wildlife Habitat Buffers) or CP30 (Marginal Pastureland Wetland Buffers):
   - $150/acre for the first 50 feet of buffer
   - $50/acre for 51-100 feet of buffer

- $0/acre beyond 100 feet of buffer

3) For land to be enrolled under practice CP23 (Wetland Restoration) or CP9 (Shallow Water Areas for Wildlife) and CP1, CP2, CP3, CP3A, CP4D determined as HEL or CP25 (Habitat for Declining Species)
   - $50/acre

USDA also offers a special 40-percent incentive bonus of the installation costs for eligible practices. Cost-share benefits are shown in **Table 2-3**.

Table 2-3: Maryland CREP Cost-Share Benefits

Eligible Conservation Practice	Cost-Share Benefit (Percent)
Riparian Forest Buffers	87.5%
Stream Fencing	87.5%
Watering Troughs	87.5%
Stream Crossings	87.5%
HEL Adjacent to Water Bodies	87.5%
Vegetative Buffers	87.5%
Wetlands Restoration	75%
Wetland Creation	50%
Declining Habitat	50%

Source: Maryland Dept. of Agriculture, "Streamside Conservation Has Never Looked So Good," http//www.mda.state.md.us/resource/crep.htm

Permanent Conservation Easements

The State goal for permanent agricultural easements in Maryland CREP is 25 percent of the total program acreage, or 25,000 acres. Landowners enrolled in CREP can sell an easement on their land directly to the MDNR, a local land trust or a SCD. Easement payments are based on fair market value of foregone development and agricultural productivity costs. If a landowner chooses to sell an easement, that landowner would receive an additional payment at the time of sign-up. Easement payments range from $765/acre in Garrett County to $6,431/acre in Harford County.

As of July 2004, 71,208.5 acres were enrolled under CREP contracts and 4,398.25 acres were permanently protected under CREP easements. Alternative 2 would allow for the balance of 28,791.5 acres to be enrolled into MD CREP. **Table 2-4** compares the program elements of the Maryland CREP alternatives.

Table 2-4: Comparison of Maryland CREP Alternatives, 2004

Program Component	Alternative 1-No Action	Alternative 2-Continuing Enrollment
Program Expiration	Feb. 29, 2004	Dec. 31, 2007
Total CREP Acreage	Up to 100,000 acres	Up to 100,000 acres
Permanent Easement Goal	25 percent, or 25,000 acres	25 percent, or 25,000 acres
Targeted Lands for CREP Enrollment	• 70,000 acres: Riparian buffers • 10,000 acres: Wetland restoration and shall water areas for wildlife • 20,000 acres: HEL w/EI≥8 located within 1,000 feet of a water body	• Up to 77,000 acres: Riparian buffers • Up to 5,000 acres: Wetland restoration • Up to 16,000 acres: HEL w/EI≥16 located within 1,000 feet of a water body • Up to 2,000 acres: habitat for declining species
Objectives	• Annually reduce nitrogen by 5,750 tons • Annually reduce phosphorus by 550 tons • Annually reduce sediment loading by 200,000 tons • Enhance 35,000 acres of riparian forested habitat • Enhance 55,000 acres of grassland habitat • Enhance 10,000 acres of wetland habitat	• Annually reduce nitrogen by 5,750 tons • Annually reduce phosphorus by 550 tons • Annually reduce sediment loading by 200,000 tons • Enhance 93,000 acres or riparian habitat • Enhance 5,000 acres of wetland habitat • Enhance 2,000 acres of habitat for declining species
Eligible Land	• Cropland that has been planted to an agricultural commodity for four of the last six years (1996-2001), hayland, and marginal pastureland adjacent to a stream or waterbody. Highly erodible lands (EI ≥8) within 1,000 feet of a stream or water body • Prior converted wetlands or areas capable of supporting wetland hydrology	• Cropland that has been planted to an agricultural commodity for four of the last six years (1996-2001), hayland, and marginal pastureland adjacent to a stream or waterbody. • Highly erodible lands (EI ≥16) within 1,000 feet of a stream or water body • Prior converted wetlands or areas capable of supporting wetland hydrology

Program Component	Alternative 1-No Action	Alternative 2-Continuing Enrollment
Federal/State Shared Costs	• USDA-CCC share=50% of reimbursable costs of eligible conservation practices. • Maryland share= remaining reimbursable costs up to 87.5% for eligible practices • Reimbursable costs cannot exceed 100% of the producer's eligible out-of-pocket expenses.	• USDA-CCC share=50% of reimbursable costs of eligible conservation practices, as provided in *Handbook 2-CRP, rev. 4.* • Maryland share= remaining reimbursable costs up to 87.5% for eligible practices • Reimbursable costs cannot exceed 100% of producer's eligible out-of-pocket expenses
Incentive Payments	Special incentive payments are paid to landowners, as a percentage of the CRP maximum annual cropland-based soil rental rate applicable to the soil types enrolled in CREP, in amounts that do not exceed the following percentages of such rates: • 100 percent for riparian buffers; • 80 percent for grass filter strips, wetland restoration and HEL Incentive payments are provided for enrollment in CREP in addition to the maximum cropland-based soil rental rate applicable for CRP acreage. State would pay a one-time $100.00 bonus payment for every acre enrolled in CREP. SIPs and PIPs are available to landowners committing to certain conservation practices.	Incentive payments made by CCC, in addition to CRP maximum annual cropland-based soil rental rates applicable to the soil types to be enrolled in CREP, are proposed as follows: 1) Land enrolled under CP22 (Riparian Buffers): • $200/acre for the first 50 feet • $50/acre for 51-100 feet • $0/acre beyond 100 feet 2) Land enrolled under CP4D (Permanent Wildlife Habitat), CP21 (Filter Strips), CP29 (Marginal Pastureland Wildlife Habitat Buffers) or CP30 (Marginal Pastureland Wetland Buffers): • $150/acre for the first 50 feet • $50/acre for 51-100 feet • $0/acre beyond 100 feet 3) Land enrolled under practice CP23 (Wetland Restoration) or CP9 (Shallow Water Areas for Wildlife) and CP1, CP2, CP3, CP3A, CP4D determined as HEL, or

Program Component	Alternative 1-No Action	Alternative 2-Continuing Enrollment
		CP25 (Habitat for Declining Species) • $50/acre SIPs and PIPs are available to landowners committing to certain conservation practices.
Implementation	• 10- to 15-year contract • Annual rental payments based on soil types • Up to 100 percent reimbursement for cost of installing eligible conservation practice • Optional bonus easement payment to farm landowners voluntarily permanently retiring sensitive land from production. Under certain circumstances, CREP easements can be layered over other conservation easement programs • Continuous, noncompetitive sign-up • Maintenance payments	• 10- to 15-year contract • Annual rental payments based on soil types • 87.5% cost-share incentive with bonus on eligible conservation practices • Permanent easement option payment to farm landowners voluntarily retiring sensitive land from production • Continuous, noncompetitive sign-up • Maintenance payments

Source: Compiled from 1997 (Amend. No. 1) and 2004 CCC-Maryland CREP Agreements, 2004; Maryland Dept. of Agriculture, "Streamside Conservation has Never Looked so Good," http://www.mda.state.md.us/resource/crep.htm
EI=Erodibility Index; HEL=Highly Erodible Land.

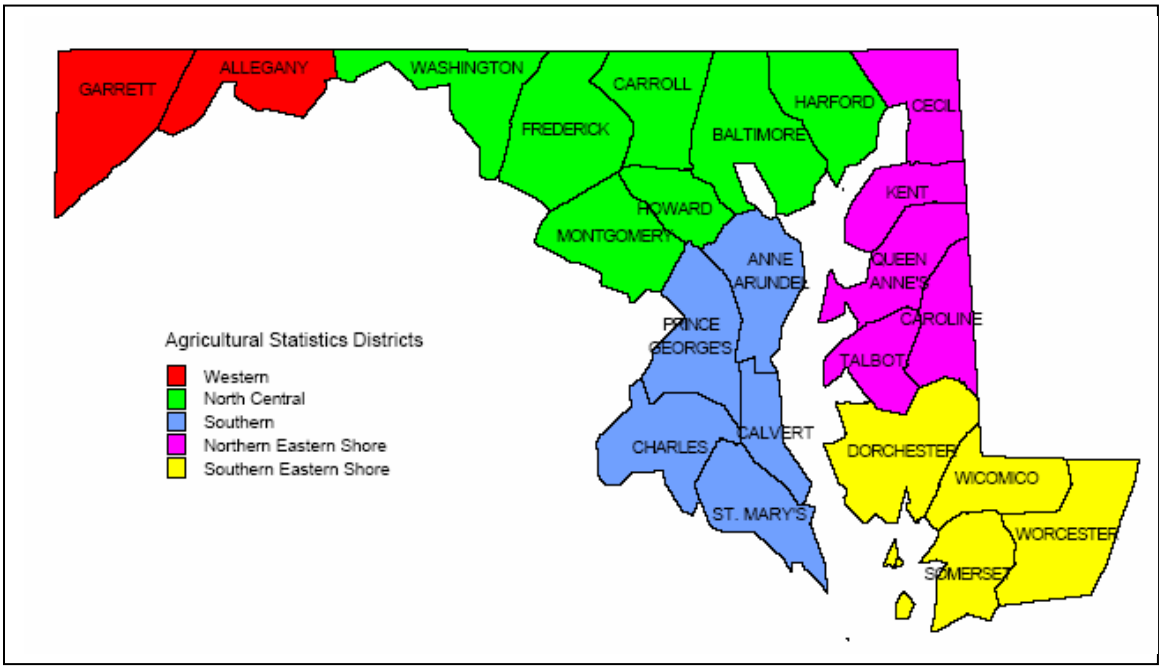
CHAPTER 3.0 AFFECTED ENVIRONMENT

This chapter provides an overview of the project area, which covers the entire State of Maryland. It describes the existing socioeconomic and demographic profile of the State and the agricultural sector; presents the natural resource conditions and programs in Maryland related to CREP, and describes Maryland agriculture and the Chesapeake Bay area. The principal cultural resources, such as National Historic Landmarks, are discussed.

3.1 Project Area Overview

The Maryland CREP project area covers the entire State of Maryland and includes its 23 counties. **Figure 3-1** shows the State, its counties and its agricultural statistics districts.

Figure 3-1: State of Maryland by Agricultural Statistics District, 2004



Source: *Agriculture in Maryland: State Summary 2002,* Maryland Dept. of Agriculture.

Though the eighth smallest State in the nation, Maryland spans 262 miles from the Atlantic Ocean to the northwest corner of the State and comprises 6.3 million acres (9,837 square miles). Maryland has 4,360 miles of coastline along the Chesapeake Bay, coastal bays and the Atlantic Ocean. Nearly 95 percent of the State's land area drains into the Chesapeake Bay. Maryland's coastal zone includes 16 counties and Baltimore City, encompasses two-thirds of the State's land and is home to nearly 68 percent of the State's residents.[1]

The climate varies throughout Maryland, as the eastern part of the State is much warmer than the western part. The annual temperatures average around 56°F in the east and 48°F in the

[1] Maryland's Coastal Program, http://www.dnr.state.md.us/bay/czm/coastal_facts.html

west (Owenby et al., 1992). Annual precipitation in the Bay area averages about 44 inches and ranges from 38.5 to 46 inches in the western part of the State.[2]

Although CREP lands in Maryland extend throughout the State, the focus of the program is within the Maryland portion of the Chesapeake Bay Watershed. The watershed expands across six States and covers 6.2 million acres of diverse landscape from its headwaters in Cooperstown, New York, south to Virginia. Most (93.8 percent) of Maryland lies within this watershed (**Fig. 3-2**).

Figure 3-2: Chesapeake Bay Watershed

Source: Chesapeake Bay Program, http://www.chesapeakebay.net/tribtools.htm

Five distinct physiographic provinces across Maryland make it one of the most geologically and hydrologically diverse States in the Northeast. These five provinces are the Coastal Plain, the Piedmont, the Blue Ridge, the Valley and Ridge and the Appalachian Plateau. Maryland's topography gradually ascends from the Atlantic Ocean across the Coastal Plain, and then rises sharply over the Piedmont Province and the ridges of the Appalachian Plateau, culminating in the highlands of the Allegheny Plateau in Garrett County. The mean elevation in Maryland is 350 feet above sea level and the maximum elevation is 3,360 feet on Backbone Mountain. The boundary between the Piedmont and the Coastal Plain Provinces is

[2] Clearwater, Denise, et al. *An Overview of Wetlands and Water Resources of Maryland*. Maryland Wetland Conservation Plan Work Group. Jan. 2000.

commonly known as the "fall line" because of the dense concentration of falls throughout the area and the rapid changes in geologic, topographic and hydrologic features.[3]

Soils that are used mainly for agricultural production were primarily formed under a mixed mesophytic forest cover type. In the Piedmont, Blue Ridge, Valley and Ridge and Appalachian Plateau Provinces, soils are mostly well-drained to moderately well-drained. The Coastal Plain Province has a higher proportion of somewhat poorly and poorly drained soils due to the subdued relief in this area.[4] Nearly 95 percent of the land in Maryland drains to the Chesapeake Bay.

3.2 Socioeconomic Characteristics

3.2.1 Population

Between 1970 and 1997, population in the entire Chesapeake Bay's Watershed grew 28 percent. By 2020, demographers project that nearly 18 million people will live in the Bay's watershed. **Table 3-1** compares the population growth among the States in the watershed between 2000 and 2020 and shows that Maryland ranks second to Virginia in overall population. **Table 3-2** compares Maryland's population and demographic characteristics reflected in the 1997 and 2000 U.S. Census. In 2003, the Census Bureau estimated that 5,508,909 people lived in Maryland.

Table 3-1: Population Growth in the Chesapeake Bay Watershed, 2000-2020

State	2000	2005	2010	2015	2020
DC	536,750	547,375	576,924	607,211	636,380
DE	82,845	88,027	92,321	95,962	99,178
MD	**5,296,486[1]**	**5,485,176**	**5,675,036**	**5,867,451**	**6,052,542**
NY	665,129	669,472	672,319	675,166	678,014
PA	3,433,056	3,485,046	3,537,020	3,568,973	3,600,916
VA	5,415,573	5,672,734	5,929,948	6,193,662	6,457,412
WV	204,620	215,318	225,255	234,343	242,188
TOTAL	**15,594,241**	**16,163,148**	**16,708,823**	**17,242,768**	**17,766,630**

[1] 2000 U.S. Census figure used.
Source: http://www.chesapeakebay.net/land.htm

Table 3-2: Comparison of Demographic Characteristics in Maryland, 1997 and 2000

Characteristic	1997	2000
Total Population	5,094,289	5,296,486
Percent Minority	31.1%	36%
Percent Below Poverty	9.5%	8.5%
Median Household Income	$45,289	$52,868

Source: U.S. Census Bureau data, Maryland QuickFacts, 2003 and U.S. Census of Population, 1997; *Emergency Conservation Program Final Programmatic EIS,* Jan. 2003.

[3] Clearwater, Denise, et al. *An Overview of Wetlands and Water Resources of Maryland*. Maryland Wetland Conservation Plan Work Group. Jan. 2000.
[4] U.S. Dept. of Agriculture, Draft Environmental Assessment. Maryland Conservation Reserve Enhancement Program.

Table 3-3 summarizes the general demographic characteristics for Maryland's farm operators, based on the 2002 Census of Agriculture's profile for Maryland. Most farmers in Maryland are white males, about 56 years of age, and though most reported farming as their principal occupation, many also have other sources of income.

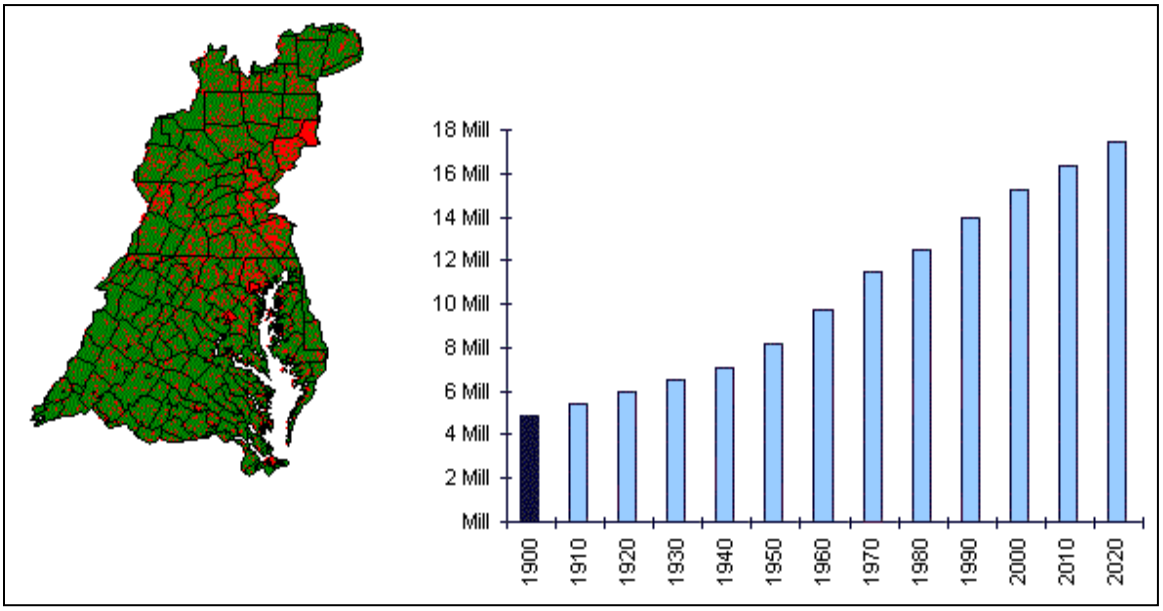
Table 3-3: Maryland Farm Operator Demographic Characteristics, 2002

Operator Characteristics	Number
Principal operators by primary occupation:	
Farming	6,977
Other	5,221
Principal farm operators by gender:	
Male	10,281
Female	1,917
Average age of principal farm operator (years)	55.9
All farm operators by race:	
White	17,740
Black or African American	296
American Indian or Alaska Native	71
Native Hawaiian or Other Pacific Islander	6
Asian	49
More than one race	57
Operators of Spanish, Hispanic, or Latino Origin	164

Source: *2002 Census of Agriculture.* State Profile United States Department of Agriculture, Maryland Agricultural Statistics Service

Figure 3-3 shows the population trends between 2000 and 2020 for States in the Chesapeake Bay Watershed.

Figure 3-3: Population Trends Projected for the Chesapeake Bay Watershed, 1900-2020



Source: Chesapeake Bay Program, http://www.chesapeakebay.net/land.htm.

Table 3-4 compares the existing and projected population for the State of Maryland with its 23 counties, based on U.S. Census data. As shown in the table, those counties reflecting the lowest population estimates are located on the Eastern Shore where impacts of development pressures have not yet been fully realized.

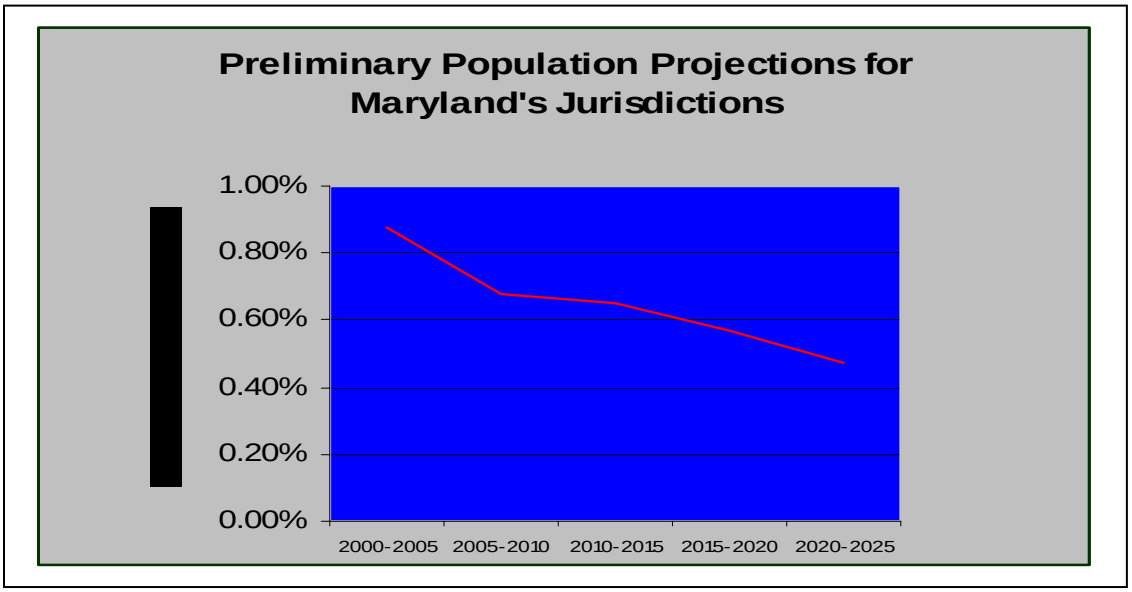
Table 3-4: State of Maryland and County Population Estimates, 1990-2020

State of Maryland	1990 Census	2000 Census	2010 Projected	2020 Projected
	4,780,753	5,296,486	5,651,525	6,014,550
County				
Allegany	74,946	74,930	72,650	71,450
Anne Arundel	427,239	489,656	516,800	537,100
Baltimore	692,134	754,292	749,500	776,000
Calvert	51,372	74,563	96,575	124,075
Caroline	27,035	29,772	32,150	33,950
Carroll	123,372	150,897	181,650	205,950
Cecil	71,347	85,951	94,600	102,500
Charles	101,154	120,546	150,100	182,900
Dorchester	30,236	30,674	29,750	30,100
Frederick	150,208	195,277	238,300	281,700
Garrett	28,138	29,846	30,900	32,150
Harford	182,132	218,590	249,350	264,800
Howard	187,328	247,842	297,950	303,450
Kent	17,842	19,197	20,150	20,450
Montgomery	757,027	873,341	945,000	1,000,000
Prince George's	728,553	801,515	852,400	916,600
Queen Anne's	33,953	40,563	47,600	52,900
St. Mary's	75,974	86,211	106,550	120,550
Somerset	23,440	24,747	25,400	25,750
Talbot	30,549	33,812	35,475	37,200
Washington	121,393	131,923	135,400	141,700
Wicomico	74,339	84,644	88,525	95,525
Worcester	35,028	46,543	48,850	52,050

Source: Maryland at a Glance. http://www.mdarchives.state.md.us/msa/mdmanual/01glance/html/pop.html#county

Figure 3-4 illustrates the projected slow growth Maryland is expected to experience over the next 20 years.

Figure 3-4: Population Projections for Maryland's Jurisdictions, 2000-2025



Source: Prepared by the Maryland Department of Planning, Planning Data Services. (Revisions_2 July, 2001)

3.2.2. Land Use and Development Trends

In order to meet housing demands to accommodate the State's rising population, development pressures will continue to occur and more homes will be built. If the current development pattern holds, many of these new houses will be located farther away from existing support infrastructure, such as schools, businesses, roads, public water supplies and wastewater treatment facilities. This pattern of sprawl development has taken hold all over the Bay region and now ranks among the top threats to the Bay's recovery.

As a result of this expansive growth, the number of acres of developed land in Maryland has significantly increased from 769,648 acres in 1973 to 1.14 million acres in 1997. Forty-two percent of new development (159,377 acres) occurred between 1985 and 1990 due to rapid economic growth and a high demand for new homes. **Table 3-5** shows the fastest growing counties in Maryland between 1985 and 1997. As shown, Calvert and Caroline Counties, both located on the Eastern Shore, significantly outpaced the other fast-growing counties in this region.

Table 3-5: Fastest Growing Counties in Maryland, 1985-1997

County	Acres	Percent Increase 1985-1997
Calvert	21,045	161%
Caroline	8,818	135%
Somerset	4,807	67%
Garrett	8,498	66%
Cecil	8,234	56%
Washington	13,360	49%
Frederick	16,256	48%
Maryland	261,677	30%

Source: *Maryland's Changing Land: Past, Present and Future.* Maryland Dept. of Planning, Dec. 2001.

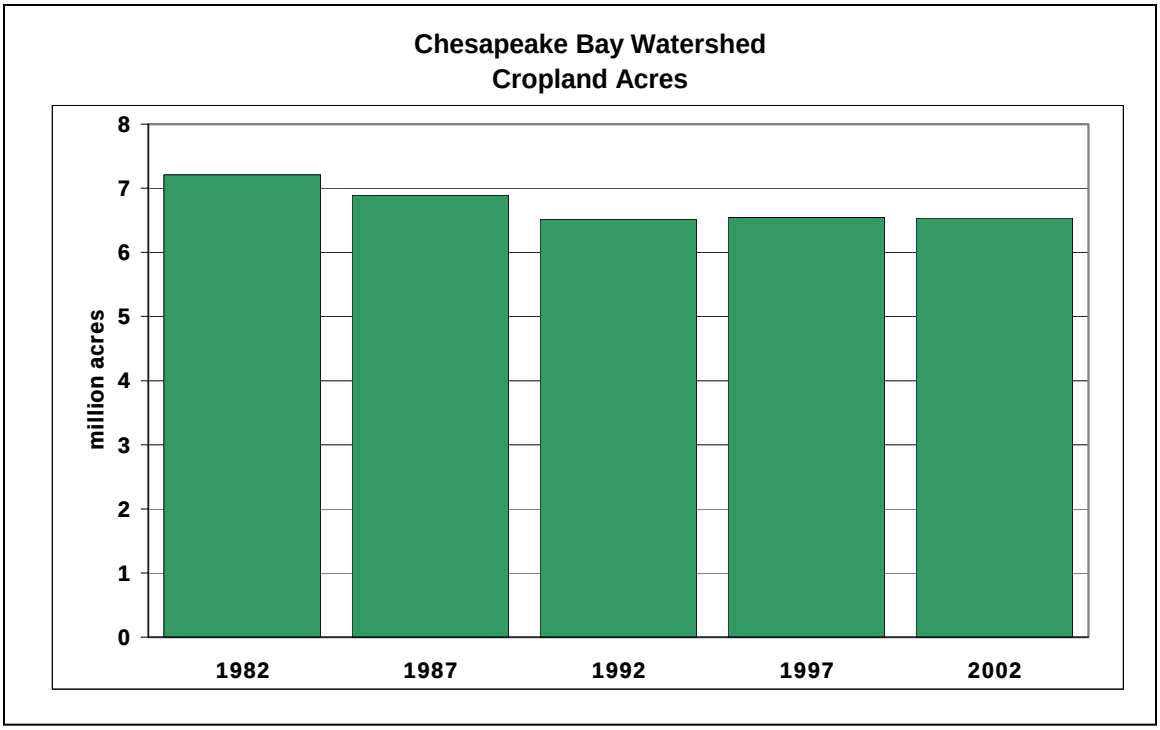
Maryland has been losing farmland at a faster rate than the United States, as a whole, and at a slightly faster rate than its neighboring States. Agricultural land use in Maryland declined from 4.2 million acres in 1945 to 2.2 million in 1997. However, despite the rapidly changing landscape, agriculture continues to be the largest single land use in Maryland, with about 33 percent of total land area used for farming.[5] **Table 3-6** shows the annual change in farmland between 1959 and 1997 among the States in the watershed and compares these changes with the United States overall. **Figure 3-5** illustrates the decline in cropland in the watershed over the past two decades.

Table 3-6: Annual Percentage Change in Farmland, 1959-1997

State	1959-87	1987-97
Delaware	-0.81%	-0.48%
Maryland	-1.31%	-1.06%
New York	-1.68%	-1.49%
Pennsylvania	-1.47%	-0.93%
Virginia	-1.48%	-0.53%
United States	-0.51%	-0.49%

Source: U.S. Census of Agriculture, 1997.

Figure 3-5: Decline in Cropland throughout the Chesapeake Bay Watershed, 1982-2002



Source: U.S. Environmental Protection Agency, Chesapeake Bay Program. "Finding Solutions to Excess Nutrients in Animal Manure and Poultry Litter, Nov. 2004.

[5] *Maryland at a Glance. http://www.mdarchives.state.md.us/msa/mdmanual/01glance/html/agri.html*

Table 3-7 presents the percentage of existing and projected statewide land use changes between 1997 and 2020. MDP predicts that Anne Arundel, Carroll, Frederick, Howard, Montgomery and Prince George's Counties will experience the highest average annual rate of development between 1997 and 2020 (refer to **Table 3-8** for projected acreage losses).

Table 3-7: Existing and Projected Land Use Changes in Maryland, 1997-2020

Land Use	1997	2020
Developed Land	18%	24%
Agriculture	35%	32%
Forest	42%	39%
Other	6%	5%

Source: USDA-FSA. Maryland CREP Proposal for Agreement No. 2, p. 3

Table 3-8: Maryland Counties with Highest Projected Average Annual Rate of Development, 1997-2020

County	Loss of Acres/Year (1997-2020)
Anne Arundel	1,021
Carroll	1,253
Frederick	1,017
Howard	1,644
Montgomery	1,090
Prince George's	1,384
Maryland	**14,618**

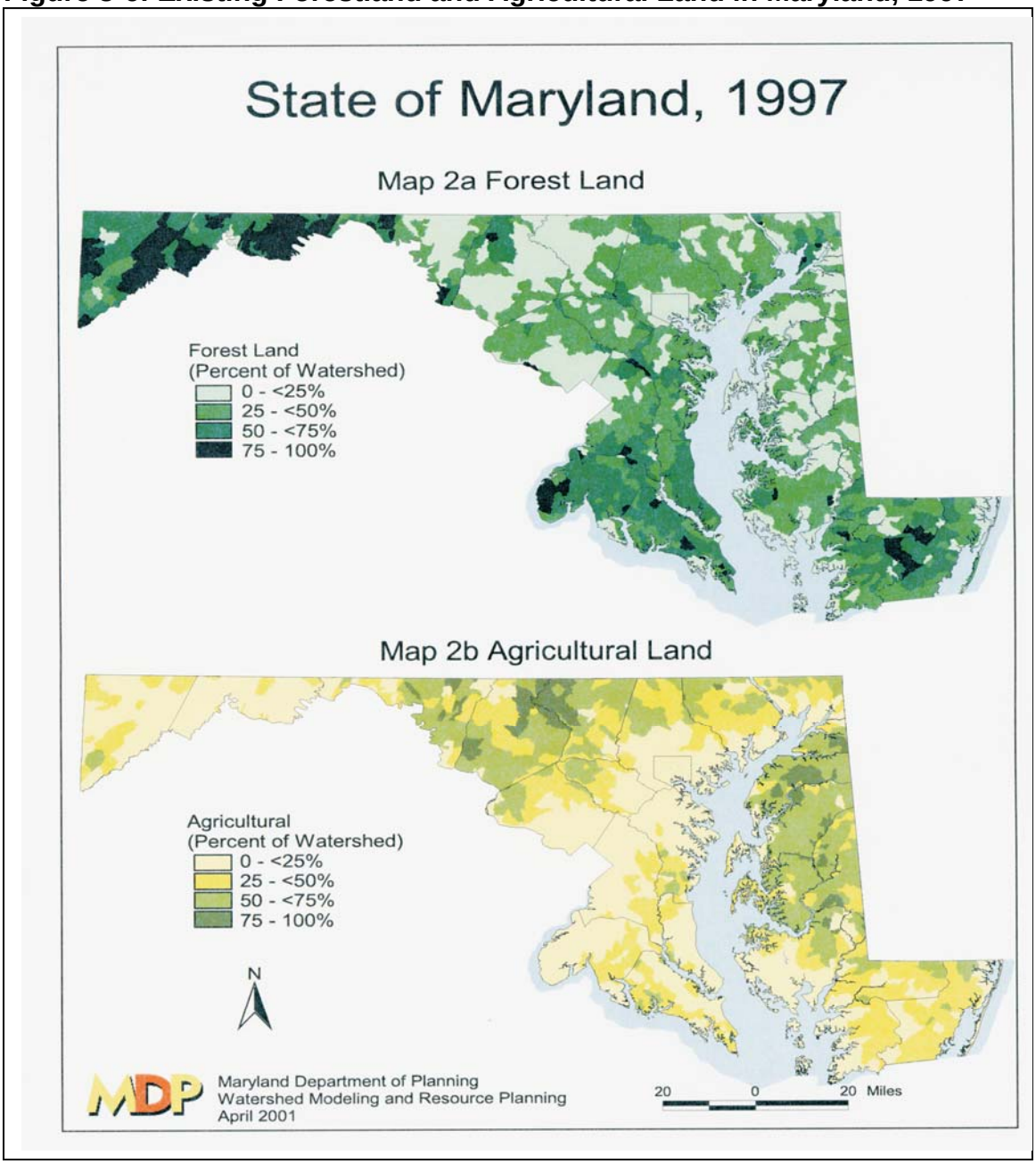
Source: *Maryland's Changing Land: Past, Present and Future.* Maryland Dept. of Planning, Dec. 2001.

In 1997, Maryland had nearly 2.6 million acres of forestland and by 2020 forestland is projected to decline 7 percent to 2.4 million acres. Charles, Baltimore, Anne Arundel, Montgomery, Prince George's and St. Mary's Counties are projected to lose the most acreage of forestland in the State, mainly due to the large number of new homes in these areas. By 2020, at 1997 development rates, agriculture will decline by 6.9 percent to about 2 million acres. The annual average rate of conversion of agricultural land to development is projected to be 6,517 acres, slightly less than for previous decades. [6]

Figures 3-6 and **3-7** show the changes in the existing and the projected agricultural and forestland cover in the State of Maryland between 1997 and 2020.[7]

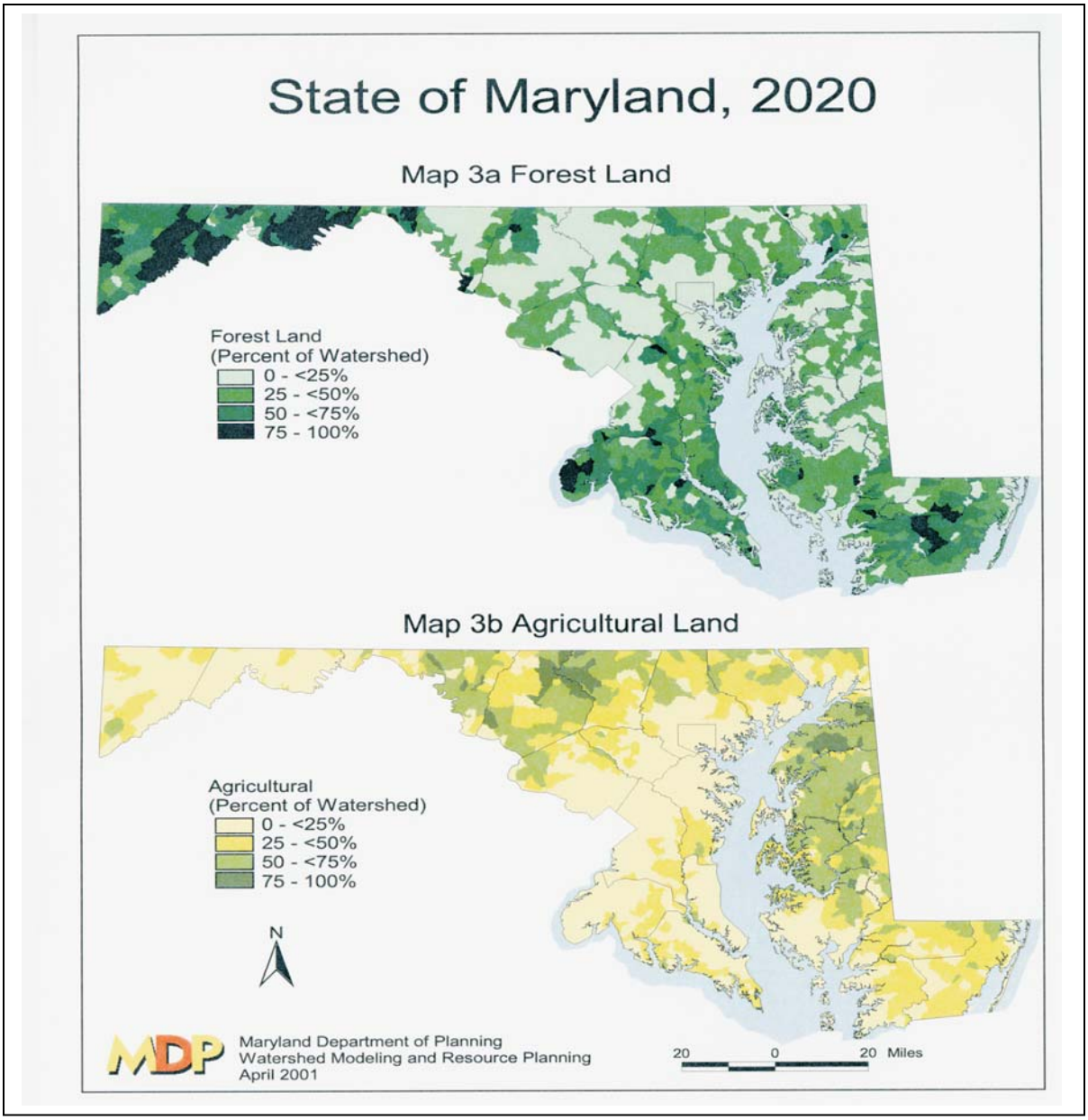
[6] *Economic Situation and Prospects for Maryland Agriculture*. Center for Agricultural and Natural Resource Policy.
[7] *Maryland's Changing Land: Past, Present and Future*. Maryland Dept. of Planning, Dec.2001, pp.18-21.

Figure 3-6: Existing Forestland and Agricultural Land in Maryland, 1997



Source: Maryland Dept. of Planning, *Maryland's Changing Land: Past, Present and Future,* Dec. 2001.

Figure 3-7: Projected Forestland and Agricultural Land in Maryland, 2020



Source: Maryland Dept. of Planning, Maryland's Changing Land: Past, Present and Future, Dec. 2001.

3.3 Profile of Maryland Agriculture

3.3.1 Maryland CREP Contracts and Easements

Most of the lands conserved by CREP are located on the Eastern Shore or along the shores of the Bay's tributaries. CREP provides protection to the Bay by helping to reduce runoff of nutrients and sediments from entering the Bay and by improving and enhancing wildlife habitat, particularly for declining species.

Maryland CREP is a two-tier system, where the landowner first voluntarily agrees to a 10- to 15-year CREP contract and installs approved conservation practices (CPs) (**Appendix D**). Second, the landowner can voluntarily sell a permanent conservation easement to the MDNR, a land trust or to a SCD. The State Board of Public Works approves the easement program and county acreage values are paid for the easements. The recorded easements are held through perpetuity either jointly by MDNR and the land trust, the SCD, or solely by MDNR.

As of March 2004, all 23 Maryland counties had participated in CREP, enrolling 71,208.5 acres in 5,191 CREP contracts and permanently protecting 4,398.25 acres in permanent CREP easements. A total of $5.7 million has been approved by the State Board of Public Works to purchase permanent CREP easements.

Maryland landowners have received about $37.5 million in Federal rental payments for establishing vegetative buffers on their property.[8] **Table 3-9** shows the acreages and costs for CREP easements in Maryland counties holding the most CREP easements, as of July 2004.

Table 3-9: Maryland Counties with Highest Number of CREP Easements, July 2004

County	CREP Easements	Acres	Cost
Somerset	29	1,999	$1,640,185
Worcester	10	741	$1,045,630
Wicomico	9	483	$644,414
Queen Anne's	3	458	$583,333
TOTAL	**51**	**3,681**	**$3,913,562**

Source: MDNR, Carol Council, July 7, 2004.

3.3.2 Agricultural Economic Characteristics

In 1999, the agricultural sector and related industries (e.g., agricultural inputs and services and food processing) accounted for about $5 billion (3 percent) of Maryland's gross State product. Nearly 62,700 people (12,400 farm operators, 5,900 farm laborers, and 44,300 in farm input and service supply and agricultural processing) were employed in the agricultural sector. In 2000, USDA's Economic Research Service estimated that Maryland's average net income per farm was $33,000, which substantially exceeded the national average. Since 1980, the growth rate of net income per farm has been higher in Maryland than in neighboring states and the United States, as a whole.[9]

Based on the *2002 Census of Agriculture*, the overall market value of agricultural products was nearly $1.3 billion in 2002, down 6 percent from nearly $1.4 in 1997. The market value of agricultural products rose 2 percent in 2003, averaging $106,026 per farm, compared with $103,469 in 1997. Crop sales accounted for $450,202,000 of the

[8] *Maryland's Land Conservation Programs, Protecting the Chesapeake Bay Watershed.* Dec. 2003, p. 12.
[9] *Economic Situation and Prospects for Maryland Agriculture*. Center for Agriculture and Natural Resource Policy, University of Maryland.

total value in 2002, compared with livestock sales, which accounted for $843,101,000 of the total value.[10]

In 2002, average gross farm income in Maryland was $137,312, while net farm income was $18,270. Maryland farmers spent about $284 million on fertilizers, energy, pesticides, machinery repairs and other services. The average government payment per farm jumped 86 percent to $9,825 in 2002 from $5,281 in 1997. **Table 3-10** summarizes the economic characteristics of Maryland's farms in 2002.

Table 3-10: Value of Farm Sales in Maryland, 2002

Value of Farm Sales	Number of Farms
<$1,000	3,633
$1,000-$2,499	1,483
$2,500-$4,999	1,199
$5,000-$9,999	1,067
$10,000-$19,999	1,006
$20,000-$24,999	313
$25,000-$39,999	531
$40,000-$49,999	197
$50,000-$99,999	670
$100,000-$249,999	814
$250,000-$499,000	630
>$500,000	655
Total farm production expenses ($1,000)	$1,127,590
Average per farm ($)	$92,585
Net cash farm income of operation ($1,000)	$246,383
Average per farm ($)	$20,230

Source: 2002 Census of Agriculture State Profile U.S. Department of Agriculture, Maryland Agricultural Statistics Service.

3.3.3 Farmland Conversion

Based on the agricultural census, agricultural land areas are steadily declining in the Chesapeake Bay Watershed. It is estimated that between 1982 and 2002, cropland and pasture in the Chesapeake Bay Watershed has declined 14 percent (1.6 million acres loss). Cropland, to which farmers apply animal waste nutrients, has seen a 9-percent decline (670,000-acre loss).[11]

The *2002 Census of Agriculture* reported that 12,198 farms operated in Maryland in 2002, down 8 percent from 13,254 farms in 1997. Land held in farmland declined 5 percent to 2,077,630 acres in 2002 from 2,193,063 acres in 1997. The average size of the farm in Maryland also declined 3 percent between 1997 and 2002. Between 1973 and 1997, Maryland's farmland declined 8 percent from 2.4 million acres to 2.2 million acres. The average annual rate of conversion of agricultural land between 1985 and 1990 was 15,749 acres, nearly triple the rate of conversion to development.

[10] *2002 Census of Agriculture State Profile-Maryland*. NASS.
[11] U.S. Environmental Protection Agency, Chesapeake Bay Program. "Finding Solutions to Excess Nutrients in Animal Manure and Poultry Litter, Nov. 2004.

Table 3-11 shows the counties that experienced the greatest farmland losses between 1985 and 1997, and those that are predicted to lead in farmland losses between 1997 and 2020.

Table 3-11: Maryland Counties Leading Loss in Agricultural Acres, 1985-2020

County	Acres Lost between 1985-1997	Acres Predicted to be Lost 1997-2020	Percentage Change
Montgomery	14,666	10,779	74%
Carroll	13,497	19,463	144%
Harford	11,432	10,790	94%
Frederick	10,771	17,934	167%
Washington	9,856	8,541	87%
Prince George's	7,627	8,849	102%
Baltimore	8,147	--	
Howard	6,997	18,414	263%
Wicomico	--	10,790	

Source: *Maryland's Changing Land: Past, Present and Future.* Maryland Dept. of Planning, Dec. 2001.

The agriculture sector in Maryland is mainly situated on the upper Eastern Shore (Kent, 65%; Queen Anne's, 64%; Talbot, 61%; Caroline, 59%; and the northern portion of Dorchester Counties) and in Central Maryland (Carroll, 58%; Frederick, 58%; Washington, 48%). [12] The Eastern Shore is projected to have a comparatively lower rate of loss of farmland due to currently lower development pressures. Agricultural land lost per new household is expected to range from 0.5 and 2 acres of land through 2020.

3.3.4 Agricultural Production

The *2002 Census of Agriculture* showed that Maryland ranked seventh in the United States in the production of broilers; eleventh in raising horses, ponies, mules, burros and donkeys; fourteenth in raising poultry and eggs, and sixteenth in tobacco. Due to the tobacco buyout, a total of 2.4 million pounds of tobacco was harvested from the fewest acres on record—1,700 acres.[13] Top crops in 2002 were soybeans, corn for grain, forage, wheat for grain and corn for silage. Growing conditions in 2002 were variable, resulting in lower crop yields than in 2001.

3.3.5. Pesticide and Fertilizer Use

In addition to soil erosion, agricultural production can produce adverse effects due to excess nutrients, animal waste and pesticides. Through soil erosion and subsurface water runoff, pesticides and excess nutrients, such as nitrogen and phosphorus, can drain from farmland into nearby streams and waterways and eventually flow to the Chesapeake Bay. In general, pesticides are used to control insects, weeds, bacteria and other organisms. USDA and MDA conducted studies on pesticide and fertilizer application in Maryland

[12] Maryland at a Glance. http://www.mdarchives.state.md.us/msa/mdmanual/01glance/html/agri.html
[13] Maryland at a Glance. http://www.mdarchives.state.md.us/msa/mdmanual/01glance/html/agri.html

and showed that Washington, Montgomery, Wicomico, Cecil and Caroline Counties used the highest levels of pesticides, with herbicides and wood preservatives (both 5.6 million pounds) receiving the most application. Nearly 1 million pounds of insecticides were used in Maryland during 1994.[14]

Active ingredients in fertilizers are nitrogen, phosphate and potassium. More than 153,000 tons of these ingredients were applied through fertilizers in Maryland in 1997. In general, the counties on the Eastern Shore and in central Maryland, several of which adjoin the Chesapeake Bay, used the most fertilizer. Counties using the most fertilizers were Caroline, Carroll, Frederick and Harford Counties.[15] **Table 3-12** shows how the counties ranked in terms of pesticide use in 1994 and fertilizer use in 1997.

Table 3-12: County Ranking by Pesticide and Fertilizer Use in Maryland, 1994 and 1997

	Pesticide Usage (1994)		Fertilizer Usage (1997)	
County	Rank	No. of Applications	Rank	Total Nutrients Applied (Tons)
Allegany	24	41	22	1,333
Anne Arundel	15	128	12	5,663
Baltimore	10	174	10	6,210
Calvert	23	80	24	616
Caroline	5	115	1	14,833
Carroll	14	116	2	14,586
Cecil	4	129	17	4,234
Charles	20	113	23	993
Dorchester	7	95	16	4,446
Frederick	11	119	3	11,929
Garrett	18	58	18	2,633
Harford	13	133	4	11,773
Howard	22	117	20	2,123
Kent	9	85	7	8,289
Montgomery	2	164	19	2,349
Prince George's	16	145	15	5,037
Queen Anne's	6	105	5	8,896
St. Mary's	21	96	11	5,786
Somerset	17	72	21	1,624
Talbot	8	112	9	6,882
Washington	1	119	6	8,642
Wicomico	3	132	8	7,790
Worcester	12	115	14	5,508
Total		**252**		**153,691**

Sources: MDA, 1996. USDA, 1999. *Maryland Agriculture and Your Watershed*. U.S. Environmental Protection Agency website http://www.epa.gov/maia/html/mda-env.html"

[14] *Maryland Agriculture and Your Watershed*. U.S. Environmental Protection Agency. EPA-MAIA. http://www.epa.gov/maia/html/mda-env.html

[15] *Ibid.*

3.4 Natural Resources

Maryland is home to a wide range of soil types, topography and a climate that supports a broad diversity of plants, animals, birds, reptiles and fish. Many of these species have reached their northern, southern, western, or eastern limits of distribution in the state. The following sections describe the primary natural resources found in Maryland.

3.4.1 Air Quality

The Baltimore Metropolitan Region (Anne Arundel, Baltimore, Baltimore City, Carroll, Harford and Howard Counties) and Cecil County are designated as severe ground-level ozone "nonattainment areas" by EPA. The Washington Metropolitan Region, which includes Calvert, Charles, Frederick, Montgomery, and Prince George's Counties, is also designated nonattainment by EPA. **Table 3-13** identifies the areas within Maryland that EPA has designated as nonattainment for 8-hour Ozone Standards. If a county is participating in an early action compact, it is identified as EAC. If a county is not listed in the table, EPA has determined that it has met the EPA standards for ozone attainment.

