



# Draft Environmental Assessment

*For the Implementation of the  
Conservation Reserve Enhancement Program  
in the Delaware River Basin*

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Pennsylvania

Prepared for:



**U.S. Department of Agriculture**

Pennsylvania State

Farm Service Agency Office

Suite 320

One Credit Union Place

Harrisburg, Pennsylvania 17110

April 2013

Prepared by



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Conshohocken, Pennsylvania

19428

**DRAFT**

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**ENVIRONMENTAL ASSESSMENT**

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## Cover Page

**Proposed Action:** The U. S. Department of Agriculture (USDA) and the State of Pennsylvania propose to implement the Delaware River Basin (DRB) Conservation Reserve Enhancement Program (CREP) by enrolling up to 20,000 acres in seven counties of Eastern Pennsylvania. CREP is a voluntary conservation program for agricultural landowners.

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**Sponsoring Agency:** Pennsylvania Department of Environmental Protection

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**Comments:** This Environmental Assessment (EA) was prepared in accordance with the FSA National Environmental Policy Act (NEPA) implementation procedures contained in 7 CFR 799, as well as NEPA of 1969, Public Law 91-190, 42 USC 4321-4347, 1 January 1970, as amended. The FSA will provide a public review and comment period prior to any final decision. An electronic copy of this EA will be available for public review at <http://www.fsa.usda.gov/FSA/>.

Written comments regarding this assessment may be submitted to:

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## LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
BMPs	Best Management Practices
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFRP	Center for Rural Pennsylvania
COC	County Committee
CP	Conservation Practice
CRP	Conservation Reserve Program
CREP	Conservation Reserve Enhancement Program
CSP	Conservation Stewardship Program
CWA	Clean Water Act
CWPA	Critical Water Planning Area
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DMAP	Deer Management Assistance Program
DRB	Delaware River Basin
DRBC	Delaware River Basin Commission
EA	Environmental Assessment
EFH	Essential Fish Habitat
EI	Erodibility Index
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act of 1973
FSA	Farm Service Agency
GAPC	Geographic Area of Particular Concern
GRP	Grassland Reserve Program
GWPA	Groundwater Protected Areas
HEL	Highly Erodible Land
IBA	Important Bird Area
IMA	Important Mammal Area
MLRA	Major Land Resources Area
NHL	National Historic Landmark
NNL	National Natural Landmark
NEPA	National Environmental Policy Act of 1969
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PADEP	Pennsylvania Department of Environmental Protection
PFBC	Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission

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PHMC-BHP	Pennsylvania Historical and Museum Commission, Bureau for Historic Preservation
PIP	Practice Incentive Payment
PNHP	Pennsylvania Natural Heritage Program
SE-GWPA	Southeastern Pennsylvania Groundwater Protected Areas
SGL	State Gamelands
SHPO	State Historic Preservation Office
SIP	Signing Incentive Payment
SPW	Special Protection Waters
SRR	Soil Rental Rate
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers
U.S.C.	U.S. Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
WHIP	Wildlife Habitat Incentives Program
WQM	Water Quality Management
WRP	Wetlands Reserve Program

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## EXECUTIVE SUMMARY

The United States Department of Agriculture (USDA) Farm Service Agency (FSA) proposes to implement the Conservation Reserve Enhancement Program (CREP) agreement for the Delaware River Basin (DRB) in Pennsylvania. CREP is a natural resources conservation program that allows agricultural producers to voluntarily retire environmentally sensitive lands. This Environmental Assessment (EA) has been prepared to analyze the potential environmental consequences associated with the Proposed Action and the No Action Alternative in accordance with the requirements of the National Environmental Policy Act (NEPA); the Council on Environmental Quality (CEQ) regulations; and the 7 CFR 799 *Environmental Quality and Related Environmental Concerns – Compliance with the National Environmental Policy Act*.

According to the Draft Final 2012 Pennsylvania Integrated Water Quality Monitoring and Assessment Report (PADEP 2012b), 3,727 stream miles and 27,867 lake acres in the DRB are impaired and not supporting their designated uses. The major causes of impairment are siltation, water flow variability, polychlorinated biphenyls (PCBs), habitat alterations, pathogens, and nutrients. The major sources of impairment are urban runoff/storm sewers and agriculture.

The purpose of the DRB CREP is to reduce agriculture-sourced non-point nutrient and sediment loading within the region's streams and rivers in order to improve Pennsylvania's surface and ground water quality, as well as to establish and restore wildlife habitat. The DRB CREP will seek to enroll up to 20,000 acres in the seven-county area, retiring 16,000 acres of highly erodible lands and restoring 4,000 acres of riparian and wetland habitat.

The DRB CREP would allow enrollment of eligible lands in Pike, Monroe, Northampton, Lehigh, Bucks, Montgomery, and Delaware counties. Landowners would enter into contracts with FSA to install conservation practices (CPs) on eligible lands and would maintain those practices for periods between 14 and 15 years. Highly erodible land (HEL) and riparian areas would be targeted for enrollment in the proposed CREP.

HEL would be eligible for the following CPs: establishment of permanent introduced grasses and legumes; establishment of permanent native grasses; permanent wildlife habitat; wildlife food plots; and habitat buffer for upland birds. Riparian lands would be eligible for the following conservation practices: grass waterway; shallow water area for wildlife; establishment of contour buffer strips; filter strips; wetland buffer; riparian buffers; wildlife buffer; and wetland restoration.

Landowners would be eligible for annual rental payments for the duration of their contracts, along with other applicable payments for implementing and maintaining approved CPs and technical support for implementing and maintaining the practices.

This EA documents the analysis of the Proposed Action and the No Action Alternative. Under the No Action Alternative, no lands within the seven-county area would be enrolled in CREP. None of the CPs described above would be implemented.

A summary of the potential impacts of the two alternatives evaluated is provided in Table ES-1.

**Table ES-1. Summary of Environmental Consequences.**

<b>RESOURCE</b>	<b>PROPOSED ACTION</b>	<b>NO ACTION</b>
Biological Resources	The Proposed Action is expected to add up to 20,000 acres of permanent vegetation and improve wildlife habitat on agricultural lands. Positive impacts to threatened and endangered species, particularly grassland species and their habitats, are expected. Site-specific reviews for threatened and endangered species will be conducted by the Natural Resources Conservation Service (NRCS) prior to the installation of CPs.	Continued degradation of riparian and aquatic habitats and the decline of habitat for grassland species.
Cultural Resources	There is high potential for encountering archaeological resources. Site-specific archaeological and historic architectural reviews and coordination with the State Historic Preservation office (SHPO) will be conducted by NRCS prior to the installation of CPs. Consultation with several tribes that have traditional ties to the DRB may be required once sites are selected.	No impact is anticipated
Water Resources	<p>The removal of marginal agricultural lands from farming would have a long-term, positive impact on water resources throughout the DRB CREP area.</p> <p>It is expected that the discontinuation of agricultural production would reduce runoff of sediment, nutrients, and agricultural chemicals that may enter water bodies. Wetlands would benefit from the newly installed CPs.</p> <p>Wetland restoration slows and stores runoff that would otherwise directly enter the floodplain, and contributes to groundwater storage. The proposed practices are expected to stabilize floodplains through the establishment of vegetation.</p> <p>During the establishment of CPs, activities that remove vegetation or disturb soil may result in temporary minor increases in runoff, which may temporarily affect surface water quality. These potential impacts can be managed through the use of standard erosion control Best Management Practices (BMPs).</p>	Benefits to water resources that are expected to result from the enrollment of CREP acreage would not occur. Agricultural practices on marginal lands would continue to degrade water quality.
Earth Resources	Soil erosion would be reduced on lands enrolled in the DRB CREP as marginal lands, including HEL, are converted to permanent vegetation.	Erosion of soil from marginal agricultural lands will continue. The loss of the soil resource and the sedimentation of waterways will continue.
Recreational Resources	Positive long-term effects on recreational resources are expected. The proposed CPs are expected to increase habitat for game and non-game species. Water quality improvements would result in improved recreational fishing, boating, and other water-related recreation.	Continued water quality degradation may affect game fish or other water-related recreation.

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<b>RESOURCE</b>	<b>PROPOSED ACTION</b>	<b>NO ACTION</b>
Socioeconomics and Environmental Justice	The market and non-market benefits of the program are expected to outweigh the loss of sales of agricultural supplies over the life of the program. Because the project area is not considered an area of concentrated poverty or minority population, the DRB CREP would not have a disproportionate impact to these communities.	No change in current trends in socioeconomic conditions is expected. No disproportionate impact to low income and minority populations would occur.

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## *1.0 Purpose and Need for the Proposed Action*

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## **1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION**

### **1.1 Introduction**

The United States Department of Agriculture (USDA) Farm Service Agency (FSA) proposes to implement the Conservation Reserve Enhancement Program (CREP) agreement for the Delaware River Basin (DRB) in Pennsylvania. CREP is a natural resources conservation program that allows agricultural producers to voluntarily retire environmentally sensitive lands. This Environmental Assessment (EA) has been prepared to analyze the potential environmental consequences associated with the Proposed Action and the No Action Alternative in accordance with the requirements of the National Environmental Policy Act (NEPA); the Council on Environmental Quality (CEQ) regulations; and the 7 CFR 799 *Environmental Quality and Related Environmental Concerns – Compliance with the National Environmental Policy Act*.

### **1.2 Background**

#### *1.2.1 The Farm Service Agency and Conservation Reserve Program*

FSA was established during the reorganization of USDA in 1994. Among the responsibilities of the FSA, is the conservation of the nation's natural resources through the Conservation Reserve Program.

FSA's Conservation Reserve Program (CRP) is a voluntary agricultural conservation program that supports the implementation of long-term conservation measures designed to improve the quality of ground and surface waters, control soil erosion, and enhance wildlife habitat on environmentally sensitive agricultural land. The CRP offers landowners an annual rental payment and a cost-share reimbursement for establishment of long-term conservation cover. In exchange, the landowner agrees to enroll environmentally sensitive lands into the program for ten to 15 years.

#### *1.2.2 Conservation Reserve Enhancement Program*

CREP was established in 1997 under the authority of the CRP. The purpose of the CREP is to address agriculture-related environmental issues by establishing conservation practices (CPs) on farmlands using funding from state, tribal, and federal governments, as well as non-government sources. The program is a partnership among farmers, the state and federal government, and private groups. The CREP addresses high priority conservation issues in defined geographic areas such as watersheds. Producers who enroll their eligible lands in the CREP receive financial and technical assistance for establishing approved CPs on their land as well as annual rental payments. Once eligible lands are identified, site-specific environmental reviews and consultation with and permitting from other federal agencies are completed by USDA, Natural Resources Conservation Service (NRCS) field staff, as appropriate. Eligible land criteria are set forth by the Farm Security and Rural Investment Act of 2008 (Farm Bill) and detailed in the FSA Handbook: *Agricultural Resource Conservation Program for State and County Offices (2-CRP Revision 5, 2012)*.

#### *1.2.3 Pennsylvania CREP*

In Pennsylvania, CREP was first implemented in 2000 in 20 counties in the Lower Susquehanna and Potomac River Basins with a goal of 100,000 acres of conservation practices. In 2003, PA CREP was expanded to 23 counties in the Upper Susquehanna River Basin with an additional

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100,000 acre goal resulting in a total of 200,000 potential acres in the Pennsylvania portion of the Chesapeake Bay watershed. In 2004 the PA CREP became available in the 16 counties of the Ohio River Basin with a goal of 65,000 acres.

In 2012, the PA CREP partners amended the existing contracts to increase the number of acres available in the Chesapeake Bay portion of PA from 200,000 to 219,746. This was achieved by shifting 25,000 acres from the PA Ohio River CREP contract to the PA Chesapeake contract. The amendment is cost neutral and results in a slight decrease in the total number of acres available due to the higher cost to enroll acres in some areas of the Chesapeake drainage counties. The new total of available acres in the 59 PA CREP counties is 259,746 with 219,746 in the Chesapeake Bay and 40,000 in the Ohio River Basin. In 2011, a total of 192,291 acres were under contract. In these watersheds, CREP supports implementation of CPs that help protect streams, lakes, and rivers from sedimentation and agricultural runoff.

#### *1.2.4 Delaware River Basin CREP*

At present, Delaware, New Jersey, and New York State participate in the CREP to address agricultural impacts to water quality and wildlife habitats in the DRB. Pennsylvania participates in the CREP in all its river basins except the Delaware River.

The DRB CREP will seek to specifically address the environmental risks facing the following three resource areas: sediment and nutrient loss from erodible cropland; riparian zone stabilization and wetland restoration/protection; and wildlife habitat restoration. The CREP will seek to retire up to 20,000 acres of environmentally sensitive cropland and marginal pastureland in the seven-county target area. The goals of this program are:

1. To improve water quality in the Delaware River by reducing sediment, nitrogen, and phosphorus loading from cropland by 15 percent by 2020 in local streams and rivers; and
2. To restore declining grassland bird populations to 1980 levels by 2020 and to restore habitat for endangered aquatic species.

The CPs proposed for the DRB CREP are:

- Establishment of Permanent Introduced Grasses and Legumes (CP1)
- Establishment of Permanent Native Grasses (CP2)
- Permanent Wildlife Habitat (CP4D)
- Grass Waterway (CP8A)
- Shallow Water Area for Wildlife (CP9)
- Wildlife Food Plots (CP12)
- Establishment of Contour Buffer Strips (CP15A)
- Filter Strips (CP21)
- Riparian Buffers (CP22)
- Wetland Restoration (CP23)
- Wildlife Buffer (CP29)
- Wetland Buffer (CP30)
- Habitat Buffer for Upland Birds (CP33)

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The DRB CREP would be implemented under an agreement between FSA and the State of Pennsylvania. Cooperating agencies and partners in the program would include the Pennsylvania Department of Environmental Protection (PADEP); Pennsylvania Game Commission (PGC); Pennsylvania Fish and Boat Commission (PFBC); Pennsylvania Department of Conservation and Natural Resources (PADCNR); NRCS; three county conservation districts (Montgomery, Northampton and Monroe); SE PA Resource Conservation and Development Council; Delaware River Basin Commission; Martins Jacoby Watershed Association; Heritage Conservancy; Pheasants Forever, Inc.; Ducks Unlimited, Inc.; and National Wild Turkey Federation.

### **1.3 Purpose and Need**

The Pennsylvania DRB plays an important role in the ecosystem health of Pennsylvania and the Delaware River, Estuary, and Bay. The Delaware River flows north-to-south from its headwaters in New York to the head of the Delaware Estuary at Morrisville, Bucks County; and Trenton, New Jersey. The 6,422-square mile area of Pennsylvania that drains into the Delaware River is not only the largest contributor of the basin, but also accounts for half of the basin's land area and 42 percent of Pennsylvania's population. Approximately 15 million people (5 percent of the U.S. population) rely on the Delaware River Basin for drinking water and industrial use, including 7 million residents of New York City and northern New Jersey who live outside of the watershed.

Important features of the watershed streams in Pennsylvania that provide value to residents include:

- 690 miles of state and federal scenic rivers
- 215 miles designated as Special Protection Waters (High Quality or Exceptional Value)
- 87 reaches designated as Class A Wild Trout Waters
- 57 miles of coastline in the Delaware Estuary (State Water Plan Digital Atlas, accessed January 18, 2013)

The PADEP has an ongoing program to assess the quality of waters in Pennsylvania and identify streams and other bodies of water that are not attaining designated and existing uses as "impaired." Water quality standards are comprised of the uses (including anti-degradation) that waters can support and goals established to protect those uses. Uses include, among other things, aquatic life, fish consumption, recreation, and potable water supply, while the goals are numerical or narrative water quality criteria that express the in-stream levels of substances that must be achieved to support the uses.

Section 303(d) of the Clean Water Act (CWA) requires states to list all impaired waters not supporting uses, even after appropriate and required water pollution control technologies have been applied. The 303(d) list includes the reason for impairment, which may be one or more point sources (like industrial or sewage discharges), or non-point sources (like abandoned mine lands or agricultural runoff).

According to the Draft Final 2012 Pennsylvania Integrated Water Quality Monitoring and Assessment Report (PADEP 2012b), 6,197 stream miles and 23,431 lake acres in the DRB attained their designated uses and 3,727 miles and 27,867 lake acres were impaired. The major

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causes of impairment are siltation (1,362 miles), water flow variability (806 miles), PCBs (347 miles), habitat alterations (345 miles), pathogens (316 miles), and nutrients (276 miles). The major sources of impairment were urban runoff/storm sewers (929 miles) and agriculture (435 miles). Other major sources included: municipal point source (228 miles), abandoned mine drainage (227 miles), habitat modification (224 miles), small residential runoff (203 miles), road runoff (156 miles), and channelization (154 miles).

As a follow-up to the listing, the state or Environmental Protection Agency (EPA) must develop a Total Maximum Daily Load (TMDL) for each waterbody on the list. A TMDL identifies allowable pollutant loads to a waterbody from both point and non-point sources that will prevent a violation of water quality standards. A TMDL also includes a margin of safety to ensure protection of the water.

A TMDL is designed to reduce pollutant loads to impaired waters and enable these waters to meet water quality standards. Pennsylvania has committed to developing TMDLs for all impaired waterbodies and will use both traditional and new approaches to correct water quality problems. Twelve TMDLs have been written for waterbodies in the DRB.