Table 3-13: Maryland Counties and Areas Designated as Nonattainment for 8-Hour Ozone Standards

Nonattainment Area	Maryland Counties	Classification	Maximum Attainment Date (from June 1, 2004)
Baltimore	Anne Arundel Baltimore City Baltimore Carroll Harford Howard	Moderate	June 2010
Kent/Queen Anne's	Kent Queen Anne's	Moderate	June 2010
Philadelphia - Wilmington, Atlantic City, PA-DE-MD-NJ	Cecil	Moderate	June 2010
Washington, DC-MD-VA	Calvert Charles Frederick Montgomery Prince George's	Moderate	June 2010
Washington County, (Hagerstown), MD (EAC)	Washington	Basic	Dec 2007

Source: U.S. Environmental Protection Agency, Region 3, 2004.

Over the past two decades, a trend shows that air quality has been improving in Maryland. During the 1980s, Maryland averaged 20 summer days when the region's air quality (ground-level ozone) exceeded the Federal health standard, otherwise referred to as "Code Red" conditions. Conditions improved somewhat during the 1990s, as Maryland averaged half the summer "Code Red" days as it had experienced a decade earlier. This improvement in air quality can be attributed to the fact that Maryland has adopted all mandated Federal control measures, implemented local air quality control programs and has engaged communities in voluntarily limiting pollution-causing activities on "Code Red" days.[16]

3.4.2 Water Resources and Water Quality

Approximately 2,319 square miles of inland waterways, including the Chesapeake Bay, occur in Maryland. Under *Chesapeake 2000*, the Stream Resources Management Goal (Stream Habitat Goal) is intended to assess, protect and restore water quantity and quality, physical habitat and biological communities of streams to the highest point practical. Stream goals are part of a larger effort by Maryland's Tributary Strategy to address overall habitat quality (both tidal and nontidal) on a Tributary Basin scale.[17]

Nontidal Areas[18]

Nontidal areas in the Chesapeake Bay region are areas where water is not affected by the tides of the Atlantic Ocean. These freshwater areas are located above the fall line—the physical barrier west of the Bay that's marked by waterfalls and rapids. Inland rivers and streams comprise about 623 square miles of water resources in the State of Maryland.

Another 1,726 square miles of water occur in the Maryland portion of the Chesapeake Bay.[19]The major tributaries on the western shore that cut a path through the fall line in Maryland include the Potomac and Patuxent Rivers. These tributaries have both tidal and nontidal portions. The Susquehanna River, north of the Bay, is entirely nontidal and contributes about half of the freshwater flow to the mainstem Bay.

Because so much freshwater flows into the Bay, the water quality in nontidal areas is extremely important. Freshwater flows carry nutrients (nitrogen and phosphorus) to the Bay. Nitrogen is essential to the production of plant and animal tissue. It is used primarily by plants and animals to synthesize protein. Just as the nitrogen and phosphorus in fertilizer aid the growth of agricultural crops, nutrients are vital to the growth of plants within the Bay and rivers. Nutrients occur naturally in water, soil and air and can reach the nontidal portions of rivers either through point sources (industrial or municipal wastewater facilities) or nonpoint sources (runoff from urban, suburban and farm fields).

Tidal Waters

The tidal portion of the Chesapeake Bay Watershed is subject to the ebb and flow of ocean tides. This area encompasses all of the mainstem Bay and the area north and east to

[16] Maryland Conservation Reserve Enhancement Program Proposal for Agreement No. 2, p. 6.
[17] Chesapeake Bay Program. "A Tributary Strategies Habitat Goals for Wetlands, Streams and Forests."
[18] U.S. Environmental Protection Agency, Chesapeake Bay Program website: www.chesapeakebay.net.
[19] Maryland CREP Proposal for Agreement No. 2, p. 4.

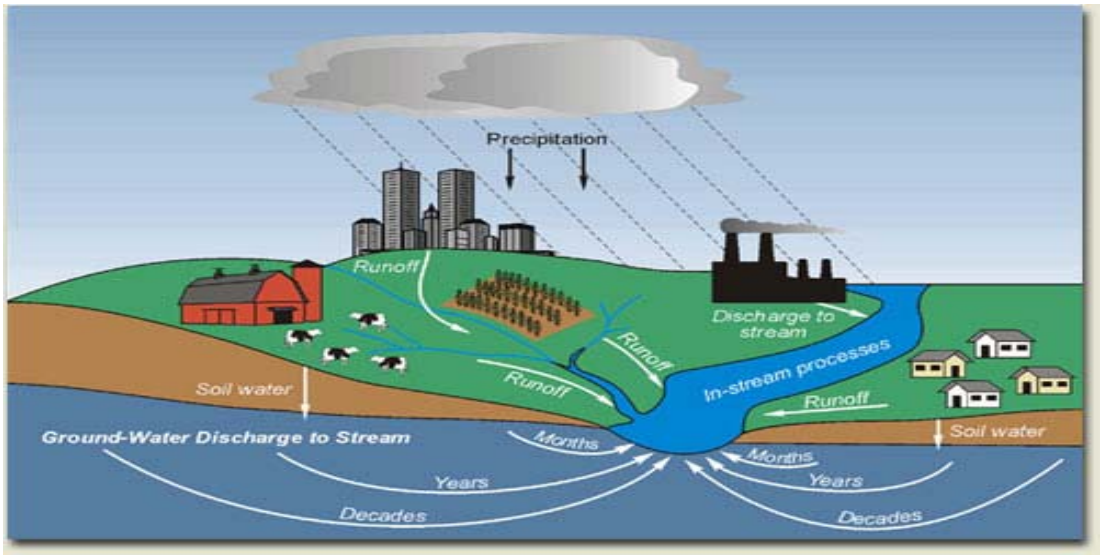
the fall line. One of the most important characteristics of the tidal area is the wide range of salinity from the fall line to the Bay's mouth at the Atlantic Ocean. Salinity is measured as the number of grams of dissolved salt in 1,000 grams of water, and is measured in parts-per-thousand (ppt). Salinity changes gradually from the fall line (low salinity) to the mouth of the Bay (high salinity) and affects resource habitats.

High spring freshwater that flows into the Bay not only shifts salinity zones, but also carries nutrients (nitrogen and phosphorus) and sediments from the land. As the actions of more than 15 million people living in the Chesapeake Bay region stress the watershed, the amount of nutrients and sediments (suspended solids) that wash into the rivers affect the Bay's living resources.

Groundwater

Fluctuations in climate patterns influence the amount of precipitation that falls. Even a small amount of precipitation can have a great impact on the Bay's watershed. Rain hitting farmland absorbs fertilizers that also flow to the Bay's tributaries and the Bay. The Bay's nine largest tributaries are estimated to contribute 93 percent of the total freshwater that enters the Bay. However, rain that falls today may not make it into those tributaries or the Bay for five years or more. This natural, slow process by which water travels on land is called groundwater lag time. Runoff from storm events can infiltrate the ground before reaching a stream, can move with groundwater, and then eventually seep back into streams, rivers and to the Bay. **Figure 3-8** illustrates the process through which nutrients and pollutants enter groundwater and how streamflows discharge contaminants into the Chesapeake Bay.

Figure 3-8: Groundwater and Streamflow Discharges into the Chesapeake Bay

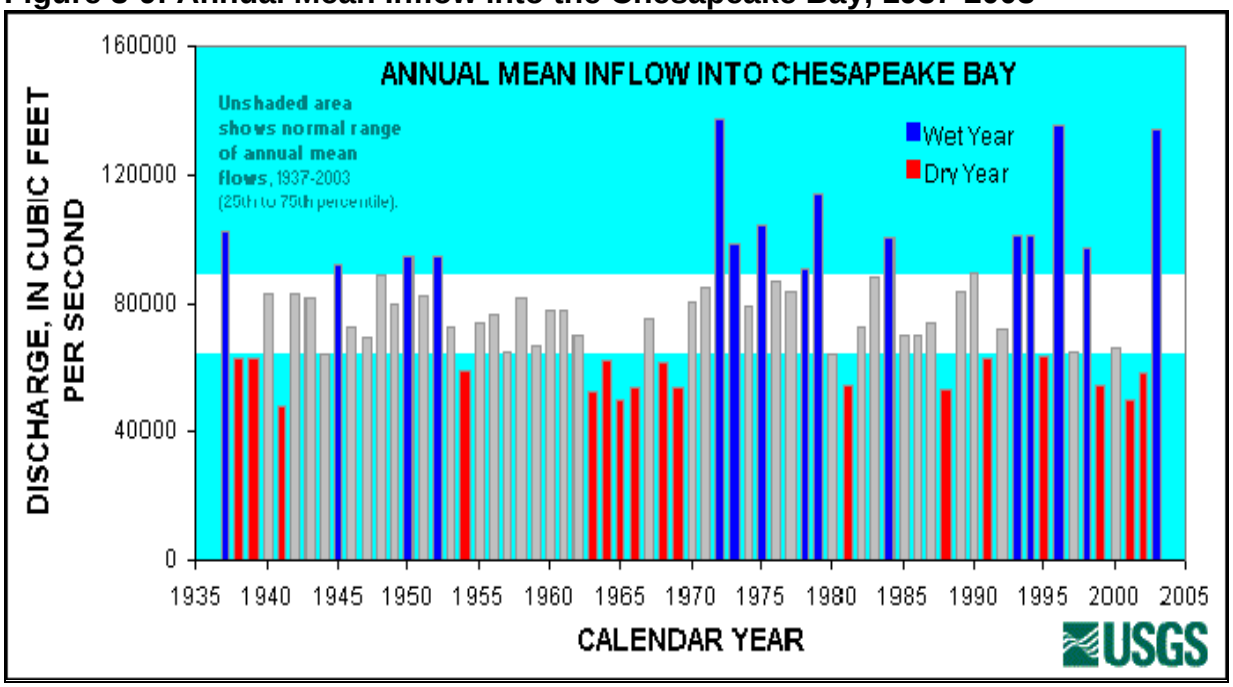


Nutrients from urban and agricultural sources enter the groundwater and streamflow that discharge into the Chesapeake Bay. Once in the Bay, the overabundance of nutrients causes algal blooms, which block sunlight and lower dissolved oxygen levels. Image courtesy S. Phillips/USGS.

Source: Chesapeake Bay Program website: http://www.chesapeakebay.net/wquality.htm

F**igure 3-9** shows the annual mean flow into the Chesapeake Bay between 1937 and 2003.

Figure 3-9: Annual Mean Inflow into the Chesapeake Bay, 1937-2003



Source: Chesapeake Bay Program, U.S. Geological Survey http://chesapeake.usgs.gov/streamflow.html1

Water Quality

The EPA Chesapeake Bay Program monitors nitrogen, phosphorus and dissolved oxygen levels in the Bay. The Bay Program also monitors water clarity by measuring the total amount of solids suspended in the water (TSS) and Secchi depth. Water clarity is important because it is linked to the health of underwater Bay grasses, which need plenty of sunlight to grow. Bay grasses, an important habitat for young fish and shellfish, tend to decrease in areas with poor water clarity.

The following factors are monitored to determine changes to and effects on water quality in the Chesapeake Bay:

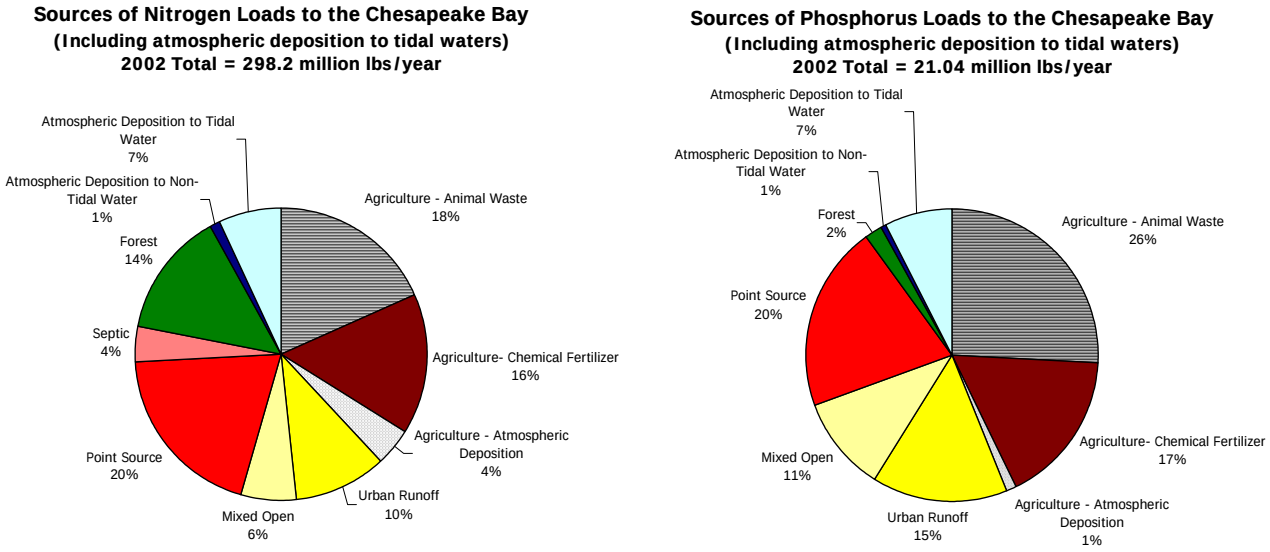
- *Nutrients* are essential for plants and animals, but too many can cause harmful effects. The *State of the Chesapeake Bay* reports that between 1985 and 2000, phosphorus loads delivered to the Bay from all of its tributaries declined by 8 million pounds per year and nitrogen loads declined by 53 million pounds per year. Unfortunately, baywide, phosphorus reductions fell short of the 2000 goal by 2.3 million pounds per year, whereas nitrogen loads fell 24 million pounds short per year. In areas where excessive nutrient loads most adversely affect the Bay (Potomac River northward), phosphorus goals were met.[20]

[20] *The State of the Chesapeake Bay, A Report to the Citizens of the Bay Region*, Executive Summary.

- *Sediments* can cloud the water which can hamper the growth of aquatic plants.
- *Water temperature* affects when animals and plants feed, reproduce and migrate.
- *Salinity* greatly determines where plants and animals live within the Bay.
- *Dissolved oxygen* is essential for animals living within the Bay.
- *Chemical contaminants* can affect the growth, survival and reproducibility of benthic organisms. In December 2000, the Chesapeake Bay Program adopted the Toxics 2000 Strategy, which commits to meeting voluntary goals that surpass current regulatory requirements and strives to achieve "zero release" of chemical contaminants into the Bay. Between 1988 and 1998, industries have reduced chemical releases by 67 percent.[21]

Of the sources emitting nitrogen and phosphorus into the Chesapeake Bay annually, agriculture is the largest source and is responsible for 38 percent of the nitrogen loads and 44 percent of the phosphorus loads. Animal manure and poultry litter together contribute half of the nitrogen coming from agricultural sources and more than half of the phosphorus. To make credible progress toward achieving the 2010 goal, strategies to effectively reduce the nutrient loads coming from manure and poultry litter are critical.[22] The percentages of nitrogen and phosphorus loads to the Chesapeake Bay are shown below in **Figure 3-10.**

Figure 3-10: Sources of Nitrogen and Phosphorus Loads to the Chesapeake Bay, 2002



Source: U.S. Environmental Protection Agency, Chesapeake Bay Program, 2004.

[21] *Ibid*.
[22] USEPA, Chesapeake Bay Program. *Primer: Finding Solutions to Excess Nutrients in Animal Manure and Poultry Litter*, November 2004.

Phosphorus occurs in dissolved organic and inorganic forms, and are often attached to particles of sediment. Phosphorus is a vital component in the process of converting sunlight into usable energy forms for the production of food and fiber. It is also essential to cellular growth and reproduction for organisms such as phytoplankton and bacteria. In the presence of oxygen, high concentrations of phosphates in the water will combine with suspended particles. These particles eventually settle to the bottom of the Bay and often become long-term constituents of the bottom sediments. Phosphorus compounds in the Bay generally occur in greater concentrations in less saline areas, such as the upper part of the Bay and its tributaries.[23]

Sediments are loose particles of clay, silt, sand and other substances that are suspended in water and also settle to the bottom of the Bay. Sediments are a natural part of the Bay ecosystem. During periods of rain or melting snow, soil and other particles are carried off the land and into waterways. Soil erosion caused by wave action along the Bay's shoreline is also a source of sediments in the Bay. Other natural processes that contribute to sediments in the Bay are wind, ice-flows and water currents.

Section 303(d) Impaired Surface Waters

The Federal Clean Water Act (CWA) requires states to assess water quality every two years and publish a list of waters failing to meet EPA's water quality standards. This list of impaired waters is called the "303(d) List." The Maryland DNR published results of the 1995-97 sampling of the *Maryland Biological Streams Survey* (MBSS), which assessed the statewide condition of Maryland's nontidal streams. The results of this survey are published in *State of the Streams 1995-1997: Maryland Biological Stream Survey*. Results of this survey helped develop the 2002 303(d) listing of impaired waters not meeting designated uses or applicable water quality standards. An impaired water is included on the section 303(d) listing when water quality monitoring data reveals that a waterbody does not meet or is not expected to meet a State's water quality standards. The 2002 303(d) listing is the most currently approved listing of impaired waters in Maryland.

Maryland's *Draft 2004 List of Impaired Surface Waters (303(d)) list and Integrated Assessment of Water Quality in Maryland* concludes that overall there are 946 listings on the current Integrated List. Only 659 of these may require a Total Maximum Daily Load (TMDL). Of the 659, 102 are listed for bacteriological (15.5%), 296 are listed for biological reasons (44.9%), 35 are listed for metals (5.3%), 96 are for nutrients (14.6%), 10 are pH listings (1.5%), 99 are for sediments (15.0%) and 21 are for toxics (3.2%).[24] Refer to **Appendix E** for a listing of these river segments.

Between 2002 and 2004, there were 122 new listings, 12 for fecal coliform, 2 for metals, 2 for low pH and 106 for biological impairments. All new listings in 2004 had other impairments that had been previously identified.[25] New 2004 listings of biologically

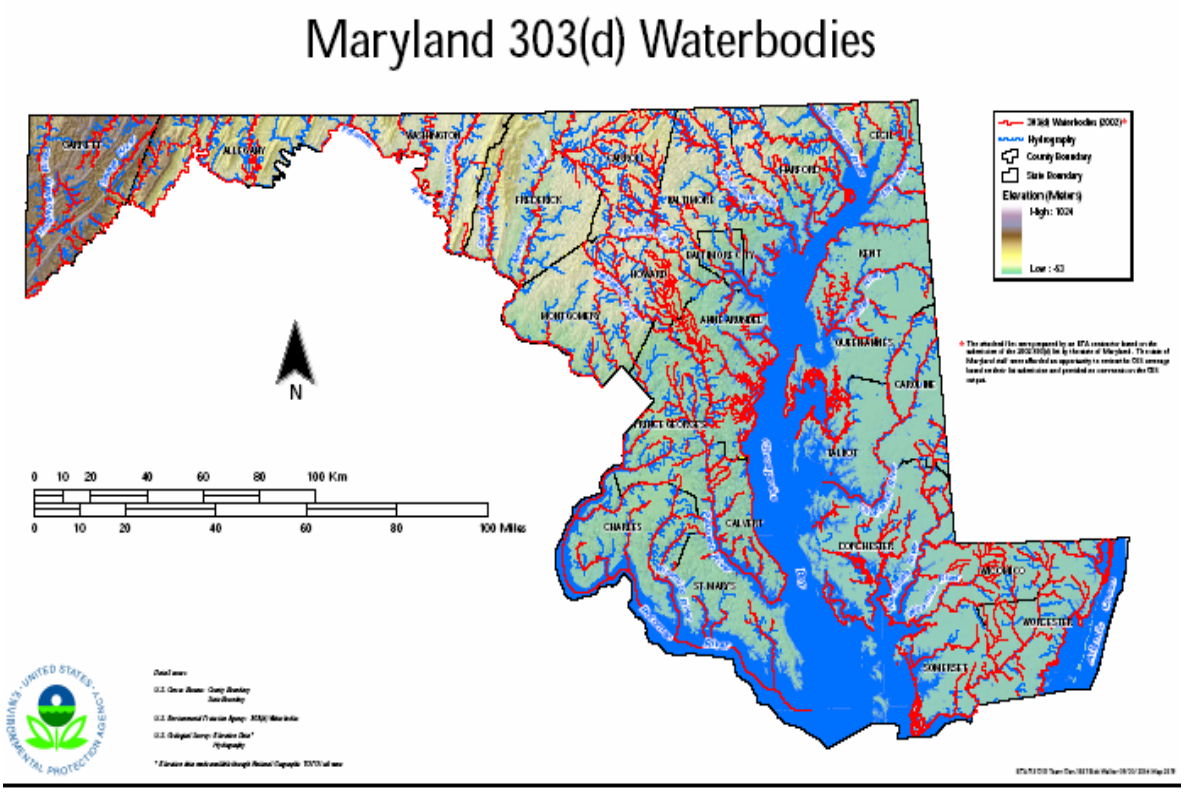
[23] *Ibid*.
[24] *Draft 2004 List of Impaired Surface Waters [303(d) List] and Integrated Assessment of Water Quality in Maryland*. Maryland Dept. of the Environment, Dec. 2004, pp. 46-47.
[25] *Ibid.*

impaired waters, based on the 2000-2002 MBSS data,[26] include the following watersheds:

- Conococheague Creek
- Lower Pocomoke River
- Middle Chester River
- Nanticoke River
- Patuxent River Middle
- Piscataway Creek

Figure 3-11 shows locations of water segments that have been included on Maryland's section 303(d) listing of impaired waters.

Figure 3-11: Maryland Section 303(d) Impaired Waterbodies



Source: Map prepared, Aug. 2004. Data sources include U.S. Census Bureau, U.S. Geological Survey, U.S.EPA 303(d) waterbodies. Note: The attached files were prepared by U.S. EPA, Region III contractor based on the admission of the 2002 303(d) list by the State of Maryland. The state staff were afforded an opportunity to review the GIS coverage based on their list submission and provided no comments on the GIS output.

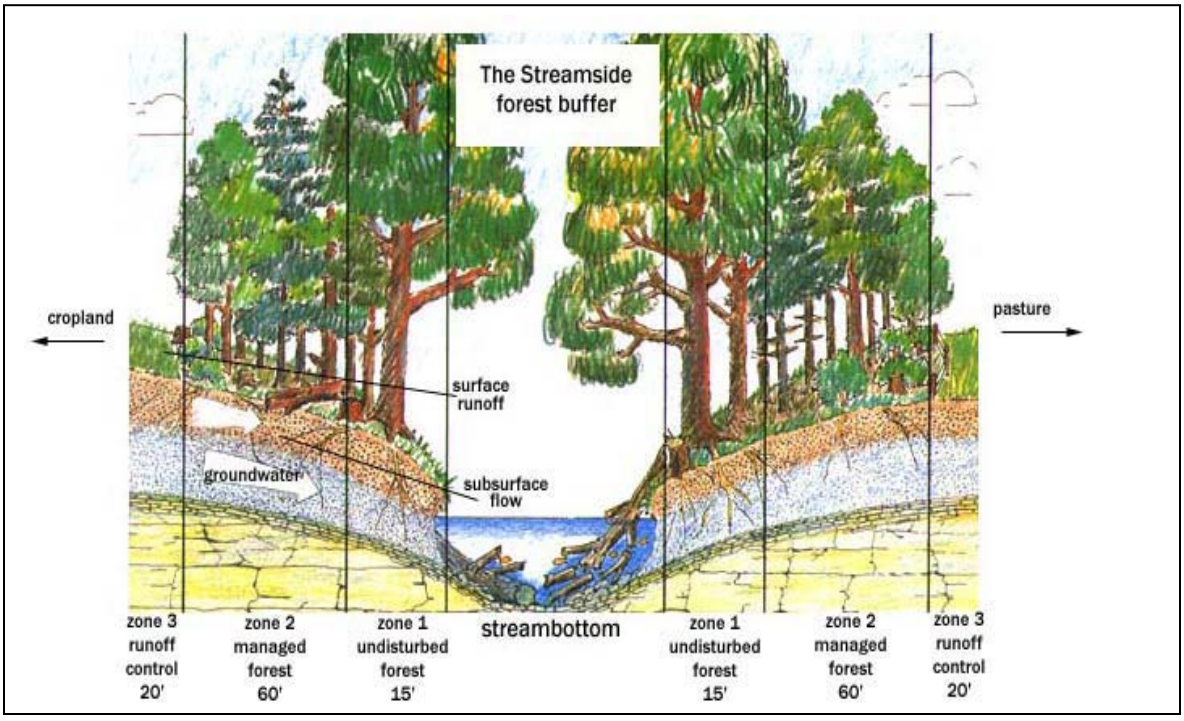
[26] Refer to the *Draft 2004 303(d) List* at http://www.mde.state.md.us/assets/document/2004-303d_List_DRAFTchap1-6.pdf.

3.4.3 Riparian Areas and Floodplains

In 2001, there were 628.5 miles of riparian forest buffers planted in the Chesapeake Bay Watershed, including 255 miles planted in Maryland. These acreages, combined with those from other watershed States, total 1,298 miles, and contribute 65 percent of the 2,010-mile goal for streamside buffers in the Chesapeake Bay Watershed by 2010.[27]

Riparian forest buffers (RFBs) provide benefits for reducing nutrients caused by agricultural practices and nonpoint urban and suburban runoff (**Figure 3-12**). Fully functional forested buffers can reduce nitrogen inputs by 60 to 95 percent and phosphorus inputs by over half (Lowrance et. al., 1997).[28]

Figure 3-12: Functions of Riparian Forest Buffers



Source: Maryland DNR.

The 1996 goal of establishing 2,010 miles of RFBs in the Chesapeake Bay Watershed by 2010 was achieved in 2002, mainly due to incentives provided by CREP in establishing new forest buffers. In 2003, the Chesapeake Bay Executive Committee recognized riparian forest buffers (RFB) as an effective way of reducing nutrient loads from agriculture and increased the RFB goal to 10,000 miles in the watershed by 2010. Also in 2001, a total of 10,100 acres of forest buffers were planted on agricultural land in Maryland, which contributes to the goal of establishing 22,033 acres for riparian reforestation on agricultural land by 2010.

[27] *The State of the Chesapeake Bay, A Report to the Citizens of the Bay Region*, Exec. Summary.
[28] USEPA, Chesapeake Bay Program. *Riparian Buffer Goals: Strategy and Cost of Attainment.*

Table 3-14 compares the 1996 goal to the revised 2003 goal of establishing forest buffers in the watershed by State partner.

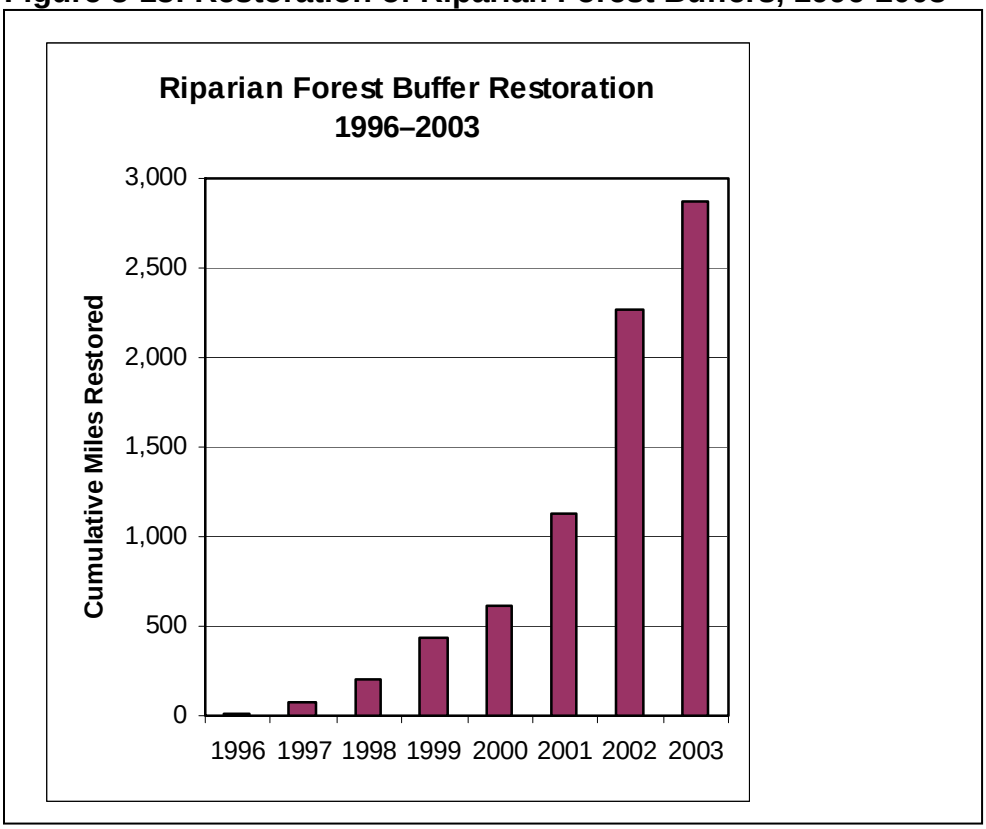
Table 3-14: Directive and Tributary Strategy Forest Buffer Goals¸ 1996 and 2003

Chesapeake Bay Partner State	Miles		
	Restored 1996-2003	Directive 03-01 (additional min.)	Tributary[1] Strategies
Virginia	1,68	3,200	46,843[2]
Maryland	**993**	**1,200**	**2,909**
Pennsylvania	740	3,300	10,716
DC and Federal[3]	36	--	--
TOTAL	2,937	7,700[4]	60,468

[1]Assuming 100-foot buffers.
[2]Virginia, using higher resolution imagery than the last Penn State study, came up with much higher numbers for available stream miles.
[3]Additional federal lands miles are included within state totals beyond 2003.
[4]Existing miles of 2,937 and estimated expanded miles of 7,700 totals to 10,637 miles Bay-wide
Source: Chesapeake Bay Program, Forestry Work Group. *Riparian Buffer Goals: Strategy and Costs of Attainment.*

Figure 3-13 shows the progress that has occurred of restoring riparian forest buffers throughout the Chesapeake Bay Watershed.

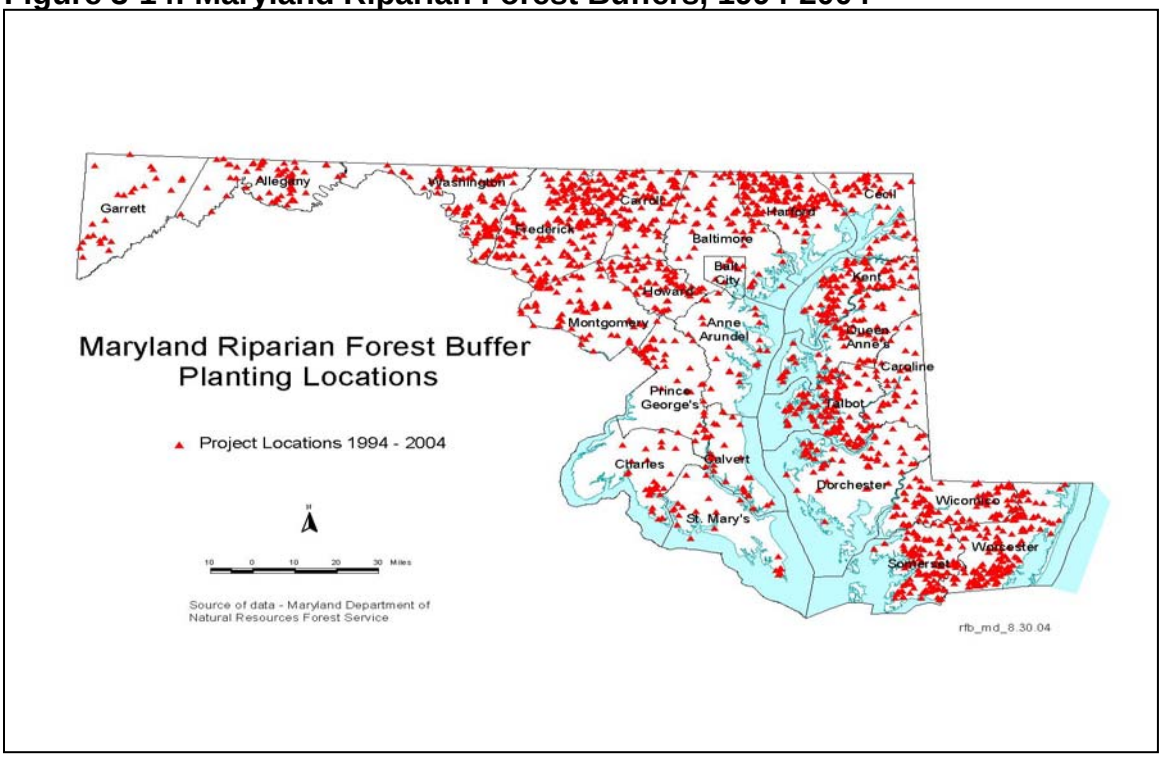
Figure 3-13: Restoration of Riparian Forest Buffers, 1996-2003



Source: U.S. Environmental Protection Agency, Chesapeake Bay Program, Forestry Work Group. *Riparian Buffer Goals: Strategy and Costs of Attainment.*

Figure 3-14 illustrates the distribution of riparian plantings in Maryland through 2004.

Figure 3-14: Maryland Riparian Forest Buffers, 1994-2004



Source: Map prepared by NPS, Chesapeake Bay Program Office, John Wolf; data provided by Maryland DNR, Forest Service, 2004.

3.4.4 Wetlands

Wetlands are areas that hold water for significant periods during the year and are characterized by anaerobic (low oxygen) conditions favoring the growth of specific plant species and the formation of specific soil types.[29] The definition of wetlands for regulatory purposes emphasizes three key attributes of wetlands:

- hydrology, the degree of flooding or soil saturation
- wetland vegetation, and
- hydric soils.

Approximately 600,000 acres of tidal and nontidal wetlands have been inventoried in the State of Maryland, of which about 94 percent are located on the Eastern Shore where about 16 percent of the area is classified wetlands. Of the State's total wetlands, 99.3 percent are classified as estuarine and palustrine. Palustrine are freshwater wetlands, representing 57.3 percent of the State's total wetlands. Of the palustrine wetlands, 88.7 percent are nontidal wetlands.

Estuarine wetlands are saltwater and brackish wetlands, representing 42 percent of the total wetlands in Maryland. About 82 percent (205,815 acres) of estuarine wetlands are

[29] Tiner and Burke. *Wetlands of Maryland*. 1995.

emergent, the most common estuarine type. Non-vegetated estuarine wetlands include 10.5 percent of the total acreage of estuarine wetlands.

Table 3-15 summarizes acreages and percentages for the predominant types of wetlands in Maryland based on 1995 data. **Table 3-16** summarizes the total acreage and percentage of the State for each county by wetland type. The counties encompassing the most wetlands acreage are Dorchester (28.3 percent) and Somerset (13.6 percent) Counties.

Table 3-15: Wetland Types throughout Maryland, 1995

Wetland Type	Acres	Percent of Total
Palustrine (freshwater)	342,626	57.3
Estuarine (saltwater/brackish)	251,542	42.0
TOTAL	**594,168**	**100.0**

Source: Tiner & Burke, *Wetlands of Maryland,* 1995.

Table 3-16: Wetland Types and Acreages by County, 1981-1982

County	Estuarine Acreage	Palustrine Acreage	Riverine, Lacustrine, Marine Acreage	Total Acres	%of State
Allegany	2,774	612	5	617	0.10
Anne Arundel	64	13,202	180	16,156	2.7
Baltimore City	2,491	155	31	250	0.04
Baltimore Co.	3,630	3,384	367	6,242	1.0
Calvert	2,121	7,077		10,707	1.8
Caroline		28,027	366	30,514	5.1
Carroll	2,184	4,229	562	4,791	0.80
Cecil	4,909	6,646	188	9,018	1.5
Charles	100,529	21,755	22	26,686	4.5
Dorchester		68,259	380	169,168	28.3
Frederick		7,243	82	7,325	1.2
Garrett	6,649	7,068	14	7,082	1.2
Harford		5,863	15	12,527	2.1
Howard	3,706	2,977	140	3,117	0.50
Kent		11,570	37	15,313	2.6
Montgomery	2,019	9,566	133	9,699	1.6
Prince George's	8,453	17,309	188	19,516	3.3
Queen Anne's	6,600	24,040	18	32,511	5.4
St. Mary's	62,408	9,671	25	16,296	2.7
Somerset	9,781	19,155		81,563	13.6
Talbot		9,993	193	19,967	3.3
Washington	14,277	2,101	9	2,110	0.40
Wicomico	18,954	23,141	343	37,761	6.3
Worcester		39,603	929	59,486	9.9

Source: Maryland Dept. of the Environment. *An Overview of Wetlands and Water Resources of Maryland*. Jan. 2000.

MDE is responsible for regulating and monitoring activities within Maryland's tidal and nontidal waters, wetlands and 100-year floodplains. Regulated activities include draining, dredging, excavating, filling, grading shaping, flooding, changing the hydrology or removing vegetation in waterbodies, floodplains and wetlands.

MDA is responsible for reviewing and approving the design, construction, operation and maintenance of agricultural drainage projects that are financed or managed by a Public Drainage Association (PDA). NRCS is available to provide technical assistance to farmers for planning and certifying a CREP practice, which must meet all applicable requirement of Federal, State and local laws and regulations, including the sodbuster/swampbuster provisions of Title XII of the Food Security Act of 1985 (7 CFR Part 12). As part of the CREP planning process, NRCS will conduct an onsite environmental evaluation, advise the client of various permit requirements, including Section 404, and provide assistance with the permit application, if needed.

A joint Federal/State permit is required before any regulated activity is conducted. If jurisdictional wetlands may be affected by a proposed CREP practice, NRCS will make a certified wetland determination for the USDA participant. For each CREP contract, NRCS provides environmental documentation to FSA through the MD-CPA-052 form.

Many agricultural activities are either exempt from permit requirements or may be covered with a general permit. General permits have specific limitations and are not valid for construction activities that affect rivers designated Wild and Scenic or their floodplains. Pursuant to COMAR 20.15.20.01, implementation of BMPs is required to protect water quality, wetlands and riparian habitat. BMPs must be incorporated into an approved soil conservation and water quality plan, which must be consistent with the State's 1991 nontidal wetlands regulations if the activity occurs in a nontidal wetland not previously used for agriculture. Agricultural activities exempt from these regulations are—[30]

- Ongoing agricultural activities conducted in accordance with public drainage regulations
- New agricultural activity not occurring in a nontidal wetland
- Changing from one agricultural activity to another, provided that additional non tidal wetlands are not converted
- Agricultural activities on areas that have lain fallow for five consecutive years
- Agricultural activities in nontidal wetlands that were under a set-aside program, provided that activities resume within five years after the expiration of the time limit specified in the set-aside contract
- Agricultural activities having a minimal impact on forested wetlands provided the wetland is not converted to upland, tree canopy is maintained and water quality is not degraded
- Agricultural activities impacting isolated, nontidal wetlands < 1 acre or less than 5,000 square feet of wetland, if the wetland has no significant wildlife/plant value
- Repair and maintenance of structures used for agriculture

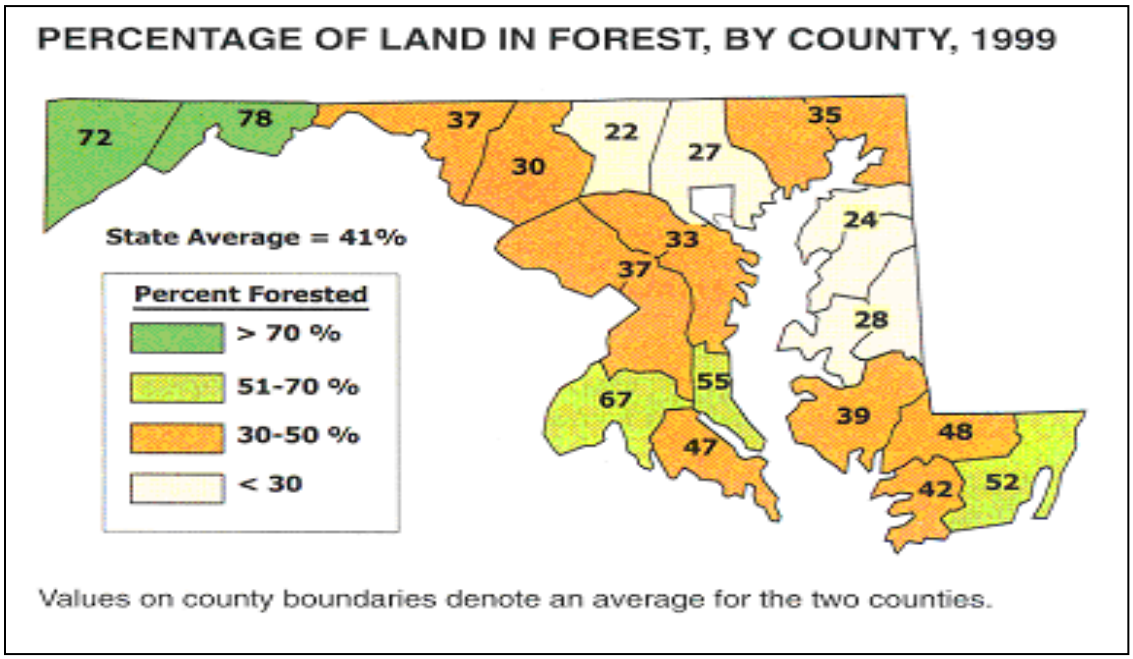
[30] Maryland Department of the Environment. *Nontidal Wetlands Regulations and Agriculture.*

Under its commitment to the Chesapeake Bay Agreement, Maryland has pledged to restore 15,000 acres of the 25,000-acre wetland goal for *Chesapeake 2000* by 2010. To date, nearly 6,000 acres have been restored through programs that favor restoration on agricultural land.[31]

3.4.5. Forestlands

In 1997, about 2.6 million acres of forestland existed in Maryland, which comprised about 41 percent of the State's land base. The most heavily forested counties are Garrett and Allegany, which are located in the westernmost part of the State. Although Maryland is the fifth most densely populated State, nearly half of its land cover is forested. **Figure 3-15** presents the percentages of forestland in Maryland counties for 1999.

Figure 3-15: Percentage of Land in Forest in Maryland by County, 1999



Source: *The Maryland Envirothon*. Forestry 2004 Resource Site. http://www.dnr.state.md.us/education/envirothon/forestry/

3.5.2 Threatened, Endangered and Declining Species

The FWS is the Federal agency responsible for listing and enforcing protection of species that are federally protected under the Endangered Species Act of 1973 (ESA), as amended. As of August 2004, there were 19 animals and 7 plants in Maryland listed as federally protected under the ESA in the State.[32] **Appendix F** provides a listing of these species in Maryland.

[31] Chesapeake Bay Program. "A Tributary Strategies Habitat Goals for Wetlands, Streams and Forests.
[32] U.S. Fish and Wildlife Service, Threatened & Endangered Species System (TESS), as of Aug. 25, 2003; www.fws.gov/tess_public

MDNR's Wildlife and Heritage Service, Natural Heritage Program, monitors the status of more than 1,100 native rare plants and animals in Maryland. Of these species, MDNR officially recognizes 659 species and subspecies as endangered, threatened, in need of conservation, or extirpated. The primary State law that lists and protects endangered species is the *Nongame and Endangered Species Conservation Act* (Annotated Code of Maryland 10-2A-01). This Act is supported by regulations (COMAR 08.03.08), which contain the official State threatened and endangered species list.

MDNR's Fisheries Service maintains an official list of game and commercial fish species that are designated as threatened or endangered in Maryland (COMAR 08.02.12). **Table 3-17** summarizes the number of federally and State protected species in the State of Maryland.

Table 3-17: Federally and State Protected Species in Maryland, 2003

Federally Listed Species		
Category	**Plants**	**Animals**
Endangered	5	23
Threatened	4	5
Total Federally Listed Species	**9**	**28**
State Listed Species*		
Category	**Plants**	**Animals**
Endangered	271	72
Threatened	73	17
In Need of Conservation	n/a	49
Endangered Extirpated	154	23
Total State Listed Species	**498**	**161**

* Summary of State Listed Species includes species lists in COMAR 08.02.12 and 08.03.08.

Source: Maryland DNR, Mar. 13, 2003.

FWS identified five primary species of concern that are threatened by agricultural activities. These species and the counties in which they are known to occur are listed in **Table 3-18**.

Table 3-18: Declining Species of Concern in Maryland, 2004

Declining Species	**County Species Known to Occur**
Bog turtle (*Clemmys muhlenbergii*)	Carroll, Baltimore, Cecil and Harford
Swamp pink (*Helonias bullata*)	Anne Arundel, Cecil and Dorchester
Delmarva fox squirrel (*Sciurus niger cinereus*)	Dorchester, Talbot, Kent, Queen Anne's, Somerset, Worcester, Wicomico and Caroline
Bald eagle (*Haliaeetus leucocephalus*)	All Maryland counties *except* Allegany, Washington and Garrett
Dwarf wedge mussel (*Alasmidonta heterodon*)	St. Mary's, Charles, Queen Anne's, Talbot and Caroline

Source: U.S. Fish & Wildlife Service, Maricela Constantino email, dated Oct. 1, 2004.

Complete listings of the *Rare, Threatened & Endangered Plants and Animals of Maryland,* including all State-listed species and those that are federally listed species in Maryland, can be reviewed in **Appendix F**.

Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, signed in 2001, directs all Federal agencies to promote conservation of migratory bird populations. Species listed in the "Migratory Nongame Birds of Management Concern in the United States," priority migratory bird species documented in plans such as *Bird Conservation Regions in the North American Bird Conservation Initiative* or *Partners in Flight* physiographic areas, and species listed in 50 CFR Part 17.11 should be given high priority in addition to those species protected under the ESA.

MDNR released results of the *2004 Midwinter Waterfowl Survey*, which showed that total waterfowl counts were down slightly from 798,000 waterfowl in 2003 to 781,300 in 2004. This decline was partially attributed to reduced coverage of inland areas and a lower usage of Federal aircraft. Species that showed increases included dabbling ducks, particularly along the lower Chester River in Kent County and in Dorchester County. Mallards, black ducks, American widgeons, northern pintails and diving ducks showed significant increases.

Table 3-19 compares the overall observations of waterfowl species in Maryland from 2000 to 2004, based on the *Midwinter Waterfowl Survey* results. As shown in the table, the total waterfowl populations for Maryland have declined 11.3 percent during this period.

Table 3-19: Maryland Midwinter Waterfowl Survey Results, 2000-2004

Species	2000	2001	2002	2003	2004
Dabblers	93,200	99,400	68,800	68,400	94,300
Divers	241,200	219,600	310,000	169,900	188,200
Ducks	341,300	340,500	390,400	247,300	215,400
Total	**881,100**	**879,000**	**919,000**	**798,000**	**781,300**

Source: MDNR website: http://www.dnr.state.md.us/dnrnews/pressrelease2004/031704b.html, posted Mar. 17, 2004.