Pennsylvania's Water Resource Planning Act of 2002 recognizes the need to plan and manage water on a watershed basis, which fits well with implementation of this CREP. Pennsylvania's State Water Plan calls for the identification of Critical Water Planning Areas (CWPAs). Little Lehigh Creek in Berks and Lehigh counties and Broadhead Creek in Monroe and Pike counties were evaluated in the DRB, and in 2011 they were put on a watch list for potential designation as CWPAs (Environmental Law Institute [ELI] 2011). Many of the CREP practices, (e.g., forested stream buffers and wetland restoration) will increase groundwater recharge, reduce siltation and nutrient loads, and help improve water quality, which will help to protect these critical water resources.

Agricultural impacts to water quality and habitat are significant, and the need for this program is to enhance water quality and further the goal of restoring the designated uses of the basin's waterbodies. Approximately 18 percent of the land in the Delaware River watershed is in agricultural use, and the seven-county target area contains approximately 330,000 acres of farmland. (State Water Plan Digital Atlas, accessed January 18, 2013).

The purpose of the DRB CREP is to reduce agriculture-sourced non-point nutrient and sediment loading within the region's streams and rivers in order to improve Pennsylvania's surface and groundwater quality and to establish and restore wildlife habitat. Specifically, the DRB CREP will seek to:

1. Raise CRP enrollment to include up to 20,000 acres by providing additional economic incentives through CREP beyond that available through CRP:
  - Retire up to 16,000 acres of agricultural highly erodible land (HEL).
  - Restore and protect up to 4,000 acres of riparian and wetland habitat.
2. Provide multiple options for the establishment of conservation initiatives to allow for a maximum level of flexibility to fit into the many different social, economic, and systemic agricultural scenarios in the seven-county region, such as:
  - Grass/legume plantings on highly erodible cropland.

- 
- Stream bank fencing.
  - Forested and grassed riparian buffers.
  - Wetland restoration.

Measurable benefits will include:

1. Projected potential reductions, at a minimum of:
  - Sediment edge-of-stream loading by approximately 557 tons per year.
  - Nitrogen edge-of-stream loading by approximately 349,500 pounds per year.
  - Phosphorous edge-of-stream loading by approximately 12,353 pounds per year.
2. Progress toward meeting the EPA TMDL requirements for all Delaware Basin streams impaired by sedimentation or nutrient impacts.
3. Significant improvement of Pennsylvania's water quality.
4. Improvement and protection of vital habitat to preserve the many threatened and endangered species existing in Pennsylvania's Delaware River basin.
5. Restoration of grassland birds to 1980 population levels by 2020.
6. Improvement of environmentally related recreational opportunities, such as hunting, fishing, hiking, birding, and wildlife watching.

#### **1.4 Regulatory Compliance**

This EA has been prepared to satisfy the requirements of NEPA (Public Law 91-190, 42 United States Code 4321 et seq.); implementing regulations adopted by the Council on Environmental Quality (CEQ; 40 Code of Federal Regulations [CFR] 1500-1508); and FSA implementing regulations, Environmental Quality and Related Environmental Concerns – Compliance with NEPA (7 CFR 799). The intent of NEPA is to protect, restore, and enhance the human environment through well-informed federal decisions. A variety of laws, regulations, and Executive Orders (EOs) apply to actions undertaken by federal agencies and form the basis of the analysis presented in this EA.

Other pertinent statutory requirements include:

- The Clean Water Act of 1970;
- Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S. Code [U.S.C.] 470);
- The Fish and Wildlife Coordination Act (48 Stat. 401), as amended;
- The Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543);
- Section 307 of the Coastal Zone Management Act of 1972;
- The Migratory Bird Treaty Act (16 U.S.C. 703-711);
- EO 13186, Protection of Migratory Birds;
- EO 11514, Protection and Enhancement of Environmental Quality;
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations;
- EO 11988 Floodplain Management; and
- EO 11990 Protection of Wetlands.

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## **1.5 Organization of the EA**

This EA assesses the potential impacts of the Proposed Action and the No Action Alternative on potentially affected environmental and economic resources. Section 1.0 provides background information relevant to the Proposed Action and discusses its purpose and need. Section 2.0 describes the Proposed Action and alternatives. Section 3.0 describes the baseline conditions (i.e., the conditions against which potential impacts of the Proposed Action and alternatives are measured) for each of the resource areas. Section 4.0 describes potential environmental impacts of the Proposed Action and alternatives on these resources. Section 5.0 includes an analysis of cumulative impacts. Section 6.0 is a list of the preparers of this document, and Section 7.0 lists persons and agencies contacted during the preparation of this document. Section 8.0 contains the references used to compile this EA.

## **1.6 Project Scoping**

To comply with the requirements set forth in §1501.7 of the CEQ's regulations involving scoping and to provide agencies and the public with an early opportunity to comment on the program, FSA mailed scoping letters to 29 local, state, and federal agencies; and non-profit stakeholders. Agencies and organizations were notified of the proposed DRB CREP and provided an opportunity to identify resources and issues of concern to be considered in the NEPA process. A copy of the scoping letter and list of agencies and organizations is included in Section 7.0.

## *2.0 Description of the Proposed Action and Alternatives*

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## 2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

### 2.1 Proposed Action

FSA proposes to implement the DRB CREP agreement. The agreement will enroll up to 20,000 acres of eligible farmland in the seven-county region of the DRB CREP (Figure 1). Approved CPs will be established on these lands, and landowners will receive support for the costs of installing and maintaining such practices as well as annual rental payments for lands enrolled in the program.

#### 2.1.1 Eligible Lands

The DRB CREP will enroll up to 20,000 acres of environmentally sensitive agricultural land in a seven-county region in the DRB watershed. Participation in CREP is voluntary; therefore, the anticipated enrollment is an estimate. The location, size, and number of tracts that will be enrolled in the CREP will be determined by individual landowner interest and eligibility.

According to the 2007 Census of Agriculture, the seven-county area has more than 331,000 acres of land in agricultural production (USDA 2007). Agricultural land use by county is depicted in Table 2.1.

*Table 2.1. Agricultural Land Use Class by County.*

COUNTY	LAND IN FARMS*	CROPLAND ACRES	PASTURE ACRES	HAYLAND ACRES
Bucks	75,883	58,012	9,048	17,386
Delaware	4,361	1,646	986	N.A.
Lehigh	84,643	72,737	4,031	9,890
Monroe	29,165	14,308	2,672	4,438
Montgomery	41,908	28,563	8,388	9,401
Northampton	68,252	58,903	4,553	11,407
Pike	27,569	2,908	715	820
<b>TOTAL</b>	<b>331,781</b>	<b>237,077</b>	<b>30,393</b>	<b>53,342</b>

Source: USDA 2007

\* The Census of Agriculture defines the acreage designated as “land in farms” as primarily agricultural land used for crops, pasture, or grazing. It also includes woodland and wasteland not actually under cultivation or used for pasture or grazing, provided it was part of the farm operator’s total operation.

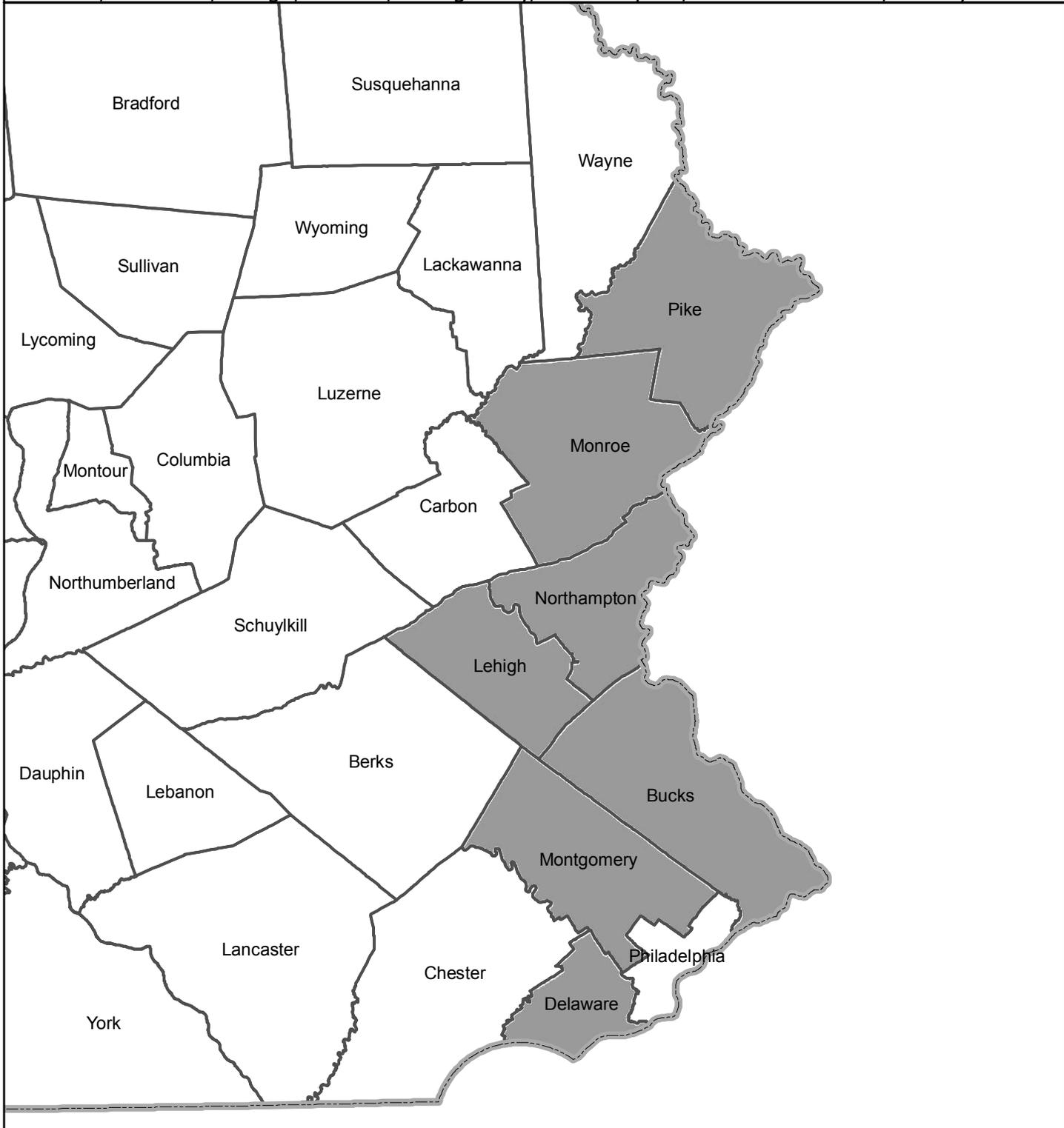
Approximately 30 percent of the region’s cropland is on soils rated as highly erodible (PADEP 2012a). Provided all other land eligibility criteria are met, the following categories of agricultural land will be eligible for enrollment: (1) cropland with an erodibility index (EI) greater than or equal to 8; (2) marginal pastureland and cropland within 180 feet of a stream; and (3) cropland where site conditions and soils are appropriate for wetland restoration.

#### 2.1.2 Establish Conservation Practices

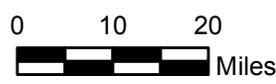
The DRB CREP will seek to specifically address the environmental risks facing the following three resource areas: sediment and nutrient loss from erodible cropland, riparian zone stabilization and wetland restoration/protection, and wildlife habitat restoration. The CPs proposed for the DRB CREP, as well as the anticipated number of acres to be enrolled and lands eligible for each practice, are included in Table 2.2. Conservation cover will be established on 16,000 acres of highly erodible cropland and 4,000 acres of conservation buffers (PADEP 2012a).

# Figure 1 Proposed Delaware River Basin CREP Area

Implementation of the CREP for the Delaware River Basin  
Bucks, Delaware, Lehigh, Monroe, Montgomery, Northampton, and Pike Counties, Pennsylvania



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 Proposed CREP Area

**Table 2.2. Eligible Conservation Practices.**

<b>CONSERVATION PRACTICE</b>	<b>ANTICIPATED ENROLLMENT (ACRES)</b>	<b>ELIGIBLE LANDS</b>
CP1: Establishment of Permanent Introduced Grasses and Legumes <sup>1</sup> CP2: Establishment of Permanent Native Grasses <sup>1</sup> CP4D: Permanent Wildlife Habitat <sup>1</sup> CP12: Wildlife Food Plots <sup>1</sup> CP33: Habitat Buffer for Upland Birds <sup>1</sup>	16,000	Erodibility Index $\geq$ 8
CP8A: Grass Waterway <sup>1</sup> CP9: Shallow Water Area for Wildlife <sup>1</sup> CP15A: Establishment of Contour Buffer Strips <sup>1</sup> CP21: Filter Strips <sup>1</sup> CP30: Wetland Buffer <sup>2</sup>	1,500	Riparian
CP22: Riparian Buffers <sup>3</sup> CP29: Wildlife Buffer <sup>2</sup>	2,000	Riparian
CP23: Wetland Restoration <sup>1</sup>	500	Riparian
<b>TOTAL</b>	<b>20,000</b>	

1 = cropland only

2 = MPL only

3 = cropland and MPL

### 2.1.3 Provide Financial Support to Landowners

Enrollment in the proposed CPs will have a contract length of 14 to 15 years. Landowners will be eligible for annual rental payments for the duration of their contracts, along with other applicable payments for implementing and maintaining approved CPs.

For lands enrolled in the CREP, annual rental payments will be the sum of the weighted average Soil Rental Rate (SRR), plus an incentive payment, plus an annual maintenance rate (as applicable for certain practices). The SRR for the eligible acres offered will be the current weighted averages of the posted CRP county SRR for the three predominant soil types on the offered acres. Incentive payments available under the proposed CREP will be as follows:

- HEL enrolled in CP1, CP2, CP4D, CP12, and CP33 will be eligible for between 0.75 and 2.25 times the SRR based on the EI of the land;
- Riparian lands enrolled in CP8A, CP9, CP15A, CP21, CP22, CP23, CP29, and CP30 will include an incentive of 1.5 times the applicable SRR;
- Signing Incentive Payment (SIP) equal to \$100 per acre for CP8A, CP21, CP22, CP23, CP29, and CP30; and
- Practice Incentive Payment (PIP) equal to 40 percent of the eligible cost of installing CP8A, CP9, CP15A, CP22, CP23, CP29, CP30, and CP33.

Costs associated with implementing the DRB CREP will be shared by federal and state agencies as well as landowners with the estimated costs over the 15-year contract period, as shown in Table 2.3.

**Table 2.3. Projected Costs.**

<b>PAY ITEM</b>	<b>FUNDING SOURCE</b>	<b>COST PER ACRE</b>	<b>ACRES</b>	<b>DURATION (YEARS)</b>	<b>YEARLY COST</b>	<b>TOTAL COST</b>
Land Rental Payment	Federal	\$187.50 to \$350.00	20,000	15	\$4,241,959	\$63,629,395
Conservation Practice Implementation	Federal	\$100 to \$1,250	20,000	5	\$1,095,000	\$5,475,000
Incentive Payments	Federal	\$550 to \$1,100	4,000	NA	NA	\$3,300,000
Conservation Practice Implementation	State	\$100 to \$1250	20,000	5	\$1,095,000	\$5,475,000
Incentive Payments – CP2	State	\$80	3,000	NA	NA	\$240,000
Monitoring of Goals and Objectives	State	NA	NA	15	\$210,000	\$3,150,000
Administration, Outreach, and Technical Assistance	State	NA	NA	15	\$102,667	\$1,540,000
In-Kind Match from State Partners	State	NA	NA	15	NA	\$10,500,000

Source: PADEP 2012a

## **2.2 Alternatives**

Two alternatives will be evaluated in this EA: the No Action Alternative and the implementation of the proposed CREP in the seven DRB counties in Pennsylvania.

### *2.2.1 Alternative A: No Action*

The No Action Alternative would result in no DRB CREP acres being enrolled and, as such, the goals of the proposed CREP would not be met. Although eligible lands could still be enrolled in the CRP or other conservation programs, the benefits of the proposed CREP (targeting lands in the DRB watershed for enrollment; providing financial incentives to landowners using federal, state, and private financial resources) would not be realized. This alternative will be carried forward in the analysis to serve as a baseline against which to assess the impacts of the Preferred Alternative.

### *2.2.2 Alternative B: Preferred*

The Preferred Alternative is the enrollment in the proposed CREP of up to 20,000 acres of eligible farmland in the seven-county DRB. Approved CPs would be established on those enrolled lands, with landowners receiving one-time and annual payments.

## *3.0 Affected Environment*

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### 3.0 AFFECTED ENVIRONMENT

This section describes relevant existing conditions for the resources potentially affected by the Proposed Action. In compliance with guidelines contained in NEPA and CEQ regulations, the description of the affected environment focuses on those aspects potentially subject to impacts. The following resources will be evaluated in this EA: biological (vegetation, wildlife and protected species); water resources (floodplains, groundwater and surface water, wetlands, coastal zone management); earth resources; socioeconomics (farm and nonfarm employment and income, farm production expenses and returns, agricultural land use, recreational spending, and environmental justice); cultural resources (archaeological resources, historic architectural resources, and traditional cultural properties); and recreation (Wild and Scenic Rivers; federal, state, and local parks and wildlife refuges). Resources that were eliminated from detailed study include noise and air quality. The Proposed Action and the No Action Alternative would not affect ambient noise levels, ambient air quality levels, or the status of attainment of air quality standards, and would not have an effect on the human or natural environment; therefore, this area will be eliminated from study.

#### 3.1 Biological Resources

Biological resources include living plant and animal species and the habitats within which they occur. For this analysis, biological resources are divided into the following categories: vegetation; wildlife, including terrestrial and aquatic species; and threatened, endangered, and sensitive species and their defined critical habitats. Vegetation, wildlife, and aquatic species refer to the plant and animal species, both native and introduced, which characterize a region. Threatened and endangered species are those species that are protected by the Endangered Species Act (ESA). Critical habitat is designated by the U.S. Fish and Wildlife Service (USFWS) as essential for the recovery of threatened and endangered species and, like those species, is protected by ESA.

##### 3.1.1 Vegetation

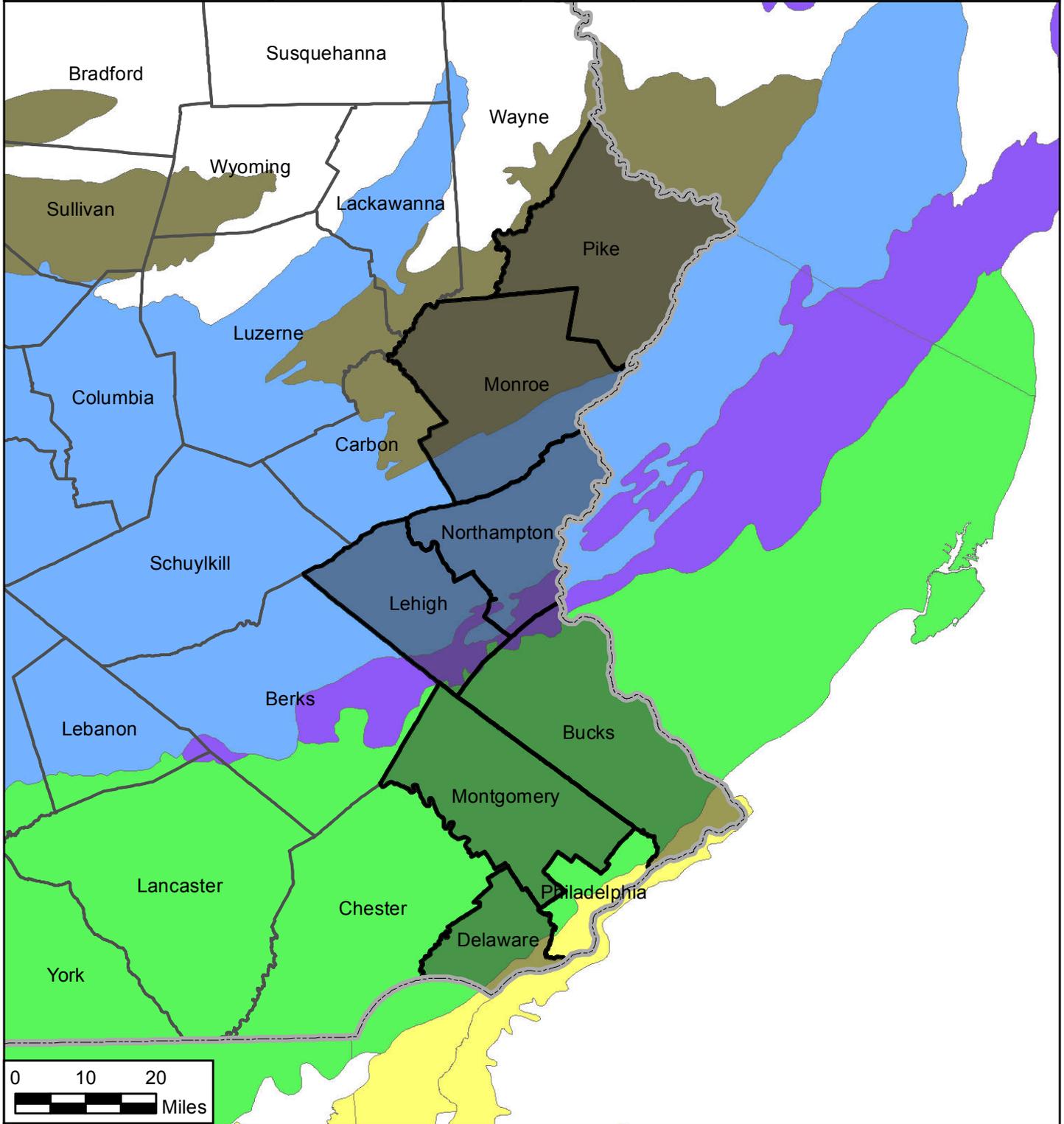
Ecoregions of the DRB CREP are depicted on Figure 2. The CREP area includes a variety of native forest communities, particularly in the northern counties and more extensive agricultural land and mixed suburban and urban land uses in the middle and southern counties. Vegetation of each ecoregion is summarized below (USDA-NRCS 2006).

North-Central Appalachians. This area supports forest vegetation, particularly hardwood species. Beech-birch-maple and elm-ash-red maple are the potential forest types. The extent of oak species increases from east to west, particularly in areas of shallow and dry soils. In some areas, conifers (e.g., white pine) are important. Aspen, hemlock, northern white-cedar, and black ash grow on the wetter soils. In some parts of the area, sugar maple has potential economic significance.

Ridge and Valley. This area supports hardwoods. White oak, red oak, black oak, hickories, and associated upland hardwoods are the major species. Scarlet oak, chestnut oak, hickories, and scattered Virginia pine, pitch pine, shortleaf pine, and eastern white pine are common on the more shallow soils and on the south aspects, especially in the southern part of the area. Yellow-

## Figure 2 Ecoregions of the Delaware River Basin CREP Area

Implementation of the CREP for the Delaware River Basin  
Bucks, Delaware, Lehigh, Monroe, Montgomery, Northampton, and Pike Counties, Pennsylvania



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poplar, red oak, red maple, and other species that require more moisture grow in sheltered coves and on footslopes and north aspects.

Northeastern Highlands. This area was cleared for agriculture in colonial times. The agricultural land was abandoned at the turn of the last century and then was reforested. The area is currently undergoing suburban and rural development. Historic and modern types of vegetation are similar. The area supports a mixture of northern and central hardwoods. Sugar maple, birch, and beech, as well as oaks and hickories, are the major species. White pine and hemlock are the dominant conifers. Pitch pine and red pine grow on sandy soils that formed in outwash. Red maple grows on the wetter sites. Northern white-cedar reaches its northern limit in bogs in this area. The non-native, invasive plants include Japanese barberry, Asiatic bittersweet, and Norway maple. The most common understory plants are dogwood. Abandoned agricultural land is dominated by red cedar and gray birch. Numerous unique habitats are in scattered areas throughout this region. Some of the habitats include freshwater marshes, swamps, floodplains, lowlands, areas of peat, sand barrens, rocky summits, limestone fens, and glades.

Northern Piedmont. This area supports deciduous hardwoods. Chestnut oak, white oak, red oak, hickories, ash, American elm, and yellow-poplar are the major species. Yellow-poplar is especially abundant on the northeast-facing slopes. Tree growth and wood production are considerably less extensive in the Triassic basins than elsewhere in the area. Black walnut and black cherry grow on the well-drained soils on floodplains. Eastern red cedar is common in many areas of abandoned cropland.

Middle Atlantic Coastal Plain. This area supports pine and hardwoods. Loblolly pine, Virginia pine, shortleaf pine, southern red oak, black oak, scarlet oak, pin oak, willow oak, northern red oak, black walnut, yellow-poplar, sweetgum, and red maple are the dominant species.

Invasive Plant Species. Federal EO 13112 of 1999 defined an “invasive species” as a species that 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. The National Invasive Species Council, established by EO 13112, estimates that invasive species cost the U.S. at least \$132 billion per year (PADCNR 2011). In January 2004, Pennsylvania’s Governor issued an EO establishing the Governor’s Invasive Species Council. The order recognized the importance of controlling invasive species, and established the council to: 1) advise and direct development and implementation of a state invasive species management plan; 2) provide guidance on prevention, control, and rapid response initiatives; and 3) facilitate coordination among invasive species management efforts at all levels. A list of currently recognized invasive plants in Pennsylvania is included in Appendix A.

### *3.1.2 Terrestrial and Aquatic Wildlife*

Pennsylvania has 414 species of wild birds, including 285 that occur regularly, while the remaining 129 species occur less frequently. There are 66 species of wild mammals known to occur in the state (PGC website, accessed January 18, 2013). Some of the major wildlife species in the DRB CREP area are white-tailed deer, cottontail, red fox, gray fox, raccoon, muskrat, opossum, skunk, coyote, gray squirrel, weasel, black bear, beaver, fisher, wild turkey, pheasant, waterfowl, songbirds, ruffed grouse, mourning dove, vultures, and forest songbirds.

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Terrestrial species that are declining in population are animals that inhabit more open areas. Grassland habitat has been drastically reduced in the last half-century, with grassland species paralleling this trend. The Pennsylvania Wildlife Action Plan identifies 38 species of birds, reptiles, amphibians, and mammals associated with grassland habitats in PA (Appendix B). Changes in farm crops and farm management are some of the factors that have reduced grassland habitats in Pennsylvania. Historical farm practices that once resulted in rotational cropping allowing for dense herbaceous cover on idle lands has been replaced by intensive cropping systems with high nutrient inputs; and large animal operations provide little wildlife habitat and have greatly increased sediment, nitrogen, and phosphorus loads coming from agricultural lands. Loss of farmland within the DRB CREP region, as well as the accelerated loss of hay and pastureland and the trend toward larger farm size under intensive production, has been detrimental to grassland species.

Grassland birds in Pennsylvania have been in decline for the past 40 years, partly due to changing agricultural practices. The Piedmont of southeastern Pennsylvania was historically a major source of grassland-dependent birds in the Northeast region. The state-listed upland sandpiper, sedge wren, and short-eared owl were once common in this area. The northern bobwhite quail, one of the most endangered birds in the state, was also routinely heard on Pennsylvania farmland in this region until about 1975. Other grassland-dependent birds in decline include grasshopper sparrow, eastern meadowlark, field sparrow, and vesper sparrow. These species are dependent on grassland habitat for nesting and rearing their young. Nest destruction by haying and mowing between April and July is the primary reason for the declining populations (USDA-NRCS 2007b).

Important Bird Areas (IBA) are sites that provide essential habitat for one or more species of birds. These sites are important for breeding, wintering, and migrating birds and are priority habitats for conservation. State-recognized IBAs in the DRB CREP area include Green Lane Reservoir (Montgomery County), Kittantiny Ridge (Lehigh, Monroe and Northampton counties), Long Pond Preserve (Monroe County), Peace Valley Park (Bucks County), Quakertown Swamp (Bucks County), Unami Creek Valley (Montgomery County), Upper Delaware Scenic River (Pike County), and Upper Ridley/Crum (Delaware County).

In 2001, the PGC and the Pennsylvania Biological Survey initiated an Important Mammal Area (IMA) program. Habitats that are critical to the survival of the state's mammal population were identified and mapped. A number of IMAs are recognized within the DRB CREP area, including Lehigh Valley/Lehigh Gorge State Park, State Gamelands (SGL) 129/Hickory Run State Park/Holiday Pocono, Pocono Lake/Adams Swamp/Two Mile Run, Tobyhanna and Gouldsboro State Parks/SGL 127, Long Pond Preserve, Tannersville Cranberry Bog, Delaware State Forest, Bushkill Creek Area, Delaware Water Gap, Cherry Valley Watershed, and Durham Mine. Although IMAs and IBAs include some public lands and conservation areas, much of this land is in private ownership.

Stream quality throughout the DRB is threatened by pollutants, sedimentation, acidic mine drainage, and a lack of adequate riparian buffers. Good quality fish habitat was found in only 14 percent of Pennsylvania streams (Goodrich et al. n.d.). In the DRB CREP area, smallmouth bass, rock bass, sunfish, catfish, and suckers are found in the larger warmwater streams. Suitable coldwater streams are stocked with native brook trout. Many of the region's aquatic species are in decline, including freshwater mussels and fishes. Migratory fish, including the America shad,

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blueback herring, alewife, sea lamprey, American eel, and shortnose sturgeon, are present in the Delaware River watershed (National Park Service [NPS] 2012).

### *3.1.3 Threatened and Endangered Species and Critical Habitat*

The federal ESA of 1973 (U.S.C. 1531-1544, 87 Stat. 884), as amended, authorizes the listing of species as endangered and threatened and provides for the conservation of critical habitat that support these species.

The National Marine Fisheries Service (NMFS) has jurisdiction over marine and anadromous species and their critical habitat, including Essential Fish Habitat (EFH). Two anadromous fish species protected by NMFS, the Atlantic sturgeon and the shortnose sturgeon, occur in the CREP area.

EO 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. Priority species within the Piedmont and Appalachian Mountains Bird Conservation Regions include Cerulean Warbler, Black-throated Blue Warbler, Golden-winged Warbler, Henslow’s Sparrow, Red-cockaded Woodpecker, Bachman’s Sparrow, and Brown-headed Nuthatch. Partners in Flight priorities within the Northern Ridge and Valley physiographic area include several additional species: Worm-eating Warbler, Louisiana Waterthrush, Upland Sandpiper, and Bobolink.

In Pennsylvania, the Wild Resources Conservation Act of 1982 and implementing regulations classifies plant species that are rare in Pennsylvania. The rare plant program is administered by the Pennsylvania Natural Heritage Program (PNHP). The list of state endangered or threatened plants has not been updated since 1987, and the PNHP has proposed changes in the classification of many species to reflect the more current statuses of many rare plants. As of 2013, these changes have not yet been adopted. The PGC has jurisdiction and management responsibility for all wildlife in Pennsylvania, and the PFBC has jurisdiction and management responsibility for all fish, reptiles, and amphibians.

There are 2,076 species of native plants recorded in Pennsylvania, 300 species of which are recommended for listing as state endangered and 115 as state threatened (Pennsylvania Biological Survey, accessed January 18, 2013). There are six plant species that occur in Pennsylvania that are federally listed as endangered or threatened; however, four of these species are believed to be extirpated and only two potentially occur in the DRB CREP area (Pennsylvania Flora Project, accessed January 22, 2013). The northeastern bulrush, an obligate wetland plant that occurs in Lehigh and Monroe counties; and the small whorled pogonia, an herbaceous perennial of dry open woodlands that occurs in parts of Northampton and Montgomery counties, are potentially present.

Twenty percent of Pennsylvania’s wildlife species are listed on state species of special concerns lists (Goodrich et al. n.d.). Wetland wildlife dominates the species of special concern list and remains the most imperiled habitat group. There are four mammals, 14 birds, five amphibians, two reptiles, eight fish, three species of mussels, and one insect either federally or state listed as threatened or endangered with potential to occur within the proposed CREP area. Species that are federally listed as endangered include the Indiana bat, Atlantic sturgeon, shortnose sturgeon, dwarf wedgemussel, and American burying beetle. The federally listed bog turtle is also known to exist in all counties within the DRB CREP except Pike County. In 2010, the USFWS conducted formal consultation with NRCS on the potential effect of the implementation of certain conservation practices on the northern population of the bog turtle (USFWS 2010).

Table 3.1 shows these species and their state and federal statuses.

**Table 3.1. Federal and State Threatened and Endangered Species Potentially Present in the Delaware Basin CREP Region.**

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
<b>MAMMALS</b>			
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	None	PE
Indiana Bat	<i>Myotis sodalist</i>	LE	PE
Allegheny Woodrat	<i>Neotoma magister</i>	None	PT
Eastern Small-Footed Myotis	<i>Myotis leibii</i>	None	PT
<b>BIRDS</b>			
American Bittern	<i>Botaurus lentiginosus</i>	None	PE
Black-Crowned Night-Heron	<i>Nycticorax nycticorax</i>	None	PE
Peregrine Falcon	<i>Falco peregrinus</i>	None	PE
Sedge Wren	<i>Cistothorus platensis</i>	None	PE
Upland Sandpiper	<i>Bartramia longicauda</i>	None	PE
Great Egret	<i>Ardea alba</i>	None	PE
Short-Eared Owl	<i>Asio flammeus</i>	None	PE
Yellow-Crowned Night-Heron	<i>Nyctanassa violacea</i>	None	PE
King Rail	<i>Rallus elegans</i>	None	PE
Least Bittern	<i>Ixobrychus exilis</i>	None	PE
Osprey	<i>Pandion haliaetus</i>	None	PT
Long-Eared Owl	<i>Asio otus</i>	None	PT
Bald Eagle	<i>Haliaeetus leucocephalus</i>	None	PT
Northern Harrier	<i>Circus cyaneus</i>	None	PT
<b>REPTILES AND AMPHIBIANS</b>			
Northern Cricket Frog	<i>Acris crepitans</i>	None	PE
Bog Turtle	<i>Glyptemys muhlenbergii</i>	LT	PE
Southern Leopard Frog	<i>Lithobates sphenoccephalus utricularius</i>	None	PE
Eastern Redbelly Turtle	<i>Pseudemys rubriventris</i>	None	PT
New Jersey Chorus Frog	<i>Pseudacris kalmi</i>	None	PE
Eastern Spadefoot	<i>Scaphiopus holbrookii</i>	None	PE
Blue-Spotted Salamander	<i>Ambystoma laterale</i>	None	PE
<b>FISH</b>			
Black Bullhead	<i>Ameiurus melas</i>	None	PE
Banded Sunfish	<i>Enneacanthus obesus</i>	None	PE
Bridle Shiner	<i>Notropis bifrenatus</i>	None	PE
Ironcolor Shiner	<i>Notropis chalybaeus</i>	None	PE
Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	LE	PE
Atlantic Sturgeon	<i>Acipenser oxyrinchus</i>	LE	PE
Banded Sunfish	<i>Enneacanthus obesus</i>	None	PE

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Longear Sunfish	<i>Lepomis megalotis</i>	None	PE
<b>MUSSELS AND SNAILS</b>			
Dwarf Wedgemussel	<i>Alasmidonta heterodon</i>	LE	PE
Brook Floater	<i>Alasmidonta varicose</i>	None	PE
Eastern Pearlshell	<i>Margaritifera margaritifera</i>	None	PE
<b>INSECTS AND SPIDERS</b>			
American Burying Beetle	<i>Nicrophorus americanus</i>	LE	None

Sources: Pennsylvania Game Commission website accessed January 18, 2013; Pennsylvania Natural Heritage Program website accessed January 18, 2013.