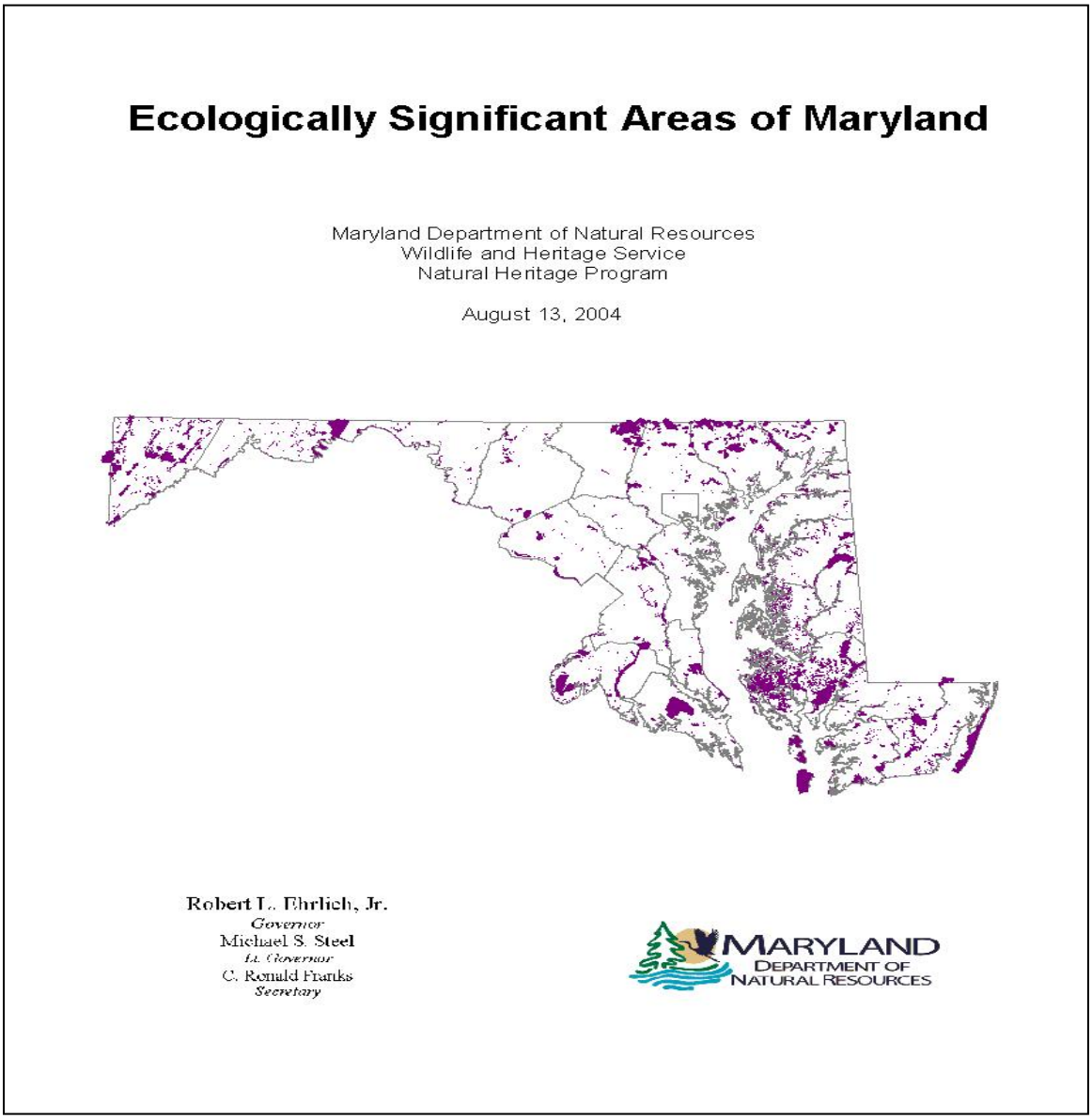
3.5.3 Wildlife Habitat

More than 3,600 species of plants, fish and animals live in the Chesapeake Bay and more than 300 species of migratory waterfowl, songbirds and birds of prey seek the shallow coastal bays for food and shelter.[33] Fish ranging from small minnows to striped bass several feet long can be found in Maryland's waters. Freshwater fish habitats consist of cool water streams in the western part of the State that support trout, and warm water streams throughout Maryland. Many rivers and streams of the Coastal Plain provide spring spawning habitat for anadromous fish, such as American shad, hickory shad, alewife herring, blueback herring, yellow perch, and white perch.[34]

[33] Maryland DNR. *Maryland's Coastal Program.* Coastal Facts, http://www.dnr.state.md.us/bay/czm/coastal_facts.html
[34] *Ibid.*

Figure 3-16 shows the ecologically sensitive habitat areas known to occur throughout Maryland, based on information obtained by MDNR.

Figure 3-16: Ecologically Significant Areas of Maryland



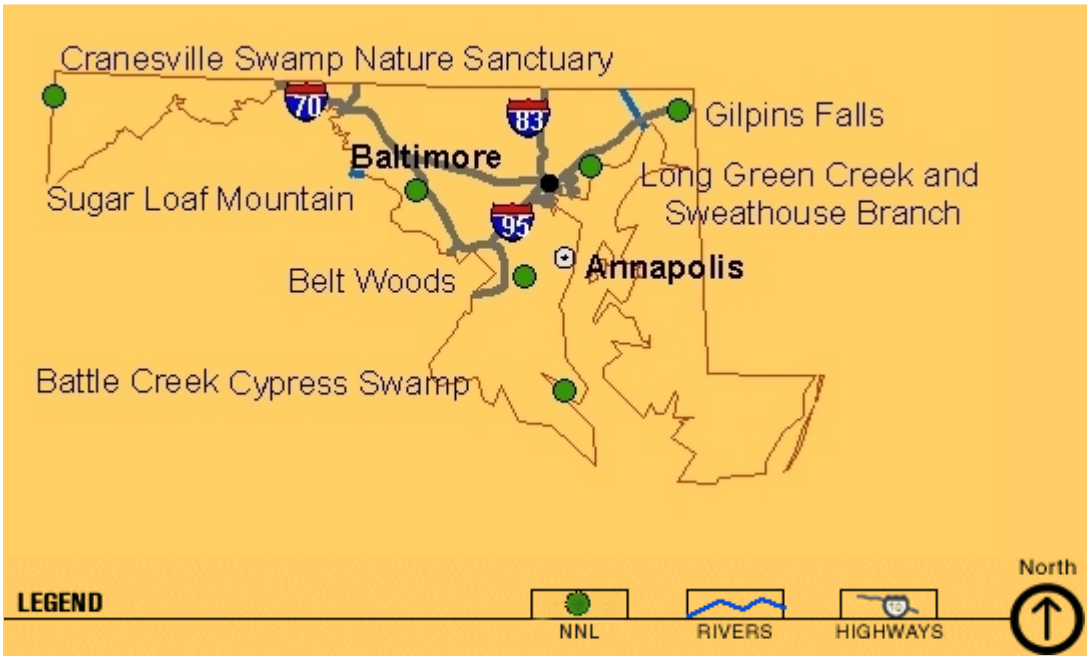
Source: Maryland DNR, Natural Heritage Program, Aug. 2004.

Maryland National Natural Landmarks

In addition to the ecologically significant areas, Maryland has six National Natural Landmarks (NNLs) (**Figure 3-17)**. These sites are—

- Battle Creek Cypress Swamp, located in Calvert County. The site is privately owned and is one of the most northerly cypress swamps in the country, containing a wide range of plant and animal life.
- Belt Woods, located in Prince George's County. The site is State-owned, and is one of few remaining old-growth upland forests in the Atlantic Coastal Plain physiographic province.
- Cranesville Swamp Nature Sanctuary, located mainly in Garrett County, Maryland, and extends into Preston County, West Virginia. The site is privately owned and occupies a natural bowl where cool, moist conditions are conducive to plant and animal communities more common in northern locations.
- Gilpin's Falls, located in Cecil County. The area exposes a spectacular sequence of early Paleozoic rocks and is probably the best outcrop of undeformed early Paleozoic metavolcanic pillow basalts in the Middle Atlantic States. It is also a prime example of a Fall Zone stream. The area is under private land ownership.
- Long Green Creek and Sweathouse Branch is located in Gunpowder Falls State Park, Baltimore County. Mature beech-tulip poplar-white oak forest, representative of the climax mesic forest type in the region, and containing an outstandingly rich herbaceous flora.
- Sugar Loaf Mountain, located in Frederick County, is privately owned. The site provides evidence about age and structural relationships of rocks of the Piedmont Province and appears to be either an outlier to the east of the main mass of Catoctin Mountain or a root remnant of the ancient Appalachia land mass.

Figure 3-17: Maryland National Natural Landmarks, 2004



Source: National Park Service, www.nps.gov

3.5.4 Invasive Species

As a Federal agency, USDA must comply with Executive Order 13112, *Invasive* Species, which addresses the introduction of invasive species and provides measures for their control. The National Invasive Species Council was established, as directed by Executive Order 13112, and was charged with developing a National Invasive Species Management Plan that provides goals and objectives to control and/or eradicate invasive species.

USDA is working with the U.S. Departments of Commerce and Interior to develop national initiatives that address problems associated with invasive species (insects, weeds, aquatic organisms, etc.). Existing USDA programs, including CREP, will be reviewed to develop specific initiatives for noxious weeds and aquatic organisms. All CREP contracts stipulate that noxious weeds and other undesirable plants, insects and pests must be controlled to avoid adverse impacts on surrounding land.

Invasive species programs will strengthen their ability to coordinate regulatory actions with regard to biocontrol initiatives. Special emphasis will be placed on the development of a National Invasive Species Database, and USDA will help organize Regional Pest Management Centers and oversee a research and education plan for growers. [35]

The State of Maryland established a Maryland Invasive Species Council that encourages efforts to prevent the introduction of these species and to manage their impacts on Maryland's ecosystems. The Maryland Invasive Species Council has developed a listing of exotic and invasive species of concern because they—

- are currently regulated by a State and/or Federal law,
- are widely recognized by biologists and resource managers to degrade natural ecosystems or negatively affect native species, are known to have significant economic impacts on agricultural ecosystems, public infrastructure or natural resources, including impact on recreational activities, or
- could cause deleterious effects on human health.

Invasive species show a tremendous capacity for reproduction and distribution and can have negative impacts on environmental, economic, and community priorities. With a highly efficient reproduction and adaptability to new habitats, invasive species can quickly eliminate native species from the landscape. More than 45 percent of species federally listed as endangered, rare, or threatened are potentially affected by newly introduced species in the United States.[36]

Invasive species in Maryland include mammals, amphibians, reptiles, birds, insects, plants, fish, shellfish, even jelly fish, insects, plants and viruses. **Appendix G** provides a listing of invasive and exotic species known to occur in Maryland. The following invasive species in Maryland are of particular concern to MDNR[37]:

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[35] Findings and Recommendations - National Drought Policy Commission Environmental Issues Group Draft Report; http://www.fsa.usda.gov/drought/finalreport/fileb/ei_draft.htm

[36] MDNR, Wildlife & Heritage Service, http://www.dnr.state.md.us/wildlife/invintro.html

[37] *Ibid.*

- mute swans (*Cygnus olor*)
- nutria (*Myocaster coypus*)
- snakehead (*Channa marulius)*
- zebra mussels (*Dreissena polymorpha*)
- water chestnut (*Trapa patens*)
- phragmites (*Phragmites australis*)
- purple loosestrife (*Lythrum salicaria*)
- *phytophthora ramorum*, a fungus that causes leaf spots, cankers and dieback in more than 12 plant families

The presence of exotic species usually indicates a history of site disturbance and may indicate a degraded natural community. The worst species are those that are damaging, easily established, and readily dispersed, such as Japanese honeysuckle (*Lonicera japonica*) and devil's tearthumb (*Tracaulon perfoliatum*). English ivy (*Hedera helix*), climbing euonymus (*Euonymus fortunei*), winged wahoo (*Euonymus alatus*) and Norway maple (*Acer platanoides*) are particularly pernicious in forested environments because they are adapted to low-light conditions and can invade high-quality forests with closed canopies.[38]

3.5 Historic and Cultural Resources

The Maryland Inventory of Historic Properties is a broad-based repository of information on districts, sites, buildings, structures, and objects of known or potential value to the prehistory, history, upland and underwater archeology, architecture, engineering, or culture of the State of Maryland. The inventory, created shortly after the Maryland Historical Trust was founded in 1961, includes data on more than 8,000 archeological sites and 80,000 historic and architectural resources.[39]

3.5.1 National Register of Historic Places

Established by the National Historic Preservation Act of 1966, the *National Register of Historic Places* is a program of the U.S. Department of the Interior, National Park Service, and is administered at the State level by the Maryland Historical Trust. The *National Register* currently comprises 1,293 listings in Maryland, including 183 historic districts.

The *National Register* recognizes districts, buildings, structures, objects, and sites for their significance in American history, archeology, architecture, engineering, or culture, and identifies them as worthy of preservation. *National Register* designation does not restrict the rights of private property owners to do anything they wish with their property, provided that no Federal funding, permit, or license is involved. Owners of properties listed in the *National Register* may be eligible for financial assistance for eligible historic preservation projects, including Federal investment tax credits for rehabilitation.

[38] MDNR, Wildlife & Heritage Service, "Non-Native Plant Species," http://www.dnr.state.md.us/wildlife/iepintro.html
[39] Maryland Dept. of Housing and Community Development, Division of Historical and Cultural Programs, Maryland Historical Trust. http://www.marylandhistoricaltrust.net/

3.5.2 National Historic Landmarks

The *National Historic Landmark* (NHL) designation is applied to properties of national significance which are considered to possess exceptional value or quality in illustrating or interpreting the heritage of the United States, and which possess a high degree of integrity. The NHL program is administered by the National Park Service and is intended to encourage the long term preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States. As of 2004, 72 NHLs had been designated in Maryland. A listing of Maryland's NHLs and their locations is provided in **Appendix H.**

3.5.3 Cultural Resources

Early Native Americans of Maryland were fishermen-hunters and farmer-gatherers, who lived along the coast and the region's waterways. The Eastern Shore was once occupied by Algonquian-speaking peoples, including Tockwoghs, who disappeared early from the Sassafras River, and the Ozinies (Wicomiss), who left their Chester River homeland in the 1640s after warfare with the English. The Choptanks, Pocomokes and Nanticokes lived along the rivers for which the tribes were named. The "Assateagues" and "Indian River" people dwelled on the ocean side of the Eastern Shore. By 1678, the colonials established reservations on the Eastern Shore, one on the south side of the Choptank River and the remaining established for the Nanticokes, the Wicomicos and the Pocomokes.

At the fall line, where Washington D.C. is now located, the Anacostians dwelled. Downstream were the Piscataways, the Mattawomans and Portobaccos. The Yoacomocos lived on St. Mary's River. The Patuxents moved upstream in 1650 and then dispersed, some families eventually going to the Eastern Shore and many more moving west to the Choptico Reservation. Today, there are no federally recognized tribal lands in Maryland.[40]

[40] Rountree, Helen C. "Native Americans." Maryland History and Culture. http://www.mdhc.org/bibliotest/essays.php?essay=21

CHAPTER 4.0 ENVIRONMENTAL CONSEQUENCES

Chapter 4 assesses the direct, indirect and cumulative effects of two alternatives designed to help reduce nutrients and phosphorus and nitrogen loads caused by agricultural practices into the Chesapeake Bay and enhance wildlife habitat for declining species. Two alternatives are evaluated in this PEA—

- Alternative 1-No Action, which evaluates the existing conditions and programs
- Alternative 2-Continuous Enrollment Program, which describes the expanded Maryland CREP identified in the 2004 Memorandum of Agreement

The components of these alternative are more fully described in Chapter 2-Description of Alternatives. Because several factors relating to specific resources are similar between the two alternatives, the alternatives analyses will be conducted by impact category. These impact categories are—

- soils
- water resources and water quality
- riparian areas, wetlands and floodplains
- wildlife habitat and forestlands
- terrestrial and aquatic species
- Federally and State protected species
- invasive species
- air quality
- historic and cultural resources
- socioeconomic impacts, including environmental justice
- cumulative impacts

Due to the programmatic nature of this evaluation, the impact analyses may not always be quantifiable. Information is presented in a broad, programmatic manner to enable decisionmakers to understand the effects and benefits of CREP on the resources within the State of Maryland and the Chesapeake Bay Watershed.

4.1 Soils

Erosion can result in significant changes in surface soil properties affecting the sustainability of production. The organic composition of soil is not only important for good soil fertility, improved soil permeability, resistance to surface soil crusting and other factors related to crop production potential, but it is also important to the soil's ability to resist erosion.[1]

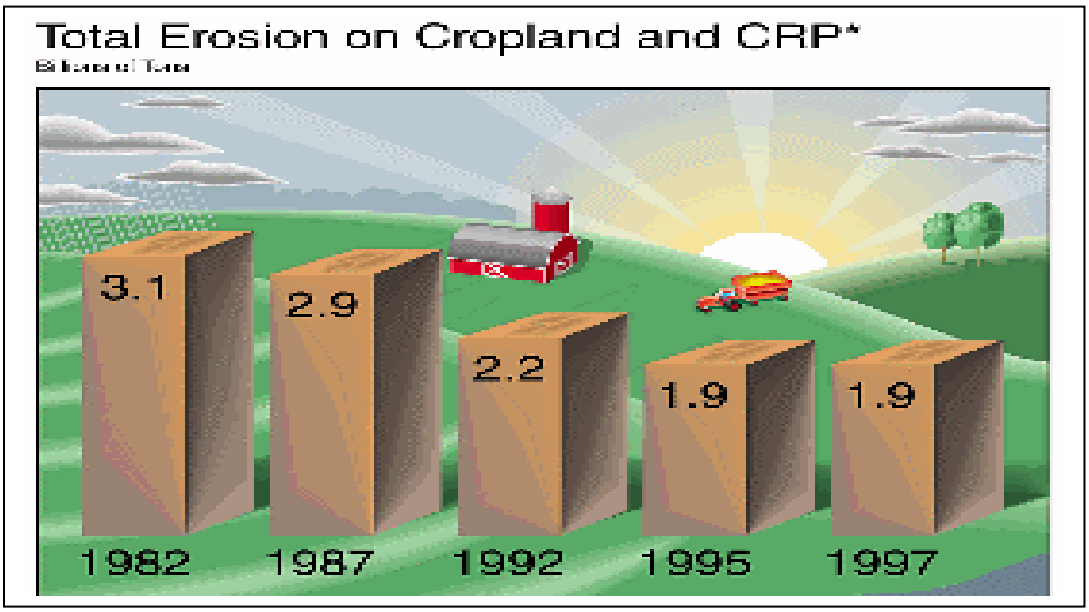
Figure 4-1 shows that soils erosion declined nationwide between 1982 and 1997 on CRP lands, and decreased by 450 million tons since the inception of CRP. As a result, soil quality has increased due to the retention of more topsoil on the land due to the absence of cultivation. Much of this decline has occurred because of implementation and

[1] Veseth, Roger. Oregon State University, Conservation Tillage Handbook, Chapter 1. "Erosion Makes Soils More Erodible."

monitoring of BMPs and because Federal and State farm programs, such as CREP, have supported improved cultivation practices, erosion control and flood control measures.

In 2001, Future Harvest-Chesapeake Alliance for Sustainable Agriculture (CASA) asked several Maryland farmers to provide insights into the effectiveness of CREP. These farmers cited the benefits of planting trees and warm season grass buffers along stream banks to slow down runoff, trap nutrients and pesticides and keep soils in the fields.

Figure 4-1: Total Erosion on Cropland and CRP Lands Nationwide



Source: USDA-Natural Resource Conservation Service, 2002.

4.1.1 Alternative 1-No Action (Existing Conditions)

Alternative 1 provides for enrollment of up to 100,000 acres in CREP through February 2004. Of this acreage, up to 20,000 acres of HEL with an EI ≥8, located within 1,000 feet of a stream or other waterbody, were targeted for enrollment into CREP. As of March 2004, nearly 12,021 acres had been enrolled in CREP to address the needs of HEL and sedimentation.

Because the existing Maryland CREP agreement under this alternative expired in February 2004, selection of this alternative would not allow for additional CREP agreements or continuance of agricultural conservation practices. Selection of this alternative would not actively meet the goals of established by CREP nor meet the State's commitment to *Chesapeake 2000*. In addition, if Alternative 1 is selected and CREP is not renewed, previous investments by FSA and Maryland's agricultural community to contribute to restoring the health of the Chesapeake Bay would most likely be reversed due to the increased erosion and sedimentation that would occur without continued CREP conservation practices.

4.1.2 Alternative 2- Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)

Alternative 2 establishes a goal to reduce the amount of sedimentation entering the Chesapeake Bay by 200,000 tons annually. To accomplish this goal, eligible conservation practices, such as establishing riparian buffers, filter strips and tree plantings, as well as permanent native grasses, are eligible for reimbursement to landowners. Funding that would be continued under Alternative 2 would help make planting streamside buffers that reduce soil erosion and runoff into streams more cost-effective for landowners. CREP offers competitive soil rental rates, plus up to 87.5 percent cost-share for many conservation practices.

Alternative 2 would allow enrollment of up to 16,000 acres of HEL located within 1,000 feet of a stream or other water body with a weighted average EI ≥16. This differs from Alternative 1, which would allow 20,000 acres with an EI ≥8. Land enrolled under the existing program may be included in this target acreage. The following conservation practices would be approved for HEL enrolled in CREP:

- CP1-Introduced Grasses/Legumes
- CP2-Native Grasses/Legumes
- CP3-Tree Planting
- CP3A-Hardwood Tree Planting
- CP4D-Permanent Wildlife Habitat

4.2 Water Resources and Water Quality

Changes in land uses along the Bay and its tributaries have led to increased sediment, nutrient, metal and organic chemical loadings to Maryland's waters. Results of sampling conducted by the *Maryland Biological Streams Survey* in 2001 showed that total nitrogen tended to be highest in the waters of Central Maryland and on the Eastern Shore, where farming is focused. Total phosphorus tended to be higher on the Eastern Shore, lower in western Maryland and moderate in the central part of the State.[2]

As discussed in **Chapter 3, section 3.3.5**, MDA and EPA conducted studies on the use of pesticides and fertilizers in Maryland by county and discovered that 153,691 tons of nutrients from fertilizer were used in the State of Maryland. Caroline, Carroll, Frederick, Harford and Queen Anne's Counties were the top five counties contributing to this usage. Nearly 1 million pounds of insecticides were used in Maryland in 1994 with Washington, Montgomery, Wicomico, Cecil and Caroline Counties using the greatest amount.

Despite these reports of fertilizer and pesticide usage, the Chesapeake Bay Program and USGS monitoring data from major rivers entering tidal waters of the Chesapeake Bay show that nitrogen concentrations are decreasing in the Susquehanna, Potomac and Patuxent Rivers. Phosphorus concentrations are decreasing in portions of the Susquehanna and the Patuxent Rivers, although the Potomac River has shown an increase. Sediment concentrations are decreasing in portions of the Susquehanna River and in the Potomac and Patuxent Rivers.

[2] *Ibid.*

The current problem with the water quality in the Bay is that it is supporting too many nutrients, which causes excessive plant growth, especially algae. When the plants die, they settle to the bottom where they naturally decompose from bacteria. The bacteria uses dissolved oxygen from the Bay's bottom waters, and often removal of dissolved oxygen is substantially increased, resulting in mortality for many organisms. The low dissolved oxygen levels caused by excess nutrients are the primary reason large bottom sections of the Bay are unsuitable for bottom-dwelling organisms, such as shellfish.
Reduction in the amount of fertilizers applied to agricultural crops and increased planting of trees are agricultural practices that could help improve these conditions.[3]

According to Maryland's Tributary Strategy, prepared for USEPA's Chesapeake Bay Program, agriculture contributed to 39 percent of the nitrogen and 43 percent of the phosphorus to the Bay in Maryland in 2002. These levels were reduced by 31 percent for nitrogen and 41 percent for phosphorus between 1985 and 2002. If the Agricultural Strategy developed for Maryland is fully implemented, the Bay Program estimates that nitrogen runoff will be reduced by 64 percent and phosphorus runoff will be reduced by 58 percent from 1985 levels by 2020 in the watershed. Agricultural Strategy examples proposed for the Chesapeake Bay Watershed farms include[4]:

- 600,000 acres of cover crops, 150,000 acres of small grain enhancement and 50,000 acres of alternative crops (warm season grasses) covering more than 75% of row crop acres will be planted in Maryland
- Between 2000 and 2002, about 10,100 acres of forest buffers were planted on agricultural land. The overall 2010 goal for riparian reforestation on agricultural land is 22,033 acres
- 57,352 acres of grass buffers will be planted
- More than 12,207 acres of wetlands will be created
- 100 percent of all farms will implement nutrient management plans
- Nutrient loads will also be reduced through increased manure transport. All excess manure will be either transported for land application out of the watershed or used by an alternative beneficial use.
- Developing agricultural technologies, such as variable rate fertilizer application, will be implemented.

4.2.1 Alternative 1-No Action (Existing Conditions)

Under Alternative 1, CREP identified up to 100,000 acres for enrollment by December 31, 2002. Of this total, 70,000 acres were targeted for planting trees or grass cover in riparian areas, 10,000 acres of wetlands restoration, and up to 20,000 acres of HEL with a weighted average EI ≥8 could be enrolled. The overall goal was to take actions to help reduce runoff of sediments and nutrients into the Bay and to enhance wildlife habitat. The specific objectives that were established to meet the reduction in nutrients were:

[3] Maryland DNR, Chesapeake Bay, Streams, Coastal Bays and Watersheds. "The Problem with Excess Nutrients." www.dnr.state.md.us/bay, Feb. 17, 2004.
[4] Maryland DNR. "Maryland's Tributary Strategy, 2004 Tributary Strategy Executive Summary."

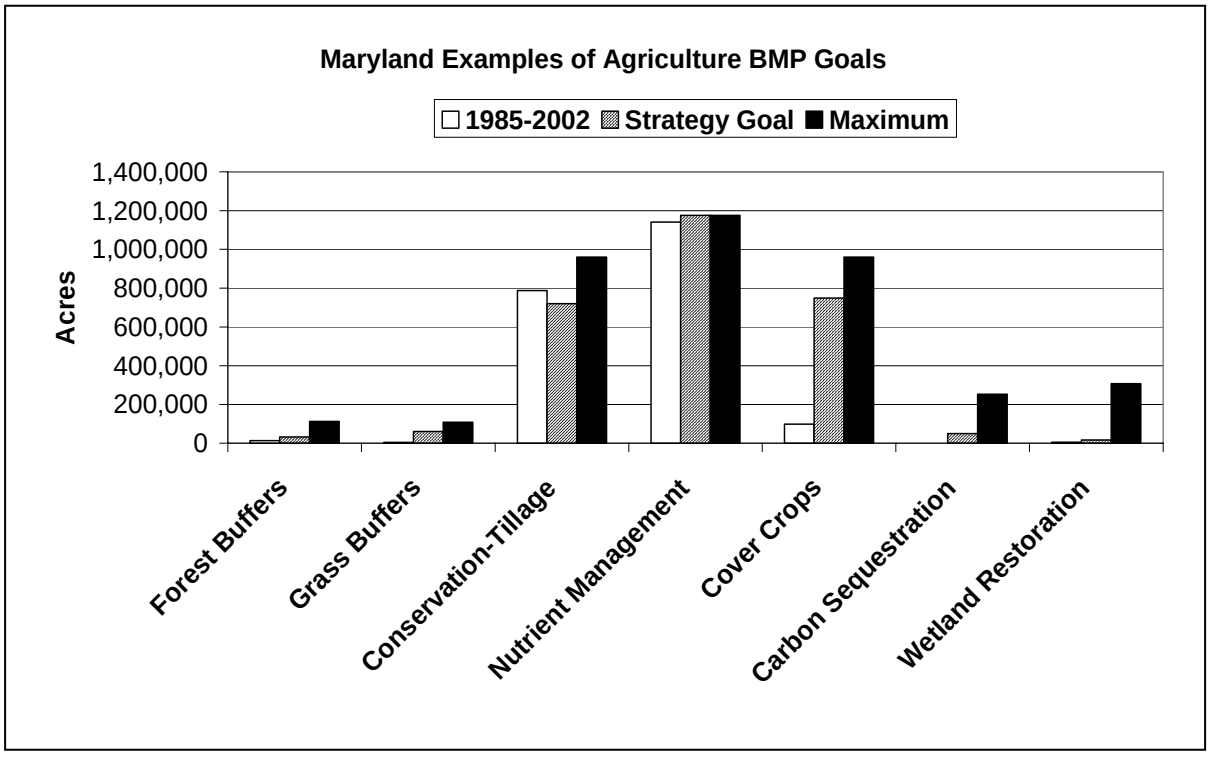
1. Reduction of approximately 5,750 tons of nitrogen and 550 tons of phosphorous annually from agricultural lands;
2. Reduction of approximately 200,000 tons of sediment annually into streams from agricultural lands; and

Alternative 1 offers special incentive payments, as a percentage of the CRP maximum annual rental rate. Incentive payments for the following conservation practices cannot exceed the following percentages of the rental rate:

- riparian buffers, 100 percent
- grass filter strips, 80 percent
- wetland restoration, HEL and habitat enhancement for declining species, 80 percent

Alternative 1 utilized the existing Tributary Strategy Teams to assist in the promotion of CREP. In conjunction with CREP's targeted lands, **Figure 4-2** illustrates how Maryland's Tributary Strategy employs additional approved Best Management Practices (BMPs) and how these BMPs contribute toward meeting the goals of water quality improvement. These agricultural BMPs are listed in **Appendix A**.

Figure 4-2: Effectiveness of Approved BMPs in Meeting Maryland's Tributary Strategy



Note: Based on draft #6of Maryland Tributary Strategy, as of May 19, 2004
Source: U.S. Environmental Protection Agency, Chesapeake Bay Program, http://www.chesapeakebay.net/tribtools.htm.

These BMPs, combined with existing CREP conservation practices, have worked together toward achieving the goals established in Maryland's Tributary Strategy and toward USDA's commitment to improving water quality under *Chesapeake 2000*. Under Alternative 1, approximately 71,208.5 acres have been enrolled in CREP and 4,398.25 acres are permanently protected in CREP easements. Because the existing MD CREP agreement expired in February 2004, additional contracts and easements cannot be approved. Selection of this alternative would not meet the goals of CREP or support the State's commitment to *Chesapeake 2000.*

4.2.2 Alternative 2- Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)

The new CREP agreement proposes to reduce 5,750 tons of nitrogen and 550 tons of phosphorus annually, to reduce sediments into streams from farmland by about 200,000 tons annually and to enhance 93,000 acres of riparian habitat, 5,000 acres of wetland habitat and 2,000 acres of habitat for declining (threatened, endangered and priority waterfowl[5]) species in Maryland.

To accomplish the goals of improving water quality, Alternative 2 would authorize enrollment of the following acreages in CREP aimed at reducing nutrients and sediments from entering the Chesapeake Bay—

1) Up to 77,000 eligible acres, including acres previously enrolled, with buffers 35-100 feet wide, located adjacent to streams, wetlands or other waterbodies, that utilize the following conservation practices:
    a. CP4D (Permanent Wildlife Habitat)
    b. CP21 (Filter Strips)
    c. CP22 (Riparian Buffers)
    d. CP29 (Marginal Pastureland Wildlife Habitat Buffers)
    e. CP30 (Marginal Pastureland Wetland Buffers)
2) Up to 5,000 eligible acres of wetland practices, including acres previously enrolled, to achieve water quality benefits for the program objectives of nutrient and sediment reduction and enhance wildlife habitat. Enrollment of this acreage, using the following conservation practices, would help contribute to the CBA's goal of restoring 25,000 acres of wetlands:
    a. CP9 (Shallow Water Areas for Wildlife) with buffers averaging 35 feet and not exceeding 100 feet
    b. CP23 (Wetland Restoration)
3) Up to 16,000 eligible acres of HEL, including acres previously enrolled, with an average EI ≥16 and located within 1,000 feet of a stream or waterbody, that utilize the following conservation practices:
    a. CP1-Introduced Grasses/Legumes
    b. CP2-Native Grasses/Legumes
    c. CP3-Tree Planting
    d. CP3A-Hardwood Tree Planting
    e. CP4D-Permanent Wildlife Habitat

[5] High-priority species listed in the *North American Waterfowl Plan.*

Through selection of Alternative 2, FSA would work with their partners on statewide watershed planning initiatives and the Maryland Tributary Strategy, particularly where these strategies can continue to reduce nutrients, sediments, pesticides and improve agricultural practices that benefit the water quality of the Bay. Under this alternative, 28,791.5 acres remain for enrollment in the program.

4.3 Riparian Areas, Wetlands and Floodplains

MDNR estimates that approximately half of the perennial and intermittent streams in Maryland lack sufficient natural buffers on one or both sides of streams. The lack of protected riparian habitat has resulted in increased stream temperatures, accelerated soil erosion, induced loss of fish and wildlife habitat and increased the amount of nutrients and chemicals running into Maryland's waterways to the Chesapeake Bay. Small streams, which are often most critical in terms of living resources and downstream water quality, are also the most heavily impacted by farming operations and urbanization.

In agricultural areas, livestock operations can contribute to severe degradation of riparian systems due to uncontrolled access to water. In urbanizing areas, increased runoff and failure to maintain adequate riparian vegetation typically result in streambank instability and severe erosion.

Approximately 600,000 acres of wetlands exist throughout the State, with a higher percentage occurring on the Eastern Shore. Many of Maryland's natural wetlands were seasonally ponded shallow water areas that provided resting and feeding habitat for migratory birds from late fall through spring. It is estimated that approximately half of these wetlands have been drained for agricultural production or filled for residential and commercial development. On the Eastern Shore, there are many former wetlands within agricultural fields that could be restored to seasonally ponded conditions to provide spring and fall migratory habitat for waterfowl and shorebirds.

Although wetlands are often identified with habitat for ducks and geese, other avian species also rely on wetlands and their associated buffers to meet their habitat needs. The American woodcock, for example, is a member of the sandpiper family that utilizes early successional moist-soil habitats where shrubs, sapling trees, and open areas are interspersed. Throughout the range of the woodcock, population estimates have declined sharply at the rate of approximately 2 percent per year during the last 30 years. In Maryland, the decline has been even more dramatic—about 10 percent per year. This population decline has been attributed to the loss and degradation of suitable habitat on breeding grounds and wintering areas.

The agricultural component of Maryland's Tributary Strategy notes that between 2000 and 2002, about 10,100 acres of forest buffers were planted on agricultural land. The overall goal for riparian reforestation on agricultural land is 22,033 acres by 2010. This strategy also emphasizes creating more than 12,207 acres of wetlands by 2010.

To avoid adverse effects to wetlands and floodplains, all Federal agencies are required to comply with the requirements of Executive Order 11988 addressing floodplain

management and Executive Order 11990, *Protection of Wetlands*. CREP focuses on enhancement and improvements to these resources.

4.3.1 Alternative 1-No Action (Existing Conditions)

Alternative 1 targeted enrollment of 70,000 acres for establishing riparian buffers, 5,000 acres for wetland restoration and 5,000 acres for shallow water areas for wildlife habitat. At the time of the initial CREP agreement, CREP enrollments also supported the former Governor's goal of restoring 60,000 acres of wetlands by using the following conservation practices:

- CP 21 (Filter Strips)
- CP22 (Riparian Buffers)
- CP23 (Wetland Restoration)
- CP9 (Shallow Water Areas for Wildlife)

Special incentive payments, as a percentage of the CRP maximum annual rental rate, were provided, but could not exceed 80 percent for wetland restoration. If Alternative 1 is selected, the opportunities for restoring wetlands in agricultural fields, establishing riparian buffers along streams and improving floodplain habitat would be limited due to the ceiling established under this program and the expiration of the program.

Through *Chesapeake 2000,* Maryland has committed to restoring 15,000 acres of wetlands by 2010. As of March 2004, nearly 59,188 acres for which CREP conservation practices have been established for establishing riparian buffers, grass buffers and restoring wetlands have been enrolled in the program. The following acreages and applicable conservation practices were enrolled under Alternative 1:

- 39,713.9 acres for grass buffers (CP21);
- 16,698.3 acres for riparian forest buffers (CP22)
- 2,123.4 acres for wetland restoration (CP23)
- 652.3 acres to establish shallows water areas (CP9)

Because the MD CREP expired in February 2004, selection of Alternative 1 would not enable achievement of the CREP goals for restoring riparian areas or wetlands in Maryland, nor would it meet the State's commitment to *Chesapeake 2000*.

4.3.2 Alternative 2- Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)

Alternative 2 would build upon the acreages established in MD CREP addressed under Alternative 1, and would focus on establishing or enhancing a total of 93,000 acres of riparian habitat, 5,000 acres of wetland habitat and 2,000 acres of habitat for declining species.

Through its commitment to *Chesapeake 2000*, the State has pledged to restore 15,000 acres of the 25,000-acre wetland goal by 2010. To date, approximately 6,000 acres of wetlands have been restored through all programs that favor wetland restoration on

agricultural land.[6] CREP has achieved restoration of 2,123 acres of wetlands and has established 652 acres of shallow water areas, which less than half of the 6,000 acres. The State needs to restore about 9,000 additional acres of wetland to meet it commitment. Selection of Alternative 2 would enable FSA and the State of Maryland to continue its commitment to restoring these valuable resources in the Chesapeake Bay Watershed.

4.4 Wildlife Habitat and Forestlands

As the human population has increased and development has overtaken farmland, forestlands and large areas of wetlands, a greater need exists throughout Maryland to establish and enhance habitat conditions for threatened, endangered and declining populations of wildlife, plants and aquatic species. Degradation, fragmentation and loss of upland, wetland, and aquatic habitat have significantly contributed to the decline of many species, including the bog turtle, Delmarva fox squirrel, Maryland darter, glassy darter, and eastern tiger salamander.

Habitat loss is the principal cause of the decline in many animals and plant communities, and is the major reason that many of these species are listed as federally and/or State threatened or endangered. Other factors leading to species decline include poaching, illegal plant harvesting, pesticide application, pollution and disease, as well as competition for limited habitat and food and predation contribute to the decline of certain species. Rapid, uncontrolled development, acid rain, traffic and a host of other human influences further contribute to the decline in species populations and their habitat.

Birds associated with agricultural uplands have suffered some of the most precipitous losses of any species group in Maryland. Loss of undisturbed, herbaceous cover in agricultural areas has been a major factor in the decline of grassland birds. Once a mainstay for upland game bird enthusiasts in much of the State, northern bobwhite (often referred to as bobwhite quail) and ring-necked pheasants have declined significantly over the past few decades. The *Breeding Bird Survey* estimates that the quail population has declined nearly 5 percent per year since the mid-1960s and the pheasant population shows an even steeper decline. Quail populations have suffered most severely in central and western Maryland.[7]

Since the establishment of CRP, several studies evaluating the effects of the new habitat established under this program have shown an increase in bird counts attributable to this program. These studies have examined several migratory avian species, including non-game grassland birds and waterfowl. These trends indicate a consistent and positive influence.

Loss of undisturbed, herbaceous cover in agricultural areas has resulted in declining populations of grassland birds. In Maryland, the decline has been even more dramatic—about 10 percent per year. This population decline has been attributed to the loss and degradation of suitable habitat on breeding grounds and wintering areas.[8]

[6] Chesapeake Bay Program. "A Tributary Strategies Habitat Goals for Wetlands, Streams and Forests.
[7] Maryland DNR website: http://www.dnr.state.md.us/wildlife/gpar/gpupland.asp
[8] *Ibid.*

Peterson and Best (1996) found mean bird abundance to be four times greater on CRP fields than on row-crop fields and that 20 of the 22 most common bird species were more abundant on CRP fields than on row-crop fields. Johnson and Koford (1995) counted breeding migratory birds in nine counties in the prairie pothole region and found that 13 of the 15 most common bird species were more abundant in CRP fields than in cropland. Similar results were observed in other studies, which are leading researchers to conclude that programs such as CRP and CREP will greatly contribute to the resurgence of several species whose declines have been attributable to the conversion of grassland to cropland.[9]

The decline of game species, such as quail, has been accompanied by the decline of an entire community of grassland and early successional wildlife species with similar habitat requirements, including grasshopper sparrows, savannah sparrows, vesper sparrows, field sparrows, indigo buntings, goldfinches, prairie warblers, eastern meadowlarks, short-eared owls, meadow voles, and a wide variety of butterflies and other insects. These species rely on herbaceous cover for nesting, food and brood-rearing habitat.

Without a doubt, habitat loss and fragmentation have been, and continue to be, significant detriments to upland game birds and other declining species. Quail and pheasants are early-successional species, which mean that they inhabit areas that have recently been disturbed. Fallowed fields, brushy fencerows, and recently cleared forests are examples of early-successional habitats. Throughout the mid-1900s, this type of habitat was abundant, but as farming became more efficient and forests matured, cleared hedgerows, fields that are tilled every year, suburbia and old forests impacted habitat suitable for these species.

Half of Maryland's natural, seasonally ponded, shallow-water areas have been drained for agricultural production or filled for residential and commercial development. Wetlands are most often identified with habitat for waterfowl, but other avian species also rely on these areas.

Total timberland in Maryland is about 2.6 million acres, of which nearly 24 percent is protected from conversion to other uses. A 1999 forest inventory revealed that forestland in Maryland has decreased by 79,500 acres since 1986, while the number of landowners who own <10 acres of timberland rose by 62 percent between 1977 and 1989.[10]

By 2020, the Maryland Department of Planning forecasts that forestland statewide will decrease 7 percent from 1997 acreages. The impact that the conversion of forestland to development will have on ecological diversity, forestry and recreation is a function of the amount of forestland lost and the amount, quality, and distribution of remaining forestland. MDP further predicts that Howard, Charles, Baltimore, Anne Arundel, Montgomery, Prince George's and St. Mary's Counties will lose the most forestland by

[9] USDA and Illinois DNR. *2001 Annual Report Illinois Conservation Reserve Enhancement Program (CREP)*, pp. 55-57.
[10] *The Maryland Envirothon.* http://www.dnr.state.md.us/education/envirothon/forestry/

2020.[11] This loss of forestland will only contribute to further fragmentation of the remaining forests and decline in ecological diversity.

MDNR forecasts that the greatest threats to Maryland's forests include suburban sprawl and forest fragmentation through increased development and subdividing of large forested tracts. Other threats include[12]—

- changes in land use, and forest fragmentation;
- poor management decisions and improper implementation of management practices;
- native and introduced insects, diseases, and plants; and
- deer browsing, wild fires, air pollution including ozone, acidic deposition, and dramatic weather events.

4.4.1 Alternative1-No Action (Existing Conditions)

CREP provides landowners with financial incentives to remove agricultural lands from production and to establish conservation practices, such as the planting of trees, establishing riparian forest and grass buffers, restoring wetlands and constructing shallow wildlife ponds. Warm season grasses are native grasses that grow during the summer months and provide much better wildlife habitat than turf-forming cool season grasses. Warm season grasses provide a critical wildlife habitat element that has been declining in the Maryland landscape for many years. Many species, such as bobwhite quail, grasshopper sparrows and other grassland birds, and cottontail rabbits are dependent on these areas to meet their specialized food and cover needs. These grasses provide abundant nesting and brood-rearing habitat for upland birds.[13]

Alternative 1 targets up to 70,000 acres for riparian buffers and 10,000 acres to restore wetlands and establish shallow water ponds, areas which provide valuable wildlife habitat. Nearly 6,000 acres have been restored through all programs that favor restoration on agricultural land.[14]

Under Alternative 1, more than 71,208 acres have been enrolled in CREP and 4,398.25 have been permanently protected by easements. Since CREP was initiated in 1997 in Maryland, 71,208.5 acres have been enrolled in the program, of which more than half (39,714 acres) are planted mostly in grass buffers. More than 16,698 acres of forest buffer have been planted, and 652.3 acres of shallow water ponds for wildlife have been established.

For all CREP contracts under Alternative 1, landowners and the TSP agree on conservation plans that indicate how the resources will be managed. These management activities are part of the approved conservation plans and are designed to ensure plant diversity and wildlife benefits, while ensuring protection of the soil and water resources.

[11] *Maryland's Changing Lands*. Dec. 2001. Maryland Dept. of Planning, p. 17.
[12] Maryland DNR. http://www.dnr.state.md.us/forests/healthreport/threats.html
[13] Long, Bob. Wildlife and Heritage Service, MDNR. Maryland DNR 2003-2004 Game Program. http://www.dnr.state.md.us/wildlife/gpar/gpupland.asp
[14] Chesapeake Bay Program. "A Tributary Strategies Habitat Goals for Wetlands, Streams and Forests.

The conservation plan also addresses maintenance for weed, insect and pest control for the life of the contract. Management activities are site specific and are used to enhance the wildlife benefits for the site.

Although the CREP has significant potential to increase the amount of habitat on farmland, landowners interested in maximizing upland game bird populations should also consider other BMPs that support wildlife habitat.[15]

Approximately 2,500 acres of wetlands have been restored under CREP, providing habitat for waterfowl, wading birds and amphibians, as well as many upland species that utilize the edges of the wetlands. Native vegetation that grows in these wetlands provides food for many migratory species that pass through Maryland or over-winter in the State.

More than 1,000 miles of streamside corridors have been planted, creating vital links for wildlife species to travel from one area to another as well as for food and shelter. The streamside plantings will also improve the conditions of the stream for fish. Shade from trees will keep waters cooler and vegetation falling in the stream provides structure and food sources for the aquatic invertebrates on which fish feed. However, due to the expiration of the CREP agreement in February 2004, no further lands can be enrolled under CREP and further restoration of wetlands would not occur.

4.4.2 Alternative 2- Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)

Alternative 2 places greater emphasis on increasing the survivability, distribution and abundance of targeted fish, wildlife and plant species in the Chesapeake region by establishing or enhancing—

- 93,000 acres of riparian habitat,
- 5,000 acres of wetland habitat, and
- 2,000 acres of habitat for declining species, which include federally and State protected species, as well as high-priority species listed under the *North American Waterfowl Plan*. Examples include, but are not limited to, bald eagles, bog turtles, Delmarva fox squirrel, dwarf wedge mussel, glass darter and harparella. Others have been identified in Chapter 3, **section 3.4.6, Table 3-18,** by FWS. **Appendix F** lists federally and State listed species known to occur in Maryland.

A total of 2,000 acres have been designated to establish or enhance habitat for declining species using CP25. The MOA states that the Maryland CREP Technical Committee will establish criteria for this practice. Up to a total of 500 acres may be enrolled on the Eastern Shore (Cecil, Kent, Queen Anne, Caroline, Talbot, Dorchester, Somerset, Worcester and Wicomico Counties). Up to 1,500 acres may be enrolled in the remaining counties (Harford, Baltimore, Carroll, Howard, Montgomery, Anne Arundel, Prince George's, Charles, Calvert, St. Mary's Frederick, Washington, Allegany and Garrett).

[15] Ibid.

As of March 2004, 652.3 acres have been enrolled in CREP to establish shallow-water areas for wildlife. Other acreages enrolled in CREP that would provide both water quality benefits, as well as wildlife habitat, include riparian forest buffers (CP22 with 16,698.3 acres), wetland restoration (CP23 with 2123.1 acres), and grass buffers (CP21 with 39,713.9 acres).

As habitat loss and fragmentation are the principal reasons for species decline, habitat conservation through agricultural programs is essential for the survival of many species. However, to establish functional habitat, contiguous tracts are necessary for wildlife migration and movement corridors, breeding and nesting. Alternative 2 allows up to a total of 5,000 acres, including previous acreage enrolled, to achieve water quality benefits, wildlife habitat enhancement and to assist in meeting the Chesapeake Bay Agreement's goal of restoring 25,000 acres of wetlands. Up to 16,000 eligible acres of HEL may be enrolled under this alternative and would include implementation of CP4D to establish permanent wildlife habitat.

Selection of Alternative 2 would enable the continuation of these conservation benefits by allowing 28,791.5 acres to be enrolled in the program. In addition, landowners and the TSP agree on conservation plans that indicate how the resources will be managed. These management activities must be designed to ensure plant diversity and wildlife benefits, while ensuring protection of the soil and water resources. The conservation plan must also address maintenance for weed, insect and pest control for the life of the contract. Management activities are site specific and are used to enhance the wildlife benefits for the site. In exchange for approved management activities, the landowner is eligible to receive up to 50 percent cost-share for the management practices.

4.5 Terrestrial and Aquatic Species

During the past 40 years, consolidation of farms and the intensity of farming operations in Maryland have significantly increased. Although certain species such as the white-tailed deer and common crow have adapted and continue to thrive in the current agricultural setting, other species commonly associated with agricultural uplands, such as grassland birds, have suffered some of the most precipitous losses of any species group in Maryland.

In its 2004 Wildlife Management policy,[16] the Maryland Farm Bureau states that farmers are experiencing an increasing problem with deer damage to crops. Concerns were expressed about the increasing population of deer as a result of increased habitat through CRP/CREP enrollments and the health and safety issues caused by deer over-population. The Maryland Farm Bureau urged MDNR to implement effective practices to control the deer population in Maryland. Such controls would include changes in hunting regulations and seasons, more accurate estimates of the deer population, establishment of a deer population threshold in the DNR deer management areas, and applying research funds to develop feasible deer repellants through genetic modification or chemical use.

[16] Maryland Farm Bureau, *Wildlife Management* policy
http://www.mdfarmbureau.com/2004/Policy/Wildlife%20Management.htm

The interspersion of agricultural lands, forests, wetlands, floodplains, and open water areas across Maryland once offered a wide range of wildlife habitats to support an even broader diversity of plants and animals. Game species such as deer, squirrel, rabbit, turkey, and dove are still abundant throughout most of the State, along with geese and ducks on the Eastern Shore.[17] The Farm Bureau supports a requirement that property purchased by the State be required to have a wildlife management plan to manage and control wildlife populations. The Farm Bureau also requests that MDNR plant some State land in wildlife food and they recommend opening the land for hunting and charging a fee to defray the cost of planting the crops for wildlife.

The Maryland Farm Bureau encourages MDNR to control resident geese in Maryland by authorizing additional resident goose hunting dates, revising goose hunting regulations and seasons, and by developing other means to limit and control migrating and non-migrating goose populations in the State. The Farm Bureau recommends that seasons be established for hunting resident geese and requests MDNR to reimburse farmers for crop damage caused by waterfowl.[18]

Freshwater fish habitats consist of cool water streams in the western part of the State that support trout, and warm water streams throughout Maryland. MDNR estimates that approximately half of the perennial and intermittent streams in Maryland lack sufficient natural buffers on one or both sides of streams. The lack of protected riparian habitat has resulted in increased stream temperatures, accelerated soil erosion, loss of fish and wildlife habitat, and increased potential for nutrient and chemical pollution in Maryland and throughout the Chesapeake Bay region. Small streams, which are often most critical in terms of living resources and downstream water quality, are also the most heavily impacted by farming operations and urbanization.

In agricultural areas, livestock operations often contribute to severe degradation of riparian systems due to uncontrolled livestock access to water. In urbanizing areas, increased runoff and failure to maintain adequate riparian vegetation typically result in stream bank instability and severe erosion.

4.5.1 Alternative 1-No Action (Existing Conditions)

Alternative 1 provides for 70,000 acres of riparian buffers, up to 10,000 acres of restored wetlands and grassland, and offers incentive payments to farmers who establish these habitats. Alternative 1 also requires the development of conservation plans. However, as development pressures continue to convert wildlife habitat to meet human needs, greater emphasis on wildlife habitat enhancement is needed.

Species of greatest conservation need are aquatic and terrestrial species that are at-risk or are declining in Maryland. These species include threatened and endangered species (see section 4.6), as well as many other species whose populations are of concern in Maryland. MDNR is preparing a Wildlife Diversity Conservation Plan to address species

[17] Maryland CREP Proposal for Agreement Number 2, pp. 5-6.
[18] *Ibid.*

that are characterized in need of conservation. Chapter 3, **section 3.4.5**, **Table 3-18**, lists the species in greatest need, as identified by MDNR.

Under Alternative 1, CREP expired in February 2004. Although wildlife benefits were realized under this alternative, much work remains to be conducted in establishing areas of wildlife habitat to support terrestrial and aquatic species. Selection of this alternative would not meet the goals of the Chesapeake Bay Agreement, nor would it meet the goals established under CREP to enhance wildlife habitat for declining species.

4.5.2 Alternative 2- Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)

Alternative 2 addresses the continuing need for enhancing wildlife habitat for declining species, as identified in Chapter 3, **section 3.4.5**, **Table 3-18**, and on high priority species in the *North American Waterfowl Plan*.

CREP conservation practices provide many wildlife benefits, including cover, food and water resources. Conservation practices that address the needs to enhance habitat for wildlife and declining species include:

- CP4D (Permanent Wildlife Habitat)
- CP9 (Shallow Water Areas for Wildlife)
- CP25 (Habitat for Declining Species)

Alternative 2 allows up to 5,000 acres, including previous acreage enrolled, to achieve water quality benefits, wildlife habitat enhancement and to assist in meeting the Chesapeake Bay Agreement's goal of restoring 25,000 acres of wetlands. Up to 16,000 eligible acres of HEL may be enrolled under this alternative and would include implementation of CP4D to establish permanent wildlife habitat.

As Alternative 2 would extend CREP through 2007, this alternative would meet the goals of the program and would allow for closer coordination with MDNR in the development of its Wildlife Diversity Conservation Plan. This plan will address the needs of other declining populations in Maryland, such as--

- Federally and State-listed threatened and endangered animals
- Wildlife species listed as In Need of Conservation
- Natural Heritage Program tracked and watchlist animal species
- Northeast wildlife species of regional conservation concern
- Endemic species
- Responsibility species (those for which MD supports the core populations)
- Partners in Flight and All Bird Conservation priority species
- migratory birds of management concern to FWS
- Colonial waterbirds
- Forest interior breeding birds
- Marshland, grassland and shrubland successional breeding birds at risk
- Shorebirds with significant migratory concentrations
- Small mammals, bats, reptiles and amphibians at risk

- Terrestrial and aquatic invertebrates at risk
- Freshwater fish at risk and depleted anadromous fish (e.g., shad spp., sturgeon)
- American Fisheries Society's species of concern
- Depleted marine invertebrates (e.g., horseshoe crab)
- Sensitive aquatic species

For all land enrolled under CREP contracts, landowners are required to perform management activities as part of their approved conservation plan. These management activities must be designed to ensure plant diversity and wildlife benefits, while ensuring protection of the soil and water resources. The conservation plan must also address maintenance for weed, insect and pest control for the life of the contract. Management activities are site specific and are used to enhance the wildlife benefits for the site. In exchange for approved management activities, the landowner may receive up to 50 percent cost-share for the management practices.

Selection of this alternative would meet the goals established in MD CREP and would promote habitat conservation and enhancement for species most in need of conservation in Maryland by allowing the remaining 28,791.5 acres to be enrolled in the program.

4.6 Federally and State Protected Species

Chapter 3 provides information on federally and State-protected species and species listed in the *North American Waterfowl Plan* and *Executive Order 13186.* More than 1,100 native plants and animals have been identified as among the rarest in Maryland and are most in need of conservation. Of these species, MDNR officially recognizes 659 species and subspecies as endangered, threatened, in need of conservation, or endangered extirpated. Only 37 species, or 3 percent of the total tracked species, are listed as federally endangered or threatened. Refer to **Appendix F** for listings of these species and to **Chapter 3, Figure 3-16, Ecologically Significant Areas of Maryland,** which illustrates the areas of significance for federally and State listed species.

USEPA's Chesapeake Bay Program has a goal of restoring population levels of bald eagles to non-threatened status. In 2003, there were 760 nesting pairs in the Maryland, Pennsylvania, Virginia and Washington, DC, portion of the Chesapeake Bay Watershed. As a result of increasing populations and productivity, the status of this once imperiled species has been changed from endangered to threatened. The threshold for down-listing to a non-threatened status has only been partially met, as permanent habitat protection requirements have not been achieved. To accomplish this through CREP, only those easements conserved in perpetuity would permanently protect habitat areas, particularly along riparian corridors and floodplains where bald eagles are known to roost and feed.

On September 1, 2004, consultation was initiated with the U.S. Fish & Wildlife Service, Annapolis, MD office with respect to compliance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543). Information was also requested concerning Maryland's declining species. FWS provided information on Maryland's declining species (refer to Chapter 3, section 3.4.6, Table 3-18). ***The agency's comments concerning section 7 of the Endangered Species Act are provided in Appendix I.***

As presented in Chapter 2, Table 2-2, the Maryland counties currently holding the most CREP easements are located on the Eastern Shore. FWS highlighted concerns regarding the Delmarva fox squirrel (Sciurus niger cinereus), which is known to occur in Caroline, Dorchester, Kent, Queen Anne's, Somerset, Talbot, Worcester and Wicomico Counties. This species requires habitat that consists of bottomland and upland, mature pine and hardwood forests with a relatively open understory.

FWS also expressed particular concern for the federally threatened bog turtle (Clemmys muhlenbergii), which is known to occur in Carroll, Baltimore, Harford and Cecil Counties. The bog turtle's primary habitat is palustrine wetlands, comprised of a muddy bottom or shallow water, and tussocks of vegetation. Bog turtles usually occur in small, discrete populations occupying suitable wetland habitat dispersed along a watershed. The occupied "intermediate successional stage" wetland habitat is usually a mosaic of micro-habitats ranging from dry pockets, to saturated areas, to areas that experience periodic flooding. Some wetlands where bog turtles are known to occur are agricultural areas that are subject to grazing by livestock. In some cases, light to moderate livestock grazing of wetlands can help maintain bog turtle habitat by preventing successional vegetation.[19]

Other species of concern cited by FWS include, but are not limited to:

- ***Swamp pink (Helonias bullata)Threatened and known to occur in Anne Arundel, Cecil and Dorchester Counties***
- ***Dwarf wedge mussel (Alasmidonta heterodon)Endangered and known to occur in Queen Anne's, Caroline, St. Mary's and Charles Counties***
- ***Maryland darter (Etheostoma sellare) Endangered and known to occur in Harford County***
- ***Northeastern bulrush (Scirpus ancistrochaetus) Endangered and known to occur in Washington County***
- ***Canby's dropwort (Oxypolis canbyi)Endangered and known to occur in Queen Anne's County***
- ***Sandplain gerardia (Agalinis acuta) Endangered and known to occur in Baltimore County***
- ***Harperella (Ptilimnium nodosum) Endangered and known to occur in Allegany and Washington Counties***
- ***Sensitive joint-vetch (Aeschynomene virginica) Threatened and known to occur in Somerset, Calvert/Prince George's and Charles Counties***

FSA will consult with FWS concerning any potential CREP enrollments in or near waterbodies identified by FWS in these counties.

4.6.1 Alternative 1-No Action (Existing Conditions)

Under Alternative 1, 71,208.5 acres were enrolled in CREP, of which nearly 16,698 were enrolled for riparian forest buffers, 2,123 acres were for wetland restoration and about

[19] U.S. Fish and Wildlife Service letter, dated Jan. 26, 2005. Subject: Maryland Conservation Reserve Enhancement Program (CREP) Programmatic Environmental Assessment (PEA). See Appendix I.

652 acres were enrolled for shallow water areas for wildlife. Approximately 4,398 acres were acquired as permanent CREP easements. In order to ensure long-term habitat protection for declining species, conservation easements that conserve land through perpetuity are more productive over the limited term contract agreements.

For those CREP practices established under Alternative 1 in Caroline, Dorchester, Kent, Queen Anne's, Somerset, Talbot, Worcester and Wicomico Counties, FSA must be sensitive to and consider the potential impacts that any clearing of forested habitats, including removal of individual trees ≥10-inch d.b.h., may have on the federally endangered Delmarva fox squirrel.[20] By its nature of either being cropland or marginal pastureland,CREP land is comprised of very few trees. Only in very unusual or rare cases, a tree or trees may exist on adjacent land that might require removal to install a water pipe or some other piece of equipment, or require removal due to disease or damage. The practice of tree clearing is not a part of any approved CREP practice and would occur only on a case-by-case basis. Whenever tree removal on CREP land in any of the counties mentioned above is needed, FSA will consult with FWS before any trees are removed in these areas.

Certain existing CREP practices that involve streambank stabilization and improve water quality, such as establishing forested riparian buffers, fencing cattle out of wetlands, stream crossings, and vegetative buffers could potentially diminish the ability of bog turtles to use the streams and associated floodplains as dispersal corridors and thus reduce the suitability of wetlands for use by these species. The following CREP practices could have potential adverse effects to bog turtles:

- ***CP21-Filter Strips***
- ***CP22-Riparian Buffers***
- ***CP30 Wetland Buffer***

Existing CREP practices that could benefit the bog turtle are:

- ***CP9-Shallow Water Areas for Wildlife***
- ***CP23-Wetland Restoration***
- ***CP4D-Permanent Wildlife Habitat***
- ***CP30-Marginal Pastureland Wetland Buffers***

FWS recommends that CREP lands located in certain watersheds in Carroll, Baltimore, Harford and Cecil Counties should be evaluated on a case-by-case basis to avoid impacts to bog turtle populations. Through consultation with FWS and with the MDNR, Wildlife and Heritage Service, FSA will be advised if bog turtles exist in these areas and if the CREP practice could adversely impact this species. For permanent species and habitat protection, placement of land under permanent conservation easement would provide even greater benefits than term contracts.

Because the existing CREP agreement expired in February 2004, selection of Alternative 1 would not provide further opportunities for permanently protecting land through CREP

[20] *Ibid.*

easements. Therefore, selection of this alternative would not be beneficial for long-term protection and re-establishment of the State's imperiled and declining species.

4.6.2 Alternative 2- Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)

The proposed MD CREP MOA, established under Alternative 2, addresses the need to increase the survivability, distribution and abundance of targeted fish, wildlife and plant species in the Chesapeake Bay region by establishing or enhancing 93,000 acres of riparian habitat, 5,000 acres of wetland habitat and 2,000 acres of habitat for the State's declining species. Declining species have been further defined to include federally and State threatened and endangered species and species of concern in Maryland. The prominent species identified included the following, but a more comprehensive listing is provided in **Appendix F**:

- Bog turtle
- Swamp pink
- Delmarva fox squirrel
- Bald eagle
- Dwarf wedge mussel
- ***Maryland darter***
- ***Northeastern bulrush***
- ***Canby's dropwort***
- ***Sandplain gerardia***
- ***Harperella***
- ***Sensitive joint-vetch***

Up to 16,000 acres of highly erodible lands may be included and would be eligible for enrollment using CP4D, a CREP conservation practice that is directed at establishing permanent wildlife habitat. Up to 77,000 acres adjacent to streams, wetlands and other water resources would also be eligible for enrollment also using CP4D. Up to 5,000 acres would be eligible for wetland restoration, using CP9, which provides for the construction of shallow water areas for wildlife. Alternative 2 also allows up to 2,000 eligible acres of land designated to establishing habitat for declining species.

As mentioned in the introduction to this section, the federally endangered Delmarva fox squirrel is known to inhabit forested areas on the Eastern Shore. Of the 2,000 acres of land designated for habitat for declining species, up to 500 acres may be enrolled in Cecil, Kent, Queen Anne's, Caroline, Talbot, Dorchester, Somerset, Worcester and Wicomico Counties and 1,500 acres may be enrolled in Harford, Baltimore, Carroll, Howard, Montgomery, Anne Arundel, Prince George's, Charles, Calvert, St. Mary's, Frederick, Washington, Allegany and Garrett Counties.

For those CREP practices established under Alternative 2 in Caroline, Dorchester, Kent, Queen Anne's, Somerset, Talbot, Worcester and Wicomico Counties, FSA must be sensitive to and consider the potential impacts that any clearing of forested habitats, including removal of individual trees ≥10-inch d.b.h., may have on the federally

endangered Delmarva fox squirrel.[21] By its nature of either being cropland or marginal pastureland, very few trees exist on CREP land. Only in very unusual or rare cases, a tree or trees may exist on adjacent land that might require removal to install a water pipe or some other piece of equipment, or require removal due to disease or damage. The practice of tree clearing is not a part of any approved CREP practice and would occur only on a case-by-case basis. Whenever tree removal on CREP land in any of the counties mentioned above is needed, FSA will consult with FWS before any trees are removed in these areas.

Alternative 2 provides for a maximum regional enrollment of 1,000 acres for 100- to 150-foot-wide buffers for HEL or land to be enhanced for wildlife benefit. This 1,000 total regional enrollment restriction for buffers in excess of 100 feet would only apply to CREP contracts if this alternative is selected and approved. The Maryland CREP Technical Committee shall develop suggested guidance and process related to preparing these applications for approval, including a wildlife management plan.

Certain existing CREP practices that involve streambank stabilization and improve water quality, such as establishing forested riparian buffers, fencing cattle out of wetlands, stream crossings, and vegetative buffers could potentially diminish the ability of bog turtles to use the streams and associated floodplains as dispersal corridors and thus reduce the suitability of wetlands for use by these species. The following CREP practices could have potential adverse effects to bog turtles:

- ***CP21-Filter Strips***
- ***CP22-Riparian Buffers***
- ***CP30 Wetland Buffer***

Existing CREP practices that could benefit the bog turtle are:

- ***CP9-Shallow Water Areas for Wildlife***
- ***CP23-Wetland Restoration***
- ***CP4D-Permanent Wildlife Habitat***
- ***CP30-Marginal Pastureland Wetland Buffers***

FWS recommends that CREP lands located in certain watersheds in Carroll, Baltimore, Harford and Cecil Counties should be evaluated on a case-by-case basis to avoid impacts to bog turtle populations. Through consultation with FWS and with the MDNR, Wildlife and Heritage Service, FSA will be advised if bog turtles exist in these areas and if the CREP practice could adversely impact this species. For permanent species and habitat protection, placement of land under permanent conservation easement would provide even greater benefits than term contracts.

Selection of Alternative 2 would allow for an additional 28,791.5 acres to be voluntarily enrolled into CREP, thus providing additional habitat benefits to Maryland's declining species and waterfowl.

[21] *Ibid.*

4.7 Invasive Species

Often referred to as exotic, nonnative, alien, noxious, or non-indigenous weeds, invasive species impact native plant and animal communities by displacing native vegetation and competing with native species for food and habitat. As defined in Executive Order 13112, an "invasive species" is 1) non-native (or alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species can be plants, animals, and other organisms (e.g., microbes). Human disturbance is the primary means of introducing invasive species into an area.

As a Federal agency, FSA must comply with Executive Order 13112, which prevents the introduction of invasive species and provides for their control. As conversion of cropland to grasslands, riparian areas, forestlands and wetlands can provide opportunities for non-native plants and animals to establish, monitoring converted farmland for these species and working with NRCS and FWS to prevent and eradicate these species is encouraged.

Chapter 3, **section 3.4.8** identifies the species of most concern to MDNR. **Appendix Table I-1** includes the most common, though not all, invasive and exotic species in Maryland.

4.7.1 Alternative 1-No Action (Existing Conditions)

Areas that have been cultivated or have lain fallow provide prime opportunities for invasive species to thrive. Invasive species include mammals, birds, fishes, plants, trees, insects, and other aquatic species, as well as fungi and bacteria. The probability that these species will occur in riparian areas, farm fields, forest edges, wetlands and woodlands that have previously been cut or disturbed is very high, as such species are opportunistic and generally occur in disturbed areas. All CREP contracts stipulate that noxious weeds and other undesirable plants, insects and pests must be controlled to avoid adverse impacts on surrounding land.

Measures to control these species require approval of a management plan when use of pesticides or biocides, including insecticides, fungicides, rodenticides and herbicides, is proposed. Targets for control by pesticides and biocides shall be limited to those species that threaten a native plant or animal species or natural communities of conservation concern.[22] Another non-chemical method of controlling noxious weeds is mowing, though FSA *Handbook 2-CRP, rev. 4,* limits or prohibits mowing in certain circumstances, particularly when nesting and breeding birds are in season. In addition, farmers have commented if an area is too clean, deer will turn to eating the trees.[23]

[22] Rural Legacy Optional Conservation Easement, Maryland DNR; http://www.dnr.state.md.us/rurallegacy/options.pdf

[23] *National CREP Forum 2002 Final Report,* p. 28.

Weed control is eligible for cost-share as provided in FSA *Handbook 2-CRP, rev. 4*. After planting, cost-share may be authorized for one post-planting weed control application if it is applied within the first year after planting the cover.

Under Alternative 1, provisions to manage noxious weeds and other invasive species were incorporated into CREP agreements and in conservation plans and are further supported by State requirements to prevent, manage and control invasive species. These provisions can be found in *Handbook 2-CRP, rev. 4*. All CREP contracts must stipulate that noxious weeds and other undesirable plants, insects and pests will be controlled to avoid adverse impacts on surrounding land.

4.7.2 Alternative 2- Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)

For all CREP contracts, landowners would be required to perform management activities as part of their approved conservation plan. These management activities shall be designed to ensure plant diversity and wildlife benefits, while ensuring protection of the soil and water resources. The conservation plan must also address maintenance for weed, insect and pest control for the life of the contract. Management activities are site-specific and are used to enhance the wildlife benefits for the site. In exchange for approved management activities, the landowner may receive up to 50 percent cost-share for the management practices.

Under Alternative 2, weed control would be eligible for cost-share as provided in FSA *Handbook 2-CRP, rev. 4*. After planting, cost-share may be authorized for one post-planting weed control application if it is applied within the first year after planting the cover. All CREP contracts must stipulate that noxious weeds and other undesirable plants, insects and pests will be controlled to avoid adverse impacts on surrounding land.

4.8 Air Quality

Section 176(c) of the Clean Air Act Amendments states, in part, that no Federal agency shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity that does not conform to a State Implementation Plan (SIP) after it has been approved. Any impacts to air quality in ozone attainment areas would be considered significant if pollutant emissions associated with a proposed action caused or contributed to a violation of any national, State or local ambient air quality standard; exposed sensitive receptors to substantially increase pollutant concentration; or exceeded any significance criteria established by the SIP.

Impacts to air quality in nonattainment areas would be considered significant if they net change in proposed pollutant emissions caused or contributed to a violation of any national, State or local ambient air quality standard; increased the frequency or severity

of a violation of any ambient air quality standard; or delayed the attainment of any standard or other milestone contained in the SIP.[24]

4.8.1 Alternative 1-No Action (Existing Conditions)

Of the State's 23 counties, 14 counties plus Baltimore City are designated as nonattainment for EPA's 8-hour ozone standards. The nine remaining counties currently in attainment with EPA's standards are—

- Allegany County
- Caroline County
- Dorchester County
- Garrett County
- St. Mary's County
- Somerset County
- Talbot County
- Wicomico County
- Worcester County

Six counties in attainment are major agricultural counties situated on the Eastern Shore. Allegany and Garrett Counties, also agricultural counties, are located in the far western part of the State, and St. Mary's County is located in southeastern Maryland. All of these counties lack major population centers and industrial and urbanized centers at this time.

Alternative 1 involves the existing implementation of conservation practices (CPs), such as planting trees and grasses, and establishing shallow wildlife ponds and riparian areas. These activities involve land disturbance and soil movement, including tilling, burning of debris and stump removal that generate fugitive dust and introduce heavy construction equipment into areas.

Open burning releases toxins, such as particulates PM_{10}, CO, hydrocarbons and nitrous oxide (EPA, 1992). The quantity and distribution of these pollutants depend on the type of vegetation that is burned, the manner in which the material is burned and the existing weather and wind conditions. Mitigation measures to control fugitive dust would include water spraying over exposed soil during and after tilling to reduce particulates in the air.

These activities would result in short-term local air quality impacts but would not affect the region's ozone attainment status or violate air quality standards in the SIP. Long-term air quality benefits would occur as a result of planting trees and other vegetation through the implementation of approved conservation practices.

4.8.2 Alternative2-Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)

As with Alternative 1, selection of Alternative 2 would result in the implementation of approved conservation practices on a maximum of 100,000 acres of farmland throughout

[24] USDA, FSA. *Programmatic Environmental Assessment for Implementation of the Conservation Reserve Enhancement Program Agreement for Pennsylvania. p. 4-6.*

the State of Maryland. In addition to improving water quality and reducing sediments and nutrients from entering waterways, planting trees and grasses would reduce the amount of exposed soils and would have long-term benefits on local air quality.

In conjunction with the benefits, however, preparing land for implementing certain CPs would involve land disturbance and soil movement activities, such as tilling, burning of debris and stump removal that would generate fugitive dust and introduce heavy construction equipment. Constructing supporting infrastructure, such as access roads, trails, firebreaks and fences, and preparing trees, shrubs and grasses for planting, would involve use of heavy construction vehicles, such as front-end lifters, dump trucks and bulldozers. Low-level, short-term air quality impacts from fugitive dust, open burning and construction equipment exhaust would occur from construction-related activities. Primary emissions from construction vehicles are CO and PM_{10} concentrations.

Open burning would introduce toxins into the air, such as particulates PM_{10}, CO, hydrocarbons and nitrous oxide (EPA, 1992). The quantity and distribution of these pollutants would depend on the type of vegetation that is burned, how the material is burned and the weather and wind conditions. The method of burning vegetation would also determine the level of pollutants released into the atmosphere.

Although these activities would induce short-term local air quality impacts, they would not affect the region's ozone attainment status or violate air quality standards in the SIP. Consultation with Maryland DEP and with the local fire marshal may be required prior to burning debris. Measures to suppress fugitive dust would include water spraying over exposed soil during and after tilling to reduce particulates in the air are recommended.

4.9 Historic and Cultural Resources

Chapter 3 identifies sites listed in the National Historic Landmarks (NHLs) and the National Register of Historic Places (NR) in Maryland. **Appendix H** presents a listing of Maryland's NHLs.

The potential for encountering archeological resources during implementation of proposed CREP conservation practices may occur during construction, tree planting or implementation of conservation practices when ground disturbance is required. Such practices may involve earthmoving for installation of filter strips, firebreaks, fencing and access roads, as well as construction during wetland restoration activities and excavation to regulate water flow.

Prior to determining whether ground disturbance would potentially impact archeological and cultural resources listed in or eligible for inclusion in the National Register of Historic Places, consultation with the Maryland State Historic Preservation Officer (SHPO), located with the Maryland Historical Trust, Maryland Department of Housing and Community Development, must be conducted ***by the FSA***. ***Notice of such*** consultation should be included in the landowner's conservation plan and environmental evaluation.

As Native Americans once inhabited the Eastern Shore, especially along the coastline, rivers and floodplains (**refer to sec. 3.5.3**), these areas should be carefully evaluated in the conservation plan. Consultation with the SHPO may result in the need to conduct archeological surveys of sites prior to construction or excavation.

Consultation with the Maryland Historical Trust was initiated pursuant to Section 106 of the National Historic Preservation Act. ***The Trust's letters, dated September 1, 2004, and January 19, 2005,*** r***equesting comments on the project are provided in Appendix I. The Trust noted that there are literally thousands of prehistoric and historic sites located within the Chesapeake Bay Watershed, many of which are already listed in or have been determined to be eligible for inclusion in the National Register of Historic Places. As these resources could be significantly impacted by activities under either alternative, such as wetlands restoration, the FSA will need to submit the following information for each undertaking or contract:***

a) a description of the proposed project,
b) ***a map(preferably a section of a USGS topographic quadrangle) or a site plan that clearly delineates the project area's limits,***
c) ***labeled photographs of any readily visible historic structures or other cultural resources in the area, and***
d) ***a brief description of the past and present land use.***

All necessary archeological investigations should be carried out by a qualified professional archeologist and performed in accordance with the Standards and Guidelines for Archeological Investigations in Maryland (Shaffer and Cole 1994). Similarly, all eligibility evaluations for historic structures must be made by individuals who meet the Secretary of the Interior's Professional Qualifications Standards as Architectural Historian or Historian (FR 44738-9 or 36 CFR Part 61). Upon review by the Maryland Historical Trust, additional investigations of identified resources may be required.

4.9.1 Alternative 1-No Action (Existing Conditions)

As the existing MOA for CREP expired in February 2004, farming practices in Maryland would continue as they currently are conducted and lands enrolled in MD CREP would be limited to 71,208.5 acres under this alternative.

Under Alternative 1, certain CREP conservation practices, such as CP3, CP3A, CP4D, CP22, and CP23, may have potential impacts on a range of cultural resources. S***ignificant prehistoric and historic archeological resources are often found below the plow zone. Plowing does not usually constitute significant ground disturbance. Many archeological sites are known*** to occur in floodplains and along rivers, especially on the Eastern Shore, where indigenous people once dwelled. Maryland's strongest CREP counties are also located on the Eastern Shore. Prior to any ground disturbance, ***the FSA is*** required to consult with the State Historic Preservation Office (SHPO) to determine if archeological resources occur in the area. If any such resources are discovered ***at any time***, ***all activities must be halted and the Trust contacted***.

As many of Maryland's National Register sites and NHLs are structures, these resources would not be adversely affected by activities under CREP. Refer to **Appendix H** for a listing of NHLs in Maryland.

4.9.2 Alternative 2- Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)

Sites potentially containing archeological resources in Maryland are more likely to occur in floodplains, along rivers and on the Eastern Shore.

Under this alternative, implementation of certain CREP conservation practices, such as CP3, CP3A, CP4D, CP22, and CP23, could potentially impact a range of cultural resources. ***It is important to note that significant prehistoric and historic archeological resources are often identified below the plow zone. Plowing does not usually constitute significant ground disturbance. Many archeological sites are known*** to occur in floodplains and along rivers, especially on the Eastern Shore, where indigenous people once dwelled. Maryland's strongest CREP counties are also located on the Eastern Shore.

Prior to any ground disturbance, ***the FSA is*** required to consult with the State Historic Preservation Office (SHPO) to determine if archeological resources occur in the area. If any such resources are discovered ***at any time***, ***all activities must be halted and the Trust contacted***.

As many of Maryland's National Register sites and NHLs are structures, these resources would not be adversely affected by activities under CREP. Refer to **Appendix H** for a listing of NHLs in Maryland. Prior to any ground disturbance activity, FSA will consult with the Maryland Historical Trust regarding the potential for archeological resources.

Alternative 2 would allow for a total enrollment of up to 100,000 acres of farmland in the MD CREP, which would include the existing 71,208.5 acres currently enrolled in the program. A remaining 28,791.5 acres may be enrolled in CREP under this alternative.

4.10 Socioeconomic Impacts

The following discussion is excerpted from the Executive Summary of *Economic Situation and Prospects for Maryland* Agriculture, prepared by the University of Maryland's Center for Agricultural and Natural Resource Policy.

4.10.1 Alternative 1-No Action (Existing Conditions)

Although Maryland's farm numbers and land in farms have been declining, especially in the suburbanized counties, the rate of loss of farms and farmland in the State has been slow. The costs of farming, along with the historically weak markets for the major crop and livestock products, raise the issue of the economic sustainability of commercial agriculture in Maryland. Some issues facing agriculture in Maryland are—

- Many Maryland farms have gone out of business, especially in hog and dairy production.
- Acreage of some commodities, notably vegetables for processing and tobacco, has substantially declined.

- Farm operators are aging, as the average Maryland farm operator is over 55 years old.
- Small-scale and part-time farming is increasing as a fraction of the State's farms, and the majority of these operations have expenses greater than receipts.
- Farmland continues to be lost to suburban development at a rapid rate.
- Public perception of farming may have shifted somewhat toward viewing agriculture as environmentally damaging. These perceptions are reflected in public policies through regulatory constraints.[25]

Positive indicators for Maryland farming are—

- Farming is the single biggest factor in the economy of many areas of the State.[26]
- Farm operator household incomes in Maryland are on average favorable, compared with other states.[27] For small and part-time farms, this may be a factor of off-farm income sources. For larger commercial farms, it remains the case that income from farming keeps the average operation economically viable.
- Maintaining productivity growth, controlling costs and by initiating shifts to market opportunities that have been relatively favorable have help the State's agricultural market.
- For both small and large operations, the relatively high value of farmland owned is an asset.
- Maryland farms have lower debt/asset ratios than are typical in other States, and the net worth of the average farm at the beginning of 2000 was $501,000 in Maryland as compared to $429,000 for the United States, as a whole, despite the smaller average size of Maryland's farms.

At both the State and Federal levels, policies have recently been enacted, and amplified in the 2002 Farm Bill, that are aimed at preserving land in farming, assisting farmers in environmental stewardship, and providing support for commodity producers to offset low prices. Recent farming trends have shown that land is disappearing from farming and farm operators are leaving the tradition and not being replaced because the economic benefits of farming are less than the rewards from nonagricultural professions.

Overall, farms in the larger metropolitan counties collectively produce only 10 percent of Maryland's farm output (measured in terms of market value), while farms in the other metropolitan and non-metropolitan areas contribute about 32 percent and 58 percent,

[25] Most notably, agricultural activity has been associated with nitrogen and phosphorus runoff that is held responsible for declines in water quality in the Chesapeake Bay and its tributaries.

[26] The farming sector and its related industries (e.g., agricultural inputs and services and food processing) accounted for about $5 billion (3 percent) of the Maryland gross state product in 1999 and employed 62,700 people (12,400 farm operators, 5,900 farm laborers, and 44,300 in farm input and service supply and agricultural processing). These contributions are not declining over time, even though the share of the State's economic activity accounted for by agriculture is declining in Maryland as in other states because non-agricultural sectors are growing faster.

[27] In 2000, Maryland's average net income per farm, estimated at $33,000 by USDA's Economic Research Service, was well above Pennsylvania, Virginia, and the US average. Since 1980, the trend rate of growth of net income per farm has been higher in Maryland than in neighboring states and the U.S. as a whole.

respectively. While the majority of farms are small in all regions,[28] their share of all farms is higher in the two metropolitan regions (89 percent in large metro; and 80 percent in other metro), compared with the non-metropolitan region (62 percent).

Maryland's population is growing at nearly the same rate as the nation. The loss of farmland in the State is tied more to the dispersed patter of residences and associated businesses through formerly rural areas of metro-area counties, i.e., suburban sprawl. Since 1980, the annual rate of decline of land in farms in the central metro counties has been 2.1 percent annually, while the rate of decline in the rest of the State is less than 1 percent annually.

The majority of farmers interviewed by the University of Maryland's Center for Agricultural and Natural Resource Policy cited suburban sprawl as the major threat to the future of agriculture in Maryland. As farms are fragmented by developments and their numbers decline, product marketing and farm service supply become more difficult and costly.

As MD CREP expired on February 29, 2004, no further enrollments can occur under this alternative. A total of 71,208.5 acres were enrolled and 4,398.25 acres were permanently protected in CREP easements. FSA pays for half of the reimbursable costs of establishing eligible conservation practices and the State pays for the remaining reimbursable costs of up to 87.5 percent for eligible practices. Reimbursable costs paid to eligible producers cannot exceed 100 percent of the producer's eligible out-of-pocket expenses.

Maryland funds its share of CREP costs through MACS and funds permanent easements through Program Open Space (POS) transfer tax funds. To date, about $5,717,651 has been approved for CREP by the Board of Public Works for funding permanent easements.

4.10.2 Alternative 2- Continuous Enrollment of Targeted Acreage in the 2004 Maryland Agreement (Agency's Preferred Alternative)

The information presented in Alternative 1 also applies to this alternative. Under Alternative 2, special incentive payments will be made by FSA. The incentives would not exceed the following:

- For land to be enrolled under CP22 (Forest Buffers)
  - $200/ac for the first 50 feet of buffer (zone 1), and
  - $50/ac for 51-100 feet of buffer (zone 2)
- For land to be enrolled under CP4D (Permanent Wildlife Habitat), CP21 (Grass Filter Strips), CP29 (Marginal Pastureland Wildlife Habitat Buffer), or CP30 (Marginal Pastureland Wetland Buffers):
  - $150/ac for the first 50 feet of buffer (zone 1), and
  - $50/ac for 51-100 feet of buffer (zone 2)

[28] Small farms are defined in this discussion as those with sales of less than $100,000 annually.

- For land to be enrolled under CP23 (Wetland Restoration), CP9 (Shallow Water Areas for Wildlife) and CP1, CP2, CP3, CP3A, CP4D determined as HEL, or CP25 (Habitat for Declining Species):
    - o $50/ac

In addition to the financial incentives related to implementing conservation practices, recreational and leisure activities on CREP land can also produce financial benefits to landowners. A conservative estimate for the hunting, fishing and wildlife-associated recreation in the project area is 1,537,000 participants; 17,550,000 work-days; and $1,541,294,000 in expenditures (National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, 1996). The proportion of these estimates attributable to hunting has declined markedly as many wildlife populations have declined in the area. The share of fishing has also declined, as the freshwater resource base has deteriorated.[29]

A total of 71,208.5 acres have been enrolled in MD CREP, providing a balance of 28,791.5 acres for additional enrollment into the program under Alternative 2.

Environmental Justice
Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* directs all Federal agencies to achieve environmental justice as part of their mission by identifying and addressing disproportionately high and adverse human health or environmental effects of their activities on minority and low-income populations.

CREP is a voluntary enrollment program that is open to all landowners or operators who meet the eligibility requirements. No data exist that specifically describe the demographic characteristics of Maryland CREP participants or tenant farmers leasing CREP land. However, as shown in **Chapter 3, Table 3-3**, the demographic composition of Maryland's farmers shows that most farmers in Maryland are white males, about 56 years of age, and many have other sources of income. In 2002, the racial composition of Maryland's farmers included 17,740 whites, 296 African Americans, 71 Native Americans, 6 Native Hawaiian or Pacific Islanders, 49 Asians, 164 Hispanic or Latino, and 57 of combined races.[30]

The percentage of minority farmers in Maryland was 36 percent and the percentage of farmers living below poverty level was 8.5 percent, which declined from 9.5 percent in 1997. Issues identified by tenant farmers during scoping, however, pertain to landowners terminating lease agreements with tenant farmers over reducing the acreage available for planting. This issue was also raised at the National CREP Forum in 2002 when a participant asked if "there are any creative incentives" that address tenant farmers loss of land when land is enrolled in CREP.

CREP's landlord-tenant provisions can be found in *Handbook 2-CRP,* rev. 4, Amendment 1, paragraph 86. These requirements state that landlords must provide

[29] USDA, preliminary Environmental Assessment. Maryland CREP, Recreation and Leisure, p. 4.
[30] *2002 Census of Agriculture*.

tenants who have an interest in the acreage being offered at the time of signup, an opportunity to participate in CRP and not reduce the number of tenants on the farm as a result of or in anticipation of enrollments in CRP. All producers, landlords and tenants are to be fully informed at the time of sign-up and that landlords violating the provisions will be ineligible to earn CRP/CREP payments.

Although CREP contracts provide compensation to farmers for enrolling certain land in CREP, FSA does not monitor whether these funds are being passed on to compensate tenant farmers for the loss of land. COC's are responsible for determining whether landlord tenant provisions have been violated before approving CRP-1. The determination shall be made by reviewing the documentation submitted with the CRP-1 and researching the tenant history on the farm. When there is a dispute between a landlord and a tenant, and the COC determines there is insufficient evidence to make a determination, the COC shall not approve the CRP contract until the landlord and tenant resolve the dispute.

A tenant may sign a statement voluntarily relinquishing his/her interest in the farm or CRP benefits allowing the landlord to offer land for CRP that has a history of a tenant if COC determines that the landlord has the "necessary means" to conduct the farming operation. As of February 6, 2002, all CRP participants, landlords and tenants are required to sign a copy of the CRP-1 indicating that they fully understand the provisions relating to Tenants and Landlords.[31]

4.11 Cumulative Impacts

Cumulative impacts are defined by CEQ in §1508.7 as the incremental effect of the proposed action when added to other past, present and reasonably foreseeable future actions regardless of who or what agency undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions that occur over time.

Since the program's inception in 1997, CCC and FSA have responded to farmers' needs and have made programmatic adjustments to CRP, as well as to CREP. Some of these adjustments include:

- New cropping history requirements that cropland must be planted or considered planted four of the six crop years (1996-2001).
- Emphasis on increasing enhancement of riparian habitat from 70,000 acres to 93,000 acres; and for providing habitat for declining species.
- Targeted land to be enrolled increased from 70,000 acres to 77,000 acres for land adjacent to streams, wetlands or other water bodies; targets for HEL decreased to 16,000 acres from 20,000 acres.
- For cropland, for a field or a portion of a field, if the weighted average EI for the three predominant soils of the new land of the acreage offered is ≥8, the land is eligible to be offered for CREP; i.e., the EI increased from ≥8 to ≥16.
- 2,000 acres was specified for habitat for declining species.

[31] USDA-FSA Memorandum, Subject: CRP Landlord and Tenant Provisions. February 6, 2002.

- Incentive payments were added for land enrolled for riparian buffers, wetland restoration, shallow-water areas for wildlife, HEL and for habitat for declining species.

Current literature states that the implementation of conservation practices will in general have a positive effect on the removal of sediment and nutrients. However the magnitude of this effect will vary depending upon local conditions and programs. Most research centers on field-level impacts though it is recognized that there is a paucity of data that quantify the change in pollution levels in streams and lakes resulting from the installation of conservation practices.[32]

For wildlife habitat and buffers to be productive and effective, contiguous areas or long and wide corridors need to be established. It is recommended that future consideration be given to interagency collaborations with FWS, MDNR, NRCS and other wildlife experts in the State to target contiguous areas for CREP wildlife practices and to understand and identify their purposes. In this PEA, FWS has identified species that they have classified as declining. Specific habitat requirements to accommodate these species vary and need to be carefully considered in the future for benefits to be realized.

General riparian buffer performance characteristics for surface flow include the following:

1. Buffers retain 40-100 percent of sediment that enters from cultivated fields.
2. Sediment attached pollutants are reduced to a lesser degree than sediment.
3. Dissolved pollutants mass and concentrations are reduced in quantity similar to that or less than that of water volume.
4. There are some situations where pollutant mass and concentrations increase as a result of large runoff flows remobilizing previously captured material.

Future activities to control nitrate in streams in highly modified systems will need to relay more upon practices such as constructed wetlands and infield practices that lower nitrogen application rates. Large-scale assessments of the needs for riparian buffers and wetlands in response to the hypoxic zone in the Gulf of Mexico suggest that the need for these conservation practices will be substantial.[33]

The cumulative effects of MD CREP involve the interest and the ability of Maryland farmers to voluntarily enroll certain environmentally sensitive land into an agricultural conservation program for the purpose of reducing runoff and sedimentation and to ultimately improve the water quality of the Chesapeake Bay. Alternative 1, though highly successful, would limit the full enrollment to 71,208.5 acres, as the program expired in February 2004. Therefore no further land can be enrolled into the program. Alternative 1 also is attributed to permanently protecting 4,398.25 with CREP easements; up to 25,000 acres are eligible for easement protection.

[32] Dosskey, M.G. 2001. Toward quantifying water pollution abatement in response to installing buffers on crop land. *Environmental Management* 28(5): pp. 577-598.
[33] Mitsch, W.J., et al. 2001. Reducing nitrogen loading to the Gulf of Mexico from the Mississippi River basin: strategies to counter a persistent ecological problem. *BioScience* 51(5), pp. 373-388.

Selection of Alternative 2 would allow for the continuation of the program at existing acreage goals: 100,000 total acres, including those enrollments established under Alternative 1. As with Alternative 1, a total of 25,000 acres, or 25 percent of the total acreage, can be placed in permanent easements. Though CREP contracts are established with landowners for 10- to 15-year periods, permanent protection is essentially the only way of guaranteeing that these lands will not be developed. Conservation easements established through perpetuity provide greater protection and benefits to wildlife than term contracts. In addition, the money invested by USDA and MDA to provide incentives, bonuses, cost-share benefits and to reimburse landowners for implementing certain practices would be lost if the land under contract is ultimately sold to developers at the end of the agreement.

As presented at the *2002 National CREP Forum*, monitoring is critical to CREP to document successes and continually improve. Each State ideally should have a comprehensive monitoring plan matched to its program goals and objectives.[34] A monitoring plan for Maryland is recommended to determine the benefits and potential consequences of CREP.

Potential adverse effects relate to unforeseen programmatic changes that could occur in CREP due to termination of the program. At any time, Congress could eliminate support for the program, and reliance to the State, local and nonprofit conservation programs would shift. As the Chesapeake Bay Watershed and the State of Maryland continue to attract people to the area and pressures continue to be placed on State and local communities to provide infrastructure and public services, land sales by farmers to developers will most likely increase. Such sales would result conversion of farmland to subdivisions and therefore would result in larger areas of fragmented habitat, incompatible development in or adjacent to floodplains and riparian areas, and increases in sedimentation and runoff into tributaries to the Chesapeake Bay.

If a new MD CREP agreement is authorized, MDA and MDNR will each appoint an official primarily responsible for implementing the duties of the State under CREP. The State will form a new committee consisting of these officials, representatives from FSA and NRCS, SCDs and other interested groups to advise FSA about the implementation of the new CREP.

FSA will develop detailed procedures for implementing CREP, which will be incorporated into *Handbook 2-CRP, rev. 4*. The partners involved in CREP will develop and implement a comprehensive communications plan. A comprehensive evaluation of MD CREP will be included in the communications plan.

[34] CREP States Monitoring. Moderated by Andrea Moore, ILDNR. Panel at the *National CREP Forum 2002.*

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APPENDIX A

MARYLAND'S TRIBUTARY STRATEGY AGRICULTURAL BEST MANAGEMENT PRACTICES

U.S. Environmental Protection Agency Chesapeake Bay Program

Agricultural BMP Descriptions
As Defined For The Chesapeake Bay Program Watershed Model

Chesapeake Bay Program Nutrient Subcommittee
Agricultural Nutrient Reduction Workgroup
Russ Perkinson, VA DCR, Chair
3/31/04

Cereal Cover Crops

This BMP refers to (non-harvested) cereal cover crops specifically designed for nutrient removal. This BMP is more prevalent in the lower Chesapeake Bay basin due to the longer growing season. The crops capable of nutrient removal include rye, wheat, barley, and to a much lesser extent, oats. There is no BMP reduction credit for legume cover crops such as clover and vetch that fix their own nitrogen from the atmosphere. Significant amounts of nitrogen may remain in the soil after harvest of summer annual crops such as corn, soybeans, and vegetables. Nitrate nitrogen is particularly subject to leaching toward groundwater if substantial nitrogen remains in the soil as crop uptake of the summer annual crop ceases. Fall nitrate nitrogen levels in soils are more pronounced following years of less crop nutrient uptake due to drought conditions. The cereal cover crops trap nitrogen in their tissues as they grow, provided root growth is sufficient to reach the available soil nitrogen. Proper timing of cover crop killing or plow down in the spring helps release some of the trapped nitrogen for subsequent summer annual crops.

The BMP also provides some benefit for sediment erosion control, particularly when established after low residue crops. The BMP is less effective in reducing phosphorus than sediment losses since some phosphorus is transported in water soluble forms in addition to particulate forms. The BMP is most effective following drought conditions. Effectiveness is reduced in years when rainfall has allowed excellent summer annual crop yields that deplete available soil nitrogen and on very sandy soils where residual nitrate may have already migrated below the early rooting depth of a cover crop.

Early planting of a fall established cereal cover crop is critical in achieving substantial uptake of nitrogen in the fall. Research indicates that nitrogen uptake and trapping ability diminishes rapidly when planting dates extend beyond optimum planting dates. To be eligible for level 1 reduction credit, the cover crop must be planted earlier than 7 days prior to the long-term published average date of the first killing frost in the fall. To be eligible for level 2 reduction credit, the cover crop must be planted earlier than 14 days following the published long-term average date of the first killing frost in the fall. No reduction credits should be allowed after these establishment dates. Cover crops may not receive N or P applications from any nutrient source and may not be harvested for grain, hay or silage. Based on research, long-term BMP N reductions for all cropland categories are 45% for level 1 and 30% for level 2 for rye, wheat, barley, or triticale. P reductions are established at 15% and 7% for levels 1 and 2 respectively for conventional tillage cropland. Sediment reductions are 20% and 10% for levels 1 & 2 respectively for

conventional tillage cropland. There are no P or sediment reductions for conservation tillage cropland. Reduction credits for oats are one-half of the above credits for the level 1 planting dates and zero for the level 2 planting dates.

Commodity Cereal Cover Crops

Commodity cereal cover crops differ from cereal cover crops in that they may be harvested for grain, hay or silage and that they may receive nutrient applications, but only on or after March 1 of the spring following their establishment. The intent of the practice is to modify normal small grain production practices by eliminating fall and winter fertilization so that the crops scavenge available soil nitrogen function similarly to cover crops for part of their production cycle. This can encourage planting of more acreage of cereal grains by providing farmers with the flexibility of planting an inexpensive crop in the fall and delaying the decision to either kill or harvest the crop based on crop prices, silage needs, weather conditions, etc. Because fertilizer may be applied in the spring, the reduction efficiencies are reduced from cereal cover crop efficiencies. The same planting date criteria applies as specified under cereal cover crops. The reduction efficiency is 25% for level 1 planting dates and 17% for level 2 planting dates for all categories of cropland. There are no phosphorus or sediment reduction credits for this practice.

Soil Conservation Plans

Soil conservation plans are comprehensive plans that meet criteria of the USDA-NRCS Field Office Technical Guide. Soil conservation plans help control erosion by modifying cultural practices or structural practices. Cultural practices may change from year to year and include changes to crop rotations, tillage practices, or use of cover crops. This BMP does not include reduction credits to cultural practice changes in conservation plans on cropland or hayland since reductions are already reflected in land use changes, conservation tillage surveys, and cover crop practices. However, cultural practice changes are reflected in pastureland reduction efficiencies. Structural practices are longer term measures that include, but are not limited to the installation of grass waterways (in areas with concentrated flow), terraces, diversions, sediment basins, or drop structures. The reduction credits attributed to structural practices in conservation plans, also including cultural practice changes for pasture only, are estimated as follows:

Landuse	TN Reductions	TP Reductions	TSS Reductions
Conventional Tillage	8%	15%	25%
Conservation Tillage	3%	5%	8%
Hayland	3%	5%	8%
Pastureland	5%	10%	14%

Controlled Livestock Watering

Direct contact of pastured animals with surface water results in direct deposition of animal waste, streambank erosion, and re-suspension of sediments and associated nutrients held in streambeds. There are three unique systems that are variations to this BMP. The variations include off stream watering: (1) without stream fencing, (2) with

stream fencing, and (3) with stream fencing and rotational grazing. The systems are mutually exclusive, so reduction efficiencies are not additive.

Without Stream Fencing – This BMP requires the use of alternative drinking water troughs or tanks away from streams. The BMP may also include options to provide shade for livestock away from streams. Limited research has been conducted for this practice that documents changes in livestock behavior resulting in significantly less time spent near streambanks and in streams. The net effectiveness of the practice must reflect partial removal of livestock from near stream areas and relocation of animal waste deposition areas and heavy traffic areas surrounding water sources to more upland locations. Reduction efficiencies are 30%, 30%, and 38% for TN, TP, and TSS respectively.