PE = Pennsylvania Endangered, PT = Pennsylvania Threatened, LT = Federally Listed Threatened, LE= Federally Listed Endangered

### 3.2 Cultural Resources

Cultural resources are generally remnants or evidence of human activity on the environment. This includes archaeological sites, artifacts, historic buildings, historic districts, and areas of the natural landscape that have significance to a particular culture or community. Cultural resources can be broken down into three different categories: historic and precontact archaeological resources, architectural resources, and traditional cultural properties. Historic and precontact archaeological resources are physical evidence of prior human activity in the form of artifacts or subsurface features. Architectural resources are buildings, structures, or districts that are typically over 50 years old and are either listed in or eligible for listing in the National Register of Historic Places (National Register). Traditional cultural resources are important properties, cultural practices, or beliefs that are rooted in a particular community's history and are essential in continuing the cultural identity of that community.

Section 106 of the National Historic Preservation Act, as implemented by 36 CFR 800, requires federal agencies to take into account the effects of their undertakings on historic properties listed in or eligible for listing in the National Register. It requires that the Advisory Council on Historic Preservation (ACHP) be afforded the opportunity to comment on the undertakings prior to project approval (ACHP 2004).

#### 3.2.1 Archaeological Resources

Pennsylvania has a rich cultural history that is reflected by the thousands of both historic and precontact archaeological sites recorded in the state. As of January 1, 2013 there are 22,569 historic and precontact archaeological sites recorded in the database at the Pennsylvania Historical Museum Commission, Bureau of Historic Preservation (PHMC-BHP), which serves as the State Historic Preservation Office (SHPO). The following sections review the general precontact and historic periods relevant to the overall DRB CREP agreement area. The following section is largely summarized from the PHMC-BHP Pennsylvania History website unless noted otherwise (PHMC-BHP 2013b, 2013c).

The archaeological record of Eastern Pennsylvania can be divided into five periods of time: the Paleo-Indian period (ca. 12,000 B.C. to 8000 B.C.), the Archaic period (8000 B.C. to 1000 B.C.), the Transitional period (1800 B.C. to 800 B.C.), the Woodland period (1000 B.C. to A.D. 1550), and the Historic period (A.D. 1550 to present; PHMC-BHP 2013c).

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The Paleo-Indians arrived in eastern Pennsylvania just after the glaciers were receding from the last ice age. A distinctive feature of this period is the adaptation to a cold climate that alternated from wet to dry. In addition, the landscape was much different, as it was comprised of tundra and dotted with stands of fir and spruce. The Paleo-Indians lived in small groups following now-extinct megafauna and moose. Hunting and gathering provided their food, with a large portion of their diet relying on hunting. The landscape of eastern Pennsylvania, especially the floodplains and watering areas provided by the DRB, provided excellent hunting grounds. High quality lithic materials were used for making tools, including fluted points (Custer 1988).

The Archaic period (8000 B.C. to 1000 B.C.) saw a change in climatic conditions that are more similar to the climate of today. In addition, the large herds of glacial age animals had become extinct, forcing the Indians to adapt to new ways of life. The warm and wet climate caused the landscape to change from tundra to forests of oak and hemlock, providing ample habitat in which animals like deer flourished. Plant food resources became more important. Eastern Pennsylvania saw a number of small procurement sites established where hunting and gathering resources were abundant (Custer 1988). Tool kits contained a wider array of specialized tools, including grinding stones, mortars, pestles, adzes, axes, and gouges.

The Transitional period (1800 B.C. to 800 B.C.) occurred during the latter part of the Archaic period and early part of the Woodland period, primarily in eastern Pennsylvania. The people of this time period had a different mode of life in which larger, more permanent settlements were located in major river floodplains (e.g., the Delaware River). Soapstone bowls and broad spear points are characteristic artifacts of this period. Soapstone vessels permitted the cooking of food directly over a fire. Projectile points made from rhyolite and jasper were common and were often turned into scraping tools or drills when they became worn or broken.

The Woodland period (1000 B.C. to A.D. 1550) is notable for the introduction of agriculture, pottery making, and hunting with a bow and arrow. This period also saw the first smoking pipes and a variety of different tools. As the bow and arrow replaced the spear, projectile points changed from long and narrow to small triangular-shaped arrowheads, sometimes with deeply cut notches. Agriculture became important to survival as true permanent villages were established during the second half of this period (Custer 1988). Animal bones and antlers were used to making agricultural implements (e.g., hoes). Pottery is more common on Late Woodland sites, as vessels became larger, more elaborate, and were used for a variety of food preparation and storage purposes.

The Historic period (A.D. 1550 to present) is marked by the development of the fur trade in which items from European settlers are more commonly found. Disease, European settlements, and land competition forced the Indians of eastern Pennsylvania to sell and vacate their lands. By the end of the eighteenth century, few, if any, Indians remained in eastern Pennsylvania.

By the mid-seventeenth century, Swedish, Dutch, and Finnish settlers were living near southeastern Pennsylvania in northern Delaware. Settlement was slow due to the Susquehannock Indians, who discouraged settlements near their villages in the Lancaster County area. The Susquehannocks were defeated in 1675, and in 1682 William Penn received granting rights for eastern Pennsylvania. This opened up the eastern part of the state for settlement. Initial grants averaged 500 acres for an individual and over 1,000 acres for land speculation companies. Bucks County was first established in 1685 and included large areas of the counties comprising the

DRB CREP. The English Quakers were the most common settlers in Pennsylvania during the seventeenth century, although some Dutch also came from New York and New Jersey. Large numbers of German and Scotch-Irish immigrants began arriving by the eighteenth century.

Agriculture and agricultural-related industry dominated the landscape of southeastern Pennsylvania during the eighteenth century. The soil in this region proved to be extremely fertile, which led to the area being called the breadbasket of the American colonies. Numerous gristmills were constructed along the waterways that flowed to the Delaware River to process raw agricultural products into usable commodities. Sawmills processed the vast stands of timber cut down to create agricultural fields. Textile production, shipbuilding, iron manufacturing, pig iron production, printing, publishing, papermaking, and tanning were all significant industries in colonial Pennsylvania. These goods and products were transported on a burgeoning network of roads in addition to waterways such as the Delaware River and its many tributaries. The northeastern portion of Pennsylvania was more sparsely settled when compared to the southeastern portion. Farming was still the predominant occupation, but the rocky mountainous landscape meant that agriculture occurred more on a subsistence level. Other industry such as timber production rose to prominence in many areas.

Agriculture and agricultural-related industry remained dominant in the nineteenth century. In the southeastern part of the state, Philadelphia had become one of the most important Atlantic Coast cities and ports. Philadelphia’s position at the mouth of the Delaware River turned it into a vital port for the importation and exportation of goods. Vast numbers of ships carrying tons of merchandise docked in and set sail from Philadelphia. The iron industry slowly faded, giving way to western Pennsylvania’s production of steel. However, the rich coal fields bordering the eastern counties fueled the industrial revolution in eastern Pennsylvania and other cities, such as New York. The rise of the automobile in the twentieth century saw the increase of the tourism industry in northeastern Pennsylvania. The automobile granted the traveler more freedom to explore the vast countryside and scenic vistas of the northeastern counties.

### 3.2.2 Archaeological Sites

There are 36 historic and precontact archaeological sites that are either eligible for or listed in the National Register within the seven CREP counties (Table 3.2). Nine sites are located in Delaware County, three in Montgomery County, five in Bucks County, four in Lehigh County, 11 in Northampton County, three in Monroe County, and one in Pike County.

**Table 3.2. National Register-Eligible or Listed Archaeological Sites in the CREP Counties.**

COUNTY	NATIONAL REGISTER ELIGIBLE OR LISTED ARCHAEOLOGICAL SITES	COUNTY	NATIONAL REGISTER ELIGIBLE OR LISTED ARCHAEOLOGICAL SITES
Delaware	9	Montgomery	3
Bucks	5	Lehigh	4
Northampton	11	Monroe	3
Pike	1		
<b>TOTAL</b>			<b>36</b>

Source: PHMC-BHP 2013a

### 3.2.3 Historic Architectural Resources

Historic architectural resources in eastern Pennsylvania include a variety of building types and styles. Resources include town centers, parks, public buildings (court houses, town halls, etc.),

dwelling, main street districts, and historic residential neighborhoods; all are important resources to the communities and towns in which they exist. Due to the important role agriculture played, farmsteads (which included dwellings, barns, agricultural outbuildings, domestic outbuildings, farm lanes, and field patterns) are also important resources. Other less common resources include historic battlefields, industrial sites or complexes (mills, factories, etc.), and military installations that played a role in the history of eastern Pennsylvania. In addition, certain materials used in construction and/or architectural styles may be distinctive of a particular region of the state, such as Wissahickon Schist.

There are numerous historic architectural resources that are eligible for or listed in the National Register or are National Historic Landmarks (NHLs) within the CREP counties. While some of these properties are agricultural or rural in nature, many of them are districts and buildings located in towns, cities, and urbanized areas, which would likely be outside of CREP areas.

**Table 3.3. Properties Eligible for or Listed in the National Register and NHLs in the CREP Counties.**

COUNTY	NATIONAL REGISTER ELIGIBLE RESOURCES	NATIONAL REGISTER LISTED RESOURCES	NATIONAL HISTORIC LANDMARKS
Delaware	172	79	7
Montgomery	368	134	13
Bucks	285	144	13
Lehigh	137	50	1
Northampton	124	49	4
Monroe	61	20	0
Pike	28	23	3
<b>TOTAL</b>	<b>1,175</b>	<b>499</b>	<b>41</b>

Source: PHMC-BHP 2013c

### 3.2.4 Traditional Cultural Properties

A traditional cultural property is defined as a property that is eligible for or listed in the National Register because of its association with important cultural practices or beliefs that are rooted in a particular community's history and are essential in continuing the cultural identity of that community. A traditional cultural property must be from a culture or community that is still alive and active. Traditional cultural properties can be associated with any sociocultural group, ethnic group, Native American group, or the people of the nation as a whole. A traditional cultural property could be a location (landmark, mountain top, river, etc.) that holds important meaning in the traditional beliefs of a group about its origin or history. It could be a grouping of buildings or land use that reflects cultural traditions of a particular group. It could also be an urban community or neighborhood that is the traditional home of a particular group in which economic, artistic, or other practices have been carried out and are important in maintaining the group's beliefs and historic identity (Parker and King 1998).

There are very few traditional cultural properties that have been identified in eastern Pennsylvania and the PHMC does not maintain a list of them within the Commonwealth. There are no federally recognized Native American tribes in Pennsylvania. Existing federally recognized tribes with traditional ties to the DRB include the St. Regis Mohawk Tribe, Onondaga Nation, Delaware Nation, Seneca Nation, and the Shawnee Tribe.

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### 3.3 Water Resources

As applied to this analysis, water resources include surface water, groundwater, water quality, wetlands, and floodplains. The CWA, the Safe Drinking Water Act, and the Water Quality Act are the primary federal laws that protect the nation's waters, including lakes, rivers, aquifers, and wetlands. The DRB Commission (DRBC) is an interstate and federal water resource agency with responsibility and regulatory authority for planning and coordinating management of the shared waters in the DRB. Regulatory authority within the State of Pennsylvania rests with the PADEP.

#### 3.3.1 Surface Water

Surface water is all water stored and flowing above the surface of the ground, including rivers, streams, lakes, reservoirs, and ponds. Five of the seven CREP counties (Pike, Monroe, Northampton, Bucks, and Delaware counties) have the Delaware River as their eastern boundaries. Lehigh and Montgomery counties contain the two largest tributaries to the Delaware River: the Lehigh River and Schuylkill River, respectively.

The Delaware River extends 330 miles from its origin in Wayne County, Pennsylvania, to the mouth of the Delaware Bay. The river is fed by 216 tributaries, the largest being the Schuylkill and Lehigh rivers in Pennsylvania. The DRB encompasses approximately 13,500 square miles, with 50.3 percent (6,422 square miles) of the DRB's total land area in Pennsylvania. Over 90 percent of all water used in the DRB is obtained from surface waters (DRBC 2010). Recent statistics indicate that approximately 65 percent of water is used by utility and thermoelectric plants; 23 percent is used for public water supplies; and the remaining 11 percent of water use is for industry, mining, commercial, and agriculture (PADEP 2012b).

The watersheds of the DRB are separated into four main regions: Upper Region, Central Region, Lower Region, and Bay Region (DRBC 2008; Figure 3). The seven CREP counties include portions of the Upper, Central, and Lower regions of the DRB Watershed, as identified below.

Upper Region. Wayne and Pike counties include the headwaters of the Delaware River and contributing waters south to Milford, Pennsylvania. The East-West Branch subbasin covers the Wayne County area. Pike County includes portions of both the East-West Branch subbasin and the Neversink-Mongaup subbasin.

Central Region. The southern half of Pike County, Monroe County, and Lehigh County are part of the freshwater river and contributing watersheds in the central part of the Basin. Pike and Monroe counties are part of the Upper Central subbasin, Lehigh County is part of the Upper Central and Lehigh Valley subbasins, and the northern portion of Bucks County is in the Lower Central subbasin.

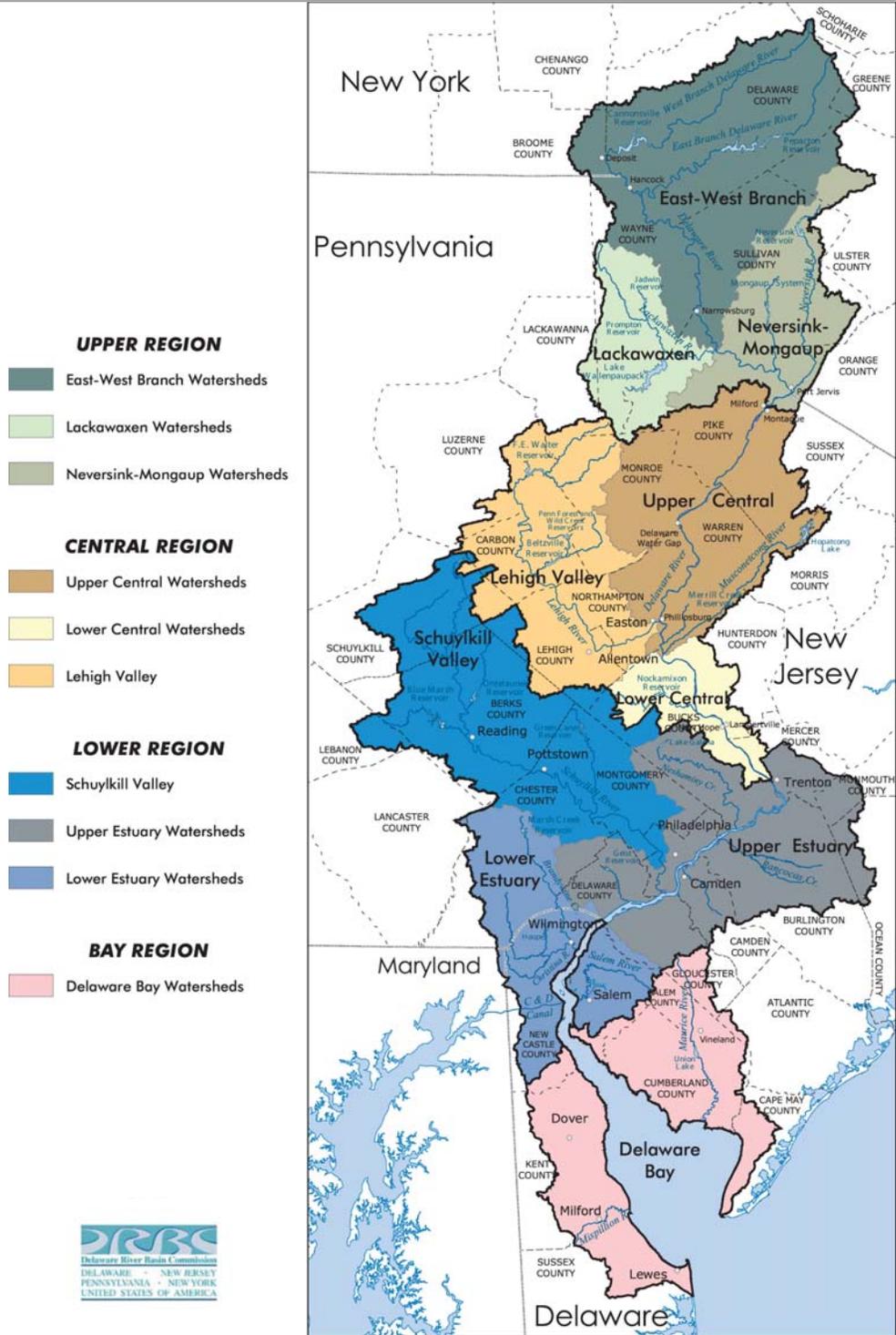
Lower Region. The Lower Region beginning at Trenton, New Jersey, and extending to the head of the Delaware Bay is the area subject to tidal flux. The remaining portions of the DRB CREP in Bucks and Delaware counties and all of Montgomery County are located in the Upper Estuary subbasin and Schuylkill Valley subbasins of the Lower Region.