With Fencing – This BMP incorporates both alternative watering and installation of fencing that involves narrow strips of land along streams to exclude livestock. The fenced areas may be planted with trees or grass, but are typically not wide enough to provide benefits of buffers. The implementation of stream fencing should substantially limit livestock access to streams, but can allow for the use of limited hardened crossing areas where necessary to accommodate access to additional pastures or for livestock watering. The BMP is estimated to impact the load from three pasture acres for each 208 feet of stream fencing with reduction efficiencies of 60%, 60%, and 75% for TN, TP, and TSS respectively.

With Stream Fencing and Rotational Grazing – This BMP combines stream fencing and alternative watering with cross fencing systems to create paddocks to enable rapid grazing of small areas in sequence. Once an area is intensively grazed of most vegetative matter, the animals are moved to another paddock to enable recovery of the pasture grasses. This BMP is beneficial in removing animals from stream areas, but detrimental in that the animal stocking rate per acre frequently increases substantially, thereby increasing the quantity of animal waste deposited per acre of pasture. Because of the offsetting impacts, the reduction efficiencies have been estimated to be 20%, 20%, and 40% for TN, TP, and TSS respectively. If the original grazing operation was not located in close proximity to surface water, reduction efficiencies of zero are applied.

Animal Waste Management

Animal waste management systems – These systems allow for collection and containment of a significant portion of the waste excreted by confined animals. They are designed for the proper handling, storage, and utilization of wastes generated from animal confinement operations. Failure to properly collect and store generated manure results in point source losses of liquid manure to surface water and excessive nutrient leachate to groundwater. For dry manure, subsequent contact with precipitation or wet soils under stockpiles can result in significant nutrient leaching. Reduction efficiencies for livestock animal waste systems are established as 80%, 80%, and 0% for TN, TP, and TSS respectively. The reduction efficiency for poultry manure is established at 14%, 14%, and 0% for TN, TP, and TSS respectively. The lower efficiencies for poultry animal

waste systems reflect the lower point source loss potential of the relatively dry nature of the waste product, however, the present efficiency only addresses partial clean-outs (known as crust-outs) but recognize that uncovered storage of crust-outs does result in some nutrient losses. A new BMP needs to be developed for covered storage of complete clean-outs that occur at infrequent intervals of two or three years. The major clean-outs can result in additional nutrient loss if stockpiles are not covered or if poultry manure is applied to land at times when no appropriate crop exists in a field nor will one be planted within a short timeframe.

Barnyard runoff control practices and rotational loafing lots – These practices may be implemented as part of a total animal waste management system, or as a stand-alone practice (particularly on smaller operations). Barnyard runoff practices include diversions, rainwater guttering, and similar practices. Installation of rotational loafing lots is grouped with barnyard control practices. The reduction efficiencies of barnyard control practices and rotational loafing lots are established as 20%, 20%, and 40% for TN, TP, and TSS respectively if the practices are implemented without an animal waste storage system. If the practices are implemented with a present or subsequent storage system, the reduction efficiencies are 10%, 10%, and 40% for TN, TP, and TSS.

Poultry mortality composters – This practice involves composting routine mortality in a designed facility, with subsequent land application of the compost. This prevents the necessity to bury dead animals that could result in nutrient leachate. Rendering of dead animals for processing into animal feeds or incineration are also alternatives to burial. No reduction efficiencies have been established at the present for this practice.

Nutrient Management Plans

Nutrient management plans (NMPs) are developed to address meeting crop nutrient needs in ways that protect water quality. NMPs are developed to match crop nutrient needs of each field with the expected crop yield based on soil productivity data or yield history for the site. NMPs 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. Nitrogen application rates have been revised to 135% of modeled crop uptake. The phosphorus application rate assumptions are under review.

Yield Reserve

This BMP involves a 15% nitrogen rate reduction below levels specified in a nutrient management plan and is available for cropland only. Therefore, this BMP requires that a nutrient management plan be developed for the farm prior to final enrollment in the program. Significant research indicates diminishing crop response to increasing rates of nitrogen application. Some research has also revealed exponentially increasing rates of nutrient loss as nutrient application rates increase. This BMP should not be applied in areas where available manure and land applied sewage sludge nutrients exceed utilization

capacity of the land at rates appropriate for nutrient management planning since it would create more surplus nutrient imbalance in such situations. The practice may negatively impact crop yields somewhat, therefore requiring financial incentives, but this yield impact is expected to be less than 15%. The reduction efficiency of this practice may be refined through additional future research. Based on available research on nutrient loss associated with application rate as well as crop nutrient budget estimates, the present reduction efficiencies for the practice are conservatively estimated at 15% for TN loss. Therefore, the modeled nitrogen rate would equate to 85% of the 135% NMP nitrogen uptake, or 114.75% of crop uptake [135% x (1.00 - 0.15)].

Enzyme Feed Additives to Reduce Phosphorus Excreted in Poultry Manure

This BMP involves the blending of enzymes into poultry feeds and a concurrent reduction in phosphorus content of feeds. Phytase is an example of a manufactured enzyme that improves the digestibility of organic phosphorus compounds contained in corn, soybean meal, and other feed ingredients consumed by poultry. Phytase can be injected into poultry feeds by the integrator or other feed supplier. Manure phosphorus reductions occur because less phosphorus needs to be blended into feed rations, resulting in a phosphorus source reduction. Documented aggregate manure analysis results indicate a 16% phosphorus reduction in turkey and broiler manure from the use of Phytase. States may claim greater future reductions with appropriate documentation such as statewide aggregate manure results or random sampling methods. Reductions of up to approximately 30% may be commercially possible with optimum implementation.

APPENDIX B

MARYLAND CREP
LEGISLATIVE MATRIX

Appendix Table B-1: Federal and State Requirements Related to Implementing Maryland CREP

Mandate	Administering Agency	Purpose
National Environmental Policy Act of 1969 (NEPA, P.L. 91-190, as amended by P.L. 94-52 and P.L. 94-52; (42 U.S.C. 4321-4347*)*	All Federal agencies	Establishes national policy for protection of the human environment and ensures that decisionmakers taken environmental factors into account. Requires all Federal agencies to analyze alternatives and document impacts resulting from proposed actions that could potentially affect the natural and human environment.
Council on Environmental Quality Regulations, as amended; 40 CFR Parts 1500-1508	All Federal agencies	Implements NEPA and provides guidance to Federal agencies in the preparation of environmental documents identified under NEPA.
Farmland Protection Policy Act of 1981 (7 U.S.C. 4201-4209)	USDA-NRCS	Minimizes impacts from Federal activities on farmland and maximizes compatibility with State and local policies.
Watershed Protection and Flood Prevention Act of 1954 (P.L. 83-566; 16 U.S.C. 1001-1008)	USDA-NRCS	Prior to FY 1996, watershed planning activities and the cooperative river basin surveys and investigations authorized by Section 6 of the Act were operated as separate programs.
Flood Control Act (P.L. 78-534)	USDA-NRCS	Authorized the Secretary of Agriculture to install watershed improvement measures to reduce flooding, sedimentation, and erosion damages, and to further the conservation, development, use and disposal of water and the proper utilization of land.

Mandate	Administering Agency	Purpose
Farm Security and Rural Investment Act of 2002 (P.L. 107-171; 2002 Farm Bill)	USDA-NRCS	The 2002 Farm Bill enhances the long-term quality of our environment and conservation of our natural resources. Published Conservation Reserve Program rule and launched CRP. Provides funding for conservation programs on working farm lands.
Clean Water Act (CWA) of 1977, as amended (33 U.S.C. 1251, et seq.) U.S. Army Corps of Engineers Regulatory Guidance Letter and National Wetlands Mitigation Action Plan, dated 12/24/02	U.S. Environmental Protection Agency; U.S. Army Corps of Engineers	Sec. 401 regulates water quality requirements specified under the CWA. Section 402 requires a National Pollutant Discharge Elimination System (NPDES) permit for discharges into waters of the U.S. Sec. 404 requires a permit before dredging or filling wetlands can occur. Clarified President George W. Bush Administration's policies on wetland loss and mitigation.
Endangered Species Act of 1973 (16 U.S.C. 1531-1543)	U.S. Fish & Wildlife Service	Establishes a policy to protect and restore federally listed threatened and endangered species of flora and fauna.
Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-711), as amended	U.S. Fish & Wildlife Service and Federal agencies	Implemented the 1916 Convention between the U.S. and Great Britain (for Canada) for the protection of migratory birds. Later amendments implemented treaties between the U.S. and Mexico, the U.S. and Japan, and the U.S. and Russia.

Mandate	Administering Agency	Purpose
Fish and Wildlife Coordination Act of 1934 (16 U.S.C. 661-666c; 48 Stat. 401), as amended	U.S. Fish & Wildlife Service	Requires Federal agencies to coordinate with the FWS when any project involves impoundment, diversion, channel deepening or other modification of a stream or water body.
Nongame and Endangered Species Conservation Act (Annotated Code of Maryland 10-2A-01). (Code of Maryland Regulations 08.03.08)	Maryland Department of Natural Resources	Contains the official State Threatened and Endangered Species list.
Federal Water Pollution Control Act of 1972 (33 U.S.C. 1251-1376, et seq.)	U.S. Environmental Protection Agency	Establishes standards for the restoration and maintenance of the chemical, physical and biological integrity of the nation's waters through prevention, reduction, and elimination of pollution.
Standards for the Use or Disposal of Biosolids (40 CFR Part 503)	U.S. Environmental Protection Agency	Provides States and local governments with guidance on the use or disposal of biosolids, including land application, and permit application requirements.
Executive Order 11990, *Protection of Wetlands*	U.S. Fish & Wildlife Service; USDA-NRCS; U.S. Army Corps of Engineers; U.S. Environmental Protection Agency	Requires Federal agencies to consider all practicable alternatives to impacting wetlands.
Executive Order 11988, *Floodplain Management*	Federal Emergency Management Agency; USDA-NRCS; U.S. Army Corps of Engineers	To restore and preserve the natural and beneficial values served by floodplains.

Mandate	Administering Agency	Purpose
Executive Order 13112, *Invasive Species*	All Federal agencies	Prevents introduction of invasive species and provides for their control to minimize the economic, ecological and human health effects that invasive species cause.
Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*	Departments of Agriculture, Commerce, Defense, Energy, Interior, State, Transportation and U.S. Environmental Protection Agency	Creates comprehensive strategy for conservation of migratory birds by Federal agencies. Enhances coordination among agencies regarding their responsibilities under the treaties on the conservation of migratory birds.
National Historic Preservation Act of 1966, as amended; Sec. 106 and Sec. 110; 16 U.S.C. 470; 36 CFR Parts 60, 63, 65, 78-79, 800	National Park Service; State Historic Preservation Offices	Protects and preserves districts, sites, structures, architectural, archaeological, and cultural resources. Sec. 106 requires consultation with the SHPO. Sec. 110 requires that NPS identify and nominate all eligible resources under its jurisdiction to the National Register of Historic Places.
Archaeological and Historic Preservation Act of 1974, as amended; 16 U.S.C. 469-469c; 74 Stat. 220	National Park Service; all Federal agencies	Requires survey, recovery, and preservation of significant scientific, prehistorical, historical, archaeological, or paleontological data when such data may be destroyed to due Federal activities.
Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*	All Federal agencies	To avoid Federal actions that cause disproportionately high, adverse impacts on minority and low-income populations with respect to human health and environment.

Source: Compiled by Environmental Management Collaboration, Ltd., 2004.

APPENDIX C

U.S. ENVIRONMENTAL PROTECTION AGENCY CHESAPEAKE BAY PROGRAM PARTNERS

APPENDIX C

U.S. Environmental Protection Agency

Chesapeake Bay Program Partners

Signatories to the Chesapeake Bay Agreement

- Chesapeake Bay Commission
- Commonwealth of Pennsylvania
- Commonwealth of Virginia
- District of Columbia
- State of Maryland
- U.S. Environmental Protection Agency

Headwater State Partners

- State of Delaware
- New York State
- State of West Virginia

Federal Agencies

- National Aeronautics and Space Administration (NASA)
- National Capital Planning Commission
- U.S. Department of Agriculture
    - Cooperative State Research, Education and Extension Service
    - Farm Service Agency
    - National Arboretum
    - Natural Resource Conservation Service
    - U.S. Forest Service
- U.S. Department of Commerce
    - National Oceanic and Atmospheric Administration (NOAA)
- U.S. Department of Defense (DOD)
    - Defense Logistics Agency
    - U.S. Department of the Air Force
    - U.S. Department of the Army
        - U.S. Army Corps of Engineers - Baltimore District
        - U.S. Army Corps of Engineers - Norfolk District
        - U.S. Army Corps of Engineers - Philadelphia District
        - U.S. Army Environmental Center
    - U.S. Department of the Navy
- U.S. Department of Education
- U.S. Department of the Interior
    - U.S. Fish and Wildlife Service (USFWS)
        - USFWS Chesapeake Bay Field Office
    - U.S. Geological Survey (USGS)
        - USGS Chesapeake Bay Information
        - USGS Patuxent Wildlife Research Center
    - National Park Service (NPS)
        - Chesapeake Bay Gateways Network
        - Rivers, Trails and Conservation Assistance Program

- U.S. Department of Transportation
  - U.S. Federal Highway Administration (FHA)
  - U.S. Coast Guard (USCG)
- U.S. General Services Administration (GSA)
- U.S. Postal Service (USPS)

Academic Institutions

- Academy of Natural Sciences
- Chesapeake Research Consortium (CRC)
- College of William and Mary
  - Virginia Institute of Marine Science (VIMS)
- Old Dominion University (ODU)
  - Department of Biological Sciences
  - Center for Coastal Physical Oceanography
- Pennsylvania State University (Penn State)
- Smithsonian Institution
  - Smithsonian Environmental Research Center (SERC)
- University of the District of Columbia (UDC)
- University of Maryland
  - Regional Earth Science Applications Center
  - University of Maryland Center for Environmental Science (UMCES)
    - UMCES Appalachian Laboratory
    - UMCES Chesapeake Biological Laboratory (CBL)
    - UMCES Horn Point Laboratory
    - Chesapeake Bay Observation System (CBOS)
    - Maryland Sea Grant Program
    - UMCES Agricultural Nutrient Management
    - University of Maryland's Maryland Water Resources Center
    - Environmental Finance Center
- University of Pennsylvania
- University of Virginia
  - Virginia Sea Grant Program
- Virginia Polytechnic Institute and State University (VA Tech)

Non-Governmental Partners

- Alliance for the Chesapeake Bay (ACB)
- American Forests
- Anacostia Watershed Society
- Center for Chesapeake Communities (CCC)
- Center for Watershed Protection (CWP)
- Chesapeake Bay Foundation (CBF)
- Chesapeake Bay Information Network (CBIN)
- Chesapeake Bay Trust
- Consortium for International Earth Science Information Network (CIESIN)
- International City/County Management Association
  - Local Government Environmental Assistance Network (LGEAN)

- Interstate Commission on the Potomac River Basin (ICPRB)
- Metropolitan Washington Council of Government (MWCOG)
- Montgomery County Environmental Protection
- Potomac Conservancy
- Susquehanna River Basin Commission (SRBC)

APPENDIX D

MARYLAND CRP-CREP CONSERVATION PRACTICES and CURRENT CREP CONTRACTS/ACREAGES

CRP Management Practices

Maryland

Cover Management to ensure plant diversity and wildlife benefits, and to protect soil and water resources.

Cover Type	Management Required
CP1 Introduced Grasses	Mixes with a forb or legume component must be overseeded starting in year 4, then every 3 years until contract expiration. Overseed the legume or forb component as was originally specified in established plant mix.
CP2 Native Grasses – Warm Season	If the native grass planting consists of warm season grasses, the management requirement is one of the following: 1. Burning – first burn at year 4 after planting, then every 3 years until contract expiration. The burned area may be divided into sections depending on the size of the practice. If separated into 3 sections, can burn one area every year beginning in year 4 in a 3-year cycle. 2. Light disking – begin in year 4 and follow prescribed rotation in job sheet.
CP2 Native Grasses – Cool Season	Native cool season plantings with a legume or forb component must be overseeded starting in year 4, then every 3 years until contract expiration. Overseed the legume or forb component as was originally specified in established plant mix.
CP3 Tree Planting (softwood)	No management required.
CP3A Tree Planting (hardwood)	No management required.
CP4B/CP4D Wildlife Habitat	If there are any cool season grasses planted with a forb or legume in the mix, the management is the same as CP1. For native grass management, see CP2. If the planting is trees and/or shrubs, no management practice is required.
CP5A Field Windbreak	No management required.
CP6 Diversion	Introduced (non-native) grass mixes with a forb or legume component must be overseeded starting in year 4, then every 3 years until contract expiration. Overseed the legume or forb component as was originally specified in established plant mix.
CP8A Grass Waterway	Introduced (non-native) grass mixes with a forb or legume component must be overseeded starting in year 4, then every 3 years until contract expiration. Overseed the legume or forb component as was originally specified in established plant mix.

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Cover Type	Management Required
CP9 Shallow Water Area for Wildlife	If the site is planned for active management as a moist-soil area, lightly disk in the pool area every 3 years as described in the job sheet. (Disking is not required if the site is planned to be a shallow emergent wetland, not actively managed.) For the buffer around the water, the management practice is based on the type of cover. See CP1, CP2, CP3, and CP3A, as appropriate.
CP10 Grass Already Established	If the original planting consisted of introduced grasses with a forb or legume in the mix, the management is the same as CP1. If the original planting was a native grass mix, see CP2.
CP11 Trees Already Established	No management required.
CP12 Wildlife Food Plot	No management required.
CP15A Contour Grass Strips	Introduced (non-native) grass mixes with a forb or legume component must be overseeded starting in year 4, then every 3 years until contract expiration. Overseed the legume or forb component as was originally specified in established plant mix.
CP16A Shelterbelt	No management required.
CP21 Filter Strip	The management practice is based on the type of cover established. See CP1 or CP2, as appropriate.
CP22 Riparian Buffer	If the planting is only trees and shrubs, no management practice is required. If the planting includes a Zone 3 grass filter strip, the management of the grass strip is based on the species of grass used (i.e., introduced vs. native; cool-season vs. warm-season). Refer to management practices for CP1 or CP2, as appropriate.
CP23 Wetland Restoration	No management practice is required for the wetland portion of CP23. For the buffer around the wetland, the management practice is based on the type of cover. See CP1, CP2, CP3, and CP3A, as appropriate.
CP25 Rare and Declining Species Habitat	The management practice is based on the type of cover established. For native grass plantings, refer to the management requirements for CP2. For native tree and/or shrub plantings, no management practice is required.
CP27 Farmable Wetland	No management required.
CP28 Buffer for Farmable Wetland	For the buffer around the wetland, the management practice is based on the type of cover. See CP1, CP2, CP3, and CP3A, as appropriate.
CP29 Wildlife Buffer	The management practice is based on the type of grass established. See CP1 or CP2, as appropriate. No management required for CP29 buffer areas planted to shrubs.
CP30 Wetland Buffer	No management required for the wetland portion of CP30. For the buffer around the wetland, the management practice is based on the type of cover. See CP1, CP2, CP3, and CP3A, as appropriate.

Revised 6/21/04

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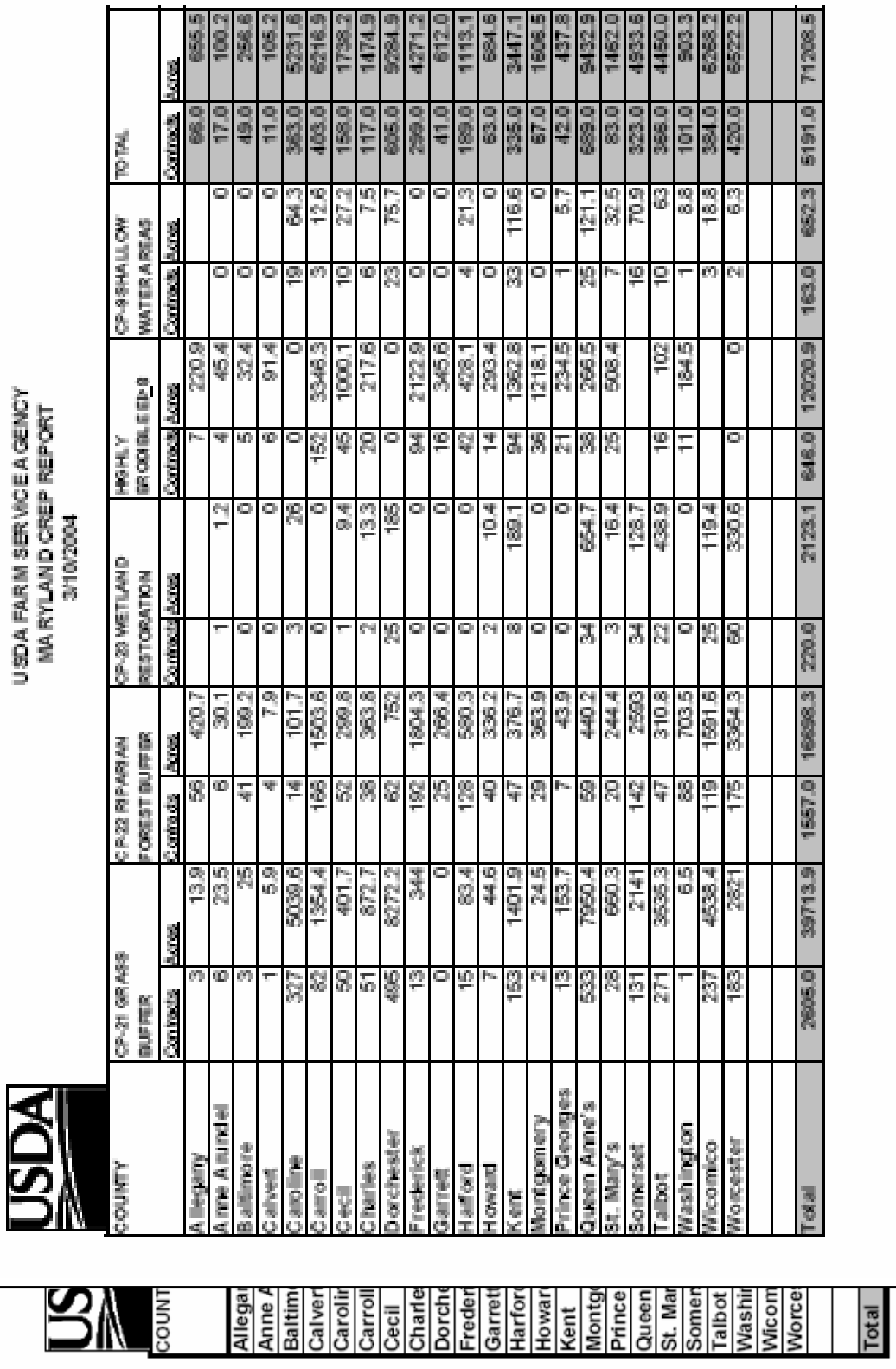
MARYLAND CREP REPORT
3/10/2004

COUNTY	CP-21 GRASS BUFFER		CP-22 RIPARIAN FOREST BUFFER		CP-23 WETLAND RESTORATION		HIGHLY ERODIBLE ED-9		CP-9 SHALLOW WATER AREAS		TOTAL	
	Contracts	Acres	Contracts	Acres	Contracts	Acres	Contracts	Acres	Contracts	Acres	Contracts	Acres
Allegany	3	13.9	56	420.7			7	220.9			66.0	655.5
Anne Arundel	6	23.5	6	30.1	1	1.2	4	45.4	0	0	17.0	100.2
Baltimore	3	25	41	199.2	0	0	5	32.4	0	0	49.0	256.6
Calvert	1	5.9	4	7.9	0	0	6	91.4	0	0	11.0	105.2
Caroline	327	5039.6	14	101.7	3	26	0	0	19	64.3	363.0	5231.6
Carroll	82	1354.4	166	1503.6	0	0	152	3346.3	3	12.6	403.0	6216.9
Cecil	50	401.7	52	299.8	1	9.4	45	1000.1	10	27.2	158.0	1738.2
Charles	51	872.7	38	363.8	2	13.3	20	217.6	6	7.5	117.0	1474.9
Dorchester	495	8272.2	62	752	25	185	0	0	23	75.7	605.0	9284.9
Frederick	13	344	192	1804.3	0	0	94	2122.9	0	0	299.0	4271.2
Garrett	0	0	25	266.4	0	0	16	345.6	0	0	41.0	612.0
Harford	15	83.4	128	580.3	0	0	42	428.1	4	21.3	189.0	1113.1
Howard	7	44.6	40	336.2	2	10.4	14	293.4	0	0	63.0	684.6
Kent	153	1401.9	47	376.7	8	189.1	94	1362.8	33	116.6	335.0	3447.1
Montgomery	2	24.5	29	363.9	0	0	36	1218.1	0	0	67.0	1606.5
Prince Georges	13	153.7	7	43.9	0	0	21	234.5	1	5.7	42.0	437.8
Queen Anne's	533	7950.4	59	440.2	34	654.7	38	266.5	25	121.1	689.0	9432.9
St. Mary's	28	660.3	20	244.4	3	16.4	25	508.4	7	32.5	83.0	1462.0
Somerset	131	2141	142	2593	34	128.7			16	70.9	323.0	4933.6
Talbot	271	3535.3	47	310.8	22	438.9	16	102	10	63	366.0	4450.0
Washington	1	6.5	88	703.5	0	0	11	184.5	1	8.8	101.0	903.3
Wicomico	237	4538.4	119	1591.6	25	119.4			3	18.8	384.0	6268.2
Worcester	183	2821	175	3364.3	60	330.6	0	0	2	6.3	420.0	6522.2
Total	2605.0	39713.9	1557.0	16698.3	220.0	2123.1	646.0	12020.9	163.0	652.3	5191.0	71208.5



USDA FARM SERVICE AGENCY
MARYLAND CREP REPORT
3/10/2004

COUNTY	CP-21 GRASS BUFFER		CP-22 RIPARIAN FOREST BUFFER		CP-23 WETLAND RESTORATION		HIGHLY ERODIBLE EB-9		CP-9 SHALLOW WATER AREAS		TOTAL	
	Contracts	Acres	Contracts	Acres	Contracts	Acres	Contracts	Acres	Contracts	Acres	Contracts	Acres
Allegany	3	13.9	56	420.7			7	220.9			66.0	655.5
Anne Arundel	6	23.5	6	30.1	1	1.2	4	45.4	0	0	17.0	100.2
Baltimore	3	25	41	199.2	0	0	5	32.4	0	0	49.0	256.6
Calvert	1	5.9	4	7.9	0	0	6	91.4	0	0	11.0	105.2
Caroline	327	5039.6	14	101.7	3	26	0	0	19	64.3	363.0	5231.6
Carroll	82	1354.4	166	1503.6	0	0	152	3346.3	3	12.6	403.0	6216.9
Cecil	50	401.7	52	299.8	1	9.4	45	1000.1	10	27.2	158.0	1738.2
Charles	51	872.7	38	363.8	2	13.3	20	217.6	6	7.5	117.0	1474.9
Dorchester	495	8272.2	62	752	25	185	0	0	23	75.7	605.0	9284.9
Frederick	13	344	192	1804.3	0	0	94	2122.9	0	0	299.0	4271.2
Garrett	0	0	25	266.4	0	0	16	345.6	0	0	41.0	612.0
Harford	15	83.4	128	580.3	0	0	42	408.1	4	21.3	189.0	1113.1
Howard	7	44.6	40	336.2	2	10.4	14	293.4	0	0	63.0	684.6
Kent	153	1401.9	47	376.7	8	189.1	94	1362.8	33	116.6	335.0	3447.1
Montgomery	2	24.5	29	363.9	0	0	36	1218.1	0	0	67.0	1606.5
Prince Georges	13	153.7	7	43.9	0	0	21	234.5	1	5.7	42.0	437.8
Queen Anne's	533	7960.4	59	440.2	34	654.7	38	266.5	25	121.1	689.0	9432.9
St. Mary's	28	660.3	20	244.4	3	16.4	25	508.4	7	32.5	83.0	1462.0
Somerset	131	2141	142	2593	34	128.7			16	70.9	323.0	4933.6
Talbot	271	3635.3	47	310.8	22	438.9	16	102	10	63	366.0	4450.0
Washington	1	6.5	88	703.5	0	0	11	184.5	1	8.8	101.0	903.3
Wicomico	237	4538.4	119	1591.6	25	119.4			3	18.8	384.0	6268.2
Worcester	183	2821	175	3364.3	60	330.6	0	0	2	6.3	420.0	6522.2
Total	2605.0	39713.9	1557.0	16888.3	220.0	2123.1	646.0	12000.9	163.0	652.3	5191.0	71208.5

APPENDIX E

MARYLAND SECTION 303(d) WATERS LISTING

Table 6: Bay IBI impairments (Category 5)

Bay segment	State 8-digit segment	State 8-digit segment name	Limits/Portion	Cause	Source
POCMH	02130201	Pocomoke Sound	mouth to Pig Point (VA)	biology	unknown
TANMH	02130206	Tangier Sound	all	biology	unknown
NAMH	02130305	Nanticoke River	mouth to Penknife Point	biology	unknown
CHOMH	02130403	Lower Choptank River	mouth to Clarks Wharf	biology	unknown
CHSMH	02130505	Lower Chester River	mouth to Melton Point	nutrients "low D.O."	eutrophication
GUNOH	02130801	Gunpowder River	all	biology	unknown
PATMH	02130903	Baltimore Harbor	all	nutrients "low D.O.",toxics	eutrophication
MAGMH	02131001	Magothy River	all	nutrients "low D.O."	eutrophication
PAXMH	02131101	Patuxent River (Mouth to Ferry Landing)	mouth to Chalk Point	nutrients "low D.O."	eutrophication
CB3MH	02139997	Middle Chesapeake Bay	Lower Bay to Black Marsh-Tolchester Beach	nutrients "low D.O."	eutrophication
CB5MH, CB4MH	02139998	Lower Chesapeake Bay	all	nutrients "low D.O."	eutrophication
POTMH, POTOH	02140101	Lower Potomac River (mouth to Smith Point)	all	nutrients "low D.O."	eutrophication
POTOH	02140102	Potomac River (Smith Point to Marshall Hall)	mouth to Moss Point-Shipping Point	biology	unknown

Table 7: Assessment Status for all waters evaluated using the Chesapeake Bay IBI.

8-DIGIT WATERBODIES ASSESSED WITH BAY IBI LISTING METHODOLOGY AQUATIC LIFE USE STANDARD			
Basin Name	**Basin Code**	**Assessment Status**	**Comments**
Middle Chesapeake Bay	02139997	not supporting	Listed in Category 5
Pocomoke Sound	02130201	not supporting	Listed in Category 5
Nanticoke River (tidal)	02130305	not supporting	Listed in Category 5
Lower Choptank River (tidal)	02130403	not supporting	Listed in Category 5
Lower Chester River (tidal)	02130505	not supporting	Listed in Category 5
Patuxent Mainstem-Mouth to Ferry Lndg (tidal)	02131101	not supporting	Listed in Category 5
Potomac - Marshall Hall to Smith Pt (tidal)	02140102	not supporting	Listed in Category 5
Lower Chesapeake Bay	02139998	not supporting	Listed in Category 5
Tangier Sound	02130206	not supporting	Listed in Category 5
Gunpowder River (tidal)	02130801	not supporting	Listed in Category 5
Baltimore Harbor	02130903	not supporting	Listed in Category 5
Magothy River (tidal)	02131001	not supporting	Listed in Category 5
Potomac - Smith Pt to Mouth (tidal)	02140101	not supporting	Listed in Category 5
Lower Pocomoke River (tidal)	02130202	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Big Annemessex River (tidal)	02130207	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Manokin River (tidal)	02130208	inconclusive (n<10)	Already listed in Category 5 for Nutrients

8-DIGIT WATERBODIES ASSESSED WITH BAY IBI LISTING METHODOLOGY AQUATIC LIFE USE STANDARD			
Basin Name	**Basin Code**	**Assessment Status**	**Comments**
Monie Bay	02130302	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Marshyhope Creek (tidal)	02130306	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Fishing Bay	02130307	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Honga River (tidal)	02130401	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Little Choptank River (tidal)	02130402	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Upper Choptank River (tidal)	02130404	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Eastern Bay	02130501	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Wye River (tidal)	02130503	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Langford Creek (tidal)	02130506	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Corsica River (tidal)	02130507	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Southeast Creek (tidal)	02130508	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Middle Chester River (tidal)	02130509	inconclusive (n<10)	Already listed in Category 5 for Nutrients

8-DIGIT WATERBODIES ASSESSED WITH BAY IBI LISTING METHODOLOGY AQUATIC LIFE USE STANDARD			
Basin Name	**Basin Code**	**Assessment Status**	**Comments**
Patuxent Mainstem-Ferry Ldg to Rt 214 (tidal)	02131102	inconclusive (n<10)	Already listed in Category 5 for Nutrients
St. Mary's River (tidal)	02140103	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Breton Bay	02140104	inconclusive (n<10)	Already listed in Category 5 for Nutrients
St. Clements Bay	02140105	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Wicomico River (tidal)	02140106	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Nanjemoy Creek (tidal)	02140110	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Mattawoman Creek (tidal)	02140111	inconclusive (n<10)	Already listed in Category 5 for Nutrients
Upper Chesapeake Bay	02139996	fully supports	Already listed in Category 5 for Nutrients
Lower Wicomico River (tidal)	02130301	fully supports	Already listed in Category 5 for Nutrients
Severn River (tidal)	02131002	fully supports	Already listed in Category 5 for Nutrients
Potomac - Marshall Hall to Chain Bridge (tidal)	02140201	fully supports	Already listed in Category 5 for Nutrients

Table 1: 8-Digit Watersheds determined to be impaired using Maryland Biological Stream Survey Data.

NEW 8-DIGIT WATERSHED LISTINGS (Category 5)			
Basin Name	Basin Code	Data Result	Comments
Conococheague Creek	02140504	Mean BIBI = 1.96, Lower 90% CI = 1.69, Upper 90% CI = 2.22	Never listed before for any biological impairment
Lower Pocomoke River	02130202	Mean BIBI = 1.86, Lower 90% CI = 1.72, Upper 90% CI = 1.99	Listed on the 2002 List only at the 12-digit level (021302020632)
Middle Chester River	02130509	Mean BIBI = 2.43, Lower 90% CI = 2.17, Upper 90% CI = 2.68	Listed on the 2002 List only at the 12-digit level (021305090415)
Nanticoke River	02130305	Mean BIBI = 2.44, Lower 90% CI = 2.19, Upper 90% CI = 2.69: Site status = Fail and Mean FIBI = 2.57, Lower 90% CI = 2.3, Upper 90% CI = 2.84	Never listed before for any biological impairment
Patuxent River Middle	02131102	Mean BIBI = 2.76, Lower 90% CI = 2.49, Upper 90% CI = 3.03: Site status = Indeterminate and Mean FIBI = 2.58, Lower 90% CI = 2.19, Upper 90% CI = 2.98	Listed on the 2002 List only at the 12-digit level (basins 021311020908, 021311020911, 021311020912, and 021311020914).
Piscataway Creek	02140203	Mean BIBI = 2.29, Lower 90% CI = 2.11, Upper 90% CI = 2.46	Listed on the 2002 List only at the 12-digit level (basins 021402030799, 021402030802, 021402030803

BIBI = Benthic Index of Biotic Integrity
FIBI = Fish Index of Biotic Integrity
CI = Confidence Interval

3.1.4 Waters with Insufficient Biological Data to Determine Impairment

Category 3 of the Integrated List is reserved for waters that have insufficient data or information to make an assessment. Insufficient information can be the result of having either an insufficient quantity of data (e.g., a single data point) or having data of insufficient quality (e.g., undocumented sample collection procedures, high analytical equipment error). Maryland's biocriteria listing methodology recognizes that, due to natural variability and/or anthropogenic impact, waters can score in an indeterminate zone between impaired and unimpaired.

APPENDIX F

FEDERALLY AND STATE PROTECTED SPECIES IN MARYLAND

Appendix Table F-1: Rare And Endangered Maryland Fish Species

Species	Estimated Number in Maryland	
Rainbow darter	< 600	Each of these species occur in less than 0.5% of Maryland's streams
Stripeback darter[S1]	< 600	
Banded darter	< 600	
Flier[SU]	1,500	
Ironcolor shiner[S1]	3,000	
Comely shiner	3,500	
Glassy darter[S1, E]	5,000	
Logperch[S1]	8,000	
Striped shiner	10,000	
Johnny darter	80,000	
American brook lamprey	180,000	Each of these species occur in less than 5% of Maryland's streams
Mud sunfish[S2]	3,500	
Swamp darter	10,000	
Warmouth	25,000	
Silverjaw minnow	60,000	
Shield darter	75,000	
Banded sunfish	80,000	
Brook trout	320,000	
Checkered sculpin	475,000	
Pearl dace	500,000	

Notes on current listings

- [E] Endangered in Maryland
- [S1] Extremely rare in Maryland
- [S2] Rare in Maryland
- [S3] Uncommon in Maryland
- [SU] Rare-uncertain status in Maryland

Source: Maryland Dept. of Natural Resources, Wildlife and Natural Heritage.

Appendix Table F-2: Federally Protected Species in Maryland, 2004	
Status	**Animals**
E	Bat, Indiana (*Myotis sodalis*)
E	Darter, Maryland (*Etheostoma sellare*)
T	Eagle, bald (lower 48 States) (*Haliaeetus leucocephalus*)
T	Plover, piping (except Great Lakes watershed) (*Charadrius melodus*)
E	Puma (=cougar), eastern (*Puma (=Felis) concolor couguar)*
T	Sea turtle, green (except where endangered) (*Chelonia mydas*)
E	Sea turtle, hawksbill (*Eretmochelys imbricata*)
E	Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
E	Sea turtle, leatherback (*Dermochelys coriacea*)
T	Sea turtle, loggerhead (*Caretta caretta*)
E	Squirrel, Delmarva Peninsula fox (except Sussex Co., DE) (*Sciurus niger cinereus*)
E	Sturgeon, shortnose (*Acipenser brevirostrum*)
T	Tiger beetle, northeastern beach (*Cicindela dorsalis dorsalis*)
T	Tiger beetle, Puritan (*Cicindela puritana*)
T	Turtle, bog (=Muhlenberg) (northern) (*Clemmys muhlenbergii*)
E	Wedge mussel, dwarf (*Alasmidonta heterodon*)
E	Whale, finback (*Balaenoptera physalus*)
E	Whale, humpback (*Megaptera novaeangliae*)
E	Whale, right (*Balaena glacialis (incl. australis*))
Status	**Plants**
T	Joint-vetch, sensitive (*Aeschynomene virginica*)
E	Gerardia, sandplain (*Agalinis acuta*)
T	Amaranth, seabeach (*Amaranthus pumilus*)
T	Pink, swamp (*Helonias bullata*)
E	Dropwort, Canby's (*Oxypolis canbyi*)
E	Harperella (*Ptilimnium nodosum*)
E	Bulrush, Northeastern (Scirpus ancistrochaetus)

Source: U.S. Fish & Wildlife Service, Threatened & Endangered Species System (TESS), as of Aug. 25, 2003; www.fws.gov/tess_public

MARYLAND'S ENDANGERED ANIMALS*

Maryland Department of Natural Resources
Wildlife and Heritage Division

FISHES

Slimy sculpin	Cottus cognatus	Threatened
Shortnose sturgeon	Acipenser brevirostrum	Endangered
Cheat minnow	Rhinichthys bowersi	Endangered Extirpated
Longnose sucker	Catostomus catostomus	Endangered
Stonecat	Noturus flavus	In Need of Conservation
Trout-perch	Percopsis omiscomaycus	Endangered Extirpated
Blackbanded sunfish	Enneacanthus chaetodon	In Need of Conservation
Maryland darter	Etheostoma sellare	Endangered
Glassy darter	Etheostoma vitreum	Endangered
Stripeback darter	Percina notogramma	Endangered

AMPHIBIANS

Eastern tiger salamander	Ambystoma tigrinum	Endangered
Hellbender	Cryptobranchus alleganiensis	Endangered
Green salamander	Aneides aeneus	Endangered
Wehrle's salamander	Plethodon wehrlei	In Need of Conservation
Mudpuppy	Necturus maculosus	Endangered Extirpated
Barking treefrog	Hyla gratiosa	Endangered
Mountain chorus frog	Pseudacris brachyphona	Threatened
Eastern narrow-mouthed toad	Gastrophryne carolinensis	Endangered
Carpenter frog	Rana virgatipes	In Need of Conservation

REPTILES

Atlantic loggerhead turtle	Caretta caretta	Threatened
Atlantic green turtle	Chelonia mydas	Threatened
Atlantic hawksbill turtle	Eretmochelys imbricata	Endangered
Atlantic ridley turtle	Lepidochelys kempii	Endangered
Atlantic leatherback turtle	Dermochelys coriacea	Endangered
Bog turtle	Clemmys muhlenbergii	Threatened
Map turtle	Graptemys geographica	Endangered
Eastern spiny softshell	Apalone spinifera	In Need of Conservation
Northern coal skink	Eumeces anthracinus	Endangered
Rainbow snake	Farancia erytrogramma	Endangered
Mountain earth snake	Virginia valeriae pulchra	Endangered

BIRDS

American bittern	Botaurus lentiginosus	In Need of Conservation
Least bittern	Ixobrychus exilis	In Need of Conservation
Bald eagle	Haliaeetus leucocephalus	Threatened
Northern goshawk	Accipiter gentilis	Endangered
Peregrine falcon	Falco peregrinus	Endangered
Greater prairie-chicken	Tympanuchus cupido	Endangered Extirpated
Black rail	Laterallus jamaicensis	In Need of Conservation
Common moorhen	Gallinula chloropus	In Need of Conservation
Wilson's plover	Charadrius wilsonia	Endangered
Piping plover	Charadrius melodus	Endangered
Upland sandpiper	Bartramia longicauda	Endangered

Eskimo curlew	Numenius borealis	Endangered Extirpated
Gull-billed tern	Sterna nilotica	Threatened
Royal tern	Sterna maxima	Endangered
Roseate tern	Sterna dougallii	Endangered Extirpated
Least tern	Sterna antillarum	Threatened
Black skimmer	Rynchops niger	Threatened
Short-eared owl	Asio flammeus	In Need of Conservation
Red-cockaded woodpecker	Picoides borealis	Endangered Extirpated
Ivory-billed woodpecker	Campephilus principalis	Endangered Extirpated
Olive-sided flycatcher	Contopus cooperi	Endangered
Alder flycatcher	Empidonax alnorum	In Need of Conservation
Bewick's wren	Thryomanes bewickii altus	Endangered
Sedge wren	Cistothorus platensis	Threatened
Loggerhead shrike	Lanius ludovicianus	Endangered
Nashville warbler	Vermivora ruficapilla	In Need of Conservation
Blackburnian warbler	Dendroica fusca	Threatened
Swainson's warbler	Limnothlypis swainsonii	Endangered
Mourning warbler	Oporornis philadelphia	Endangered
Bachman's sparrow	Aimophila aestivalis	Endangered Extirpated
Lark sparrow	Chondestes grammacus	Endangered Extirpated
Henslow's sparrow	Ammodramus henslowii	Threatened

MAMMALS

Southern water shrew	Sorex palustris punctulatus	Endangered
Smoky shrew	Sorex fumeus	Threatened
Long-tailed shrew	Sorex dispar	In Need of Conservation
Indiana bat	Myotis sodalis	Endangered
Eastern small-footed bat	Myotis leibii	In Need of Conservation
Appalachian cottontail	Sylvilagus obscurus	In Need of Conservation
Snowshoe hare	Lepus americanus	Endangered Extirpated
Delmarva fox squirrel	Sciurus niger cinereus	Endangered
Eastern harvest mouse	Reithrodontomys humulis	Endangered Extirpated
Allegheny woodrat	Neotoma magister	Endangered
Southern rock vole	Microtus chrotorrhinus carolinensis	Endangered
Porcupine	Erethizon dorsatum	In Need of Conservation
Sperm whale	Physeter catodon	Endangered
Fin whale	Balaenoptera physalus	Endangered
Sei whale	Balaenoptera borealis	Endangered
Blue whale	Balaenoptera musculus	Endangered
Humpback whale	Megaptera novaeangliae	Endangered
Black right whale	Eubalaena glacialis	Endangered
Gray wolf	Canis lupus	Endangered Extirpated
American marten	Martes americana	Endangered Extirpated
Least weasel	Mustela nivalis	In Need of Conservation
Eastern cougar	Felis concolor couguar	Endangered Extirpated
Bobcat	Lynx rufus	In Need of Conservation
American elk	Cervus elaphus	Endangered Extirpated

*This list contains all vertebrate animals listed as Endangered, Threatened, In Need of Conservation, or Endangered Extirpated by the State of Maryland, except for several species of commercially harvested fish. Many species of invertebrate animals, including some crustaceans, freshwater mussels, butterflies, dragonflies and other insects, are also listed in Maryland. This document is current as of June 15, 2001.

December 2003 RARE, THREATENED, AND ENDANGERED PLANTS OF MARYLAND
MD DNR

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	STATE STATUS	FEDERAL STATUS
Abies balsamea	Balsam fir	G5	S1		
Aconitum uncinatum	Blue monkshood	G4	S1	E	
Adlumia fungosa	Climbing fumitory	G4	S2	T	
Aeschynomene virginica	Sensitive joint-vetch	G2	S1	E	LT
Agalinis acuta	Sandplain gerardia	G1	S1	E	LE
Agalinis auriculata	Auricled gerardia	G3	S1	E	
Agalinis fasciculata	Fascicled gerardia	G5	S1	E	
Agalinis linifolia	Flax-leaved gerardia	G4?	SP		
Agalinis obtusifolia	Blunt-leaved gerardia	G4G5Q	S1	E	
Agalinis setacea	Thread-leaved gerardia	G5?	S1	E	
Agalinis skinneriana	Midwestern gerardia	G3	S1	E	
Agastache scrophulariifolia	Purple giant hyssop	G4	S1S2	T	
Agrimonia microcarpa	Small-fruited agrimony	G5	SU		
Agrimonia striata	Woodland agrimony	G5	S1	E	
Aletris aurea	Golden colicroot	G5	SH	X	
Alnus maritima	Seaside alder	G3	S3.1		
Alopecurus aequalis	Short-awned foxtail	G5	SU		
Amaranthus pumilus	Seabeach amaranth	G2	S1	E	LT
Amelanchier humilis	Running serviceberry	G5	S1	T	
Amelanchier nantucketensis	Nantucket shadbush	G3Q	S1	T	
Amelanchier obovalis	Coastal juneberry	G4G5	SR		
Amelanchier sanguinea	Roundleaf serviceberry	G5	S1		
Amelanchier stolonifera	Running juneberry	G5	S2	T	
Amianthium muscitoxicum	Fly-poison	G4G5	S2?		
Ammannia coccinea	Scarlet ammannia	G5	SU		
Ammannia latifolia	Koehne's ammannia	G5	S2		
Ampelopsis arborea	Pepper-vine	G5	SU		
Ampelopsis cordata	Heartleaf peppervine	G5	SU		
Amphicarpum purshii	Pursh's amphicarpum	G4	S3		
Anagallis minima	Chaffweed	G5	SU	X	
Anaphalis margaritacea	Pearly everlasting	G5	S3		
Anemone canadensis	Canada anemone	G5	SH	X	
Anemone lancifolia	Mountain thimble-weed	G5	SU		
Angelica atropurpurea	Great angelica	G5	SH	X	
Angelica triquinata	Filmy angelica	G4	S1	E	
Antennaria solitaria	Single-headed pussytoes	G5	S2	T	
Apocynum sibiricum	Clasping-leaved dogbane	G5?	SH	X	
Arabis glabra	Tower mustard	G5	SU		
Arabis hirsuta	Hairy rockcress	G5	SU		
Arabis missouriensis	Missouri rockcress	G4G5Q	S1	E	
Arabis patens	Spreading rockcress	G3	S3		
Arabis shortii	Short's rockcress	G5	S3		
Aralia hispida	Bristly sarsaparilla	G5	S1	E	
Arctostaphylos uva-ursi	Bearberry	G5	S1	E	
Arethusa bulbosa	Arethusa	G4	SH	X	
Aristida curtissii	Curtiss' three-awn	G5T5	SU		
Aristida lanosa	Woolly three-awn	G5	S1	E	
Aristida tuberculosa	Sea-beach three-awn	G5	S1		
Aristida virgata	Wire grass	G5T4T5	S1	E	
Aristolochia macrophylla	Pipevine	G5	S1	T	
Armoracia lacustris	Lake cress	G4?	S1	E	
Arnica acaulis	Leopard's-bane	G4	S1	E	
Aronia prunifolia	Purple chokeberry	G4G5Q	S3		
Aronia x prunifolia	Purple chokeberry	HYB	S3		
Arundinaria gigantea	Giant cane	G5	S2		
Asclepias lanceolata	Smooth orange milkweed	G5	SU		
Asclepias purpurascens	Purple milkweed	G4G5	SU		
Asclepias rubra	Red milkweed	G4G5	S1	E	
Asclepias verticillata	Whorled milkweed	G5	S3		
Asplenium bradleyi	Bradley's spleenwort	G4	SH	X	
Asplenium pinnatifidum	Lobed spleenwort	G4	S1	E	
Asplenium resiliens	Black-stem spleenwort	G5	S1	E	
Asplenium ruta-muraria	Wall-rue	G5	S3		
Aster concinnus	Steele's aster	G5T4	SH	X	
Aster concolor	Silvery aster	G4?	S1	E	
Aster depauperatus	Serpentine aster	G2	S1	E	
Aster drummondii	Drummond aster	G5	S1		
Aster infirmus	Cornel-leaf aster	G5	S3		

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	STATE STATUS	FEDERAL STATUS
Aster lowrieanus	Lowrie's aster	G3G5Q	S3		
Aster nemoralis	Bog aster	G5	SE?		
Aster praealtus	Willow aster	G5	S1		
Aster radula	Rough-leaved aster	G5	S1	E	
Aster shortii	Short's aster	G4G5	S3		
Aster spectabilis	Showy aster	G5	S1	E	
Astilbe biternata	False goat's-beard	G4G5	S?		
Astragalus canadensis	Canada milkvetch	G5	S1	E	
Astragalus distortus	Bent milkvetch	G5	S2	T	
Atriplex arenaria	Sea-beach orach	G5	S3		
Aureolaria flava	Smooth false foxglove	G5	S3		
Aureolaria laevigata	Downy yellow foxglove	G5	SU		
Axonopus furcatus	Big carpet grass	G5	SH	X	
Azolla caroliniana	Mosquito fern	G5	SU		
Bacopa innominata	Mat-forming water-hyssop	G3G5	SH	X	
Bacopa monnieri	Coastal water-hyssop	G5?	SU		
Baptisia australis	Wild false indigo	G5	S2	T	
Bartonia paniculata	Twining bartonia	G5	S3		
Berberis canadensis	American barberry	G3	SH	X	
Betula populifolia	Gray birch	G5	SU		
Bidens bidentoides var mariana	Maryland bur-marigold	G3T3	S3.1		
Bidens coronata	Tickseed sunflower	G5	S2S3		
Bidens discoidea	Swamp beggar-ticks	G5	S3		
Bidens mitis	Small-fruited beggar-ticks	G4?	S1	E	
Blephilia ciliata	Downy woodmint	G5	S3		
Blephilia hirsuta	Hairy woodmint	G5?	S2		
Boltonia asteroides	Aster-like boltonia	G5	S1	E	
Borrichia frutescens	Sea ox-eye	G5	SH	X	
Botrychium lanceolatum	Triangle grape-fern	G5	SH	X	
Botrychium matricariifolium	Matricary grape-fern	G5	SU		
Botrychium multifidum	Leathery grape-fern	G5	SH	X	
Botrychium oneidense	Blunt-lobe grape-fern	G4Q	S1	E	
Botrychium simplex	Small grape-fern	G5	SH	X	
Bouteloua curtipendula	Side-oats grama	G5	S2		
Bromus ciliatus	Fringed brome	G5	SU	X	
Bromus kalmii	Wild chess	G5	S1	E	
Bromus latiglumis	Broad-glumed brome	G5	S1	E	
Bromus nottowayanus	Nottoway's brome	G3G4	SH	X	
Buchnera americana	Blue-hearts	G5?	SH	X	
Cacalia muehlenbergii	Great indian-plantain	G4	SH	X	
Calamagrostis canadensis	Blue-joint grass	G5	S3		
Calamagrostis porteri	Porter's reedgrass	G4	S1	E	
Calla palustris	Wild calla	G5	S1	E	
Callicarpa americana	French mulberry	G5	SH	X	
Calopogon tuberosus	Grass-pink	G5	S1	E	
Calystegia spithamaea	Low bindweed	G4G5	S2		
Campanula divaricata	Southern harebell	G4	SU	X	
Campanula rotundifolia	Harebell	G5	S2		
Cardamine douglassii	Purple cress	G5	S3		
Cardamine longii	Long's bittercress	G3	S1	E	
Cardamine pratensis	Cuckooflower	G5	S1		
Cardamine rotundifolia	Mountain watercress	G4	S3		
Carex aestivalis	Summer sedge	G4	S1	E	
Carex albursina	A sedge	G5	S3		
Carex appalachica	Appalachian sedge	G4	S1?		
Carex aquatilis	Water sedge	G5	S1		
Carex argyrantha	Hay sedge	G5	S3		
Carex barrattii	Barratt's sedge	G4	S3		
Carex brevior	Fescue sedge	G5?	S2?		
Carex brunnescens	Brownish sedge	G5	S3		
Carex bullata	Button sedge	G5	S3		
Carex buxbaumii	Buxbaum's sedge	G5	S2	T	
Carex careyana	Carey's sedge	G5	S1	E	
Carex cephaloidea	Thin-leaved sedge	G5	SH		
Carex conoidea	Field sedge	G5	S1	E	
Carex cristatella	Crested sedge	G5	SU		
Carex davisii	Davis' sedge	G4	S1	E	
Carex decomposita	Cypress-knee sedge	G3	S1	X	

Appendix 34

December 2003 RARE, THREATENED, AND ENDANGERED PLANTS OF MARYLAND
MD DNR

SCIENTIFIC NAME	COMMON NAME	RANK	RANK	STATU
STATUS				
Carex diandra	Lesser panicled sedge	G5	S1	E
Carex digitalis var macropoda	A carex	G5T?	S1?	
Carex eburnea	Ebony sedge	G5	S1	E
Carex echinata	Little prickly sedge	G5	S1	
Carex emoryi	Emory's sedge	G5	S1S2	
Carex exilis	Coast sedge	G5	S1	E
Carex gigantea	Giant sedge	G4	S3	
Carex glaucescens	A sedge	G4	S1	E
Carex haydenii	Cloud sedge	G5	S1	
Carex hirtifolia	Pubescent sedge	G5	S3	
Carex hitchcockiana	Hitchcock's sedge	G5	S1	E
Carex hyalinolepis	Shoreline sedge	G4G5	S2S3	
Carex hystericina	Porcupine sedge	G5	S1	E
Carex interior	Inland sedge	G5	S1	
Carex joorii	Cypress-swamp sedge	G4G5	S3	
Carex lacustris	Lake-bank sedge	G5	S2	T
Carex lasiocarpa	Hairy-fruited sedge	G5	S1	E
Carex laxiculmis var copulata	Spreading sedge	G5T?	S1?	
Carex louisianica	Louisiana sedge	G5	S3	
Carex lucorum	A sedge	G4	SH	
Carex lupuliformis	Hop-like sedge	G4	S1?	
Carex meadii	Mead's sedge	G4G5	S1	E
Carex mitchelliana	Mitchell's sedge	G3G4	S1	
Carex molesta	Troublesome sedge	G4	S1?	
Carex novae-angliae	New England sedge	G5	SRF	
Carex pedunculata	Long-stalked sedge	G5	S1	E
Carex pellita	Woolly sedge	G5	S2?	
Carex planispicata	A sedge	G4Q	S1S2	
Carex plantaginea	Plantain-leaved sedge	G5	S1?	
Carex polymorpha	Variable sedge	G3	SH	X
Carex projecta	Necklace sedge	G5	S2	
Carex richardsonii	Richardson's sedge	G4	S1	E
Carex rostrata	Beaked sedge	G5	SRF	
Carex sartwellii	Sartwell sedge	G4G5	SH	
Carex shortiana	Short's sedge	G5	S2	E
Carex silicea	Sea-beach sedge	G5	S1	E
Carex sparganioides	Burr-reed sedge	G5	S1S2	
Carex straminea	Straw sedge	G5	S1S2	
Carex striatula	Lined sedge	G4G5	S3	
Carex tenera	Slender sedge	G5	SH	X
Carex tetanica	Rigid sedge	G4G5	SH	X
Carex trichocarpa	Hairy-fruited sedge	G4	S2	
Carex tuckermanii	Tuckerman sedge	G4	S1	E
Carex venusta	Dark green sedge	G4	S2	T
Carex vesicaria	Inflated sedge	G5	S1	T
Carex vestita	Velvety sedge	G5	S2	T
Carya laciniosa	Big shellbark hickory	G5	S1	E
Cassia marilandica	Maryland senna	G5	S3	
Castanea dentata	American chestnut	G4	S2S3	
Castilleja coccinea	Indian paintbrush	G5	S1	E
Celtis laevigata	Sugarberry	G5	SU	
Centella erecta	Coinleaf	G5	S3	
Centrosema virginianum	Spurred butterfly-pea	G5	S2	
Ceratophyllum echinatum	Prickly hornwort	G4?	S1	E
Chamaecrista fasciculata var macrosperma	Marsh wild senna	G5T3	S1	E
Chamaecyparis thyoides	Atlantic white cedar	G4	S3	
Chamaedaphne calyculata	Leatherleaf	G5	S1	T
Chamaelirium luteum	Devil's-bit	G5	S3	
Chamaesyce vermiculata	Hairy spurge	G5	SH	
Chelone obliqua	Red turtlehead	G4	S1	T
Chenopodium gigantospermum	Maple-leaved goosefoot	G4G5	S1	E
Chenopodium leptophyllum	Narrow-leaved goosefoot	G5	SX	
Chenopodium standleyanum	Standley's goosefoot	G5	S1	E
Chimaphila umbellata	Prince's pine	G5	S1?	
Chrysogonum virginianum	Golden-knees	G5	S3	
Cicuta bulbifera	Bulb-bearing water hemlock	G5	S1	E
Cimicifuga americana	American bugbane	G4	S2	
Cinna latifolia	Slender wood reedgrass	G5	S2	T
		GLOBAL	STATE	STATE
FEDERAL				
SCIENTIFIC NAME	COMMON NAME	RANK	RANK	STATU
STATUS				

Cirsium horridulum	Yellow thistle	G5	S3	
Cirsium muticum	Swamp thistle	G5	S3	
Claytonia caroliniana	Carolina spring-beauty	G5	S3	
Cleistes divaricata	Spreading pogonia	G4	S1	E
Clematis occidentalis	Purple clematis	G5	S1	E
Clematis ochroleuca	Curly-heads	G4	SH	X
Clematis viorna	Leatherflower	G5	S3	
Clintonia alleghaniensis	Harned's swamp clintonia	G1Q	S1	
Clintonia borealis	Yellow clintonia	G5	S2	T
Coeloglossum viride	Long-bracted orchis	G5	S1	E
Coelorachis rugosa	Wrinkled jointgrass	G5	S1	E
Commelina erecta	Slender dayflower	G5	S3	
Coptis trifolia	Goldthread	G5	S1	E
Corallorhiza trifida	Early coralroot	G5	S1	E
Corallorhiza wisteriana	Wister's coralroot	G5	S1	E
Coreopsis rosea	Rose coreopsis	G3	S1	E
Coreopsis tripteris	Tall tickseed	G5	S1	E
Coreopsis verticillata	Whorled coreopsis	G5	S3	
Cornus canadensis	Bunchberry	G5	S1	E
Cornus rugosa	Round-leaved dogwood	G5	S1	E
Corydalis aurea	Golden corydalis	G5	SR	
Corydalis sempervirens	Pale corydalis	G4G5	S3	
Corylus cornuta	Beaked hazelwood	G5	S3	
Crassula aquatica	Pygmyweed	G5	SH	X
Crotalaria rotundifolia	Rabbit-bells	G5	S1	E
Croton capitatus	Hogwort	G5	SU	
Croton monanthogynus	Prairie-tea	G5	SR	
Cuscuta coryli	Hazel dodder	G5	SH	X
Cuscuta indecora	Pretty dodder	G5	S1?	
Cuscuta polygonorum	Smartweed dodder	G5	S1	E
Cuscuta rostrata	Beaked dodder	G4	S1	E
Cymophyllus fraserianus	Fraser's sedge	G4	S1	E
Cyperus dentatus	Toothed sedge	G4	SH	X
Cyperus diandrus	Low cyperus	G5	SU	
Cyperus haspan	Sheathed flatsedge	G5	S1?	
Cyperus houghtonii	Houghton's umbrella-sedge	G4?	S1	
Cyperus lancastriensis	Lancaster's sedge	G5	SU	
Cyperus plukenetii	Plukenet's cyperus	G5	SH	X
Cyperus refractus	Reflexed cyperus	G5	S2?	
Cyperus retrofractus	Rough cyperus	G5	S2	
Cyperus squarrosus	Awned cyperus	G5	SU	
Cypripedium candidum	Small white lady's slipper	G4	S1	E
Cypripedium reginae	Showy lady's slipper	G4	SR	X
Cystopteris bulbifera	Bulblet fern	G5	S3	
Cystopteris tennesseensis	Tennessee bladder-fern	G5	S1	
Delphinium exaltatum	Tall larkspur	G3	S1	E
Delphinium tricorne	Dwarf larkspur	G5	S3	
Deschampsia cespitosa	Tufted hairgrass	G5	S1	E
Desmodium canadense	Showy tick-trefoil	G5	S3	
Desmodium cuspidatum	Large-bracted tick-treefoil	G5	SU	
Desmodium humifusum	Trailing tick-trefoil	G1G2Q	SH	X
Desmodium laevigatum	Smooth tick-trefoil	G5	S3S4	
Desmodium lineatum	Linear-leaved tick-trefoil	G5	S1	E
Desmodium nuttallii	Nuttall's tick-trefoil	G5	SU	
Desmodium ochroleucum	Cream-flowered tick-trefoil	G2?	S1	E
Desmodium pauciflorum	Few-flowered tick-trefoil	G5	S1	E
Desmodium rigidum	Rigid tick-trefoil	G?Q	S1	E
Desmodium sessilifolium	Sessile-leaved tick-trefoil	G5	SH	X
Desmodium strictum	Stiff tick-trefoil	G4	S1	E
Desmodium viridiflorum	Velvety tick-treefoil	G5?	S3S4	
Diarrhena americana	Twin oats	G4?	S1	E
Dicentra eximia	Wild bleeding-heart	G4	S2	T
Digitaria villosa	Shaggy crabgrass	G5	SU	X
Dioscorea hirticaulis	Wild yam	G3Q	SH	
Diplazium pycnocarpon	Glade fern	G5	S2	T
Dirca palustris	Leatherwood	G4	S2	T
Dodecatheon meadia	Shooting-star	G5	S3	
Drosera capillaris	Pink sundew	G5	S1	E

FEDERAL SCIENTIFIC NAME STATUS	COMMON NAME	GLOBAL RANK	STATE RANK	STATE STATUS
Drosera rotundifolia	Round-leaved sundew	G5	S3	
Dryopteris campyloptera	Mountain wood-fern	G5	S1	E
Dryopteris celsa	Log fern	G4	S3.1	T

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Dryopteris clintoniana	Clinton's wood-fern	G5	S1	
Dryopteris goldiana	Goldie's wood-fern	G4	S3	
Echinodorus cordifolius	Upright burhead	G5	S1	E
Elatine americana	American waterwort	G4	S3	
Elatine minima	Small waterwort	G5	S1	E
Eleocharis albida	White spikerush	G4G5	S2	T
Eleocharis compressa	Flattened spikerush	G4	S1	E
Eleocharis engelmannii	Engelmann's spikerush	G4?	S3	
Eleocharis equisetoides	Knotted spikerush	G4	S1	E
Eleocharis erythropoda	Bald spikerush	G5	SU	
Eleocharis fallax	Creeping spikerush	G4G5	S3	
Eleocharis flavescens	Pale spikerush	G5	S1	
Eleocharis geniculata	Capitate spikerush	G5	SU	
Eleocharis halophila	Salt-marsh spikerush	G4	S1	E
Eleocharis intermedia	Matted spikerush	G5	S1	E
Eleocharis melanocarpa	Black-fruited spikerush	G4	S1	E
Eleocharis robbinsii	Robbins' spikerush	G4G5	S1	E
Eleocharis rostellata	Beaked spikerush	G5	S2?	
Eleocharis tortilis	Twisted spikerush	G5	S3	
Eleocharis tricostata	Three-ribbed spikerush	G4	S1	E
Elephantopus tomentosus	Tobaccoweed	G5	S1?	E
Elymus trachycaulus	Rough-stemmed wheatgrass	G5T5	SR	
Epilobium ciliatum	Northern willowherb	G5	S1	E
Epilobium leptophyllum	Linear-leaved willowherb	G5	S2S3	
Epilobium strictum	Downy willowherb	G5?	S1	E
Equisetum fluviatile	Water horsetail	G5	S1	E
Equisetum sylvaticum	Wood horsetail	G5	S1	E
Eragrostis hirsuta	Big-topped lovegrass	G5	S1S2	
Eragrostis refracta	Meadow lovegrass	G5	S3S4	
Erianthus contortus	Bent-awn plumegrass	G5	S3S4	
Erigenia bulbosa	Harbinger-of-spring	G5	S3	
Erigeron pulchellus var brauniae	Lucy Braun's robin plantain	G5T4	S1	
Eriocaulon aquaticum	Seven-angled pipewort	G5	S1	E
Eriocaulon compressum	Flattened pipewort	G5	S2	
Eriocaulon decangulare	Ten-angled pipewort	G5	S2	
Eriocaulon parkeri	Parker's pipewort	G3	S2	T
Eriophorum gracile	Slender cottongrass	G5	S1	E
Eriophorum virginicum	Tawny cottongrass	G5	S3	
Eryngium yuccifolium	Tall rattlesnake master	G5	SH	X
Erythronium albidum	White trout lily	G5	S2	T
Eupatorium altissimum	Tall boneset	G5	S3	
Eupatorium leucolepis	White-bracted boneset	G5	S2S3	T
Eupatorium maculatum	Spotted Joe-pye-weed	G5	SU	X
Euphorbia obtusata	Blunt-leaved spurge	G5	S1	E
Euphorbia purpurea	Darlington's spurge	G3	S1	E
Euphorbia zinniiflora	Flowering spurge	G5	SU	
Festuca paradoxa	Cluster fescue	G5	SH	X
Filipendula rubra	Queen-of-the-prairie	G4G5	S1	E
Fimbristylis annua	Baldwin's fimbristylis	G5	S3	
Fimbristylis caroliniana	Carolina fimbry	G4	S1S2	
Fimbristylis perpusilla	Harper's fimbristylis	G2	S2	E
Fimbristylis puberula	Hairy fimbristylis	G5	SU	
Fraxinus nigra	Black ash	G5	S3	
Fraxinus profunda	Pumpkin ash	G4	S2S3	
Fuirena pumila	Smooth fuirena	G4	S2S3	
Galactia volubilis	Downy milk pea	G5	S3	
Galax aphylla	Galax	G5	SR	
Galium boreale	Northern bedstraw	G5	S1	E
Galium concinnum	Shining bedstraw	G5	S3	
Galium hispidulum	Coast bedstraw	G5	S1	E
Galium latifolium	Purple bedstraw	G5	S3	
Galium trifidum	Small bedstraw	G5	SU	
Gaultheria hispidula	Creeping snowberry	G5	S1	E
Gaylussacia brachycera	Box huckleberry	G3	S1	E
Gentiana andrewsii	Fringe-tip closed gentian	G5?	S2	T

FEDERAL SCIENTIFIC NAME STATUS	COMMON NAME	GLOBAL RANK	STATE RANK	STATE STATUS
Gentiana linearis	Narrow-leaved gentian	G4G5	S3	
Gentiana puberulenta	Downy gentian	G4G5	SH	X
Gentiana villosa	Striped gentian	G4	S1	E
Gentianella quinquefolia	Stiff gentian	G5	S1	E
Gentianopsis crinita	Fringed gentian	G5	S1	E
Geranium robertianum	Herb-robert	G5	S1	

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	STATE STATUS	FEDERAL STATUS
Geum aleppicum	Yellow avens	G5	S1	E	
Geum laciniatum	Rough avens	G5	S3		
Glaux maritima	Sea milkwort	G5	SH	X	
Glyceria acutiflora	Sharp-scaled mannagrass	G5	S1	E	
Glyceria grandis	American mannagrass	G5	S1	E	
Goodyera repens	Dwarf rattlesnake-plantain	G5	SH	X	
Goodyera tesselata	Tesselated rattlesnake-plantain	G5	SH	X	
Gratiola ramosa	Branching hedge-hyssop	G4G5	SH	X	
Gratiola viscidula	Short's hedge-hyssop	G4G5	S1	E	
Gymnocarpium dryopteris	Oak fern	G5	S1	E	
Gymnocladus dioicus	Kentucky coffee-tree	G5	S1		
Gymnopogon brevifolius	Broad-leaved beardgrass	G5	S1	E	
Hasteola suaveolens	Sweet-scented indian-plantain	G3	S1	E	
Helianthemum bicknellii	Hoary frostweed	G5	S1	E	
Helianthus hirsutus	Hirsute sunflower	G5	SU		
Helianthus laevigatus	Smooth sunflower	G4	S1	E	
Helianthus microcephalus	Small-headed sunflower	G5	S1	E	
Helianthus occidentalis	Mcdowell's sunflower	G5	S1	T	
Helonias bullata	Swamp pink	G3	S2	E	LT
Heracleum lanatum	Cow-parsnip	G5	S3		
Heuchera pubescens	Downy heuchera	G4?	S3		
Heuchera villosa	Rough heuchera	G5	SH	X	
Hexalectris spicata	Crested coralroot	G5	SH	X	
Hexastylis virginica	Virginia heartleaf	G4	S1	E	
Hibiscus laevis	Halberd-leaved rose-mallow	G5	S3		
Hierochloe odorata	Holy grass	G4G5	S1	E	
Honckenya peploides	Sea-beach sandwort	G5	S1	E	
Hottonia inflata	Featherfoil	G4	S1	E	
Houstonia serpyllifolia	Thyme-leaved bluets	G4?	S3		
Houstonia tenuifolia	Slender-leaved bluets	G4G5Q	S1		
Hudsonia ericoides	Golden-heather	G4	S1	E	
Huperzia porophila	Rock clubmoss	G4	SR	X	
Hybanthus concolor	Green violet	G5	S3		
Hydrastis canadensis	Goldenseal	G4	S2	T	
Hydrophyllum macrophyllum	Large-leaved waterleaf	G5	S2	T	
Hypericum adpressum	Creeping St. John's-wort	G2G3	S1	E	
Hypericum denticulatum	Coppery St. John's-wort	G5	S2	T	
Hypericum drummondii	Drummond's St. John's-wort	G5	SH	X	
Hypericum ellipticum	Pale St. John's-wort	G5	SU		
Hypericum gymnanthum	Clasping-leaved St. John's-wort	G4	S1	E	
Hypericum pyramidatum	Great St. John's-wort	G4	SH	X	
Ilex decidua	Deciduous holly	G5	S2		
Iresine rhizomatosa	Bloodleaf	G5	S1	E	
Iris cristata	Crested iris	G5	S1	E	
Iris prismatica	Slender blue flag	G4G5	S1	E	
Iris verna	Dwarf iris	G5	S1	E	
Iris virginica	Virginia blue flag	G5	S3		
Isoetes engelmannii	Appalachian quillwort	G4	S3		
Isoetes riparia	Riverbank quillwort	G5?	SU		
Isotria medeoloides	Small whorled pogonia	G2	SH	X	LT
Juglans cinerea	Butternut	G3G4	S2S3		
Juncus articulatus	Jointed rush	G5	S1		
Juncus balticus	Baltic rush	G5	SH	X	
Juncus brachycarpus	Short-fruited rush	G4G5	SU		
Juncus brachycephalus	Small-headed rush	G5	SH	X	
Juncus brevicaudatus	Narrow-panicled rush	G5	S2		
Juncus caesariensis	New Jersey rush	G2	S1	E	
Juncus longii	Long's rush	G3G4Q	S1	E	
Juncus megacephalus	Big-headed rush	G4G5	SH	X	
Juncus militaris	Bayonet rush	G4	SH	X	
Juncus pelocarpus	Brown-fruited rush	G5	S1	E	
Juncus polycephalus	Many-headed rush	G5	S1		
Juncus torreyi	Torrey's rush	G5	S1	E	
Juncus trifidus	Highland rush	G5	S1	E	
Juniperus communis	Juniper	G5	SH	X	
Kalmia angustifolia	Sheep-laurel	G5	S3S4		
Krigia biflora	Two-flowered cynthia	G5	S3		
Krigia dandelion	Potato dandelion	G5	S1	E	
Kyllinga pumila	Thin-leaved flatsedge	G5	S1	E	

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Lachnanthes caroliana	Red-root	G4	S1	E
Lactuca hirsuta	Hairy lettuce	G5?	SH	X
Larix laricina	Larch	G5	S1	E
Lathyrus palustris	Vetchling	G5	S1	X
Lathyrus venosus	Veiny pea	G5	S3	
Lechea maritima	Beach pinweed	G5	S3	
Lechea tenuifolia	Narrow-leaved pinweed	G5	SH	X
Leersia hexandra	Club-headed cutgrass	G5	S1	E
Leersia lenticularis	Catchfly-grass	G5	S1	E
Lemna trisulca	Star duckweed	G5	S1	E
Leptochloa fascicularis	Long-awned diplachne	G5	SU	
Lespedeza stuevei	Downy bushclover	G4?	S3	
Lespedeza violacea	Violet bushclover	G5	S3	
Liatris spicata	Spiked blazing-star	G5	S1	
Liatris squarrosa	Scaly blazing-star	G5	S1	E
Liatris turgida	Robust blazing-star	G3	SH	X
Ligusticum canadense	American lovage	G4	SH	X
Lilium philadelphicum	Wood lily	G5	SH	X
Limnobium spongia	American frog's-bit	G4	S1	E
Limosella australis	Mudwort	G4G5	S2	E
Linnaea borealis	Twinflower	G5	SR	X
Linum floridanum	Florida yellow flax	G5?	SH	X
Linum intercursum	Sandplain flax	G4	S2	T
Linum sulcatum	Grooved flax	G5	S1	E
Liparis loeselii	Loesel's twayblade	G5	S3	
Lipocarpha micrantha	Small-flowered hemicarpha	G4	S1	E
Listera australis	Southern twayblade	G4	S3	
Listera cordata	Heartleaf twayblade	G5	SH	X
Listera smallii	Appalachian twayblade	G4	S1	E
Lithospermum latifolium	American gromwell	G4	S1	E
Litsea aestivalis	Pondspice	G3	S1	E
Lobelia canbyi	Canby's lobelia	G4	S1	E
Lobelia elongata	Elongated lobelia	G4G5	S3	
Lobelia glandulosa	Glandular lobelia	G4G5	SR	X
Lonicera canadensis	Canada honeysuckle	G5	S1	E
Ludwigia brevipes	Creeping ludwigia	G4G5	SU	
Ludwigia decurrens	Primrose willow	G5	S2S3	
Ludwigia glandulosa	Cylindric-fruited seedbox	G5	S1	E
Ludwigia hirtella	Hairy ludwigia	G5	S1	E
Lupinus perennis	Wild lupine	G5	S2	T
Lycopodiella caroliniana	Carolina clubmoss	G5	S1	X
Lycopodiella inundata	Bog clubmoss	G5	S2	
Lycopodium tristachyum	Ground-cedar	G5	S3	
Lycopus amplectens	Sessile-leaved water-horehound	G5	S1	E
Lygodium palmatum	Climbing fern	G4	S2	T
Lysimachia hybrida	Lowland loosestrife	G5	S2	T
Lysimachia lanceolata	Lance-leaved loosestrife	G5	S3	
Lysimachia thyrsiflora	Tufted loosestrife	G5	S1	E
Lythrum alatum	Winged loosestrife	G5	S1	E
Magnolia tripetala	Umbrella magnolia	G5	S3	
Malus angustifolia	Narrow-leaved wild crab	G5?	S3	
Manfreda virginica	False aloe	G5	SU	
Marshallia grandiflora	Barbara's buttons	G2	SR	X
Matelea carolinensis	Anglepod	G4	S1	E
Matelea decipiens	Old-field milkvine	G5	SH	X
Matelea gonocarpos	Angular-fruited milkvine	G5	S1?	
Matelea obliqua	Climbing milkweed	G4?	S1	E
Matteuccia struthiopteris	Ostrich fern	G5	S2	
Mecardonia acuminata	Erect water-hyssop	G5	S1	E
Melanthium latifolium	Broad-leaved bunchflower	G5	S1	E
Melanthium virginicum	Virginia bunchflower	G5	S3	

FEDERAL SCIENTIFIC NAME STATUS	COMMON NAME	GLOBAL RANK	STATE RANK	STATE STATUS
Melica mutica	Narrow melicgrass	G5	S1	T
Melica nitens	Three-flowered melicgrass	G5	S2	T
Melothria pendula	Creeping cucumber	G5?	S1	E
Menyanthes trifoliata	Buckbean	G5	S1	E
Micranthemum micranthemoides	Nuttall's micranthemum	GH	SH	X
Milium effusum	Millet grass	G5	S3	
Minuartia caroliniana	Carolina sandwort	G5	S1	E
Minuartia glabra	Mountain sandwort	G4	S1	E
Minuartia michauxii	Rock sandwort	G5	S2	T
Moehringia lateriflora	Grove sandwort	G5	S1	E

MD DNR SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	STATE STATUS
Monarda clinopodia	Basal bee-balm	G5	S3	
Monarda media	Purple bergamot	G4?	SU	
Monotropsis odorata	Sweet pinesap	G3	S1	E
Muhlenbergia capillaris	Long-awned hairgrass	G5	S1	E
Muhlenbergia glabrifloris	Hair grass	G4?	SU	
Muhlenbergia glomerata	Marsh muhly	G5	SU	
Muhlenbergia sylvatica	Woodland dropseed	G5	S3	
Muhlenbergia torreyana	Torrey's dropseed	G3	S1	E
Myosotis macrosperma	Large-seeded forget-me-not	G5	S2S3	
Myosotis verna	Spring forget-me-not	G5	S3	
Myrica heterophylla	Evergreen bayberry	G5	S1	E
Myriophyllum heterophyllum	Broadleaf water-milfoil	G5	S1	
Myriophyllum tenellum	Slender water-milfoil	G5	SH	X
Myriophyllum verticillatum	Whorled water-milfoil	G5	SU	
Najas flexilis	Slender naiad	G5	S3	
Najas gracillima	Thread-like naiad	G5?	SU	X
Najas guadalupensis	Southern naiad	G5	S3	
Nelumbo lutea	American lotus	G4	S2	
Nemopanthus mucronatus	Mountain holly	G5	S3	
Nemophila aphylla	Small-flowered baby-blue-eyes	G5	S1	
Nymphoides aquatica	Larger floating-heart	G5	S1	E
Nymphoides cordata	Floating-heart	G5	S1	E
Oenothera argillicola	Shale-barren primrose	G3G4	S3	
Oldenlandia uniflora	Clustered bluets	G5	S3	
Onosmodium molle	Shaggy false-gromwell	G4G5	S1	E
Onosmodium virginianum	Virginia false-gromwell	G4	S1	E
Orthilia secunda	One-sided pyrola	G5	SH	X
Oryzopsis asperifolia	White-fruited mountainrice	G5	S2	T
Oryzopsis racemosa	Black-fruited mountainrice	G5	S2	T
Oxydendrum arboreum	Sourwood	G5	S1	E
Oxypolis canbyi LE	Canby's dropwort	G2	S1	E
Panax quinquefolius	Ginseng	G3G4	S3	
Panicum aciculare	Bristling panicgrass	G4G5	SU	
Panicum angustifolium	Narrow-leaved panicgrass	G4G5	SU	
Panicum boreale	Northern panicgrass	G5	SR	X
Panicum flexile	Wiry witch-grass	G5	S1	E
Panicum hemitomon	Maidencane	G5?	S3	
Panicum laxiflorum	Lax-flowered witchgrass	G5	SU	
Panicum leucothrix	Roughish panicgrass	G4?Q	SU	
Panicum oligosanthes	Few-flowered panicgrass	G5	S2S3	
Panicum ravenelii	Ravenel's witchgrass	G5	S3	
Panicum scabriusculum	Tall swamp panicgrass	G4	S1	E
Panicum tuckermanii	Tuckerman's panicgrass	G3G5	SU	
Panicum wrightianum	Wright's panicgrass	G4	S1	E
Parnassia asarifolia	Kidneyleaf grass-of-parnassus	G4	S1	E
Paronychia virginica var virginica	Yellow nailwort	G4T1Q	S1	E
Parthenium integrifolium	American feverfew	G5	S1	E
Paspalum boscianum	Bull paspalum	G5	SR	
Paspalum dissectum	Walter's paspalum	G4?	S2	T
Paspalum fluitans	Floating paspalum	G5	S1	E
Passiflora incarnata	Purple passionflower	G5	S1?	
Paxistima canbyi	Canby's mountain lover	G2	S1	E
Pedicularis lanceolata	Swamp lousewort	G5	S1	E
Pellaea glabella	Smooth cliffbrake	G5	S1	E
Penstemon laevigatus	Smooth beardtongue	G5	S3	
Persea borbonia	Red bay	G5	S1	E
Phacelia covillei	Coville's phacelia	G2	S1	E
Phacelia purshii	Miami-mist	G5	S3	

FEDERAL SCIENTIFIC NAME STATUS	COMMON NAME	GLOBAL RANK	STATE RANK	STATE STATUS
Phalaris caroliniana	May grass	G5?	SH	X
Phaseolus polystachios	Wild bean	G4	S3	
Phlox carolina	Thick-leaved phlox	G5?	SRF	
Phlox glaberrima	Smooth phlox	G5	S1	E
Phlox latifolia	Mountain phlox	G4	SH	X
Phlox pilosa	Downy phlox	G5	S1	E
Phyllanthus caroliniensis	Carolina leaf-flower	G5	S3	
Physalis virginiana	Virginia ground-cherry	G5	S3	
Picea rubens	Red spruce	G5	S3	
Pilea fontana	Coolwort	G5	S3	
Pinus echinata	Shortleaf pine	G5	S4	
Plantago cordata	Heart-leaved plantain	G4	SH	X

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Plantago pusilla	Slender plantain	G5	SH	X
Platanthera blephariglottis	White fringed orchid	G4G5	S2	T
Platanthera ciliaris	Yellow fringed orchid	G5	S2	T
Platanthera cristata	Crested yellow orchid	G5	S3	
Platanthera flava	Pale green orchid	G4	S2	
Platanthera grandiflora	Large purple fringed orchid	G5	S2	T
Platanthera peramoena	Purple fringeless orchid	G5	S1	T
Platanthera psycodes	Small purple fringed orchid	G5	SU	X
Pleopeltis polypodioides	Resurrection fern	G5	S3	
Pluchea camphorata	Marsh fleabane	G5	S1	E
Poa alsodes	Grove meadow-grass	G4G5	S2	
Poa chapmaniana	Chapman bluegrass	G5	SR	
Poa languida	Weak speargrass	G3G4Q	SU	
Poa palustris	Fowl bluegrass	G5	SH	
Poa saltuensis	Drooping bluegrass	G5	S1	E
Podostemum ceratophyllum	Threadfoot	G5	S3	
Pogonia ophioglossoides	Rose pogonia	G5	S3	
Polanisia dodecandra	Clammyweed	G5	S1	E
Polemonium vanbruntiae	Jacob's-ladder	G3	S2	T
Polygala cruciata	Cross-leaved milkwort	G5	S2	T
Polygala incarnata	Pink milkwort	G5	S2S3	
Polygala polygama	Racemed milkwort	G5	S1	T
Polygala senega	Seneca snakeroot	G4G5	S2	T
Polygonum careyi	Carey's knotweed	G4	SU	
Polygonum cilinode	Fringed bindweed	G5	S3	
Polygonum densiflorum	Dense-flowered knotweed	G5	S1?	E
Polygonum glaucum	Seaside knotweed	G3	S1	E
Polygonum ramosissimum	Bushy knotweed	G5	SH	X
Polygonum robustius	Stout smartweed	G4G5	S1?	X
Polygonum setaceum	Bristly smartweed	G5	SU	
Porteranthus stipulatus	American ipecac	G5	SH	X
Potamogeton amplifolius	Large-leaved pondweed	G5	SH	X
Potamogeton foliosus	Leafy pondweed	G5	S1	E
Potamogeton illinoensis	Illinois pondweed	G5	S1	
Potamogeton natans	Floating pondweed	G5	SU	
Potamogeton perfoliatus	Clasping-leaved pondweed	G5	S2	
Potamogeton pusillus	Slender pondweed	G5	S1	
Potamogeton richardsonii	Redheadgrass	G5	SH	X
Potamogeton robbinsii	Robbins' pondweed	G5	SH	X
Potamogeton spirillus	Spiral pondweed	G5	S1	
Potamogeton zosteriformis	Flatstem pondweed	G5	S1	E
Potentilla arguta	Tall cinquefoil	G5	SU	
Prenanthes autumnalis	Slender rattlesnake-root	G4G5	S1	E
Prunus alleghaniensis	Alleghany plum	G4	S2	T
Prunus maritima	Beach plum	G4	S1	E
Prunus pumila	Eastern dwarf cherry	G5	SU	
Psoralea psoralioides	False scurf-pea	G4?	SX	
Ptelea trifoliata	Wafer-ash	G5	S3	
Ptilimnium nodosum	Harperella	G2	S1	E
LE				
Pycnanthemum clinopodioides	Basil mountain-mint	G2	S1S2	
Pycnanthemum pycnanthemoides	Southern mountain-mint	G5	SH	X
Pycnanthemum setosum	Awned mountain-mint	G3?	S3.1	T
Pycnanthemum torrei	Torrey's mountain-mint	G2	S1	E
Pycnanthemum verticillatum	Whorled mountain-mint	G5	S1	E
Pycnanthemum virginianum	Virginia mountain-mint	G5	S2	
Pyrola virens	Greenish-flowered pyrola	G5	SH	X

FEDERAL		GLOBAL	STATE	STATE
SCIENTIFIC NAME	COMMON NAME	RANK	RANK	STATU
STATUS				
Quercus macrocarpa	Mossy-cup oak	G5	S1	
Quercus prinoides	Dwarf chestnut oak	G5	S3	
Quercus shumardii	Shumard's oak	G5	S2	T
Ranunculus allegheniensis	Mountain crowfoot	G4G5	S3	
Ranunculus ambigens	Water-plantain spearwort	G4	SH	X
Ranunculus fascicularis	Early buttercup	G5	S1	E
Ranunculus flabellaris	Yellow water-crowfoot	G5	S1	E
Ranunculus hederaceus	Long-stalked crowfoot	G5	SH	X
Ranunculus hispidus var nitidus	Hispid buttercup	G5T5	S1?	X
Ranunculus laxicaulis	Mississippi buttercup	G5?	SU	
Ranunculus pensylvanicus	Bristly crowfoot	G5	SH	X
Ranunculus pusillus	Low spearwort	G5	SU	
Ranunculus trichophyllus	White water-crowfoot	G5	S1	E
Rhexia aristosa	Awned meadow-beauty	G3	SRF	

Rhododendron arborescens	Smooth azalea	G4G5	S3	
Rhododendron calendulaceum	Flame azalea	G5	S1	
Rhododendron canescens	Hoary azalea	G5	SU	
Rhynchosia tomentosa	Hairy snoutbean	G5	S2	T
Rhynchospora alba	White beakrush	G5	S3	
Rhynchospora cephalantha	Capitate beakrush	G5	S1	E
Rhynchospora filifolia	Thread-leaved beakrush	G5	SU	
Rhynchospora fusca	Brown beakrush	G4G5	S?	
Rhynchospora globularis	Grass-like beakrush	G5?	S1	E
Rhynchospora glomerata	Clustered beakrush	G5	S3	
Rhynchospora harperi	Harper's beakrush	G4?	S1	T
Rhynchospora inundata	Drowned hornedrush	G3G4	S1	E
Rhynchospora microcephala	Tiny-headed beakrush	G5	S2S3	
Rhynchospora nitens	Short-beaked baldrush	G4?	S1	E
Rhynchospora pallida	Pale beakrush	G3	SH	X
Rhynchospora rariflora	Few-flowered beakrush	G5	SH	X
Rhynchospora scirpoides	Long-beaked baldrush	G4	S2	T
Rhynchospora torreyana	Torrey's beakrush	G4	S2	T
Ribes americanum	Wild black currant	G5	SH	X
Ribes cynosbati	Prickly gooseberry	G5	S3	
Ribes glandulosum	Skunk currant	G5	S3	
Ribes hirtellum	Low wild gooseberry	G5	S1	
Rosa blanda	Smooth rose	G5	S1	E
Rudbeckia fulgida	Orange coneflower	G5	S3	
Rudbeckia triloba	Thin-leaved coneflower	G4G5	S3	
Ruellia humilis	Hairy wild-petunia	G5	S1	E
Ruellia purshiana	Pursh's ruellia	G3?	S1	E
Ruellia strepens	Rustling wild-petunia	G4G5	S1	E
Rumex altissimus	Tall dock	G5	S1	E
Rumex hastatulus	Engelmann's dock	G5	SU	
Sabatia campanulata	Slender marsh pink	G5	S1	E
Sabatia difformis	Lance-leaved sabatia	G4G5	S1	E
Sabatia dodecandra	Large marsh pink	G5?	S3	
Saccharum alopecuroidum	Woolly beardgrass	G5	S1?	
Saccharum baldwinii	Narrow plumegrass	G5	S1	
Sacciolepis striata	Sacciolepis	G5	S1	E
Sagittaria calycina	Spongy lophotocarpus	G5	S2	
Sagittaria engelmanniana	Engelmann's arrowhead	G5?	S2	T
Sagittaria graminea	Grass-leaved arrowhead	G5	SU	
Sagittaria longirostra	Long-beaked arrowhead	G?Q	SU	
Sagittaria rigida	Sessile-fruited arrowhead	G5	S1	E
Sagittaria subulata	Subulate arrowhead	G4	SU	
Salix bebbiana	Bebb's willow	G5	SH	X
Salix caroliniana	Carolina willow	G5	S3	
Salix discolor	Pussy willow	G5	SU	
Salix exigua	Sandbar willow	G5	S1	E
Salix lucida	Shining willow	G5	SH	X
Salix tristis	Dwarf prairie willow	G4G5	S1	
Salvia urticifolia	Nettle-leaved sage	G5	SX	X
Sanguisorba canadensis	Canada burnet	G5	S2	T
Sanicula marilandica	Sanicle	G5	S3	
Sanicula trifoliata	Three-leaved snakeroot	G4	S3	
Sarracenia purpurea	Northern pitcher-plant	G5	S2	T
Saxifraga micranthidifolia	Lettuce-leaved saxifrage	G5	S3	
		GLOBAL	STATE	STATE
FEDERAL				
SCIENTIFIC NAME	COMMON NAME	RANK	RANK	STATUS
STATUS				
Schizachne purpurascens	Purple oat	G5	S1	E
Schwalbea americana	Chaffseed	G2	SX	X
LE				
Scirpus ancistrochaetus	Northeastern bulrush	G3	S1	E
LE				
Scirpus cylindricus	Salt-marsh bulrush	G5	S2	
Scirpus etuberculatus	Canby's bulrush	G3G4	S1	E
Scirpus expansus	Wood bulrush	G4	S3	
Scirpus pendulus	Pendulous bulrush	G5	S3	
Scirpus smithii	Smith's clubrush	G5?	SU	X
Scirpus subterminalis	Water clubrush	G4G5	S1	E
Scirpus torreyi	Torrey's clubrush	G5?	SH	X
Scirpus verecundus	Bashful bulrush	G4G5	S2S3	
Scleria minor	Slender nutrush	G4	S1	E
Scleria nitida	Shining nutrush	G?	S1	E
Scleria pauciflora	Papillose nutrush	G5	S3	
Scleria reticularis	Reticulated nutrush	G4	S2	

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SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	STATE STATUS	FEDERAL STATUS
Scleria triglomerata	Tall nutrush	G5	S1S2		
Scleria verticillata	Whorled nutrush	G5	S1	E	
Sclerolepis uniflora	Pink bog-button	G4	S2	T	
Scrophularia lanceolata	Hare figwort	G5	S3		
Scutellaria galericulata	Common skullcap	G5	S1		
Scutellaria incana	Downy skullcap	G5	S3		
Scutellaria leonardii	Leonard's skullcap	G4T4	S2	T	
Scutellaria nervosa	Veined skullcap	G5	S1	E	
Scutellaria ovata	Heart-leaved skullcap	G5	S3		
Scutellaria parvula	Small skullcap	G4	SH	X	
Scutellaria saxatilis	Rock skullcap	G3	S1	E	
Scutellaria serrata	Showy skullcap	G4G5	S3		
Sedum glaucophyllum	Cliff stonecrop	G4	S1	E	
Senecio antennariifolius	Shale-barren ragwort	G4	S3		
Senecio pauperculus	Balsam ragwort	G5	S3		
Sesuvium maritimum	Sea-purslane	G5	S1	E	
Sida hermaphrodita	Virginia mallow	G2	S1	E	
Silene nivea	Snowy campion	G4?	S1	E	
Silphium trifoliatum	Three-leaved rosinweed	G4?	S3		
Sisyrinchium fuscatum	Sand blueeyed-grass	G5?	S1	X	
Smilacina stellata	Star-flowered false Solomon's-seal	G5	S1	E	
Smilax bona-nox	Bullbrier	G5	S3		
Smilax ecirrata	Upright smilax	G5?	SU		
Smilax pseudochina	Halberd-leaved greenbrier	G4G5	S2	T	
Solidago arguta var harrisii	Cut-leaved goldenrod	G5T4	S3		
Solidago curtisii	Curtis' goldenrod	G4G5Q	S1	E	
Solidago elliottii	Elliott's goldenrod	G5	S3		
Solidago hispida	Hairy goldenrod	G5	SH	X	
Solidago patula	Sharp-leaved goldenrod	G5	S3		
Solidago rigida	Hard-leaved goldenrod	G5	SH	X	
Solidago roanensis	Mountain goldenrod	G4G5	S1?	E	
Solidago rupestris	Rock goldenrod	G4?	S1	X	
Solidago spathulata	Riverbank goldenrod	G5	S1	T	
Solidago speciosa	Showy goldenrod	G5	S2	T	
Solidago stricta	Wandlike goldenrod	G5	SU		
Solidago tarda	Late goldenrod	G4?Q	S1?		
Solidago uliginosa	Bog goldenrod	G4G5	S3		
Sorbus americana	American mountain-ash	G5	S3		
Sorghastrum elliottii	Long-bristled indian-grass	G5	S1	E	
Sparganium androcladum	Branching bur-reed	G4G5	S3		
Sparganium chlorocarpum	Green-fruited bur-reed	G5	S3		
Sparganium eurycarpum	Broad-fruited bur-reed	G5	S3		
Spermacoce glabra	Buttonweed	G4G5	S1	E	
Sphenopholis pensylvanica	Swamp-oats	G4	S1S2	T	
Spigelia marilandica	Indian-pink	G4	SRF		
Spiraea betulifolia	Corymbed spiraea	G4G5	S3		
Spiranthes laciniata	Lace-lip ladys' tresses	G4G5	SU		
Spiranthes lucida	Wide-leaved ladys' tresses	G5	S1	E	
Spiranthes ochroleuca	Yellow nodding ladys' tresses	G4	S1	E	
Spiranthes odorata	Sweet-scented ladys' tresses	G5	SH	X	
Spiranthes praecox	Grass-leaved ladys' tresses	G5	S1		
Spiranthes tuberosa	Little ladys' tresses	G5	S3		
Sporobolus asper	Long-leaved rushgrass	G5	S1		
Sporobolus clandestinus	Rough rushgrass	G5	S2	T	
Sporobolus heterolepis	Northern dropseed	G5	S1	E	
Sporobolus neglectus	Small rushgrass	G5	S1?	X	
Stachys aspera	Rough hedge-nettle	G4?	S1	E	
Stachys cordata	Nuttall's hedge-nettle	G5?	S1		
Stachys hyssopifolia	Hyssop-leaved hedge-nettle	G5	SU		
Stachys latidens	Broad-toothed hedge-nettle	G4G5	S1		
Stellaria alsine	Trailing stitchwort	G5	S1	E	
Stenanthium gramineum	Featherbells	G4G5	S1	T	
Streptopus amplexifolius	White mandarin	G5	SR		
Streptopus roseus	Rose twisted-stalk	G5	S1S2	T	
Suaeda linearis	Tall sea-blite	G5	S3		
Symphoricarpos albus	Snowberry	G5	S1	T	
Symplocos tinctoria	Sweetleaf	G5	S3		
Taenidia montana	Mountain pimpernel	G4	S2	T	
Talinum teretifolium	Fameflower	G4	S1	T	
Taxus canadensis	American yew	G5	S2	T	
Tephrosia spicata	Southern goat's rue	G4G5	S1	E	