Eight watersheds in the DRB were identified by DRBC and the U.S. Army Corps of Engineers (USACE) as having potential long-term sufficiency issues and requiring review by the Water

**Figure 3**

**Watersheds of the Delaware River Basin**

Implementation of the CREP for the Delaware River Basin  
Bucks, Delaware, Lehigh, Monroe, Montgomery, Northampton, and Pike Counties, Pennsylvania



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Management Advisory Committee. Only one of these watersheds, the Perkiomen Creek below the east branch in Montgomery County, is located in the DRB CREP area (DRBC 2010).

### 3.3.2 *Groundwater*

Groundwater is defined as the water that is stored in and moves through spaces in underground layers of soil, sand, and rock. Layers of rock and soil within the saturated zone that are capable of transmitting water in accessible amounts are called aquifers (The Groundwater Foundation 2009). Groundwater in Pennsylvania is a vast resource and is estimated to be more than twice as abundant as the amount of water that flows annually in the state's streams. Water supply is the primary use of groundwater in Pennsylvania (56 percent), followed by mining (20 percent), industry (19 percent), and agriculture (5 percent; Pennsylvania State University 2007).

From north to south, the DRB CREP area encompasses parts of several geologic provinces, including: the Appalachian Plateau Province, Ridge and Valley Province, New England Province, Piedmont Province, and a small portion of the Atlantic Coastal Plain Province (Figures 2 and 4). Aquifers within these provinces recharge at different rates depending on their bedrock geology. Aquifers of large yield occur in the northern Appalachian Plateau region, especially in glaciated valleys. The central Ridge and Valley section is characterized by consolidated-rock aquifers comprised of sandstone, shale, and carbonate rocks. The lower Piedmont region is underlain by sedimentary and crystalline rock characterized by smaller natural storage capacity. Piedmont streams generally have higher flood flows and lower baseflows than those of the Appalachian Plateau and Coastal Plain provinces.

The unconsolidated bedrock of the Atlantic Coastal Plain underlies the southernmost portion of the CREP area in southern Bucks County and Delaware County. This area has easily rechargeable aquifers made up of sands and gravels that are confined only by clay-based soils. This area is highly developed at Philadelphia and surrounding communities, so recharge is decreased due to the abundance of impervious surfaces.

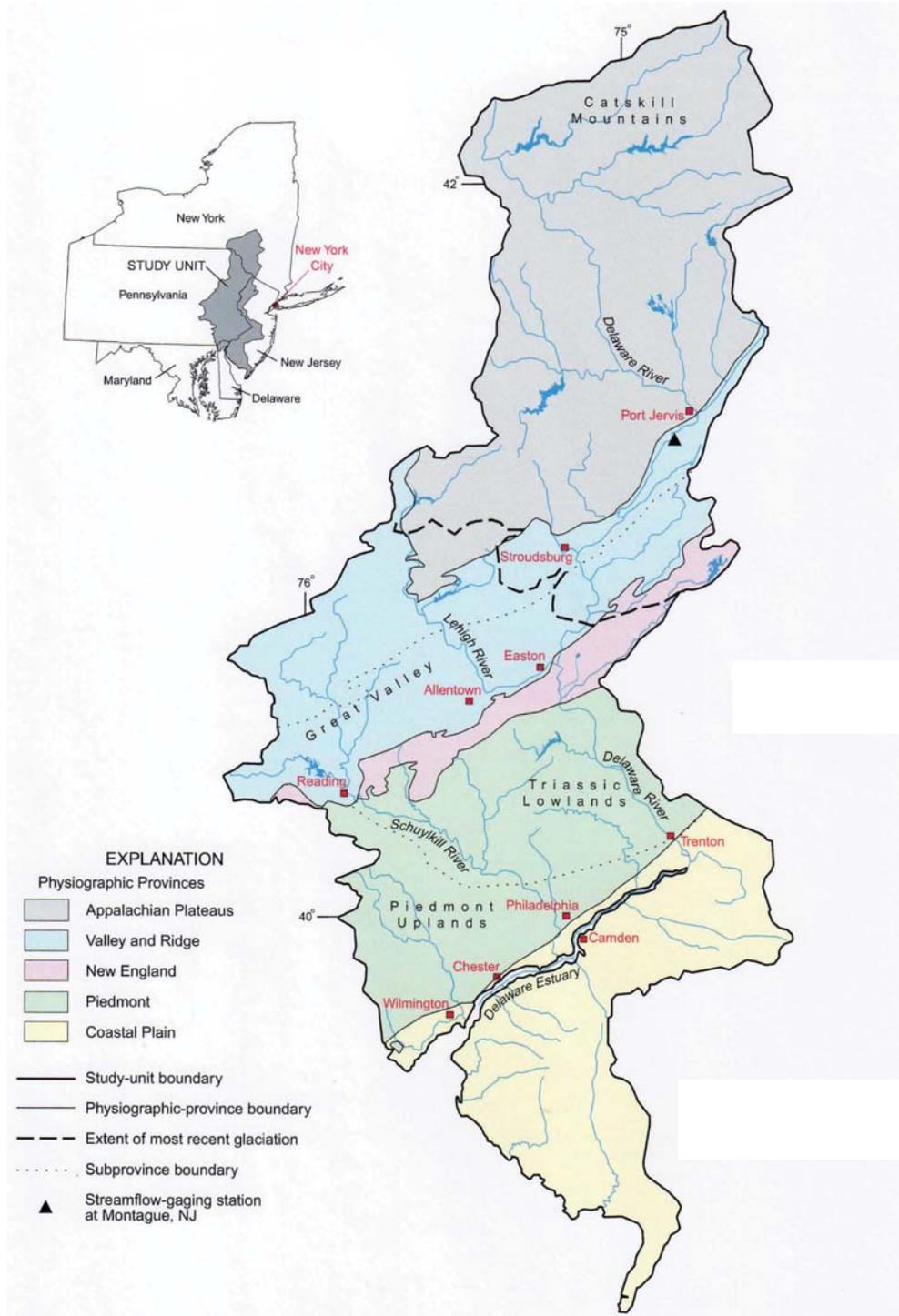
Sole Source Aquifers. Sole source aquifers are underground water sources that provide at least 50 percent of the drinking water consumed within the overlying area and where no economically feasible alternative drinking water source is available, which could replace the aquifer system (EPA 1988).

A sole source aquifer designation has been established for the New Jersey Coastal Plain Aquifer System. This aquifer lies beneath the New Jersey counties of Monmouth, Burlington, Ocean, Cumberland and Cape May, and portions of Mercer and Middlesex counties. In certain areas along the Delaware River, water use has caused a reversal in the normal discharge from the aquifer such that the Delaware River now recharges the New Jersey Coastal Plain aquifer. Based upon these conditions, the DRB must be regarded as a stream flow source zone (an upstream headwaters area that drains into a recharge zone) for the New Jersey Coastal Plain Sole Source Aquifer. Portions of five DRB CREP counties are included within the stream flow source zone of the New Jersey Coastal Plain Sole Source Aquifer System: Delaware, Bucks, Monroe, Northampton, and Pike counties.

Groundwater Protected Area (GWPA). The Southeastern Pennsylvania GWPA (SE-GWPA) is shown on Figure 5. The SE-GWPA covers 1,200 square miles and includes 127 municipalities.

# Figure 4 Physiographic Regions of the Delaware River Basin

Implementation of the CREP for the Delaware River Basin  
Bucks, Delaware, Lehigh, Monroe, Montgomery, Northampton, and Pike Counties, Pennsylvania



# Figure 5 Southeastern Pennsylvania Groundwater Protected Area within the Delaware River Basin

Implementation of the CREP for the Delaware River Basin  
Bucks, Delaware, Lehigh, Monroe, Montgomery, Northampton, and Pike Counties, Pennsylvania



The SE-GWPA includes portions of Bucks County and Montgomery County CREP areas. Within this special management area, DRBC has implemented more stringent regulations for groundwater withdrawal in response to negative impacts on groundwater levels from development (DRBC 2010).

### 3.3.3 Water Quality

Water quality in the DRB varies, with higher quality conditions generally in headwaters and non-tidal areas than in areas below the head of the tide. Many of the water quality issues in the DRB can be related to the high human population density and activities associated with urban, industrial, and agricultural land use (United States Geological Survey [USGS] 1999).

The 2012 DRBC Delaware River and Bay Water Quality Assessment provides the most recent water quality data. This assessment involves the comparison of several key water quality parameters with applicable DRBC water quality criteria and evaluates the extent to which waters of the Delaware River and Bay are attaining designated uses for aquatic life, drinking water supply, recreation, and fish consumption (DRBC 2012).

The Delaware River and Bay consists of non-tidal and tidal zones. The DRBC categorizes the non-tidal main stem into five Water Quality Management (WQM) Zones: 1A, 1B, 1C, 1D, and 1E. WQM Zones 2, 3, 4, 5, and 6 make up the tidal portion of the DRB (Figure 6). The DRB CREP covers all zones noted above, with the exception of Zones 5 and 6. Table 3.4 provides a summary of 2012 DRBC Water Quality Assessment results for Aquatic Life, Public Water Supply, Recreation, and Fish Consumption for the DRB CREP area.

**Table 3.4. CREP Area Water Quality Assessment.**

<b>WATER QUALITY MANAGEMENT ZONE</b>	<b>AQUATIC LIFE</b>	<b>DRINKING WATER</b>	<b>RECREATION</b>	<b>FISH CONSUMPTION</b>
1A	NS <sub>A</sub>	NS <sub>A</sub>	S	NS
1B	NS <sub>A</sub>	NS <sub>A</sub>	S	NS
1C	NS <sub>A</sub>	S	S	NS
1D	NS <sub>A</sub>	NS <sub>A</sub>	S	NS
1E	NS <sub>A</sub>	NS <sub>A</sub>	S	NS
2	NS <sub>A</sub>	NS <sub>A</sub>	S	NS
3	NS <sub>A</sub>	S	S	NS
4	NS <sub>A</sub>	N/A	ID/S	NS

Source: DRBC 2012

\* NS – Not Supported; ID - Insufficient Data; S – Supported; N/A - Not Analyzed; <sub>A</sub> - based on exceedance of criteria fewer than 10 percent of the time

Based on 2012 water quality data, significant reaches of the rivers and streams in the DRB are impacted by pollutants and do not support their designated uses. While primary contact recreation is supported in all zones of the Delaware River, fish consumption is not supported in any zone. Meaningful assessment is hindered by the requirement to assign a “not supporting designated use” criteria even where data shows less than 10 percent exceedance of quality standards (DRBC 2012).

**Figure 6**  
**Delaware River Water Quality Management Zones/Assessment Units**  
 Implementation of the CREP for the Delaware River Basin  
 Bucks, Delaware, Lehigh, Monroe, Montgomery, Northampton, and Pike Counties, Pennsylvania



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The CWA requires that states report on their quality of water. Under Section 303(d) of the CWA, PADEP develops a list of impacted state water bodies and establishes a TMDL for waters that do not achieve the applicable water quality standards for a designated use. A TMDL is the calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards.

Under Section 305(b) of the CWA, PADEP develops a water quality report that provides information about water quality conditions, sources, and causes of pollution; attainment of water quality standards; and designated use support (PADEP 2012b). PADEP assigns a Category 1 to 5 ranking, with Category 1 indicating waters attaining all designated uses and Category 5 indicating waters impaired for one or more designated uses by any pollutant. Those waters receiving a Category 5 designation require the development of a TMDL. Table 3.5 lists the impaired waters with an established TMDL in the DRB CREP area. The main sources of non-point runoff resulting in degraded water quality in Pennsylvania are agriculture, abandoned mine drainage, and urban runoff in metropolitan areas (PADEP 2010).

**Table 3.5. CREP Area Category 5 Waters.**

COUNTY	IMPAIRED WATERS	ASSESSMENT CATEGORY	TMDL
<b>Bucks</b>	Neshaminy Creek	PS, NPS	Sediment
	Southampton Creek	PS, NPS	Nutrients, sediment
<b>Delaware</b>	Delaware River Estuary	Fish Consumption	Chlordane, PCBs
	Goose Creek	PS, NPS	Nutrients
<b>Lehigh</b>	Little Cedar Creek	NPS	Sediment
<b>Monroe</b>	Lehigh River	AMD	Metals, pH
<b>Montgomery</b>	Glanraffan Creek	NPS	Metals, sediment
	Green Lane Reservoir	NPS	Organic enrichment, low DO
	Indian Creek	PS, NPS	TDS, siltation, nutrients
	Neshaminy Creek	PS	Phosphorus, siltation, sediment
	Schuylkill River (main)	Fish Consumption	PCBs
	Skippack Creek	PS, NPS, Aquatic Life	Siltation, nutrients, channelization
	Southampton Creek	Aquatic Life	Siltation, nutrients, channelization
	Trout Creek	PS	None established
	Valley Creek Basin	Fish Consumption	PCBs
	Wissahickon Creek	PS, NPS	Nutrients, siltation
<b>Northampton</b>	Waltz Creek	Aquatic life	Metals, siltation

PS - Point Source; NPS - Non-Point Source; AMD - Acid Mine Drainage; DO - Dissolved Oxygen; TDS - Total Dissolved Solids; PCB - Polychlorinated Biphenyls

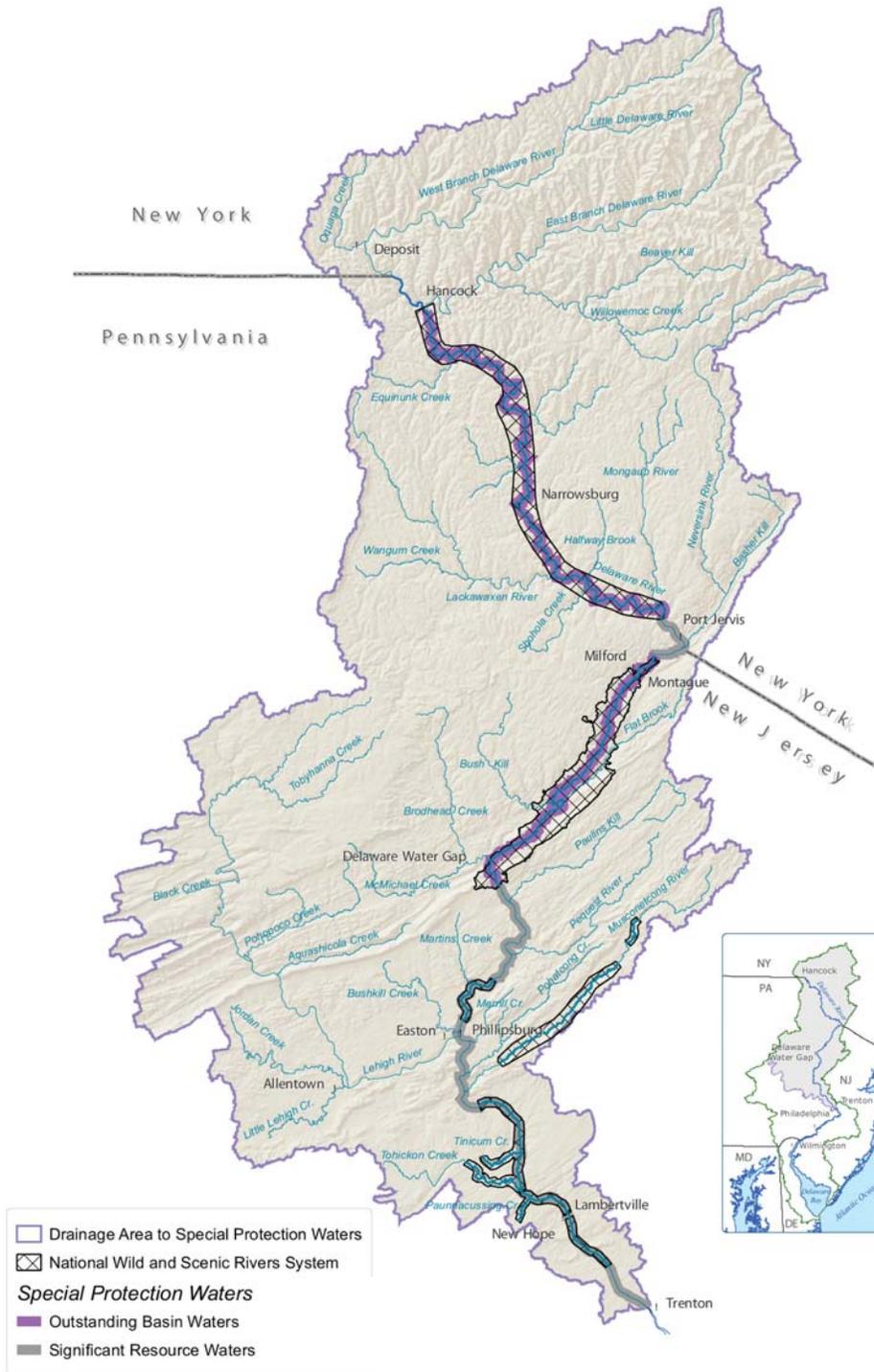
The entire 197-mile non-tidal Delaware River is protected by Special Protection Waters (SPW) anti-degradation regulations. SPW regulations address point source discharges as well as non-point source pollutant loadings carried by runoff to protect existing high quality in areas of the DRB. Figure 7 shows the SPW areas. This designation incorporates National Wild and Scenic River Systems, State Recreational Rivers, High Quality and Exceptional Value Waters, and Class A Wild Trout Waters.