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Thaspium trifoliatum	Purple meadow-parsnip	G5	S1	E
Thelypteris phegopteris	Northern beech fern	G5	S2	
Thelypteris simulata	Bog fern	G4G5	S2	T
Thuja occidentalis	Arbor-vitae	G5	S1	T
Tillandsia usneoides	Spanish moss	G5	SX	
Tofieldia glutinosa	False asphodel	G5	SR	
Tofieldia racemosa	Coastal false asphodel	G5	SX	X
Torreyochloa pallida	Pale mannagrass	G5?	S1	E
Torreyochloa pallida var fernaldii	Fernald's mannagrass	G5?T4Q	S1	
Trachelospermum difforme	Climbing dogbane	G4G5	S1	E
Trautvetteria caroliniensis	Carolina tassel-rue	G5	S3	
Triadenum tubulosum	Large marsh St. John's-wort	G4?	S1	
Trichostema brachiatum	False pennyroyal	G4G5	S3	
Trichostema setaceum	Narrow-leaved bluecurls	G5	S1	
Trifolium reflexum	Buffalo clover	G5	SH	X
Trifolium virginicum	Kate's-mountain clover	G3	S2S3	T
Triglochin maritima	Seaside arrow-grass	G5	SR	
Triglochin striata	Three-ribbed arrow-grass	G5	S1	E
Trillium cernuum	Nodding trillium	G5	S3	
Trillium flexipes	Drooping trillium	G5	S1	E
Trillium nivale	Snow trillium	G4	S1	E
Trillium pusillum var virginianum	Dwarf trillium	G3T2	S2	T
Triosteum angustifolium	Narrow-leaved horse-gentian	G5	S1	E
Triphora trianthophora	Nodding pogonia	G3G4	S1	X
Typha domingensis	Southern cattail	G4G5	S3	
Utricularia cornuta	Horned bladderwort	G5	SH	
Utricularia fibrosa	Fibrous bladderwort	G4G5	S1	E
Utricularia inflata	Swollen bladderwort	G5	S1	E
Utricularia purpurea	Purple bladderwort	G5	S1	T
Utricularia resupinata	Reversed bladderwort	G4	S1	E
Utricularia subulata	Zig-zag bladderwort	G5	S3	
Uvularia grandiflora	Large-flowered bellwort	G5	S1	
Vaccinium macrocarpon	Large cranberry	G4	S3	
Vaccinium myrtilloides	Velvetleaf blueberry	G5	S3	
Vaccinium oxycoccos	Small cranberry	G5	S2	T
Valeriana pauciflora	Valerian	G4	S1	E
Valerianella chenopodiifolia	Goose-foot cornsalad	G5	S1	E
Valerianella umbilicata	Tall cornsalad	G3G5	SH	X
Vernonia gigantea	Giant ironweed	G5	SU	
Veronica scutellata	Marsh speedwell	G5	S1	E
Viburnum lentago	Nannyberry	G5	S1	
Vicia americana	Purple vetch	G5	SU	X
Viola appalachiensis	Appalachian blue violet	G3	S2	
Viola incognita	Large-leaved white violet	G4G5	S1	
Viola rostrata	Long-spurred violet	G5	S3	
Viola septentrionalis	Northern blue violet	G5	SU	
Vitis cinerea	Graybark	G4G5	SU	
Vitis novae-angliae	New England grape	G4G5Q	SH	X
Vitis rupestris	Sand grape	G3	S1	

FEDERAL SCIENTIFIC NAME STATUS	COMMON NAME	GLOBAL RANK	STATE RANK	STATE STATUS
Wolffia columbiana	Columbian water-meal	G5	S3	
Wolffia papulifera	Water-meal	G4	S2	
Wolffia punctata	Dotted water-meal	G5	S2	
Wolffiella floridana	Wolffiella	G5	SH	X
Woodsia ilvensis	Rusty woodsia	G5	S1	T
Xerophyllum asphodeloides	Eastern turkeybeard	G4	SRF	
Xyris fimbriata	Fringed yelloweyed-grass	G5	S1	E
Xyris smalliana	Small's yelloweyed-grass	G5	S1	E
Zanthoxylum americanum	Northern prickly-ash	G5	S1	E
Zephyranthes atamasca	Atamasco lily	G4G5	S1	E
Zizaniopsis miliacea	Southern wildrice	G5	S1	E
Zizia aurea	Golden alexanders	G5	S3	

APPENDIX I

CHANGES TO PLANT RANKS SINCE LAST PUBLISHED LIST (APRIL 2001)

Scientific Name	Common Name	Current Rank	Former Rank
Amelanchier obovalis	Coastal juneberry	SR	S1
Arabis shortii	Short's rockcress	S3	S2
Carex conjuncta	Soft fox sedge	S4	S1?
Carex decomposita	Cypress-knee sedge	S1	SH
Carex emoryi	Emory's sedge	S1S2	S1
Carex leptonervia	Finely-nerved sedge	S4	S1
Carex mesochorea	Midland sedge	S4	S2?
Carex shortiana	Short's sedge	S2	S1
Carex striatula	Lined sedge	S3	S2?
Carex utriculata	A sedge	S4	S2S3
Carex vestita	Velvety sedge	S2	S1
Carex woodii	Wood's sedge	S4	S2S3
Centella erecta	Coinleaf	S3	S1
Cuscuta indecora	Pretty dodder	S1?	SH
Eleocharis albida	White spikerush	S2	S1
Eleocharis tricostata	Three-ribbed spikerush	S1	SH
Elymus trachycaulus	Rough-stemmed wheatgrass	SR	SH
Eragrostis refracta	Meadow lovegrass	S3S4	S1
Erianthus contortus	Bent-awn plumegrass	S3S4	S2
Honckenya peploides	Sea-beach sandwort	S1	SH
Hypericum denticulatum	Coppery St. John's-wort	S2	S1
Phlox carolina	Thick-leaved phlox	SRF	SH
Phlox glaberrima	Smooth phlox	S1	SH
Platanthera cristata	Crested yellow orchid	S3	S2
Polygonum robustius	Stout smartweed	S1?	SH
Rhynchospora glomerata	Clustered beakrush	S3	S2
Rumex floridanus	Florida dock	SSYN	S1
Sporobolus clandestinus	Rough rushgrass	S2	S1
Sporobolus neglectus	Small rushgrass	S1?	SH
Stachys clingmanii	Clingman's hedge-nettle	SRF	S1
Triphora trianthophora	Nodding pogonia	S1	SH
Utricularia biflora	Two-flowered bladderwort	SSYN	S1

APPENDIX II

CROSS REFERENCE OF PLANT SYNONYM NAMES

Synonym Name	Current Name
Agalinis decemloba	Agalinis obtusifolia
Agalinis virgata	Agalinis fasciculata
Agave virginica	Manfreda virginica
Agropyron trachycaulum	Elymus trachycaulus
Amelanchier spicata	Amelanchier stolonifera
Ammannia teres	Ammannia latifolia
Arabis perstellata var shortii	Arabis shortii
Arctostaphylos alpina	Arctostaphylos uva-ursi
Arctostaphylos rubra	Arctostaphylos uva-ursi
Arenaria caroliniana	Minuartia caroliniana
Arenaria groenlandica var glabra	Minuartia glabra
Arenaria lateriflora	Moehringia lateriflora
Arenaria peploides	Honckenya peploides
Arenaria stricta	Minuartia michauxii
Aristida dichotoma var curtissii	Aristida curtissii
Aristida purpurascens var virgata	Aristida virgata
Aristolochia durior	Aristolochia macrophylla
Armoracia aquatica	Armoracia lacustris
Arnoglossum muehlenbergii	Cacalia muehlenbergii
Asarum virginicum	Hexastylis virginica
Asplenium cryptolepis	Asplenium ruta-muraria
Aster laevis var concinnus	Aster concinnus
Aster steeleorum	Aster concinnus
Athyrium pycnocarpon	Diplazium pycnocarpon
Bacopa acuminata	Mecardonia acuminata
Bacopa stragula	Bacopa innominata
Botrychium dissectum forma oneidense	Botrychium oneidense
Cacalia muhlenbergii	Cacalia muehlenbergii
Cacalia suaveolens	Hasteola suaveolens
Calopogon pulchellus	Calopogon tuberosus
Carex amphibola var amphibolia	Carex planispicata
Carex aquatilis var substricta	Carex aquatilis
Carex brevior, in part	Carex molesta
Carex cephalantha	Carex echinata
Carex copulata	Carex laxiculmis var copulata
Carex crinita var mitchelliana	Carex mitchelliana
Carex filiformis	Carex lasiocarpa
Carex lanuginosa	Carex pellita
Carex pensylvanica var distans	Carex lucorum
Carex ritchii	Carex straminea
Carex tetanica var woodii	Carex woodii
Cassia fasciculata var macrosperma	Chamaecrista fasciculata var macrosperma
Centunculus minimus	Anagallis minima
Ceratophyllum echinatum	Ceratophyllum echinatum
Chenopodium hybridum var gigantospermum	Chenopodium gigantospermum
Chenopodium hybridum var standleyanum	Chenopodium standleyanum
Clematis verticillaris	Clematis occidentalis
Convolvulus spithamaeus	Calystegia spithamaea
Coptis groenlandica	Coptis trifolia
Cymophyllus fraseri	Cymophyllus fraserianus
Cyperus aristatus	Cyperus squarrosus
Cyperus inflexus	Cyperus squarrosus
Cyperus tenuifolius	Kyllinga pumila
Dichanthelium aciculare	Panicum aciculare
Dichanthelium boreale	Panicum boreale
Dichanthelium laxiflorum	Panicum laxiflorum
Dichanthelium leucothrix	Panicum leucothrix
Dichanthelium oligosnathes	Panicum oligosanthes
Dichanthelium ravenelii	Panicum ravenelii
Dichanthelium scabriusculum	Panicum scabriusculum
Dichanthelium wrightianum	Panicum wrightianum

Synonym Name	Current Name
Digitaria filiformis var villosa	Digitaria villosa
Dioscorea villosa var hirticaulis	Dioscorea hirticaulis
Diplachne fascicularis	Leptochloa fascicularis
Dryopteris cristata var clintoniana	Dryopteris clintoniana
Dryopteris disjuncta	Gymnocarpium dryopteris
Dryopteris spinulosa var americana	Dryopteris campyloptera
Eleocharis ambigens	Eleocharis fallax
Eleocharis calva	Eleocharis erythropoda
Epilobium glandulosum var adenocaulon	Epilobium ciliatum
Eragrostis virginica	Eragrostis refracta
Erianthus alopecuroides	Saccharum alopecuroidum
Erianthus strictus	Saccharum baldwinii
Eriocaulon septangulare	Eriocaulon aquaticum
Eupatoriadelphus maculatus	Eupatorium maculatum
Euphorbia vermiculata	Chamaesyce vermiculata
Euthamia minor	Euthamia tenuifolia var tenuifolia
Fimbristylis baldwiniana	Fimbristylis annua
Fimbristylis puberula	Fimbristylis caroliniana
Fraxinus tomentosa	Fraxinus profunda
Galax urceolata	Galax aphylla
Gentiana crinita	Gentianopsis crinita
Gentiana puberula	Gentiana puberulenta
Gentiana quinquefolia	Gentianella quinquefolia
Gerardia auriculata	Agalinis auriculata
Gerardia laevigata	Aureolaria laevigata
Gillenia stipulata	Porteranthus stipulatus
Glyceria fernaldii	Torreyochloa pallida var fernaldii
Glyceria pallida	Torreyochloa pallida
Habenaria blephariglottis	Platanthera blephariglottis
Habenaria ciliaris	Platanthera ciliaris
Habenaria cristata	Platanthera cristata
Habenaria fimbriata	Platanthera grandiflora
Habenaria flava	Platanthera flava
Habenaria grandiflora	Platanthera grandiflora
Habenaria peramoena	Platanthera peramoena
Habenaria psycodes	Platanthera psycodes
Habenaria psycodes var grandiflora	Platanthera grandiflora
Habenaria viridis var bracteata	Coeloglossum viride
Hedyotis michauxii	Houstonia serpyllifolia
Hedyotis uniflora	Oldenlandia uniflora
Hemicarpha micrantha	Lipocarpha micrantha
Heracleum maximum	Heracleum lanatum
Hibiscus militaris	Hibiscus laevis
Hypericum ascyron	Hypericum pyramidatum
Hypericum tubulosum	Triadenum tubulosum
Isanthus brachiatus	Trichostema brachiatum
Jussiaea decurrens	Ludwigia decurrens
Lachnanthes caroliniana	Lachnanthes caroliana
Limosella subulata	Limosella australis
Lophotocarpus calycina	Sagittaria calycina
Lophotocarpus spongiosus	Sagittaria calycina
Lycopodium carolinianum	Lycopodiella caroliniana
Lycopodium inundatum	Lycopodiella inundata
Lycopodium porophilum	Huperzia porophila
Maianthemum stellatum	Smilacina stellata
Manisuris rugosa	Coelorachis rugosa
Melanthium hybridum	Melanthium latifolium
Nemophila microcalyx	Nemophila aphylla
Onosmodium hispidissimum	Onosmodium molle
Orbexilum pedunculatum var psoralioides	Psoralea psoralioides
Pachistima canbyi	Paxistima canbyi
Phlox ovata	Phlox latifolia
Polemonium van-bruntiae	Polemonium vanbruntiae
Polygonum polypodioides	Pleopeltis polypodioides
Pseudotaenidia montana	Taenidia montana

Synonym Name	Current Name
Psilocarya nitens	Rhynchospora nitens
Psilocarya scirpoides	Rhynchospora scirpoides
Pteretis pensylvanica	Matteuccia struthiopteris
Ptilimnium fluviatile	Ptilimnium nodosum
Puccinellia fernaldii	Torreyochloa pallida var fernaldii
Puccinellia pallida	Torreyochloa pallida
Pyrola chlorantha	Pyrola virens
Pyrola secunda	Orthilia secunda
Pyrus floribunda	Aronia prunifolia
Ranunculus aquatilis	Ranunculus trichophyllus
Ranunculus carolinianus	Ranunculus hispidus var nitidus
Rumex verticillatus	Rumex floridanus
Sagittaria australis	Sagittaria longirostra
Sagittaria spathulata	Sagittaria calycina
Salix humilis var microphylla	Salix tristis
Salix humilis var tristis	Salix tristis
Salix interior	Salix exigua
Scirpus maritimus var fernaldi	Scirpus cylindricus
Scleria muehlenbergii	Scleria reticularis
Scutellaria epilobiifolia	Scutellaria galericulata
Scutellaria parvula var leonardii	Scutellaria leonardii
Senna marilandica	Cassia marilandica
Silphium asteriscus	Silphium trifoliatum
Sisyrinchium arenicola sensu stricto	Sisyrinchium fuscatum
Smilax tamnifolia	Smilax pseudochina
Solidago microcephala	Euthamia tenuifolia var tenuifolia
Solidago racemosa	Solidago spathulata
Spiraea corymbosa	Spiraea betulifolia
Spiranthes cernus var ochroleuca	Spiranthes ochroleuca
Stachys hyssopifolia var ambigua	Stachys aspera
Stachys nuttallii	Stachys cordata
Stachys riddellii	Stachys cordata
Stachys tenuifolia var latidens	Stachys latidens
Synosma suaveolens	Hasteola suaveolens
Tillaea aquatica	Crassula aquatica
Tomanthera auriculata	Agalinis auriculata
Trisetum pensylvanicum	Sphenopholis pensylvanica
Utricularia biflora	Utricularia gibba
Vernonia altissima	Vernonia gigantea
Viola blanda var palustriformis	Viola incognita
Xanthoxylum americanum	Zanthoxylum americanum

APPPENDIX III

PLANT SPECIES UNDER REVIEW FOR INCLUSION ON LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK
Asplenium montanum	Mountain spleenwort	G5	S?
Aster ontarionis	Ontario aster	G5	S?
Celastrus scandens	Climbing bittersweet	G5	S?
Cirsium pumilum	Pasture thistle	G4G5	S?
Collinsonia verticillata	Whorled horse-balm	G3	SR
Desmodium fernaldii	Fernald's tick-trefoil	G4	S?
Geum rivale	Purple avens	G5	S?
Gymnopogon ambiguus	Broad-leaved beardgrass	G4	S?
Ludwigia leptocarpa	River seedbox	G5	S?
Polemonium reptans	Greek valerian	G5	S?
Polypremum procumbens	Juniper-leaf	G5	S?
Rubus centralis	Deam's dewberry	G2G4Q	S?
Saxifraga pensylvanica	Swamp saxifrage	G5	S?
Spiranthes ovalis	Lesser ladies'-tresses	G5?	S?
Strophostyles leiosperma	Small-flowered woolly bean	G5	S?
Trichomanes intricatum	A filmy-fern	G3G4	S?
Tridens chapmanii	Chapman's redtop	G5T3T5	S?
Triosteum aurantiacum	Coffee tinker's-weed	G5	S?
Utricularia intermedia	Flat-leaved bladderwort	G5	S?
Utricularia juncea	Southern bladderwort	G5	S3?
Veronicastrum virginicum	Culver's-root	G4	S?

APPENDIX IV

EXPLANATION OF SPECIES RANK AND STATUS CODES

GLOBAL AND STATE RANKS

The global and state ranking system is used by all 50 state Natural Heritage Programs and numerous Conservation Data Centers in other countries in this hemisphere. Because they are assigned based upon standard criteria, the ranks can be used to assess the range-wide status of a species, as well as the status within portions of the species' range. The primary criterion used to define these ranks is the number of known distinct occurrences with consideration given to the total number of individuals at each locality. Additional factors considered include the current level of protection, the types and degree of threats, ecological vulnerability, and population trends. Global and state ranks are used in combination to set inventory, protection, and management priorities for species both at the state as well as regional level.

GLOBAL RANK

G1 Highly globally rare. Critically imperiled globally because of extreme rarity (typically 5 or fewer estimated occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 Globally rare. Imperiled globally because of rarity (typically 6 to 20 estimated occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 Either very rare and local throughout its range or distributed locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; typically with 21 to 100 estimated occurrences.

G4 Apparently secure globally, although it may be quite rare in parts of its range, especially at the periphery.

G5 Demonstrably secure globally, although it may be quite rare in parts of its range, especially at the periphery.

GH No known extant occurrences (i.e., formerly part of the established biota, with the expectation that it may be rediscovered).

GU Possibly in peril range-wide, but its status is uncertain; more information is needed.

GX Believed to be extinct throughout its range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered.

G? The species has not yet been ranked.

_Q Species containing a "Q" in the rank indicates that the taxon is of questionable or uncertain taxonomic standing (i.e., some taxonomists regard it as a full species, while others treat it at an infraspecific level).

_T Ranks containing a "T" indicate that the infraspecific taxon is being ranked differently than the full species.

STATE RANK

S1 Highly State rare. Critically imperiled in Maryland because of extreme rarity (typically 5 or fewer estimated occurrences or very few remaining individuals or acres in the State) or because of some factor(s) making it especially vulnerable to extirpation. Species with this rank are actively tracked by the Wildlife and Heritage Service.

S2 State rare. Imperiled in Maryland because of rarity (typically 6 to 20 estimated occurrences or few remaining individuals or acres in the State) or because of some factor(s) making it vulnerable to becoming extirpated. Species with this rank are actively tracked by the Wildlife and Heritage Service.

S3 Watch List. Rare to uncommon with the number of occurrences typically in the range of 21 to 100 in Maryland. It may have fewer occurrences but with a large number of individuals in some populations, and it may be susceptible to large-scale disturbances. Species with this rank are not actively tracked by the Wildlife and Heritage Service.

S3.1 A "Watch List" species that is actively tracked by the Wildlife and Heritage Service because of the global significance of Maryland occurrences. For instance, a G3 S3 species is globally rare to uncommon, and although it may not be currently threatened with extirpation in Maryland, its occurrences in Maryland may be critical to the long term security of the species. Therefore, its status in the State is being monitored.

S4 Apparently secure in Maryland with typically more than 100 occurrences in the State or may have fewer occurrences if they contain large numbers of individuals. It is apparently secure under present conditions, although it may be restricted to only a portion of the State.

S5 Demonstrably secure in Maryland under present conditions.

SA Accidental or a vagrant in Maryland.

SE Established, but not native to Maryland; it may be native elsewhere in North America.

SH Historically known from Maryland, but not verified for an extended period (usually 20 or more years), with the expectation that it may be rediscovered.

SP Potentially occurring in Maryland or likely to have occurred in Maryland (but without persuasive documentation).

SR Reported from Maryland, but without persuasive documentation that would provide a basis for either accepting or rejecting the report (e.g., no voucher specimen exists).

SRF Reported falsely (in error) from Maryland, and the error may persist in the literature.

SU Possibly rare in Maryland, but of uncertain status for reasons including lack of historical records, low search effort, cryptic nature of the species, or concerns that the species may not be native to the State. Uncertainty spans a range of 4 or 5 ranks as defined above.

SX Believed to be extirpated in Maryland with virtually no chance of rediscovery.

SZ The species would not substantially benefit from protection efforts at a given location in Maryland because of its transitory nature.

S? The species has not yet been ranked.

STATE STATUS

This is the status of a species as determined by the Maryland Department of Natural Resources, in accordance with the Nongame and Endangered Species Conservation Act. Definitions for the following categories have been taken from Code of Maryland Regulations (COMAR) 08.03.08.

- E Endangered; a species whose continued existence as a viable component of the State's flora or fauna is determined to be in jeopardy.
- I In Need of Conservation; an animal species whose population is limited or declining in the State such that it may become threatened in the foreseeable future if current trends or conditions persist.
- T Threatened; a species of flora or fauna which appears likely, within the foreseeable future, to become endangered in the State.
- X Endangered Extirpated; a species that was once a viable component of the flora or fauna of the State, but for which no naturally occurring populations are known to exist in the State.
- * A qualifier denoting the species is listed in a limited geographic area only.

FEDERAL STATUS

This is the status of a species as determined by the U.S. Fish and Wildlife Service's Office of Endangered Species, in accordance with the Endangered Species Act. Definitions for the following categories have been modified from 50 CRF 17.

- LE Taxa listed as endangered; in danger of extinction throughout all or a significant portion of their range.
- LT Taxa listed as threatened; likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
- PE Taxa proposed to be listed as endangered.
- PT Taxa proposed to be listed as threatened.
- C Candidate taxa for listing for which the Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened.

APPENDIX G

INVASIVE AND EXOTIC SPECIES IN MARYLAND

Appendix Table G-1: Invasive Species Known to Occur in Maryland

Species	Description	Common Name
Adelges tsugae (insect)	*Adelges tsugae* (*A. tsugae*) is a small, aphid-like insect that has become a serious pest of eastern hemlock and Carolina hemlock. Infested eastern North American hemlocks defoliate prematurely and will eventually die if left untreated. Hemlock trees provide important habitats for many wildlife species and *A. tsugae* has severe adverse ecological impacts that will become more severe as its distribution expands.	hemlock woolly adelgid
Ailanthus altissima (shrub, tree)	*Ailanthus altissima* is a very aggressive plant, a prolific seed producer (up to 350,000 seeds in a year), grows rapidly and can overrun native vegetation. It also produces toxins that prevent the establishment of other plant species. The root system is aggressive enough to cause damage to sewers and foundations.	Chinese sumac, stinking sumac, tree of heaven
Akebia quinata (vine, climber)	*Akebia quinata*, also commonly known as chocolate vine, is a twining woody vine that grows quickly and, if left unmanaged, can cover, out compete and kill existing ground herbs and seedlings, understory shrubs and young trees. Once established, its dense growth prevents seed germination and establishment of seedlings of native plants.	chocolate vine
Albizia julibrissin (tree)	*Albizia julibrissin* (*A. julibrissin*) is commonly used as an ornamental tree because of its appealing fragrance, showy flowers, and low maintenance. It has escaped from the urban landscape and competes with native plants in disturbed habitats and occasionally in forested areas. Typical disturbed habitat may	mimosa, powderpuff tree, silk tree, silky acacia

Species	Description	Common Name
	include roadsides, vacant lots and riparian areas. *A. julibrissin* prefers full sunlight but is salt and drought tolerant and can thrive in a wide range of soil types.	
Alliaria petiolata (herb)	It is believed that European settlers brought *Alliaria petiolata* to North America for cooking purposes. This exotic may out compete native herbaceous species and negatively impact ecosystems of invaded areas. *A. petiolata* acts as a population sink for certain butterflies. Its seeds are transported by humans, on animals and in water.	Garlic mustard, garlic root, garlicwort, hedge garlic, Jack-by-the-hedge, Jack-in-the-bush, mustard root, poorman's mustard
Ampelopsis brevipedunculata (vine, climber)	*Ampelopsis brevipedunculata* is a deciduous, climbing vine from the grape family. It is a hardy species that can adapt to a variety of environmental conditions, growing especially well in moist soils exposed to full sunlight or partial shade. It is however drought-tolerant and adaptable to poor soils of varying pH. Birds and other small mammals and water are primary dispersants of seeds.	peppervine, creeper, porcelainberry, wild grape
Branta Canadensis (bird)	Goose populations have grown rapidly in the last three decades, displays aggressive behavior, eliminates shoreline vegetation.	Canada goose (non-migratory)
Bromus tectorum (grass)	This invasive grass is troublesome to farmers and many ecosystems. It usually thrives in disturbed areas preventing natives from returning to the area. Disturbance, such as overgrazing, cultivation, and frequent fires, facilitate invasion. Once established the natives cannot compete and the whole ecosystem is altered.	broncograss, cheatgrass, cheatgrass brome, downy brome, downy chess, drooping brome, early chess, military grass, Mormon Oats, slender chess, thatch bromegrass
Carduus nutans (herb)	*Carduus nutans* readily invades disturbed areas and out competes native plants. The best form of	Musk thistle, nodding plumeless thistle

Species	Description	Common Name
	prevention is maintaining a healthy native ecosystem in recently disturbed sites. It is also invades grazed pastures, where it reduces the amount of pasture available for livestock.	
Centaurea biebersteinii (herb)	Centaurea biebersteinii is a biennial or short-lived perennial composite and a very aggressive invader. It has been reported to grow on a wide variety of habitats, especially industrial land, including gravel pits, stockpiles, power lines, grain elevators, railroad, equipment yards, pasture, range, and timbered range. It is often associated with irrigation, preferring areas of high available moisture, and is best adapted to well-drained, light- to coarse-textured soils.	spotted knapweed
Centaurea solstitialis (herb)	*Centaurea solstitialis* is a winter annual that can form dense impenetrable stands that displace desirable vegetation in natural areas, rangelands, and other places. The short, stiff, pappus bristles are covered with barbs that readily adhere to clothing, hair, and fur. Transport of contaminated hay and uncertified seed, as well as wind, contribute to dispersal of seeds.	golden star thistle, St. Barnaby's thistle, yellow centaury, yellow cockspur, yellow star thistle
Channa argus (fish)	Little is known of the impacts of the northern snakehead, but as a voracious predator with no natural enemies, its introduction could interrupt and devastate the food web of freshwater systems. Although it can live outside the water for up to 4 days, biologists believe that *C. argus* is not well adapted to land travel. The major threat of dispersal is through human release.	northern snakehead, eastern snakehead

Species	Description	Common Name
Channa marulius (fish)	*Channa marulius* is an extremely voracious predator and has the potential to disturb functioning native ecosystems. Although native to parts of tropical Africa and Asia, *C. marulius* has been reported in the eastern U.S., where it was introduced via illegal aquarium release.	bullseye snakehead, cobra snakehead, giant snakehead, great snakehead, Indian snakehead
Cirsium arvense (herb)	*Cirsium arvense* is an herbaceous perennial in the aster family. It occurs in nearly every upland herbaceous community within its range, and is a particular threat in grassland communities and riparian habitats. The seeds spread as a contaminant in agricultural seeds in hay and in cattle and horse droppings and on farm machinery. It produces an abundance of bristly-plumed seeds that are easily dispersed by the wind and water.	Californian thistle, Canadian thistle, creeping thistle, field thistle, perennial thistle
Corbicula fluminea (mollusc)	*Corbicula fluminea* is a freshwater clam that has caused millions of dollars worth of damage to intake pipes used by power, water, and other industries. Many native clams are declining as *C. fluminea* out competes them for food and space. *C. fluminea* spreads when it is attached to boats or carried in ballast water, used as bait, sold through the aquarium trade, and carried with water currents.	Asian clam, prosperity clam
Coronilla varia (herb)	*Coronilla varia* is a perennial herb with creeping stems that may reach 0.6 - 2 meters. It is tolerant of drought, heavy precipitation, and cold temperatures, but it is intolerant of shade. *C. varia* is adapted to all coarse and medium textured soils, but it does not grow well in fine textured, saline, and alkaline soils. It reproduces	axseed, crown-vetch, trailing crown-vetch

Species	Description	Common Name
	prolifically and spreads rapidly via creeping rhizomes. *C. varia* has been extensively planted for erosion control along many roads and other disturbed areas, and has also been widely planted for ground cover on steep banks, mine reclamation, and as a cover crop on cropland.	
Cronartium ribicola (macro-fungus)	White pine blister rust, a widely known tree disease in North America, is caused by the introduced fungus *Cronartium ribicola*. The two host groups of this fungus are five-needle *Pinus* spp. and plants of the currant/gooseberry genus (*Ribes* spp.). Spores on infected pines are carried by wind. Large-scale weather events, such as hurricanes, that bring wet conditions to a region increase opportunities for infection and spore travel distance.	white pine blister rust
Cygnus olor (bird)	Invader of freshwater and saltwater, diet of submerged aquatic vegetation; poses threat to Chesapeake Bay ecosystem.	Mute swan
Cyprinus carpio (fish)	The common carp has been introduced as a food and ornamental fish into temperate freshwaters throughout the world. It is considered a pest because of its abundance and its tendency to reduce water clarity and destroy and uproot aquatic habitat.	carp, carpeau, common carp, European carp, German Carp, grass carp, leather carp, mirror carp, wild carp
Cytisus scoparius (shrub)	The densely growing *Cytisus scoparius* is a shrub indigenous to Europe and northern Asia that favors temperate climates and is found in abundance on sandy pastures and heaths. Where introduced, it colonizes pastures and cultivated fields, dry scrubland and "wasteland", and native grasslands. Most rapid	common broom, European broom, Irish broom, Scotch broom

Species	Description	Common Name
	spread of the plant occurs along waterways where the seed is dispersed by water. Seed re-introduction may occur from the sheep droppings during grazing.	
Dioscorea oppositifolia (herb, vine, climber)	*Dioscorea oppositifolia* is a fast growing twining vine that can survive in many different habitats and environmental conditions, but is most commonly found at the edges of rich, mesic bottomland forests, along stream banks and drainageways and near fencerows. This species can easily spread to nearby riparian swaths and undisturbed habitats. It mostly grows at intermediate light levels along forest edges and is typically found in silty loam soils and soils that are relatively rich in nitrogen.	Chinese yam, cinnamon vine
Dreissena polymorpha (mollusc)	Freshwater mussel that fouls water supply pipes, boat engine cooling systems, and interferes with native mussel growth and survival	zebra mussel
Eichhornia crassipes (aquatic plant)	Infestations of water hyacinth block waterways, limit boat traffic, swimming and fishing, and prevent sunlight and oxygen from reaching the water column and submerged plants. It shades and crowds out native aquatic plants, dramatically reducing biological diversity in aquatic ecosystems.	water hyacinth
Elaeagnus angustifolia (shrub, tree)	Native to southern Europe and western Asia, *E. angustifolia* is commonly found along floodplains, riverbanks, stream courses, marshes, and irrigation channels. Seedlings are tolerant of shade and the plant thrives in a variety of soil and moisture conditions, including bare mineral substrates. *E. angustifolia* can withstand competition from other shrubs and trees and can spread	Russian olive

Species	Description	Common Name
	vegetatively by sprouting from the root crown and sending up root suckers. The fruits float and are probably dispersed via water transport, and seeds ingested with the fruit by birds and small mammals are dispersed in their droppings.	
Elaeagnus umbellata (shrub, tree)	*Elaeagnus umbellate* is valued as an ornamental because of its silvery foliage and flowers and its hardiness under dry conditions. It invades grasslands and disturbed areas adjacent to the plantings, and its encroachment can be rapid because of its high seed production and germination rate. *E. umbellata* seeds are dispersed by birds and mammals, and are also used for wildlife plantings. It grows well on a variety of soils, including sandy, loamy, and somewhat clayey textures, as well as on infertile soils. This species has the potential of becoming one of the most troublesome introduced shrubs in the central and eastern United States.	autumn-olive, silverberry
Erodium cicutarium (herb)	*Erodium cicutarium* is an annual, winter annual or biennial that is a pioneer on disturbed and arid sites. It can cause yield reductions of crops and the seed is very difficult to clean out of small seeded crops. This species is considered a noxious weed because it crowds out or ~~outcompetes~~out competes crops and native plant species. *E. cicutarium* provides forage for rodents, desert tortoise, big game animals, livestock, and also upland game birds, and songbirds. It may be impossible to actually prevent this species from colonizing or to eradicate it once present, as there	California filaree, cutleaf filaree, heronsbill, pin-grass, pin-weed, redstem, redstem stork's bill, stork's bill

Species	Description	Common Name
	are few known chemical controls for this species other than general herbicide controls. Cover may be enhanced in areas exposed to fire or livestock grazing.	
Euphorbia esula (herb)	Native to Europe and temperate Asia, leafy spurge currently is found throughout the world with the exception of Australia. This aggressive invader displaces native vegetation by shading and using up available water and nutrients and by plant toxins that prevent the growth of other plants beneath it.	leafy spurge, spurge
Hedera helix (vine, climber)	*Hedera helix* is an evergreen climbing vine in the ginseng family (Araliaceae) that aggressively threatens forested and open areas. It is widely used as a fast-growing, low maintenance, evergreen groundcover, and once established at a site, *H. helix* can be expected to move beyond its intended borders by vegetative means or by seed. Seeds are dispersed to new areas primarily by birds.	English ivy
Hydrilla verticillata (aquatic plant)	*Hydrilla verticillata* is a submerged aquatic weed that crowds out native plants by shading them and out competing them for nutrients. Dense masses of *H. verticillata* interfere with recreational activities, such as boating, fishing, and swimming.	Florida elodea, hydrilla, Oxygen weed, water thyme, water weed
Lespedeza cuneata (herb, shrub)	*Lespedeza cuneata* is a long-lived perennial that thrives in grasslands, pastures, along roadsides, drainage areas, fencerows, and in other disturbed areas. It is often found in cultivated areas, fallow and abandoned fields, meadows, and marshes. It is adapted to a wide	Chinese bush clover, Himalayan bush clover, perennial lespedeza, silky bush-clover

Species	Description	Common Name
	range of climatic conditions and is tolerant of drought. It can survive freezing winter temperatures, but is often damaged by late spring freezes. *L. cuneata* grows best in deep soils, such as deep sands with organic matter or sandy loams with clay loam subsoil, and will also grow on strongly acidic to neutral soils. Dispersal is aided by animals that consume the fruits and pass the seeds; autumn dispersal is aided by the haying of infested fields.	
Ligustrum sinense (shrub, tree)	*Ligustrum spp*. has been cultivated into horticultural varieties. As perennial shrubs, *Ligustrum spp*. are commonly used for hedges, and can easily invade adjacent areas to form dense, monospecific thickets. *Ligustrum spp*. usually occurs in low woods, bottomlands, streamsides and disturbed areas. It prefers wet, damp habitat, though it has also been found in dry habitats. *Ligustrum spp*. can escape from cultivation when the fruits are consumed by wildlife, which often disperse seeds at distant locations where they may germinate and become established.	Chinese privet
Lonicera japonica (vine, climber)	*Lonicera japonica* is an extremely vigorous vine that grows up through the canopy of trees, smothering and ultimately killing the host tree. It is shade and drought tolerant, though it needs full to partial sunlight to grow successfully.	Japanese honeysuckle, Chinese honeysuckle, Hall's honeysuckle
Lymantria dispar (insect)	*Lymantria dispar* is one of the most destructive pests of shade, fruit, ornamental trees and hardwood forests throughout the northern hemisphere. *L. dispar* caterpillars cause extensive	gypsy moth, Asian gypsy moth

Species	Description	Common Name
	defoliation, leading to reduced growth and mortality of the host tree. Larvae and egg masses can cause allergies in some people.	
Lythrum salicaria (aquatic plant, herb)	*Lythrum salicaria* is an erect perennial herb with a woody stem and whirled leaves that has the ability to reproduce prolifically by both seed dispersal and vegetative propagation. Any sunny or partly shaded wetland is vulnerable to *L. salicaria* invasion, but disturbed areas with exposed soil accelerate the process by providing ideal conditions for seed germination.	purple loosestrife, rainbow weed, spiked loosestrife
Myriophyllum aquaticum (aquatic plant)	*M. aquaticum* is a bright or glaucous green perennial freshwater herb that exhibits two different leaf forms depending on whether it is growing as a submerged plant or as an emergent. It is found in freshwater lakes, ponds, streams, and canals and is adapted to high nutrient environments, good light and a slightly alkaline environment. *M. aquaticum* has been introduced for use in indoor and outdoor aquaria and is a popular aquatic garden plant.	parrot feather, Brazilian watermilfoil, parrot feather watermilfoil, thread-of-life, water-feather
Myriophyllum spicatum (aquatic plant)	A submerged aquatic plant that can rapidly colonize a pond, lake or area of slow-moving water. Creates dense mats of vegetation that shade out other native aquatic plants, diminish habitat and food resource value for fish and birds, and decrease oxygen levels in the water when the plant decays.	Eurasian water-milfoil, spike water-milfoil
Nymphoides peltata (aquatic plant)	*Nymphoides peltata* is usually introduced as an aquatic ornament. The sale and distribution of this invasive is slowing becoming more controlled, as this species	floating heart, fringed water lily, yellow floating heart

Species	Description	Common Name
	can become extremely invasive in shallow, slow-moving swamps, rivers, lakes and ponds. Hand removal for small infestations and herbicides for larger ones seems to be the most likely to be effective.	
Onopordum acanthium (herb)	*Onopordum acanthium* is an herb of the sunflower family (*Asteraceae*), which is native to Europe and Asia. In North America, *O. acanthium* is a weed problem on western rangeland and produces significant economic losses for ranchers. Seeds are dispersed locally by wind; humans, water, livestock, and wildlife are involved in long distance dispersal.	cotton thistle, heraldic thistle, Scotch cotton thistle, Scotch thistle, woolly thistle
Orconectes virilis (crustacean)	*Orconectes virilis* is closely related to the lobster. *O. virilis* can be found in lakes, rivers, streams, marshes, and ponds and requires shelter in the form of rocks, logs, or thick vegetation. Its dispersal is fostered by its popularity as a food, as baitfish, and through the aquarium trade as pets or food for predaceous fishes.	Northern crayfish, virile crayfish
Passer domesticus (bird)	*Passer domesticus* is a small, non-migratory bird native to Eurasia and northern Africa. These birds are often closely associated with human populations and are found in highest abundance in agricultural, suburban, and urban areas, ~~as they~~as they tend to avoid woodlands, forests, grasslands, and deserts. Particularly high densities were found where urban settlements meet agricultural areas. *P. domesticus* may displace native birds from their nests and out-compete them for trophic resources. Early in its introduction to North America, *P. domesticus*	English sparrow, house sparrow, town sparrow

Species	Description	Common Name
	began attacking ripening grains on farmland and was considered a serious agricultural pest. Recent surveys show populations are declining.	
Paulownia tomentosa (tree)	*P. tomentosa* is a small to medium sized tree native to Asia that was introduced to North America as an ornamental but is now also commercially farmed. *P. tomentosa* grows best on moist, well-drained soils of steep slopes or open valleys, but it is also considered a pioneer species and can establish itself readily on poor quality sites such as abandoned surface mines, along roadways, railways, and steep, rocky waterways. *P. tomentosa* is considered to be an aggressive ornamental tree that grows rapidly in disturbed natural areas.	empress tree, princess tree, foxglove-tree
Phragmites australis (grass)	*Phragmites australis* grows on level ground in tidal and nontidal marshes, lakes, swales, backwater areas of rivers, and streams. It is ~~a~~an herbaceous perennial that overtakes wetland ecosystems and forms large colonies on sites that are seasonally flooded. It is capable of vigorous vegetative reproduction, and its seeds, which are normally dispersed by wind, water and may be transported by birds that nest among the reeds. Invasion and continued spread is aided by disturbances or stresses such as pollution, alteration of the natural hydrologic regime, dredging, and increased sedimentation.	cane, common reed, ditch reed, giant reed, giant reedgrass, phragmites, reed grass, yellow cane
Populus alba (tree)	*Populus alba* is a member of the willow family (Salicaceae) that is native to Eurasia. It is a dioecious species and female mature trees	silver-leaf poplar, white poplar

Species	Description	Common Name
	can produce large seed crops. *P. alba* spreads to new locations when mature trees release thousands of wind-dispersed seeds that may be carried long distances. It is an especially strong competitor because it can grow in a variety of soils and resprout easily in response to damage.	
Potamogeton crispus (aquatic plant)	*P. crispus* is an aquatic plant that grows in fresh and slightly brackish waters. It becomes invasive in some areas because of its tolerance for low light and low water temperatures. These tolerances allow it to get a head start on and out-compete native plants in the spring.	curly pondweed, curly-leaved pondweed
Pylodictis olivaris (fish)	*Pylodictis olivaris* is one of the largest members of the catfish family. Its introduction is the most biologically harmful of all fish introductions in North America, as it pre-dates heavily on native fishes. Native to the warm water streams and rivers of the Mississippi River Basin, it has been introduced east of the Appalachian Mountains. *P. olivaris* prefers the slow moving water of large rivers and lakes and can be spread by unintentional stock contamination of channel catfish shipments.	mud cat, opelousas, shovelhead cat, yellow cat
Rosa multiflora (shrub)	*R. multiflora* is a perennial shrub that forms dense, impenetrable thickets of vegetation. *R. multiflora* can colonize in along roadsides, in old fields, pastures, prairies, savannas, open woodlands, and forest edges, as well as in late-successional forests. It invades pasturelands, degrades forage quality, reduces grazing	baby rose, Japanese rose, multiflora rose, seven-sisters rose

Species	Description	Common Name
	area and agricultural productivity and can cause severe eye and skin irritation in cattle. *R. multiflora* is tolerant of a wide range of soil and environmental conditions and is thought to be limited by intolerance to extreme cold temperatures. Many species of birds and mammals feed on the rose hips.	
Salmo trutta (fish)	The brown trout, introduced for aquaculture and stocked for sport fisheries, is blamed for reducing native fish populations, especially other salmonids through predation, displacement, and food competition.	brook trout, brown trout, sea trout, salmon trout
Trapa natans (aquatic plant)	*Trapa natans* is an annual plant introduced from Asia that has become abundant in the northeastern United States where it is a nuisance in lakes, ponds, canals and other slow-moving water. *T. natans* grows best in shallow, nutrient-rich lakes and rivers and is generally found in waters with a pH range of 6.7 to 8.2 and alkalinity of 12 to 128 mg/L of calcium carbonate. It out competes native plants for sunlight, and is spread either by the rosettes detaching from their stems and floating to another area or more often by the nuts being swept by currents or waves to other parts of the lake or river.	bull nut, European water chestnut, water chestnut
Tussilago farfara (herb)	*Tussilago farfara* is a perennial herb that spreads mainly through underground rhizomes. It thrives on gravelly soil and along roadsides. If left unchecked, it can take over an entire field. It is best to stop *T. farfara* before it spreads because control is difficult.	Assfoot, British tobacco, bull's-foot, clayweed, cleats, colt-herb, coltsfoot, coughwort, dove-dock, dummyweed, foalfoot, ginger, gingerroot
Vinca major (herb)	*V. major* is introduced to new	periwinkle, bigleaf

Species	Description	Common Name
	locations usually as an ornamental or medicinal herb. It spreads locally from dumped garden waste, plant fragments carried downstream, and as a garden escape along shady corridors. It grows most vigorously in moist shady areas in forests, along streams and in urban areas. Once established, the herb competes with native vegetation by smothering all native groundcover vegetation and preventing the regeneration of trees and shrubs. V. major a serious threat to the understory of forested areas and streamside vegetation.	periwinkle, blue periwinkle, greater periwinkle, large periwinkle
Vulpes vulpes (mammal)	Native to Europe, Asia, North Africa, and boreal regions of North America, European red foxes have been introduced into temperate regions of North America. Introduced red foxes have negative impacts on many native species, including smaller canids and ground nesting birds, and many small and medium-sized rodents.	red fox, silver, black or cross fox
Wisteria sinensis (vine, climber)	*Wisteria sinensis*, a popular ornamental vine, invades forest edges, disturbed areas, and riparian zones, where it spreads seeds downstream. It tolerates shade and a variety of soil types. Most infestations of natural habitats are due to discarded landscape plantings.	Chinese wisteria
Carpodacus mexicanus (bird)	The house finch, or Linnet, is native to the western United States and Mexico. In 1940, wild birds illegally sold as "Hollywood Finches" in New York were released by dealers anxious to avoid prosecution, and populations now exist throughout eastern	house finch, Linnet

Species	Description	Common Name
	North America. In many areas, house finches are not considered a nuisance and are appreciated for their musical song and bright colors, but they peck and feed on practically all deciduous fruits, berries, grains, and seed. Consequently, large populations of this species have become a nuisance, even in its native range, where they have caused economic losses in agricultural areas.	
Molothrus ater (bird)	*Molothrus ater* is a small blackbird that can be found in almost every habitat, consisting of open woodlands, fields, and the marginal habitat in between. *M. ater* is commonly associated with agriculture (cattle pastures, feed lots), and is migratory, spending time year round in the southern United States, but occurring only during the breeding season in the northern and mountainous regions of the United States. *M. ater* has undergone a rapid range expansion with habitat alterations due to forest clearing, domestic cattle grazing, urbanization, and conversion of forested habitats to agricultural land.	brown-headed cowbird, buffalo bird, cowbird
Myocastor coypus (rodent)	Introduced for the fur trade, forages directly on marsh vegetation accelerating the erosion processes associated with tidal currents.	Nutria
Myxobolus cerebralis (micro-organism)	*Myxobolus cerebralis* is a microscopic parasite that causes a chronic disease resulting in high mortalities among young, hatchery reared fish. It is called "whirling disease" because infected fish swim in radical, circular motions. *M. cerebralis* has a wide distribution that appears to be	whirling disease

Species	Description	Common Name
	expanding mainly through the stocking of live, infected fish. Wild populations are infected mostly by stocking.	
Phalaris arundinacea (grass)	*Phalaris arundinacea* is a cool-season perennial grass that grows successfully in northern latitudes. It can be invasive in wet habitats and so is often a target for control. It is considered a serious threat in wet meadows, wetlands, marshes, fens, old fields, floodplains, wet prairies, roadsides, and ditch banks. The invasion is promoted by disturbances such as ditching of wetlands, stream channelization, deforestation of swamp forests, sedimentation, overgrazing and intentional planting. Soils are usually fine textured, and poorly drained. *P. arundinacea* spreads within sites by creeping rhizomes and forms dense and impenetrable mats of vegetation.	reed canary grass, ribbon grass, variegated grass
Pistia stratiotes (aquatic plant)	*Pistia stratiotes* is an invasive weed found throughout the tropics and subtropics. Dumping of aquarium or ornamental pond plants is often the means of its spread. *P. stratiotes* is a free floating plant that is capable of forming dense mats on the surfaces of lakes, ponds, rivers and other bodies of water. The popularity of *P. stratiotes* as a garden plant has also led to its spread.	tropical duckweed, water lettuce

Source: The Global Invasive Species Database, developed by the IUCN/SSC Invasive Species Specialist Group (ISSG) as part of the global initiative on invasive species led by the Global Invasive Species Programme (GISP). The IUCN/SSC Invasive Species Specialist Group (ISSG) (http://www.issg.org); ISSG Global Invasive Species Database (http://www.issg.org/database).

APPENDIX H

MARYLAND NATIONAL HISTORIC LANDMARKS SURVEY

NATIONAL HISTORIC LANDMARKS SURVEY

NATIONAL PARK SERVICE
1849 C Street, N.W. Room NC-400
Washington, DC 20240

LISTING OF NATIONAL HISTORIC LANDMARKS BY STATE
MARYLAND (72)

- ACCOKEEK CREEK SITE..... 07/19/64
PRINCE GEORGE'S COUNTY, MARYLAND
- *BALTIMORE* (Tug).....01/04/93
BALTIMORE CITY, MARYLAND
- BALTIMORE AND OHIO TRANSPORTATION MUSEUM AND MOUNT CLARE.....09/15/61
BALTIMORE CITY, MARYLAND
- BARTON, CLARA, HOUSE.....01/12/65
GLEN ECHO, MONTGOMERY COUNTY, MARYLAND
- BOLLMAN TRUSS RAILROAD BRIDGE…..... ...02/16/00
SAVAGE, HOWARD COUNTY, MARYLAND
- BRICE HOUSE 04/15/70
ANNAPOLIS, ANNE ARUNDEL COUNTY, MARYLAND
- CARROLLTON VIADUCT 11/11/71
BALTIMORE CITY, MARYLAND
- CARSON, RACHEL, HOUSE.....12/04/91
SILVER SPRING, MONTGOMERY COUNTY, MARYLAND
- CASSELMAN BRIDGE, NATIONAL ROAD 01/29/64
GRANTSVILLE, GARRETT COUNTY, MARYLAND
- CHAMBERS, WHITTAKER, FARM.....05/17/88
WESTMINSTER, CARROLL COUNTY, MARYLAND
- CHASE-LLOYD HOUSE.....04/15/70
ANNAPOLIS, ANNE ARUNDEL COUNTY, MARYLAND
- CHESTERTOWN HISTORIC DISTRICT.....04/15/70
CHESTERTOWN, KENT COUNTY, MARYLAND
- COLLEGE OF MEDICINE OF MARYLAND ….....09/25/97
BALTIMORE CITY, MARYLAND
- COLONIAL ANNAPOLIS HISTORIC DISTRICT.....06/23/65
ANNAPOLIS, ANNE ARUNDEL COUNTY, MARYLAND
- *CONSTELLATION* (Frigate) 05/23/63
BALTIMORE CITY, MARYLAND
- DOUGHOREGAN MANOR.....11/11/71
HOWARD COUNTY, MARYLAND
- *EDNA E. LOCKWOOD*.....04/19/94
ST. MICHAELS, TALBOT COUNTY, MARYLAND
- ELLICOTT CITY STATION.....01/24/68
ELLICOTT CITY, HOWARD COUNTY, MARYLAND
- FIRST UNITARIAN CHURCH.....02/20/72
BALTIMORE CITY, MARYLAND
- FORT FREDERICK….....11/07/73
WASHINGTON COUNTY, MARYLAND
- GAITHERSBURG LATITUDE OBSERVATORY.....12/20/89
GAITHERSBURG, MONTGOMERY COUNTY, MARYLAND
- GREENBELT, MARYLAND HISTORIC DISTRICT 02/18/97
GREENBELT, PRINCE GEORGE'S COUNTY, MARYLAND
- HABRE-DE-VENTURE.....11/11/71
PORT TOBACCO, CHARLES COUNTY, MARYLAND
- HAMMOND-HARWOOD HOUSE.....10/09/60
ANNAPOLIS, ANNE ARUNDEL COUNTY, MARYLAND

- *HILDA M. WILLING*.....04/19/94
TILGHMAN ISLAND, TALBOT COUNTY, MARYLAND
- HIS LORDSHIP'S KINDNESS.....04/15/70
PRINCE GEORGE'S COUNTY, MARYLAND
- HOMEWOOD.....11/11/71
BALTIMORE CITY,
MARYLAND*KATHRYN*.....04/19/94
TILGHMAN ISLAND, TALBOT COUNTY, MARYLAND
- KENNEDY FARM.....11/07/73
SAMPLES MANOR, WASHINGTON COUNTY, MARYLAND
- LIGHTSHIP *NO. 116*, "CHESAPEAKE" 12/20/89
BALTIMORE CITY, MARYLAND
- LONDON TOWN PUBLIK HOUSE.....04/15/70
ANNE ARUNDEL COUNTY, MARYLAND
- LORE, J.C. OYSTER HOUSE.....08/07/01
SOLOMONS, CALVERT COUNTY, MARYLAND
- MARYLAND STATEHOUSE.....12/19/60
ANNAPOLIS, ANNE ARUNDEL COUNTY, MARYLAND
- McCOLLUM, ELMER V., HOUSE 01/07/76
BALTIMORE CITY, MARYLAND
- MENCKEN, H.L., HOUSE ….....07/28/83
BALTIMORE CITY, MARYLAND
- MINOR BASILICA OF THE ASSUMPTION OF THE BLESSED VIRGIN MARY...11/11/71
BALTIMORE CITY, MARYLAND
- MONOCACY BATTLEFIELD.....12/18/73
FREDERICK COUNTY, MARYLAND
- MONTPELIER …….....04/15/70
PRINCE GEORGE'S COUNTY, MARYLAND
- MOUNT CLARE.....04/15/70
BALTIMORE CITY, MARYLAND
- MOUNT ROYAL STATION AND TRAINSHED.....12/08/76
BALTIMORE CITY, MARYLAND
- MOUNT VERNON PLACE HISTORIC DISTRICT….....11/11/71
BALTIMORE CITY, MARYLAND
- *NELLIE CROCKETT* 04/19/94
GEORGETOWN, KENT COUNTY, MARYLAND
- OLD LOCK PUMP HOUSE, CHESAPEAKE AND DELAWARE CANAL.....01/12/65
CHESAPEAKE CITY, CECIL COUNTY, MARYLAND
- PACA, WILLIAM, HOUSE 11/11/71
ANNAPOLIS, ANNE ARUNDEL COUNTY, MARYLAND
- PEALE'S BALTIMORE MUSEUM.....12/21/65
BALTIMORE CITY, MARYLAND
- PHOENIX SHOT TOWER.....11/11/71
BALTIMORE CITY, MARYLAND
- POE, EDGAR ALLAN, HOUSE.....11/11/71
BALTIMORE CITY, MARYLAND
- *REBECCA T. RUARK* 07/31/03
TILGHMAN ISLAND, TALBOT COUNTY, MARYLAND
- REMSEN, IRA, HOUSE 05/15/75
BALTIMORE CITY, MARYLAND
- RESURRECTION MANOR 04/15/70
ST. MARY'S COUNTY, MARYLAND
- RIVERSDALE.....12/09/97
RIVERDALE, PRINCE GEORGE'S COUNTY, MARYLAND
- ROWLAND, HENRY AUGUST, HOUSE.....05/15/75
BALTIMORE CITY, MARYLAND
- ST. MARY'S CITY HISTORIC DISTRICT 08/04/69
ST. MARY'S COUNTY, MARYLAND
- ST. MARY'S SEMINARY CHAPEL 11/11/71
BALTIMORE CITY, MARYLAND

- SHEPPARD AND ENOCH PRATT HOSPITAL AND GATE HOUSE.....11/11/71
TOWSON, BALTIMORE COUNTY, MARYLAND
- SION HILL 04/27/92
HAVRE DE GRACE, HARFORD COUNTY, MARYLAND
- SOTTERLEY.....02/16/00
HOLLYWOOD, ST. MARY'S COUNTY, MARYLAND
- SPACECRAFT MAGNETIC TEST FACILITY 10/03/85
GREENBELT, PRINCE GEORGE'S COUNTY, MARYLAND
- STAR-SPANGLED BANNER FLAG HOUSE.....12/16/69
BALTIMORE CITY, MARYLAND
- STEWART, PEGGY, HOUSE ….....11/07/73
ANNAPOLIS, ANNE ARUNDEL COUNTY, MARYLAND
- *TANEY* (USCGC) 06/07/88
BALTIMORE CITY, MARYLAND
- THOMAS POINT SHOAL LIGHT STATION.....01/20/99
ANNE ARUNDEL COUNTY, MARYLAND
- THOMAS VIADUCT, BALTIMORE & OHIO RAILROAD.....01/28/64
BALTIMORE AND HOWARD COUNTIES, MARYLAND
- *TORSK*
(USS).....01/14/86
BALTIMORE CITY, MARYLAND
- TULIP HILL 04/15/70
ANNE ARUNDEL COUNTY, MARYLAND
- UNITED STATES NAVAL ACADEMY.....07/04/61
ANNAPOLIS, ANNE ARUNDEL COUNTY, MARYLAND
- WASHINGTON AQUEDUCT (*Also in the District of Columbia*) 11/07/73
GREAT FALLS, MONTGOMERY COUNTY, MARYLAND to DALECARLIA RESERVOIR, WASHINGTON, DISTRICT OF COLUMBIA
- WELCH, WILLIAM HENRY, HOUSE.....01/07/76
BALTIMORE CITY, MARYLAND
- WEST ST. MARY'S MANOR.....04/15/70
ST. MARY'S COUNTY, MARYLAND
- WHITEHALL 10/09/60
ANNAPOLIS, ANNE ARUNDEL COUNTY, MARYLAND
- *WILLIAM B. TENNISON*.....04/19/94
SOLOMONS, CALVERT COUNTY, MARYLAND
- WYE HOUSE.....04/15/70
TALBOT COUNTY, MARYLAND

APPENDIX I

AGENCY AND PUBLIC COMMENTS RECEIVED ON THE DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

SUMMARY OF COMMENTS RECEIVED ON THE DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT AND RESPONSES

Four comments were received on the draft Programmatic Environmental Assessment for the Maryland CREP during the public comment period. These comments and the FSA responses are summarized below. Agency letters are presented at the end of this appendix.

1. COMMENT: Email received from Mr. Jimmy Lewis to Ms. Bebe Shortall, Maryland State Environmental Coordinator, FSA, dated Dec. 7, 2004.

-----Original Message-----
From: Jimmy Lewis [mailto:jl139@umail.umd.edu]
Sent: Tuesday, December 07, 2004 10:31 AM
To: Shortall, Bebe - Columbia, MD
Subject: Re: CREP PEA Website

thanx for sending me the website.

The only comments I have are: 1) buffers along channelized intermittent streams and constructed ditches should be allowed to go to at least 50 feet, 100 would be better. If you look at yield maps and fields, most turn rows are about 50 feet and the yield is greatly reduced in turn rows and nutrient usage is very inefficient in those rows. 2) tile wells should qualify for crep. the water that goes into a tile well goes directly thru a pipe and into a water body. Also, small ditches, gullies, and grass waterways should qualify as they act as ditches- feeding water directly to a water body. 3) A landowner(especially if he or she is farming the land themselves) should have the option of planting trees in the buffer not just grass.

Payments seem adequate and cropping history is ok.
and should be allowed to plant trees, not just grass.

RESPONSE:
1) Buffers along streams and constructed ditches: FSA had responded to the agricultural community's earlier concerns that the initial CREP buffer widths were too wide 300 feet and that these buffers removed too much agricultural land from production. Buffers provide the most benefit for water quality in widths ranging from 35 to 50 feet. Beyond 50 feet, the benefits occur more for wildlife habitat and corridors than for water quality.

In September 2004, NRCS and FSA published "Criteria for Expanding CREP Buffers." This guidance pertains to buffers established for CP4D, CP21, CP22, CP29 and CP30. On the Eastern Shore (Cecil County and southward), buffers wider than 100 feet up to a maximum of 150 feet will be approved because of HEL and for wildlife benefits, but will not exceed a total of 1,000 acres for this region (Eastern Shore). For the remainder of the state, west of the Chesapeake Bay, buffers wider than 100 feet up to a maximum of 300 feet will be approved where additional water quality benefits can be derived due to floodplains, hydric soils or HEL, or for wildlife benefits, but cannot exceed 5,000 acres for the area west of the Bay.

2) Tile wells should qualify under CREP:
FSA provides cost-share for the digging or boring of tile wells under certain riparian practices to exclude livestock when determined as a requirement to help solve a conservation issue. FSA may cost-share the establishment of a well for livestock producers enrolling lands under a CREP contract to replace a water source for drinking purposes when included as part of an approved conservation plan for lands under contract and where livestock are excluded from the stream or river where the stream or river is a primary source of water for the livestock operation.

3) Landowners should be able to plant trees in buffers: Landowners can plant trees in buffers on CREP land using the following eligible CREP practices:

- CP4D Wildlife Habitat
- CP22 Riparian Buffer

2. COMMENT: Maryland Historical Trust, Maryland Department of Housing and Community Development letters, dated September 1, 2004, and January 19, 2005:

The Maryland Historical Trust's letters responding to notification of the project are provided at the end of this appendix. In summary, the Trust noted that there are literally thousands of prehistoric and historic sites located within the Chesapeake Bay Watershed, many of which are already listed in or have been determined to be eligible for inclusion in the National Register of Historic Places. As these resources could be significantly impacted by activities under either alternative, such as wetlands restoration, the FSA will need to submit the following information for each undertaking or contract:

a) a description of the proposed project,
b) a map (preferably a section of a USGS topographic quadrangle) or a site plan that clearly delineates the project area's limits,
c) labeled photographs of any readily visible historic structures or other cultural resources in the area, and
d) a brief description of the past and present land use.

All necessary archeological investigations should be carried out by a qualified professional archeologist and performed in accordance with the *Standards and Guidelines for Archeological Investigations in Maryland* (Shaffer and Cole 1994). Similarly, all eligibility evaluations for historic structures must be made by individuals who meet the Secretary of the Interior's *Professional Qualifications Standards as Architectural Historian or Historian* (FR 44738-9 or 36 CFR Part 61). Upon review by the Maryland Historical Trust, the identified resources may require additional investigations.

In addition, the Trust noted inconsistencies in the draft PEA regarding a suggestion that areas that have been plowed are unlikely to contain significant archeological deposits. The Trust stated that it is important to note that significant archeological resources (both prehistoric and historic) are often identified below the plow zone. Plowing, in fact, does not usually constitute significant ground disturbance. The Trust requested that language

that implies that significant archeological resources may not exist beneath the plow zone be deleted from the draft.

RESPONSE:
A summary of the Trust's comments and procedures has been added to **section 4.9** of the final PEA. References that inferred that significant archeological resources may not exist beneath the plow zone have been deleted from **sections 4.9.1 and 4.9.2** in the final PEA.

The Trust has requested that consultation with the SHPO occur for each undertaking or CREP contract. Based on the intended CREP practice and the location of the CREP land, consultation with the Maryland Historical Trust may be warranted. CREP practices, such as CP3, CP3A, CP4D, CP22, and CP23, may present potential impacts to a range of cultural resources. Many archeological sites are known to occur in floodplains and along rivers, especially on the Eastern Shore, where indigenous people once dwelled. Maryland's strongest CREP easement counties are also located on the Eastern Shore.

Prior to any ground disturbance activities, FSA will consult with the Maryland Historical Trust (SHPO) to determine if archeological resources exist in the area. If any such resources are discovered at any time, all activities must be halted and the Trust will be consulted.

3. COMMENT: U.S. Fish and Wildlife Service, Threatened & Endangered Species Program, Chesapeake Bay Field Office, section 7 consultation letter, dated Jan. 26, 2005:

FWS highlighted concerns regarding several federally protected species, including the Delmarva fox squirrel (*Sciurus niger cinereus*), which is known to occur in Caroline, Dorchester, Kent, Queen Anne's, Somerset, Talbot, Worcester and Wicomico Counties. This species requires habitat that consists of bottomland and upland, mature pine and hardwood forests with a relatively open understory.

FWS also expressed particular concern for the federally threatened bog turtle (*Clemmys muhlenbergii*), known to occur in Carroll, Baltimore, Harford and Cecil Counties. The bog turtle's primary habitat is palustrine wetlands, comprised of a muddy bottom or shallow water, and tussocks of vegetation. Bog turtles usually occur in small, discrete populations occupying suitable wetland habitat dispersed along a watershed. The occupied "intermediate successional stage" wetland habitat is usually a mosaic of micro-habitats ranging from dry pockets, to saturated areas, to areas that experience periodic flooding. Some wetlands where bog turtles are known to occur are agricultural areas that are subject to grazing by livestock. In some cases, light to moderate livestock grazing of wetlands can help maintain bog turtle habitat by preventing successional vegetation.

Other species of concern cited by FWS include, but are not limited to:

- Swamp pink (*Helonias bullata*): Threatened and known to occur in Anne Arundel, Cecil and Dorchester Counties
- Dwarf wedge mussel (*Alasmidonta heterodon*): Endangered and known to occur in Queen Anne's, Caroline, St. Mary's and Charles Counties

- Maryland darter (*Etheostoma sellare*): Endangered and known to occur in Harford County
- Northeastern bulrush (*Scirpus ancistrochaetus*): Endangered and known to occur in Washington County
- Canby's dropwort (*Oxypolis canbyi*): Endangered and known to occur in Queen Anne's County
- Sandplain gerardia (*Agalinis acuta*): Endangered and known to occur in Baltimore County
- Harperella (*Ptilimnium nodosum*): Endangered and known to occur in Allegany and Washington Counties
- Sensitive joint-vetch (*Aeschynomene virginica*): Threatened and known to occur in Somerset, Calvert/Prince George's and Charles Counties

RESPONSE:
The preceding and following information have been added to section 4.6 of Chapter 4 of the final PEA. FSA will consult with FWS concerning any CREP enrollments in or near waterbodies identified by FWS in the preceding counties. For those CREP practices established in counties on the Eastern Shore, FSA will consider the potential impacts that any clearing of forested habitat, including removal of individual trees ≥10-inch d.b.h., may have on the Delmarva fox squirrel. By its nature of either being cropland or marginal pastureland, CREP land comprises very few trees.

Only in very unusual or rare cases, a tree or trees may exist on adjacent land that might require removal to install a water pipe or some other piece of equipment, or require removal due to disease or damage. The practice of tree clearing is not a part of any approved CREP practice and would occur only on a case-by-case basis. Whenever tree removal on CREP land in any of the counties mentioned above is needed, FSA will consult with FWS before any trees are removed in these areas.

Certain existing CREP practices that involve streambank stabilization and improve water quality, such as establishing forested riparian buffers, fencing cattle out of wetlands, stream crossings, and vegetative buffers could potentially diminish the ability of bog turtles to use the streams and associated floodplains as dispersal corridors and thus reduce the suitability of wetlands for use by these species. The following CREP practices could have potential adverse effects to bog turtles:

- CP21-Filter Strips
- CP22-Riparian Buffers
- CP30 Wetland Buffer

Existing CREP practices that could benefit the bog turtle are:

- CP9-Shallow Water Areas for Wildlife
- CP23-Wetland Restoration
- CP4D-Permanent Wildlife Habitat
- CP30-Marginal Pastureland Wetland Buffers

FWS recommended that CREP lands located in certain watersheds in Carroll, Baltimore, Harford and Cecil Counties be evaluated on a case-by-case basis to avoid impacts to bog turtle communities. Through consultation with FWS and with the MDNR, Wildlife and Heritage Service, FSA will be advised if bog turtles exist in these areas and if the CREP practice proposed could adversely impact this species.

4. COMMENT: Maryland Department of the Environment, Wetlands and Waterways Program letter, dated January 3, 2005.

The Maryland Department of the Environment provided a consistency determination pursuant to section 307 of the Federal Coastal Zone Management Act of 1972, as amended. Section 307 requires that proposed Federal activities be consistent, to the maximum extent practicable, with the State's federally approved Coastal Zone Management Program (CZMP). The Maryland CREP was determined to be consistent with the State's CZMP, as required by section 307.

DHCD
Maryland Department of Housing and Community Development

January 19, 2005

Ms. Bebe Shortall
State Environmental Coordinator
USDA Farm Service Agency
Maryland State FSA Office
8335 Guilford Road, Suite E
Columbia, MD 21046

Re: MHT Review of Maryland Conservation Reserve Enhancement Program (CREP)
Programmatic Environmental Assessment (PEA)

Dear Ms. Shortall:

Thank you for your recent letter regarding the Farm Service Agency's (FSA) preparation of the above-referenced draft PEA. MHT staff have accessed the draft PEA online at www.fsa.usda.gov and have reviewed the document in accordance with Section 106 of the National Historic Preservation Act. Below are our comments regarding potential effects that the proposed program may have on historic properties, and we ask that these comments be addressed in the preparation of the final document.

As noted in our September 1, 2004 letter (see attached), there are literally thousands of prehistoric and historic sites located within the Chesapeake Bay Watershed, many of which are already listed on or have been determined to be eligible for the National Register of Historic Places. As these resources could be significantly impacted by activities such as wetland restoration, the USDA and FSA will need to comply with Section 106 of the National Historic Preservation Act and submit the following information for each undertaking: a) a description of the proposed project, b) a map (preferably a section of a USGS topographic quadrangle) or a site plan that clearly delineates the project area's limits, c) labeled photographs of any readily visible historic structures or other cultural resources in the area, and d) a brief description of the past and present land use. Please see the attached fact sheet for additional information. All necessary archeological investigations should be carried out by qualified professional archeologists and performed in accordance with the *Standards and Guidelines for Archeological Investigations in Maryland* (Shaffer and Cole 1994). Similarly, all eligibility evaluations for historic structures must be made by individuals who meet the Secretary of the Interior's Professional Qualifications Standards as Architectural Historian or

DIVISION OF HISTORICAL AND CULTURAL PROGRAMS
100 Community Place
Crownsville, MD 21032
PHONE 410-514-7600
TOLL FREE 1-800-756-0119
FAX 410-987-4071
TTY/RELAY 711 or 1-800-735-2258
WEB www.mdhousing.org

Historian (see FR 44738-9 or 36 CFR Part 61). Upon our review of the results of any necessary studies, additional investigations of identified resources may be required.

Please note that we appreciate the efforts that have been made by the USDA and FSA to address historic preservation issues in the draft PEA. As discussed above, we concur with the finding that a number of activities associated with the proposed CREP conservation practices could potentially impact a variety of cultural resources. However, as currently drafted, the PEA suggests that areas that have been plowed are unlikely to contain significant archeological deposits. It is important to note however, that significant archeological resources (both prehistoric and historic) are often identified below the plow zone. Plowing, in fact, does not usually constitute significant ground disturbance. For these reasons, this particular language should be removed from sections 4.9.1 and 4.9.2 of the draft PEA.

We are very pleased to be participating in this collaborative effort, and we would like to once again commend the USDA and FSA for implementing such an important and worthwhile program. If you have any questions or require further information, please do not hesitate to contact either me (for archeology) at 410-514-7638 or Jonathan Sager (for historic built environment) at 410-514-7636. Thank you for providing us with this opportunity to comment.

Sincerely,

Dixie Henry

Dixie L. Henry
Preservation Officer
Project Review and Compliance

DLH/200403861
Attachment
cc: Eileen Carlton (EMC)

D·H·C·D
MARYLAND DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT

FILE COPY

September 1, 2004

Ms. Bebe Shortall
State Environmental Coordinator
USDA Farm Service Agency
Maryland State FSA Office
8335 Guilford Road, Suite E
Columbia, MD 21046

Re: Programmatic Environmental Assessment for the Maryland Conservation Reserve Enhancement Program

Dear Ms. Bebe:

Thank you for your recent letter regarding the Farm Service Agency's (FSA) initiation of a Programmatic Environmental Assessment (PEA) for the USDA's Conservation Reserve Enhancement Program. We understand that the PEA will evaluate alternatives to and the potential effects of enrolling up to 100,000 acres of cropland into the conservation program, and that the conservation of the enrolled land will be aimed at a variety of objectives ranging from the reduction of nutrient pollution to the restoration of wetland areas. We were very pleased to be notified of this collaborative effort, and we commend the USDA and FSA for implementing such an important and worthwhile program and assessment.

Please note that there are literally thousands of prehistoric and historic sites located within the Chesapeake Bay Watershed, many of which are already listed on or have been determined to be eligible for the National Register of Historic Places. As these resources could be significantly impacted by activities such as wetland restoration, the USDA and FSA will need to comply with Section 106 of the National Historic Preservation Act and submit the following information for each undertaking: a) a description of the proposed project, b) a map (preferably a section of a USGS topographic quadrangle) or a site plan that clearly delineates the project area's limits, c) labeled photographs of any readily visible historic structures or other cultural resources in the area, and d) a brief description of the past and present land use. Please see the attached fact sheet for additional information.

If you have any questions or require further information, please do not hesitate to contact either me (for archeology) at 410-514-7638 or Andrew Lewis (for historic built environment) at 410-514-7630. We look forward to further consultation as planning for the PEA progresses. Thank you for providing us with this opportunity to comment.

Sincerely,

Dixie Henry

Dixie L. Henry
Preservation Officer
Project Review and Compliance

DLH/200402459

DIVISION OF HISTORICAL AND CULTURAL PROGRAMS 100 COMMUNITY PLACE CROWNSVILLE, MARYLAND 21032 PHONE: 410-514-7600
FAX: 410-987-4071 TOLL FREE: 1-800-756-0119 TTY/RELAY: 711 OR 1-800-735-2258 WWW.DHCD.STATE.MD.US

D·H·C·D
MARYLAND DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT

OPS FACT SHEET

HOW TO OBTAIN HISTORIC PROPERTIES INFORMATION FOR COMPLIANCE PROJECTS

During planning and implementation of proposed projects, government agencies (or their program applicants) frequently require information and technical assistance on historic properties that may be affected by the planned activity. The Maryland Historical Trust (Maryland's State Historic Preservation Office) is the state office charged with providing this assistance in its role in the protection and preservation of Maryland's rich cultural heritage. The Trust's Office of Preservation Services (OPS), is the unit responsible for reviewing all state and federally assisted projects, to ensure compliance with historic preservation laws and regulations.

Upon written request, staff within OPS will provide historic properties' information, technical assistance, and comments for clearly defined project areas subject to state and federal review. This information includes data on inventoried historic properties, National Register listed properties, prior archeological or architectural research conducted in the project vicinity, and an informed assessment of the project area's potential for containing historic properties that have not yet been identified. Staff will also supply recommendations and assistance on the appropriate treatment of historic properties for a given project (such as: acceptable rehabilitation measures, stabilization, site avoidance, archeological investigation, etc.).

To obtain information or assistance, please put your request in writing addressing the following items, and send to OPS at the address below:

- a description of the proposed project, noting the nature of state and/or federal involvement (Corps permit, CDBG funding etc.);
- a map (preferably a section of USGS topographic quadrangle) or a site plan, clearly delineating the project area's limits;
- labeled photographs (keyed to a site plan) and descriptions of any readily visible historic structures, ruins, or other cultural resources in the project area; and
- a brief description of past and present land use in the project area (tilled field, wooded, mined, etc.).

Staff normally provide a written response within 30 days from receipt of request. Unfortunately we are unable to provide general information on study areas that encompass large geographic regions; however, the public is welcome to make an appointment to use the Trust's library. Please visit the Trust's homepage for more information about our programs and services – www.marylandhistoricaltrust.net. For further information or assistance please contact OPS:

Ms. Elizabeth Cole, Administrator,
Project Review and Compliance
Office of Preservation Services
Maryland Historical Trust
100 Community Place
Crownsville, Maryland 21032
410-514-7631
cole@dhcd.state.md.us

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

January 26, 2005

Ms. Bebe Shortall
State Environmental Coordinator
U.S. Dept of Agriculture
Farm Service Agency
Maryland State FSA Office
8335 Guilford Road, Suite E
Columbia, Maryland 21046

RE: Maryland Conservation Reserve Enhancement Program (CREP) Programmatic Environmental Assessment (PEA)

Dear Ms. Shortall:

This responds to your letter, received November 30, 2004, requesting blanket Endangered Species Act clearance to enroll up to 100,000 acres of eligible cropland into the Maryland Conservation Reserve Enhancement Program (MD CREP). We have reviewed the MD CREP Programmatic Environmental Assessment and are providing comments in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

It is our understanding that the U.S. Department of Agriculture Farm Service Agency (FSA) and the State of Maryland propose to contribute to the restoration of the Chesapeake Bay ecosystem by improving agricultural land management practices throughout the State. Maryland CREP will help reduce nutrient pollution and sediment loading into the Bay's tributaries from agricultural lands and increase the viability of declining fish, wildlife and plants. Conservation practices prescribed by MD CREP include establishing riparian buffer zones, shallow water areas for wildlife, restoring wetlands and permanently vegetating highly erodible slopes.

The federally endangered Delmarva fox squirrel *(Sciurus niger cinereus)* is known to occur in appropriate habitat in the following Maryland Counties: Caroline, Dorchester, Kent, Queen Anne's, Somerset, Talbot, Worcester, and Wicomico. This species occupies mature pine and hardwood forests, both bottomland and upland, with a relatively open understory. If any clearing of forested habitats (including individual trees ≥10 inch d.b.h.) will occur as part of an individual CREP enrollment in one of the above referenced counties, the Delmarva fox squirrel may be impacted. We recommend that Maryland FSA consult with the U.S. Fish and Wildlife Service on CREP enrollments in the above referenced counties for which forest clearing is proposed.

The federally threatened bog turtle *(Clemmys muhlenbergii)* is known to occur within the following Maryland Counties: Carroll, Baltimore, Harford and Cecil. This species primarily inhabits palustrine wetlands comprised of a muddy bottom or shallow water, and tussocks of vegetation. Bog turtles usually occur in small, discrete populations occupying suitable wetland habitat dispersed along a watershed. The occupied "intermediate successional stage" wetland habitat is usually a mosaic of micro-habitats ranging from dry pockets, to areas that are saturated with water, to areas that are periodically flooded. Some wetlands occupied by bog turtles are located in agricultural areas and are subject to grazing by livestock; in fact, in some cases light to moderate livestock grazing of wetlands can help maintain bog turtle habitat by preventing vegetative succession.

Because of these habitat requirements, actions commonly chosen to combat streambank erosion and improve water quality, such as establishing forested riparian buffer zones, fencing cattle out of wetlands, and placing large rocks in stream channels, could diminish the ability of bog turtles to use the streams and associated floodplains as dispersal corridors and reduce the suitability of wetland areas for use by bog turtles. We recommend that lands proposed for MD CREP enrollment in certain areas of Carroll, Baltimore, Harford and Cecil Counties be evaluated on a case-by-case basis to avoid impacts to bog turtle populations. We have enclosed a table in order to provide you with a list of the watersheds in which the bog turtle is known to occur (Table 1). We recommend that projects occurring in any of the DNR 12 digit basins identified in the attached table be screened through the Maryland Department of Natural Resources, Wildlife and Heritage Service. If a bog turtle wetland is identified further section 7 consultation with the U.S. Fish and Wildlife Service will be required. Measures the Service might recommend to avoid impacts to bog turtles include seasonal restrictions on project construction and alterations to project design to protect habitat quality.

Finally, a second table has been enclosed to provide you with a list of Maryland waters in or along which the following federally-listed species have been documented to occur: swamp pink (*Helonias bullata*), dwarf wedge mussel (*Alasmidonta heterodon*), Maryland darter (*Etheostoma sellare*), Northeastern bulrush (*Scirpus ancistrochaetus*), Canby's dropwort (*Oxypolis canbyi*), sandplain gerardia (*Agalinis acuta*), harperella (*Ptilimnium nodosum*), and sensitive joint-vetch (*Aeschynomene virginica*). We recommend that Maryland FSA consult with the U.S. Fish and Wildlife Service on CREP enrollments proposed for the waterbodies identified in table 2.

Except for occasional transient individuals, no other federally proposed or listed endangered or threatened species are known to exist within the potential impact area. Therefore, for all areas in Maryland not specifically identified in this response no further section 7 consultation is required. Should additional information on listed or proposed species become available, this determination may be reconsidered. Furthermore, this information must be renewed each calendar year.

This response relates only to federally-protected threatened or endangered species under our jurisdiction. For information on the presence of other rare species, you should contact Lori Byrne of the Maryland Wildlife and Heritage Division at (410) 260-8573.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interest in these resources. If you have any questions or need further assistance, please contact Maricela Constantino (410) 573-4542.

Sincerely,

G. A. Mor

for Mary J. Ratnaswamy, Ph.D.
Program Supervisor, Threatened and Endangered Species

Enclosures

cc: Lori Byrne, Wildlife and Heritage Service, MDNR, Annapolis, MD
Scott Smith, Wildlife and Heritage Service, MDNR, Wye Mills, MD

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

Kendl P. Philbrick
Secretary

Jonas A. Jacobson
Deputy Secretary

January 3, 2005

Ms. Bebe Shortall
State Environmental Coordinator
Maryland State Farm Service Agency
United States Department of Agriculture
8335 Guilford Road, Suite E
Columbia, Maryland 21046

RE: Maryland Conservation Reserve Enhancement Program (CREP)
Programmatic Environmental Assessment

Dear Ms. Shortall:

I am responding to your letter requesting a Federal Consistency determination pursuant to Section 307 of the Federal Coastal Zone Management Act of 1972, as amended (CZMA), for the referenced Program. Section 307 requires that proposed federal activities be consistent, to the maximum extent practicable, with the State's federally-approved Coastal Zone Management Program (CZMP).

The Maryland CREP has been prepared by the U.S. Department of Agriculture (USDA), Farm Service Agency, in cooperation with the Maryland Department of Agriculture, to help restore the health of the Chesapeake Bay ecosystem by improving agricultural land management practices throughout the State. The Program will enable voluntary contractual arrangements between USDA and private landowners, who agree to plant specific types of native vegetation and trees near streams and rivers in exchange for rental payments and other financial incentives. Landowners may also voluntarily place a permanent conservation easement on their land and receive an additional bonus payment if they agree that certain conservation practices will be retained in perpetuity. With cost-share support from the State, landowners may be partially reimbursed for the cost of installing conservation practices, such as riparian forests, vegetative buffers, or retiring highly erodible lands from cultivation. The goal of the CREP is to reduce nutrient pollution and sediment loading to the Bay's tributaries from agricultural lands, and to increase the viability of declining fish, wildlife and vegetation throughout the Chesapeake Bay watershed.

Ms. Bebe Shortall
Page 2
January 3, 2005

Based on this information, the Maryland CREP is consistent with the State's CZMP, as required by Section 307 of the CZMA.

If you have any questions, please contact me at (410) 537-3763.

Sincerely,

Elder A. Ghigiarelli, Jr.
Deputy Administrator
Wetlands and Waterways Program

EAGJr:cma

APPENDIX J

MARYLAND ENVIRONMENTAL EVALUATION CHECKLIST

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MD-CPA-052
(REVISED 03-01-04)

MARYLAND ENVIRONMENTAL EVALUATION CHECKLIST

Background

The National Environmental Policy Act (NEPA) requires federal agencies to evaluate the potential effects of their activities and programs on the quality of the human environment. The "human environment" includes natural resources (such as soil, water, air, plants, and animals), plus cultural resources and social and economic considerations. Although NEPA is concerned about all types of effects (both positive and negative), it is especially intended to help decisionmakers identify significant adverse impacts and avoid, minimize, or mitigate them.

During conservation planning, NRCS uses an environmental evaluation process to assess potential beneficial and adverse impacts of conservation practices, systems, or other activities that a client wants to implement. The amount of documentation that is required is based on the type, size, and complexity of the proposed project. It is not intended that many hours be spent documenting projects that have overall beneficial effects with little or no adverse effects.

Instructions

The Maryland Environmental Evaluation (EE) Checklist, MD-CPA-052, provides a basic framework for documenting effects on resources and concerns that are important in Maryland. Use the EE Checklist to briefly describe the proposed conservation practices, systems, or other activities that may be implemented. Then summarize any resource concerns that you identified during the planning process, and document the effects of proposed actions on the various natural resources, cultural resources, and social and economic concerns.

For on-farm conservation planning, complete at least one EE Checklist for each new conservation plan (or plan revision) containing practices or activities that involve clearing, earthmoving, grading, shaping, filling, etc. Land-disturbing activities have the highest potential for significant adverse effects, especially during the construction phase. Generally, plans that contain engineering practices will require completion of an EE Checklist. Evaluate the effects of each plan as a whole, while keeping in mind the effects of individual practices or systems. If desired, you may use more than one EE Checklist per plan if the plan contains many different land uses, conservation practices, or conservation systems. For example, you could use one EE Checklist to document the effects of a pasture management system, and another EE Checklist to document the effects of a cropland management system on the same farm.

You may also use the EE Checklist to document the effects of a plan that includes only vegetative or management practices, such as conservation crop rotation, contour farming, filter strips, nutrient management, and riparian buffers. These are practices that don't involve land disturbance below an already disturbed plow zone, and are usually less likely to have adverse environmental effects. Caution: Be aware that significant changes in vegetative cover (such as from pastured wetland to wooded wetland) can adversely affect some protected resources (e.g., bog turtles). You must complete an EE Checklist if you know that protected resources are present on a property and could be affected by proposed practices, systems, or other activities.

Important Note: Cost-sharing programs and other funding sources may require more extensive use of the EE Checklist than described above. Check with the appropriate Program Manager for specific documentation requirements.

1

1. **Part A, Resource Concerns.**

   a. Summarize whether any natural resource concerns were identified during the planning process. Check (✓) the appropriate boxes.

   b. Note whether the planned treatment or activity meets the Quality Criteria for natural resources, again by checking the appropriate boxes. Quality Criteria are described in Section III-A of the Field Office Technical Guide (FOTG).

   c. Use the "Comments" lines to add further explanation, if needed. If the planned treatment or activity will not meet the minimum Quality Criteria, briefly explain why in the space provided.

2. **Part B, Protected Resources.**

   a. Evaluate the effects of the proposed conservation practices, systems, or activities on significant natural and cultural resources. These are resources that occur within the work zone or are close enough to be affected by the proposed project.

   b. Check (✓) the available sources of information that were used, whether the resource is present or absent, and the probable effects of the proposed practices, systems, or activities on each resource. If you know that mitigation will be needed (for example, wetland mitigation) and the client has agreed to implement it, then evaluate the project's overall effect with mitigation included.

   c. You do <u>not</u> need to use every source of information that is listed in the EE Checklist. Some sources may be more useful than others, depending on the type of project you are working on and the quality of available data. Select the data sources that are best suited for your project.

   d. If a resource never occurs in an area (for example, if the county you are working in has no tidal waters and therefore cannot have a Maryland Critical Area or Coastal Zone Management Area), then just check the "Absent" box for that resource and go the next resource. There is no need to check any information sources for that item.

   e. As appropriate, indicate whether the proposed practices, systems, or activities are likely to need permits or approvals from regulatory agencies. Attach additional documentation as needed.

   f. Additional instructions for Item 1 (Waters of the State/United States): If regulated waters are present, check the water "use" category as listed by MDE (e.g., Use I, II, III, or IV).

   g. Additional instructions for Items 6 (Coastal Zone Management Area) and 8 (Prime Farmland): For on-farm conservation planning, you can skip evaluating these items if the proposed project consists <u>only</u> of implementing Best Management Practices. The use of Best Management Practices is consistent with state and federal policies for protecting these resources, and the effects on the Coastal Zone and Prime Farmland should always be beneficial.

3. **Part C, Other Environmental Considerations.**

   Are you aware of other important environmental factors, safety issues, or legal constraints that could affect or be affected by the proposed practices, systems, or activities? If so, check (✓) "Yes" and briefly explain.

4. **Part D, Public Interest and Social Concerns.**

   Are you aware of any social, economic, or other special concerns that relate to the proposed practices, systems, or activities? Will minority or low-income communities be adversely affected? (This is a federal "Environmental Justice" concern.) If you answer "Yes" to either of these questions, briefly explain.

5. **Part E, Alternatives.**

   Sometimes a proposed conservation practice, system, or activity will have significant adverse effects on natural and cultural resources, and/or on social, economic, or other special concerns. Based on your answers in Parts A–D of the EE Checklist, will alternatives to the proposed practices, systems, or activities have to be considered in order to avoid or minimize significant adverse effects? If so, check (✓) "Yes" and briefly explain the other alternatives (including the "no project" option) and their effects. Attach additional sheets if you need more space.

6. **Part F, Conclusion.**

   a. Check (✓) the appropriate box to summarize the results of the environmental evaluation. If the proposed conservation practice, system, or activity will have no significant adverse effects on the environment, or if any significant adverse effects will be mitigated as part of the project, then check the "No adverse effects" box.

   b. If the project will have significant adverse effects that cannot or will not be mitigated, sufficiently minimized, or avoided, then check the "Adverse effects" box. Contact the Maryland NRCS State Biologist for guidance concerning additional environmental compliance and documentation requirements.

   c. The person who prepared the EE Checklist will sign and date the document in the spaces provided. The preparer's signature indicates that he/she used the best available information when preparing the document and arriving at a conclusion.

   d. For NRCS programs, NRCS is the Responsible Federal Agency for NEPA compliance. The Responsible Federal Official (in a field office, this is the District Conservationist) must sign the EE Checklist in the Responsible Federal Agency box unless he/she has already signed the form as the Preparer.

   e. When NRCS is providing technical assistance for FSA programs (e.g., for CRP), FSA will sign the NRCS EE Checklist as the Responsible Federal Agency.

   f. File the completed EE Checklist in the case file to provide supporting documentation for the conservation plan, and for future reference when working with the client.

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	MARYLAND ENVIRONMENTAL EVALUATION CHECKLIST	MD-CPA-052 (Issued 02-25-03)

Client Name:	Farm No:	Tract No:
Address:	Evaluator:	Date:

Proposed Conservation Practices, Systems, or Activities *(describe)*:

A. RESOURCE CONCERNS

During the planning process, inventory the planning unit for natural resources and economic and social information, as appropriate. Use this information to identify problems, consider alternatives and their potential impacts, and develop a conservation plan. Use the checklist below to summarize identified problems and the effects of the proposed conservation practices, systems, or activities. For each major natural resource listed below, check (✓) whether a resource concern (problem) was identified, and whether the planned project will adequately address the problem. Refer to Section III-A of the Field Office Technical Guide for more information about the Quality Criteria for soil, water, air, plant, and animal resources, and to identify concerns affecting the use, management, and sustainability of each resource.

Resource	Resource Concern Identified?		Planned Treatment Meets Quality Criteria?		Comments
	Yes	No	Yes	No	
Soil	☐	☐	☐	☐	
Water	☐	☐	☐	☐	
Air	☐	☐	☐	☐	
Plants	☐	☐	☐	☐	
Animals	☐	☐	☐	☐	

If the planned treatment will not meet the minimum Quality Criteria, explain why.

B. PROTECTED RESOURCES

Evaluate the effects of the proposed conservation practices, systems, or activities on the significant natural and cultural resources listed below. These are resources that are located within the work zone or are close enough to be affected by the proposed activities. Check (✓) the available sources of information that were used, whether the resource is present or absent, and the effects of the proposed practices, systems, or activities on each resource. As appropriate, indicate whether the proposed project will need permits or approvals from regulatory agencies. Attach additional documentation as needed.

	Resource is:		Effect is:			Permits or approvals needed?	
	Present	Absent	Beneficial	Adverse	None	Yes	No
1. WATERS OF THE STATE/ UNITED STATES *Intermittent or perennial streams, or other waterbodies, regulated by the state and/or federal government.*	☐	☐	☐	☐	☐	☐	☐

Information source(s) used:

- ☐ USGS 7.5' topo quads (1:24,000)
- ☐ Maryland Department of the Environment Tidal Waters maps
- ☐ Maryland Department of the Environment Water Quality regulations:
  Listed as: ☐ Use I ☐ Use II ☐ Use III ☐ Use IV
- ☐ Aerial photos
- ☐ Soil maps ☐ Field investigations
- ☐ Other sources (describe):

MD-CPA-052 (Issued 02-25-03) Page 2 of 3

B. PROTECTED RESOURCES (Continued)	Resource is:		Effect is:			Permits or approvals needed?	
	Present	Absent	Beneficial	Adverse	None	Yes	No
2. WETLANDS *Tidal and nontidal wetlands regulated by the state and/or federal government.* Information source(s) used: ☐ US Fish and Wildlife Service, National Wetland Inventory maps ☐ Maryland Department of the Environment Nontidal Wetlands Guidance maps ☐ Maryland Department of the Environment Tidal Waters maps ☐ Aerial photos ☐ Soil maps ☐ Field investigations ☐ Other sources (describe):	☐	☐	☐	☐	☐	☐	☐
3. 100-YEAR FLOODPLAIN *Area at or below the 100-year frequency flood elevation that is adjacent to a stream or other regulated waterbody.* Information source(s) used: ☐ Federal Emergency Management Agency (FEMA) maps ☐ Field investigations/surveys ☐ Hydrologic & hydraulic computations ☐ Other sources (describe):	☐	☐	☐	☐	☐	☐	☐
4. SCENIC AND WILD RIVERS *Floodplain or channel of mainstem state designated Scenic & Wild Rivers, as follows: Anacostia, Deer Creek, Monocacy, Patuxent, Pocomoke, Potomac in Montgomery and Frederick counties, Severn, Wicomico in Charles County, and Youghiogheny.* Information source(s) used: ☐ USGS 7.5' topo quads (1:24,000) ☐ Soil maps ☐ Field investigations ☐ Other sources (describe):	☐	☐	☐	☐	☐	☐	☐
5. MARYLAND CRITICAL AREA *All lands within 1,000 linear feet of tidal waters or adjacent tidal wetlands.* Information source(s) used: ☐ USGS 7.5' topo quads (1:24,000) ☐ Maryland Department of the Environment Tidal Waters and Wetlands maps ☐ Soil maps ☐ Field investigations ☐ Other sources (describe):	☐	☐	☐	☐	☐	☐	☐
6. COASTAL ZONE MANAGEMENT AREA *All lands within the 16 counties surrounding the Chesapeake Bay, Coastal Bays, and Atlantic Ocean. Federal projects must be consistent with the state coastal zone policies.* Information source(s) used: ☐ USGS 7.5' topo quads (1:24,000) ☐ Soil maps ☐ Other sources (describe):	☐	☐	☐	☐	☐	☐	☐
7. THREATENED or ENDANGERED SPECIES *Plant or animal species listed by the state and/or federal government as endangered, threatened, or formally proposed as a candidate for listing.* Information source(s) used: ☐ NRCS Maryland Field Office Technical Guide - T&E Species Lists ☐ Maryland Department of the Environment Nontidal Wetlands Guidance Maps (Areas of Special State Concern) ☐ Consultation with U.S. Fish and Wildlife Service ☐ Consultation with Maryland Department of Natural Resources ☐ Other sources (describe):	☐	☐	☐	☐	☐	☐	☐

B. PROTECTED RESOURCES (Continued)	Resource is:		Effect is:			Permits or approvals needed?	
	Present	Absent	Beneficial	Adverse	None	Yes	No
8. PRIME FARMLAND *Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Identified by soil survey map units that meet these requirements. Federal projects should not cause unnecessary and irreversible conversion of prime farmland to nonagricultural uses.* Information source(s) used: ☐ NRCS Maryland Field Office Technical Guide - Cropland interpretations ☐ Soil maps ☐ Field investigations ☐ Other sources (describe):	☐	☐	☐	☐	☐	☐	☐
9. ARCHEOLOGICAL/ HISTORICAL SITE *A significant resource that is listed on, or eligible for listing on, the National Register of Historic Places.* Information source(s) used: ☐ NRCS Maryland Field Office Technical Guide - Cultural Resources Information, National Register County Lists ☐ Landowner/landuser information ☐ Consultation with Maryland Historical Trust ☐ Field inspection for surface artifacts (describe field conditions): ☐ Other sources (describe):	☐	☐	☐	☐	☐	☐	☐

C. OTHER ENVIRONMENTAL CONSIDERATIONS Are you aware of other important factors that could affect (or be affected) by the proposed practices, systems, or activities? ☐ *Yes* ☐ *No* Consider the presence of dump sites, hazardous materials, public or private pipelines, transmission lines, access roads, easements, or other legal restrictions. If "Yes," please explain.

D. PUBLIC INTEREST AND SOCIAL CONCERNS Are you aware of any social, economic, or other special concerns that relate to the proposed practices, systems, or activities? ☐ *Yes* ☐ *No* Will there be any adverse effects on minority or low-income communities? ☐ *Yes* ☐ *No* If you answer "Yes" to either of these questions, please explain.

E. ALTERNATIVES Will alternatives to the proposed practices, systems, or activities have to be considered in order to avoid or minimize significant adverse effects on natural and cultural resources, and/or on social, economic, or other special concerns? ☐ *Yes* ☐ *No*
If "Yes," briefly explain here, or attach a separate page describing other alternatives (including "no project") and the effects of each alternative.

F. CONCLUSION *Check one of the following boxes to summarize the results of this environmental evaluation:*

☐ **No Adverse Effects:** The proposed conservation practices, systems, or activities have been planned in accordance with NRCS policy, including compliance with all applicable federal, state, and local regulations. **There will be no significant adverse effects** on the quality of the environment (or significant adverse effects, if any, will be mitigated). To the best of my knowledge, no further environmental analysis is needed. The client has been informed that he/she is responsible for obtaining any needed permits or approvals from federal, state, or local government agencies before any work is performed.

☐ **Adverse Effects:** The proposed conservation practices, systems, or activities **will have significant adverse effects** that cannot be mitigated, sufficiently minimized, or avoided. Additional documentation for environmental compliance, such as preparation of an Environmental Assessment or Environmental Impact Statement may be required. Contact the Maryland NRCS State Biologist for additional guidance.

Signature of Designated Conservationist	Title	Date