### 3.3.4 Wetlands

Wetlands are defined by the USACE as areas that are inundated and saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil

# Figure 7 Special Protection Waters of the Delaware River Basin

Implementation of the CREP for the Delaware River Basin  
Bucks, Delaware, Lehigh, Monroe, Montgomery, Northampton, and Pike Counties, Pennsylvania



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conditions (USACE 1987). Wetlands are transitional zones between terrestrial and aquatic systems where the land is covered by shallow water or the water table is at or near the surface of the ground. Wetlands filter excess nutrients, sediment, and toxic materials from agricultural runoff before discharging to waterways. Additionally, water is trapped in wetlands and slowly released over floodplains, buffering uplands from storm surges (EPA 2006).

The USFWS provides information on the location, type, and status of the nation’s wetlands through the National Wetlands Inventory (NWI). There are two general categories of wetlands: coastal (including estuaries) and inland (including rivers, lakes, and riparian areas). According to the NWI, there are 67,900 acres of wetlands in the proposed CREP area counties. Wetland and riverine wetland acreages are listed by county in Table 3.6 (Tiner 1990).

**Table 3.6. CREP Area – Wetlands Acreage.**

COUNTY	RIVERINE WETLANDS	TOTAL WETLANDS
Bucks	4,676	10,144
Delaware	3,365	1,582
Lehigh	767	1,534
Monroe	843	24,872
Montgomery	1,809	3,493
Northampton	1,729	2,943
Pike	2,029	23,336
<b>TOTAL</b>	<b>15,218</b>	<b>67,900</b>

Wetlands are most abundant in the glaciated portions of northeastern and northwestern Pennsylvania. Crawford, Mercer, Erie, Monroe, Pike, Wayne, and Luzerne counties contain 40 percent of the Commonwealth’s wetlands. Pike and Monroe counties located within the CREP area have the highest percentages of land covered by wetlands with 6.7 percent and 6.4 percent, respectively (PADEP 2010).

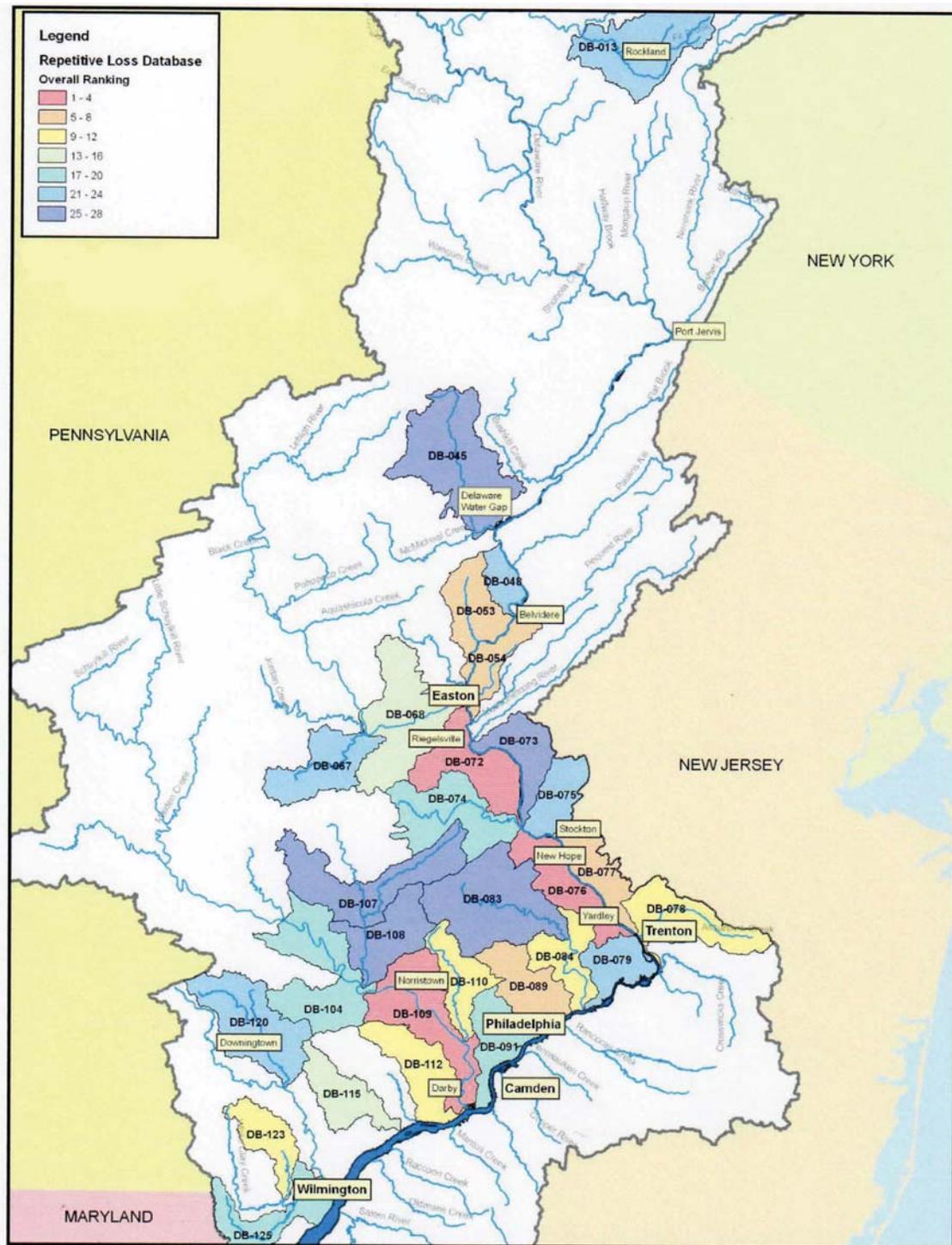
Riverine wetlands are associated with running water systems found along rivers, creeks, and drainageways and have a defined channel and floodplain. Overbank flow from the stream exerts considerable influence on the hydrology of larger streams. Riverine wetlands include freshwater marshes, bottomland hardwood forest, and riverine swamp forest.

### 3.3.5 Floodplains

All waterways from small creeks to major rivers have a riparian zone or floodplain. Floodplains are those riparian areas close to riverine channels that become inundated during flooding. Floodplains are essential for maintaining bank stability, water quality protection, and absorptive capacity of floodplain soils; reducing stream flow velocities; and providing flood storage. Disturbance of floodplain vegetation destabilizes the banks of surface water channels, which leads to increased erosion and sedimentation and exacerbates the intensity and frequency of flooding. The loss of vegetation adjacent to surface waters also reduces filtration of stormwater runoff, thus degrading the quality of these waters. Floodplains also provide habitat for plant and animal species, recreational opportunities, and aesthetic benefits.

The DRB has a long history of flooding dating back to the late 1800s. Land use activities have increased the runoff from watersheds and changed the hydraulics of the floodplain itself. Figure 8

**Figure 8**  
**Highest Repetitive Flood Loss Rankings in the Delaware River Basin**  
 Implementation of the CREP for the Delaware River Basin  
 Bucks, Delaware, Lehigh, Monroe, Montgomery, Northampton, and Pike Counties, Pennsylvania



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shows the DRB watershed basins, which have undergone repetitive and severe repetitive flood loss (USACE 2008).

Floodplain management recommendations of the DRB Interstate Flood Mitigation Task Force include the preservation and restoration of floodplains in the DRB (DRBC 2007). Implementation of the DRB CREP will serve to address the Task Force recommendation for preserving and restoring floodplains.

### 3.3.6 Coastal Zones

The federal Coastal Zone Management Act (CZMA) defines the coastal zone as:

the coastal waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each other and in proximity to the shorelines of the several coastal states, and includes islands, transitional and intertidal areas, salt marshes, wetlands, and beaches. (16 USC 1451)

Pennsylvania's coastal zone boundaries include those waters, wetlands, and uplands that are hydrologically connected within a watershed (National Oceanic and Atmospheric Administration [NOAA] 2011).

One of two Coastal Zone Management (CZM) areas in the State of Pennsylvania is located within the DRB CREP area. Extending 57 miles along the tidal Delaware River from Marcus Hook in Delaware County to Morrisville in Bucks County, the CZM area contains 35,325 acres (96.3 square miles). The boundary of the Delaware Estuary coastal zone varies from 0.125 mile wide in urban areas such as Philadelphia, Chester, and Bristol, to over 3.5 miles in Falls Township, Bucks County. The coastal zone includes floodplains of the Delaware and Schuylkill rivers and the upper limit of tidal influence on their tributaries, as well as tidal and freshwater wetlands. The coastal zone extends eastward to the border with New Jersey in the middle of the Delaware River (PADEP 2002).

The Pennsylvania CZM program is administered by PADEP and provides grants for projects that improve water quality, enhance coastal resources, and mitigate the adverse impacts of stormwater runoff and non-point source pollution. Areas requiring special management may be either designated or nominated as a Geographic Area of Particular Concern (GAPC). Delaware River coastal wetlands and coastal floodplains are "designated" GAPCs based upon their high importance (PACRMP 2008).

Consistent with the objectives of CREP, PA CZMA policies place a high priority on the protection, enhancement, and creation of coastal wetlands and coastal floodplains. The 2011 CZMA assessment report identified the most severe and extensive threats to coastal wetlands to include: development/fill, alteration of hydrology, exotic species, and loss of wetland buffers. The former extent of tidal wetlands in the DRB was quite substantial (6,400 to 12,800 total vegetated and non-vegetated acres); today, only 2 to 5 percent of Pennsylvania's former tidal wetlands remain (PADEP 2011). The forested buffers and transition zones do not have regulatory protection. Therefore, the CRMA program places a high priority on their protection. CZMA policy areas of high importance also include: coastal hazard areas, dredging and spoil disposal, fisheries management, public access for recreation, historic sites and structures, port

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activities, energy facility siting, intergovernmental coordination, public involvement, and ocean resources.

### **3.4 Earth Resources**

Five Major Land Resources Areas (MLRA) are recognized within the DRB CREP area. MLRAs are geographically associated land resources defined by features including physiography, geology, climate, water, soils, and biological resources (USAD-NRCS 2006). MLRA 140, the Glaciated Allegheny Plateau and Catskill Mountains, includes portions of Pike and Monroe counties; MLRA 144A - New England and Eastern New York Upland, Southern Part is present in parts of Northampton County; MLRA 147 Northern Appalachian Ridges and Valleys includes parts of Northampton and Lehigh counties; MLRA 148 Northern Piedmont includes all of Bucks and Montgomery counties, and a small portion of MLRA 149A Northern Coastal Plain is present along the Delaware River. The soil resources of each resource area are described below.

#### *3.4.1 Soils*

Soils in MLRA 140. The dominant soil order in this MLRA is Inceptisols. The soils in the area dominantly have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed mineralogy. They are shallow to very deep, well drained to very poorly drained, and loamy or loamy-skeletal. Dystrudepts (Arnot, Lordstown, and Oquaga series) formed in till on hills and dissected plateaus. Fragiudepts (Bath, Lackawanna, Mardin, Swartswood, Wellsboro, and Wurtsboro series) and Fragiaquepts (Chippewa, Morris, Norwich, and Volusia series) formed in till (dense till in some areas) on hills and till plains.

Soils in MLRA 144A. The dominant soil orders in this MLRA are Entisols, Histosols, and Inceptisols. The soils in the area dominantly have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed mineralogy. They are generally very deep, somewhat excessively drained to poorly drained, and loamy or sandy. The MLRA was affected by early periods of glaciation, and many soils formed in very deep, highly weathered till. The dominant soils in this part of the MLRA are Hapludalfs (Washington, Gladstone, Parker, and Allenwood series) and Fragiudults (Califon series) or Fragiudalfs (Clarksburg) and Fragiaquults (Cokesbury). Areas of Gladstone, Allenwood, and Parker soils on hills have high EI values.

Soils in MLRA 147. The dominant soil orders in this MLRA are Inceptisols, Ultisols, and Alfisols. The soils in the area have a mesic soil temperature regime, a udic soil moisture regime, and mixed or siliceous mineralogy. They are shallow to very deep, generally excessively drained to moderately well drained, and loamy or clayey. Steep and very steep, shallow to very deep, well-drained, medium-textured Dystrudepts (Berks, Calvin, Dekalb, Hazleton, and Weikert series) are on the side slopes and ridges of mountains. Nearly level to sloping, very deep, well-drained, medium-textured to fine-textured Hapludalfs (Hagerstown and Duffield) are in limestone valleys. Gently sloping or sloping, deep and very deep, well-drained and moderately well-drained, medium-textured to fine-textured Hapludults (Allenwood, Bedington, and Murrill series) and Fragiudults (Buchanan and Laidig series) are on the lower footslopes of the ridges and in the valleys. Most of these soils formed in residuum or colluvium derived from limestone (some of which is cherty), sandstone, or shale. Nearly level to gently sloping, very deep, well-drained to poorly drained, medium-textured to fine-textured soils (Brinkerton, Holly, and Middlebury series) formed in alluvium on floodplains along drainageways. Areas of Allenwood,

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Bedington, Hagerstown, Duffield, and Berks have high EI values. Areas of Holly and Brinkerton along streams are suited for riparian buffers.

Soils in MLRA 148. The dominant soil orders in this MLRA are Alfisols, Inceptisols, and Ultisols. The soils have a mesic soil temperature regime; a udic soil moisture regime; and mixed, micaceous, or kaolinitic mineralogy. They are moderately deep to very deep, moderately well drained to somewhat excessively drained, and loamy or loamy-skeletal. Hapludalfs (Duffield, Neshaminy, and Penn series) and Dystrudepts (Manor series) formed in residuum on hills. Fragiudalfs (Readington series) formed in residuum on footslopes and in drainageways. Hapludults (Chester, Gladstone, and Glenelg series) formed in residuum on hills, upland divides, and ridges. Fragiudults (Glenville series) formed in colluvium or residuum on hills. Glenelg, Manor, and Gladstone soils from schist and gneiss are the major soils, with some Neshaminy and Lehigh soils on the diabase hills. These soils are on rolling, hilly landscapes and are erodible. The red shale Readington, Penn, Reaville, Abbottstown, and Croton soils predominate within the Triassic Basin part of MLRA 148. They are highly erosive.

Soils in MLRA 149A. Much of MLRA 149A has been urbanized and developed. Small areas of Alton, Delaware, and Matapeake soils exist within larger areas of altered soils.

#### *3.4.2 National Natural Landmarks*

There are two National Natural Landmarks (NNL) within the DRB CREP area: the Monroe Border Fault and Tannersville Cranberry Bog. The Monroe Border Fault is located in Bucks County and illustrates an episode of orogenic compression in which Precambrian rocks were thrust northward over lower Paleozoic deposits. The Tannersville Cranberry Bog is located in Monroe County, and is recognized as one of the best developed boreal bogs in Pennsylvania and possibly the most southern black spruce-tamarack bog along the Eastern Seaboard (NPS 2012a).

### **3.5 Recreational Resources**

Recreational resources are those activities or settings either natural or manmade that are designated or available for recreational use by the public. In this analysis, recreational resources include lands and waters utilized by the public for hunting, fishing, hiking, birding, canoeing, and other water sports and related activities.

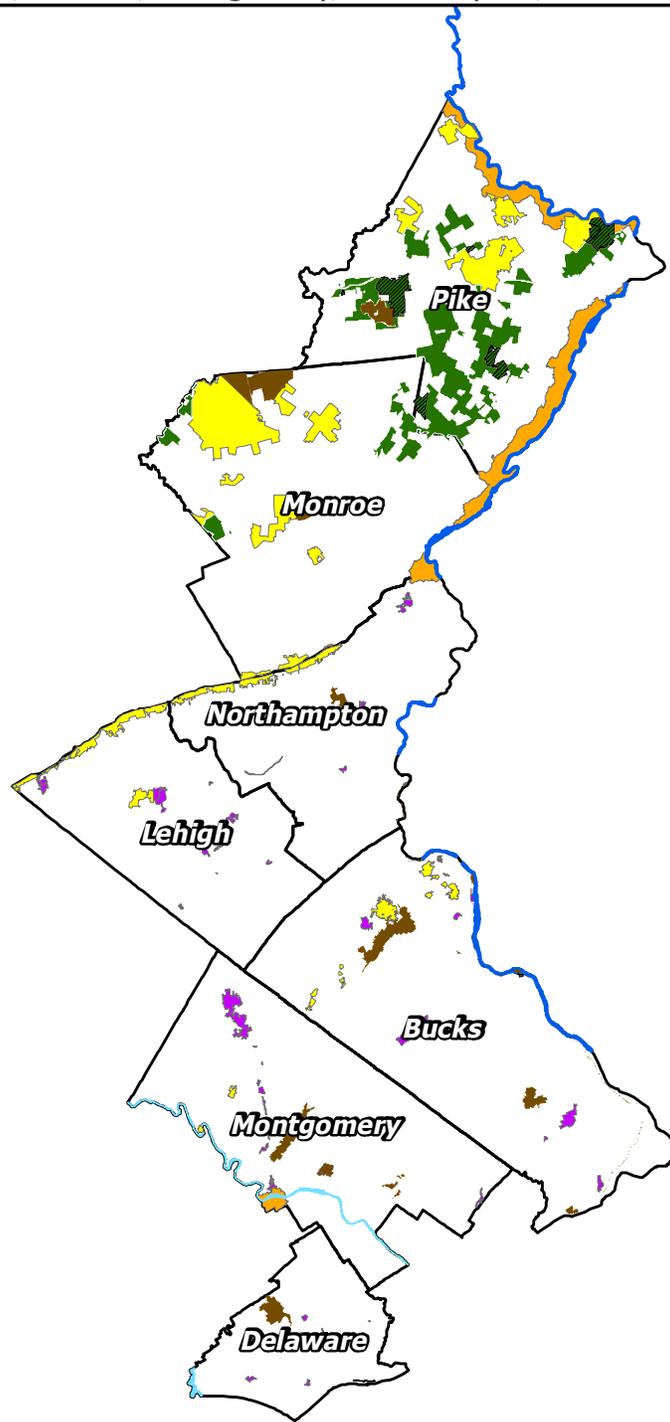
Because the lands that could be enrolled in CREP are privately held, access to these lands for recreational activities is controlled by landowners. However, in the proposed CREP area there are numerous public lands available for recreation. There are nine state forests, 81,685 acres of state gamelands, three national parks, and 15 state parks in the proposed CREP area (Figure 9). There are three sections of the Delaware River that are listed as National Wild and Scenic Rivers in the CREP area: Upper Delaware River, Middle Delaware River, and Lower Delaware River. This designation, in part, reflects the outstanding recreational value of the river. River activities include canoeing, kayaking, boating, tubing, rafting, scuba diving, snorkeling, swimming, and hunting waterfowl. These public lands provide recreational activities such as hunting, hiking, camping, fishing, biking, and backpacking. Hunting and fishing require state-issued licenses for both public and private lands.

**Figure 9**

**Parks and Public Lands in the Proposed Delaware River Basin CREP Area**

Implementation of the CREP for the Delaware River Basin

Bucks, Delaware, Lehigh, Monroe, Montgomery, Northampton, and Pike Counties, Pennsylvania



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- State Wild and Natural Areas
- State Parks
- State Forests
- State Gamelands
- State Scenic Rivers
- National Scenic Rivers
- National Parks
- County Parks

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A discussion of the economic impacts of hunting, fishing, and other recreational activities can be found in Sections 3.6 and 4.6. Game species are discussed in Sections 3.1 and 4.1, and water quality is discussed in Sections 3.3 and 4.3.

### **3.6 Socioeconomics and Environmental Justice**

For this analysis, socioeconomics includes investigations of population demographics, employment and income, farm production expenses and returns, agricultural land use, and recreation spending.

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* requires a federal agency to:

make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high human health or environmental effects of its programs, policies, and activities on minority populations and low income populations. (EO 12898)

A minority population can be defined by race, ethnicity, or a combination of the two classifications. According to the CEQ, a minority population can be described as being composed of the following groups: American Indian or Alaska Native, Asian or Pacific Islander, Black, not of Hispanic origin, or Hispanic; and exceeding 50 percent of the population in an area or in which the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population (CEQ 1997). The U.S. Census Bureau (USCB) defines ethnicity as either being of Hispanic origin or not being of Hispanic origin. Hispanic origin is further defined as “a person of Cuban, Mexican, Puerto Rican, South or Central America, or other Spanish culture or origin regardless of race” (USCB 2001). Every year the USCB defines the national poverty thresholds, which are measured in terms of household income and are dependent upon the number of persons within the household. Individuals falling below the poverty threshold are considered low-income individuals. USCB census tracts, in which at least 20 percent of the residents are considered poor, are known as *poverty areas* (USCB 1995). When the percentage of residents considered poor is greater than 40 percent, the census tract is considered an *extreme poverty area*.

#### *3.6.1 Demographic Profile and Environmental Justice*

The total population within the DRB CREP exceeded 2.8 million people in 2010 (USCB 2010). Demographically, the DRB CREP population was 82 percent White, 9 percent Black or African American, 0.2 percent Native American or Alaska Native, 3.3 percent Asian, 0.01 percent Native Hawaiian or Pacific Islander, 3.3 percent some other race, 2.2 percent two or more races, and 1 percent Hispanic (USCB 2010). The total minority population within the DRB CREP was 73,325, or 25 percent of the total DRB CREP population (USCB 2010). The DRB CREP is not a location with a concentrated minority population.

Table 3.7 shows the principal operators of the farms in the DRB CREP by race. The total minority percentage of principal operators within the DRB CREP is 2.7 percent (USDA 2007).

**Table 3.7. Principal Operator by Race, 2007.**

COUNTY	WHITE	BLACK OR AFRICAN AMERICAN	ASIAN	AMERICAN INDIAN OR ALASKA NATIVE	NATIVE HAWAIIAN OF OTHER PACIFIC ISLANDER	MORE THAN ONE RACE	ALL OPERATORS OF SPANISH, HISPANIC OR LATINO ORIGIN
<b>Bucks</b>	1,390	8	6	1	0	3	23
<b>Delaware</b>	119	1	0	0	0	0	0
<b>Lehigh</b>	773	0	1	6	0	7	2
<b>Monroe</b>	532	0	0	0	0	0	14
<b>Montgomery</b>	1064	2	2	0	1	6	6
<b>Northampton</b>	752	1	4	4	0	3	8
<b>Pike</b>	86	0	0	0	0	0	0

Source: USDA 2007

While some counties in Pennsylvania are expected to decrease in population between 2010 and 2030, the counties within the DRB CREP are expected to increase. This population increase puts pressure on farmland as the increased population requires an increase in housing. Between 1978 and 2007, 734,417 acres of farmland in Pennsylvania have been lost, and the average size of farms has decreased from 152 acres in 1978 to 124 in 2007 (USDA 2007). Table 3.8 shows the populations in 2000 and 2010 and the projected population in 2030 for Pennsylvania and the counties within the DRB CREP. Pike County is expected to see the largest percentage increase in population (64.5) percent.

**Table 3.8. Population Growth 2000 to 2030.**

COUNTY	POPULATION 2000	POPULATION 2010	PROJECTED POPULATION 2030	PERCENT CHANGE BETWEEN 2010 AND 2030 (%)
<b>Pennsylvania</b>	12,281,054	12,702,379	13,190,400	3.8
<b>Bucks</b>	597,635	625,249	697,961	11.6
<b>Delaware</b>	550,864	558,979	583,942	4.5
<b>Lehigh</b>	312,090	349,497	381,738	9.2
<b>Monroe</b>	138,687	169,842	239,824	41.2
<b>Montgomery</b>	750,097	799,874	888,265	11.1
<b>Northampton</b>	267,066	297,735	342,081	14.9
<b>Pike</b>	46,302	57,369	94,374	64.5

Source: USBC 2000 and 2010; PA State Data Center 2008

### 3.6.2 Income and Poverty

The American Community Survey 2007 to 2011 was used for all economic data below. Median household income from 2007 to 2011 was \$64,195 for the DRB CREP area. The highest median household income occurred in Montgomery County (\$78,446) and the lowest median household income occurred in Lehigh County (\$54,312; USCB 2010). The average poverty rate for the DRB CREP from 2007 to 2011 was 8.9 percent (USCB 2010). The 2007 to 2011 poverty rate varied from a high of 12.3 percent in Lehigh County to a low of 5.2 percent in Bucks County (USCB 2010). The DRB CREP area would not be considered a poverty area.

### 3.6.3 Farm Demographics

In Pennsylvania, there are over 63,000 farms, 4.9 percent of which are in the DRB. Table 3.9 lists the hired farm and contract labor costs per county within the DRB CREP area and the total production costs.

**Table 3.9. Farm Labor as a Percentage of Total Production Expenses.**

AREA	2007			2002		
	HIRED FARM LABOR (\$000)	CONTRACT LABOR (\$000)	TOTAL PRODUCTION EXPENSES (\$000)	HIRED FARM LABOR (\$000)	CONTRACT LABOR (\$000)	TOTAL PRODUCTION EXPENSES (\$000)
<b>Pennsylvania</b>	590,891	62,941	4,909,109	443,050	35,792	3,614,072
<b>Bucks</b>	13,864	2,113	67,272	11,609	757	72,025
<b>Delaware</b>	3,090	(D)	9,524	1,595	78	5,568
<b>Lehigh</b>	10,596	(D)	70,023	8,013	(D)	46,001
<b>Monroe</b>	1,581	30	9,459	838	108	7,400
<b>Montgomery</b>	7,967	469	36,971	8,245	190	33,237
<b>Northampton</b>	2,437	98	26,846	2,485	(D)	22,082
<b>Pike</b>	710	(D)	3,374	476	0	1,715

Source: USDA 2007

(D) information withheld to avoid disclosing data for individual farms

Table 3.10 lists the average value of land and buildings and the average value of machinery and equipment per farm within each of the counties within the DRB CREP area and the average dollar value per acre of land in the DRB CREP area.

**Table 3.10. Average Value Per Farm of Land, Buildings, Machinery, Equipment, and Per Acre of Land.**

COUNTY	AVERAGE SIZE OF FARM (ACRES)	AVERAGE VALUE OF LAND AND BUILDINGS (\$000)	AVERAGE VALUE OF MACHINERY AND EQUIPMENT (\$000)	AVERAGE DOLLAR VALUE PER ACRE OF LAND (\$)
<b>Bucks</b>	81	808,476	81,015	9,951
<b>Delaware</b>	55	718,736	66,447	13,020
<b>Lehigh</b>	164	963,477	112,524	5,874
<b>Monroe</b>	84	590,756	53,463	7,069
<b>Montgomery</b>	58	584,297	53,301	10,025
<b>Northampton</b>	140	854,282	89,758	6,083
<b>Pike</b>	511	849,318	55,728	1,664

Source: USDA 2007

In 2007, the DRB CREP area contained 332,000 acres of farmland. Table 3.11 lists the acreage for different agricultural land uses in 2007. In 2002, 5,435 acres within the DRB CREP area were enrolled in either the CRP or Wetlands Reserve Program (WRP; USDA 2007). In 2007, enrollment decreased to only 2,669 acres, accounting for 0.008 percent of active agricultural lands (USDA 2007).

**Table 3.11. Agricultural Land Use Class by County.**

<b>COUNTY</b>	<b>LAND IN FARMS</b>	<b>CROPLAND ACRES</b>	<b>PASTURE ACRES</b>	<b>HAYLAND ACRES</b>	<b>CRP, WETLANDS RESERVE 2007</b>	<b>CRP, WETLANDS RESERVE 2002</b>
<b>Bucks</b>	75,883	58,012	9,048	17,386	1003	1311
<b>Delaware</b>	4,361	1,646	986	N.A.	80	(D)
<b>Lehigh</b>	84,643	72,737	4,031	9,890	419	803
<b>Monroe</b>	29,165	14,308	2,672	4,438	135	705
<b>Montgomery</b>	41,908	28,563	8,388	9,401	677	1336
<b>Northampton</b>	68,252	58,903	4,553	11,407	385	1280
<b>Pike</b>	27,569	2,908	715	820	0	(D)
<b>TOTAL</b>	<b>331,781</b>	<b>237,077</b>	<b>30,393</b>	<b>53,342</b>	<b>2,669</b>	<b>5,435</b>

Source: USDA 2007

(D) information withheld to avoid disclosing data for individual farms

### *3.6.4 Recreational Values*

The Center for Rural Pennsylvania (CFRP) found that recreational activities associated with wildlife contributed significant amounts to the economic activities of Pennsylvania. CFRP estimated that from the 1995 to 1996 activity year, hunting activities in Pennsylvania created \$4.8 billion in economic activity, while fishing accounted for \$4.7 billion. Wildlife viewing activities during this period were estimated to have generated approximately \$860 million (CFRP 1998). Additionally, CRP enrollments in the Northeast, where per-acre benefits exceed costs, are very beneficial. Research shows that the estimated annual non-market benefit to wildlife is \$47.50 per acre for the Northeast (Hansen 2007).

The Delaware River is designated as a National Wild and Scenic River for much of its length within the DRB CREP region. This designation, in part, reflects the outstanding recreational value of the river. River activities include canoeing, kayaking, boating, tubing, rafting, scuba diving, snorkeling, swimming, and hunting waterfowl.

Other recreational activities available on public and private lands throughout the DRB CREP region include photography, wildlife viewing, birdwatching, picnicking, hunting for both small and big game, and hiking/cross-country skiing. Camping at both primitive and developed commercial campgrounds, fall foliage viewing, resorts, downhill skiing, geocaching, scientific research, eagle watching, education activities, and ranger-led activities are also popular. Experienced commercial outfitters provide canoe, kayak, and raft rentals, as well as transportation between access points. Guided trips are also available. Commercial fishing guides provide guided fishing trips for both warm and cold water fish species (NPS 2012b).

## *4.0 Environmental Consequences*

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## 4.0 ENVIRONMENTAL CONSEQUENCES

### 4.1 Biological Resources

#### 4.1.1 *Alternative A: No Action*

If the No Action Alternative is selected, the proposed CREP would not be implemented. Lands that would have been eligible for enrollment would remain in agricultural production. The use of marginal land for agriculture would continue to add to the stresses on wildlife and their habitats, reducing opportunities for buffers between agricultural uses and natural habitats. The opportunity to establish 3,000 acres of grassland habitat and 4,000 acres of wetland and riparian buffers within the DRB would be lost. The runoff of agricultural chemicals, animal wastes, and sediment from agricultural practices on HEL would continue to degrade water quality and thus degrade habitat for native aquatic plants and animals.

#### 4.1.2 *Alternative B: Preferred*

Vegetation. Native vegetation could be enhanced or restored with the implementation of CREP CPs in the DRB, particularly the establishment of permanent native grasses (CP2), permanent wildlife habitat (CP4D), riparian forested stream buffers (CP22), wetland restoration (CP23), wildlife habitat buffer (CP29), marginal pastureland wetland buffer (CP30), and habitat buffer for upland birds (CP33). Many of these practices present the opportunity for the establishment of permanent, native plant communities on acreage that has recently been in cultivation or pasture. Establishment of plant communities from agricultural fields can also provide an opportunity for the spread of noxious weeds and exotic, invasive plant species. Management of acreage enrolled in CPs will help to control these undesirable species. During establishment, the spot-spraying of herbicides and targeted mowing may be used to encourage growth of beneficial plants and control undesirable species. Common beneficial and noxious weed and invasive plant species are listed in Table 4.1.

**Table 4.1. Common Beneficial and Noxious Weed and Invasive Plant Species.**

<b>BENEFICIAL PLANTS</b>	<b>NOXIOUS AND INVASIVE PLANTS</b>
asters	<b>NOXIOUS</b>
blackberries	Canada thistle
blue vervain	multiflora rose
boneset	purple loosestrife
buttercups	<b>INVASIVE</b>
common mullein	autumn olive
common ragweed	bindweed
daisies	common reed ( <i>Phragmites</i> )
daisy fleabane	garlic mustard
dogbane	honeysuckles
goldenrods	Japanese barberry
ironweeds	Japanese hops
Joe Pye weed	Japanese knotweed
milkweeds	Japanese stiltgrass
Queen Anne's lace (wild carrot)	morning glory
raspberries	reed canarygrass
rushes	spotted knapweed
sedges	tall fescue

<b>BENEFICIAL PLANTS</b>	<b>NOXIOUS AND INVASIVE PLANTS</b>
smartweeds	tree-of-heaven ( <i>Alanthus</i> )
sumacs (native)	
sunflowers	

Source USDA-NRCS 2007b

The establishment of vegetation on the targeted lands, such as HEL and lands within 180 feet of waterways, will also help to control soil erosion and allow the soil resource to be restored, benefiting the future establishment of native plant communities.

Terrestrial and Aquatic Wildlife. Terrestrial and aquatic wildlife would benefit from the implementation of CREP CPs in the DRB, particularly the establishment of permanent native grasses (CP2), permanent wildlife habitat (CP4D), wildlife food plots (CP12), shallow water areas for wildlife (CP9), riparian forested stream buffers (CP22), wetland restoration (CP23), wildlife habitat buffer (CP29), marginal pastureland wetland buffer (CP30), and habitat buffer for upland birds (CP33). Wildlife benefits from a diversity of interspersed plant communities such as those created with the proposed CPs. The CPs would provide for increased food, nesting, and cover resources for a variety of common wildlife species. The DRB CREP includes specific goals for the restoration and establishment of 4,000 acres of wetland and riparian habitat.

IBAs and IMAs that support significant species and communities of birds and mammals in the DRB counties may benefit from the enrollments of acreage into the CREP and the resultant implementation of CPs.

Certain CPs are targeted for once common species that are threatened due to declining habitat, specifically grassland birds. The proposed CPs would restrict mowing from April 1 to July 31 on enrolled acreage once established and provide for rotation mowing after July 31, allowing one-third of a field to be mown each year. The PGC would provide incentive payments to DRB CREP participants for the planting of native grasses on 3,000 acres of eligible lands. Grassland bird species would benefit from the increase of 3,000 acres of available nesting habitat.

Conversion of agricultural lands into food plots and habitat buffers may enhance the existing habitat in some locations, however these food plots are less than 1 percent of the CREP enrollment. For white-tailed deer, conversion of agricultural fields to CREP will result in reduced availability of food sources and therefore carrying capacity. Crop damage from white-tailed deer and other wildlife continues to be a challenge for farmers and changes in hunting seasons, and limits (regulated by the PGC) are being implemented and monitored to determine effectiveness in managing populations. The Agricultural Deer Control Permit Program allows for a special regulation area in southeastern Pennsylvania where significant damage occurs due to deer. The Deer Management Assistance Program (DMAP) provides assistance to landowners whose lands are impacted by deer over-browsing or who have specific deer management goals. Permits allow landowners to manage antlerless deer for specific land areas. Through the DRB CREP, the PGC would commit two biologists to provide technical assistance to landowners in the management of these CPs on their lands.

Aquatic biodiversity in the DRB CREP waterways and downstream reaches would benefit from reduced nutrient and sediment loading to surface waters from agricultural activity. In particular,

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establishment of grass waterways (CP8A), contour buffer strips (CP15A), filter strips (CP21), riparian buffers (CP22), wetland restoration (CP23), and marginal pastureland wetland buffers (CP30) would enhance aquatic biodiversity through improved water quality.

Threatened and Endangered Species and Critical Habitat. Implementation of the proposed CREP is likely to have positive impacts on threatened and endangered species and critical habitat. Benefits to terrestrial species could be realized as marginal agricultural lands are converted to grassland habitat, wetlands, wetland buffers, and riparian buffers. In accordance with the USFWS Biological Opinion (2010), certain habitat restoration practices have been determined not likely to adversely affect bog turtles. CPs that are proposed along the main stem of the Delaware River and within 300 feet of the River or its tributaries in Monroe, Northampton or Pike counties could potentially have an adverse impact on the dwarf wedgemussel. Site-specific assessments would be completed by USDA-NRCS field staff to determine if threatened and endangered species or critical habitat is present in proximity to the offered acreage prior to implementing CPs. If lands offered are determined to have threatened or endangered species or potential habitat, USDA-NRCS would consult with USFWS to determine any potential for adverse effect to the species. Technical assistance would be provided to landowners to encourage protection of all threatened and endangered species and their habitats.

Benefits to aquatic species would be realized with the improvement in water quality within the DRB CREP waterways and also downstream reaches. CPs that target enrollment of HEL would help to reduce nutrients and sediments from entering waterways. CPs that target lands adjacent to wetlands and waterways would provide vegetated buffers to filter runoff from adjacent farmlands, improving the quality of runoff reaching the streams and restoring more natural flow regimes. Aquatic species that are federally listed as threatened or endangered and would benefit from improved water quality include: bog turtle, shortnose sturgeon, Atlantic sturgeon, and dwarf wedgemussel. Aquatic species which are state listed and would benefit from improved water quality include: northern cricket frog, southern leopard frog, eastern redbelly turtle, New Jersey chorus frog, eastern spadefoot, blue-spotted salamander, black bullhead, banded sunfish, bridle shiner, ironcolor shiner, banded sunfish, longear sunfish, brook floater, and eastern pearlshell.

## **4.2 Cultural Resources**

### *4.2.1 Alternative A: No Action*

Under this alternative, agricultural practices in the CREP areas would continue. The continuation of farming is not expected to impact cultural resources.

### *4.2.2 Alternative B: Preferred*

Archaeological Resources. The land included within the CREP agreement area is rich in cultural history. Because lands targeted for the CREP are along the banks of the Delaware River and its tributaries, the potential for encountering archaeological resources during the implementation of CREP contracts is considered high. Implementation activities that have the potential to cause ground disturbance beyond agricultural plowing have the potential to impact known or unknown archaeological resources. These activities can include, but are not limited to: fence construction, digging to regulate water flow, construction of shallow water areas or wetlands, and installation of filter strips. In order to determine whether implementation activities would have the potential to impact known or unknown archaeological resources, an archaeological review of the land

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offered would be completed by a USDA-NRCS representative. The representative would conduct a survey of the site-specific lands to be impacted and consult with the PHMC to determine if the proposed practices are likely to result in an adverse effect to archaeological resources.

Architectural Resources. The CREP agreement area likely contains a high number of historic architectural resources that are eligible for or listed in the National Register. These resources include buildings, dwellings, districts, and agricultural properties that are found throughout the CREP area. A USDA-NRCS representative will conduct a survey of the site-specific lands to be affected by a CP to determine if any historic architectural resources are present. Should a CP require the modification, alteration, or removal of an architectural resource that is potentially eligible for the National Register, the USDA-NRCS would consult with PHMC. Should a CP require the modification, alteration, or removal of an architectural resource that is eligible for or listed in the National Register, then PHMC would be notified and provided an opportunity to comment on the Proposed Action prior to implementation.

Traditional Cultural Properties. Since the area of potential effects of CREP actions have not yet been defined, no Native American sacred sites or traditional cultural properties have been identified. Once these areas have been defined, a USDA-NRCS representative would consult with Native American tribes that have traditional ties to the CREP agreement area to determine if any such sites exist on affected site-specific lands. Federally recognized tribes to be contacted may include, but are not limited to: the St. Regis Mohawk Tribe, Onondaga Nation, Delaware Nation, Seneca Nation, and the Shawnee Tribe.

### **4.3 Water Resources**

Enrolling land in CREP and installing CPs (vegetation planting, native grasses, and restoring wetlands and riparian habitat) would decrease groundwater withdrawal, reduce the application of agricultural chemicals in the CREP area, and reduce erosion and sedimentation, which would ultimately increase groundwater storage and streamflows, improve surface water quality, and improve wetland habitat. Implementation of the DRB CREP would have long term-beneficial impacts to water resources within the DRB and areas downstream.

#### *4.3.1 Alternative A: No Action*

Surface Water. Under the No Action Alternative, the proposed implementation of CREP CPs in the DRB would not be implemented. No land would be enrolled and the goals of the CREP would not be met. Although eligible lands could be enrolled in other conservation programs, the benefits would not be as extensive as those gained from implementing a CREP that is focused on particular CPs, that targets lands in the DRB watershed, and that provides financial incentives to landowners using federal, state, and private financial resources. Surface water quality would continue to decline with implementation of the No Action Alternative.

Groundwater. Under the No Action Alternative, the DRB CREP would not be implemented, no land would be enrolled, and the goals of the CREP would not be met. Current agricultural practices introduce fertilizers, pesticides, and nutrients into groundwater recharge, resulting in the potential for impacts to groundwater quality. Although eligible lands could be enrolled in other conservation programs, the benefits would not be as extensive as those gained from implementing a CREP that is focused on particular CPs, that targets lands in the DRB watershed,

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and that provide financial incentives to landowners using federal, state, and private financial resources.

Water Quality. With implementation of the No Action Alternative, surface water quality would continue to decline and long-term adverse effects to water quality would result. Agricultural runoff introduces contaminants into surface water, and any improvements in water quality would be dependent upon existing and proposed programs outside of CREP. Since current agricultural practices introduce fertilizers, pesticides, and nutrients into groundwater recharge, there would also be the continued potential for impacts to groundwater quality.

Wetlands. Under the No Action Alternative, the CPs would not be implemented in the seven-county DRB CREP areas. Wetlands that have been converted to farmlands would remain in production and wetland benefits would not be recognized.

Floodplains. Not implementing the proposed CPs would prevent or reduce the creation of wetlands or the restoration of riparian buffers, both of which have beneficial effects on floodplain conditions, especially the ability of floodplains to store floodwaters. Agricultural lands could be enrolled in other conservation programs, but floodplain benefits would be less than if a coordinated effort was in effect targeting particular floodplain benefits from the implementation of specific CPs.

Coastal Zone. Not implementing the CREP would reduce the wetland and floodplain restoration and management efforts being implemented in the DRB. Coastal zone management may be addressed through the Pennsylvania CZM program, but benefits may be less than if implementation of CREP CPs were to occur in conjunction with Pennsylvania CZM efforts.

#### *4.3.2 Alternative A: Preferred*

Surface Water Quality. Implementing the Proposed Action is expected to result in long-term positive impacts to surface water quality within the proposed CREP watersheds. Establishment of CPs, including permanent native grasses (CP2), contour buffer strips (CP15A), filter strips (CP21), wetland buffers, (CP30), riparian buffers (CP22), and wetland restoration (CP23), would stabilize soils and stream banks; would establish vegetation for the retention of sediment, excess nutrients, and other pollutants from lands adjacent to surface waters; and improve aquatic habitat. Similarly, restoration of wetlands, wetland buffers, and riparian buffers would improve water quality of connected streams, rivers, and ponds by reducing flood flows, decreasing erosion, and improving sediment-trapping efficiency.

Activities such as vegetation clearing and soil disturbance would occur during the installation of CPs. This has the potential to negatively affect water quality through increased erosion, leading to increased sedimentation of nearby waters. This potential is localized and temporary and is minimized by use of BMPs such as erosion control fencing, temporary vegetative buffers, erosion control blankets, or similar practices. No significant negative impacts to surface water quality are expected from implementation of the Proposed Action.

Groundwater. Implementation of the Proposed Action would result in long-term positive impacts on groundwater quality and quantity in the DRB CREP. Establishment of filter strips, riparian buffers, and restoration of wetlands (CP-21, CP-22, and CP-23) would provide the following benefits: reduce surface flow velocity, allow for water to permeate the soil, and recharge

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groundwater and filter contaminants. Either directly or indirectly, each of the CREP CPs improves surface water quality and would potentially improve the quality and quantity of water that recharges groundwater.

The retirement of marginal farmland would result in fewer fertilizers and pesticides being applied on CREP acreage, and groundwater recharge from land established in CPs is expected to be of higher quality than recharge from previously farmed lands. The impacts associated with installation of CPs are localized and cease with the conclusion of land preparation activities, and therefore do not have the potential to negatively affect groundwater supplies. There are no significant negative impacts associated with the Proposed Action.

Water Quality. Many of the contaminants found in the water bodies of the DRB have a direct link to agricultural practices. Implementation of the Proposed Action would result in long-term beneficial effects to water quality. Agricultural runoff would be filtered, improving the water quality in the DRB water bodies.

Wetlands. The establishment of wetland buffers (CP30) and implementation of wetland restoration (CP-23) is expected to increase wetland acreage and restore degraded wetland habitat in the DRB CREP area. The positive impacts of restoring wetlands and riparian areas would have corresponding positive impacts on biological resources, including increasing vegetation diversity and habitat for protected species that use and live in these areas.

Wetlands retain surface water, allowing it to permeate into underlying groundwater supplies. Further, wetlands act as natural filters by containing sediments and nutrients from runoff before releasing to nearby surface waters. Reductions in nitrogen, phosphorous, and other agricultural chemicals in runoff would occur with the conversion of agricultural land to CPs proposed under this alternative.

Activities such as vegetation clearing and soil disturbance would occur during the installation of CPs. This could result in temporary and minor negative impacts to wetlands resulting from increased sedimentation transported in runoff. There is also greater potential for spreading invasive plant species. The use of BMPs to control erosion and invasive plant species would reduce impacts and contain sediment within the site. No significant negative impacts are expected from the implementation of the Proposed Action.

Floodplains. There is a strong need to reduce flood vulnerability and damages in the DRB. Implementation of DRB CREP would serve to support the ongoing flood loss reduction efforts of the DRBC and address the DRB Task Force recommendation for preserving and restoring floodplains.

Implementation of wetland buffers and restoration practices on floodplains (CP-23) is expected to increase wetland acreage. These practices restore native plant communities that stabilize stream banks, restore hydrology, and reduce flood damage. Wetlands trap and slowly release floodwaters over the floodplain, which decrease flood heights. Implementation of DRB CREP is expected to reduce the number and severity of flood events.

Activities that alter the hydrology of an area could occur during the installation of CPs. This could result in temporary and minor negative impacts such as soil erosion, sedimentation of

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water bodies, and streambed scouring. The use of BMPs such as temporary vegetation covers, erosion control fencing, erosion control blankets, and other similar measures would minimize these impacts. These impacts would be localized and cease with the conclusion of land preparation activities and would not be significant.

Coastal Zone. Implementation of DRB CREP would support the goals of the Pennsylvania CZM program and provide additional opportunities and incentives to restore wetlands and floodplains in the Delaware Estuary CZM area. No significant negative impacts are expected from the implementation of the Proposed Action.

## **4.4 Earth Resources**

### *4.4.1 Alternative A: No Action*

If Alternative A of the No Action Alternative is selected, the CPs described would not be implemented, and continued agricultural practices on marginal agricultural lands, including HEL, would cause additional loss of soil resources to erosion.

### *4.4.2 Alternative B: Preferred*

Alternative A, implementation of the DRB CREP on up to 20,000 acres of land (including 16,000 acres of HEL) would have potential long-term positive impacts to soil resources. Implementation of the proposed CPs would result in localized stabilization of soils and topography as a result of reduced erosion and runoff. In pasturelands, exclusion of cattle from streams and riparian areas bordering streams will reduce stream bank destabilization, resulting in reduced rates of sedimentation and subsequent improvements to water quality (see Section 4.3 for a discussion of surface water quality). Establishing permanent vegetation on former croplands would reduce erosion by wind and water. Short-term disturbance to soils during implementation of CPs could include tilling or installation of various structures such as fences, breakwaters and roads. These activities may result in temporary minor increases in soil erosion.

## **4.5 Recreational Resources**

### *4.5.1 Alternative A: No Action*

Under Alternative A, the No Action Alternative, the CREP would not be implemented and there would be no direct impact to recreational land. However, the watershed-focused improvements to water, biological, and recreational resources described in the project purpose and need would not occur. Indirectly, recreational resources, including the Wild and Scenic Rivers, would be impacted by a continued decrease in water quality over time. This would impact fishing in the waterways and would also impact hunting as the game population decreases. People's ability to enjoy recreational areas through wildlife viewing, hiking, and camping would also decrease as the amount of wildlife declines and the aesthetics of the natural environment are degraded.

### *4.5.2 Alternative B: Preferred*

Implementation of Alternative B would have a positive long-term impact on recreational resources within the CREP area. Establishing the proposed CPs would increase the availability and quality of habitat for and abundance of game bird and mammal species (see Section 4.1 Biological Resources). Improving the water quality in the CREP area would have beneficial impacts in the CREP area, as well as downstream (see Section 4.3 Water Resources). The improved water quality would be able to support an increase in fish populations and provide for

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additional fishing opportunities. The increase in game and fish populations could increase funds spent on hunting and fishing licenses and improve socioeconomic conditions in the area (see Section 4.6 Socioeconomics and Environmental Justice). In addition to hunting and fishing, the proposed CPs would increase the desirability of land to be used for hiking or camping by improving the aesthetics.

A short-term negative impact to recreational activities may occur during the installation of the proposed CPs due to unsightly construction activities or displacement of game species.

## **4.6 Socioeconomics and Environmental Justice**

### *4.6.1 Alternative A: No Action*

Under the No Action Alternative, the CREP would not be implemented within the DRB CREP. Socioeconomic conditions would continue to follow the trends associated with the DRB region. Pennsylvania would continue to lose farmland and the degradation of water quality described in other sections of this report would continue.

Additionally, the DCNR estimates that approximately 350 acres per day of wildlife habitat are lost to development or conversion, while approximately 170 acres per day are conserved through state or private initiatives (PADCNR 2004). This loss of wildlife habitat would adversely impact wildlife-related recreational opportunities in Pennsylvania, which contribute approximately \$5.2 billion to the statewide economy (USFWS 2007). This loss of wildlife habitat could cause hunters, fisherman, hikers, and wildlife observers to look for other opportunities outside of the DRB (where the opportunities for outdoor recreation are more plentiful and enjoyable) and forego the remaining available wildlife-related recreation opportunities within the DRB.

Since the DRB CREP area would not be considered an area of concentrated minority population or a poverty area, and there would be no impacts from selecting the No Action Alternative, there would be no impacts to minority or low income populations.

### *4.6.2 Alternative B: Preferred*

Under the Proposed Action, up to 20,000 acres would be enrolled and land taken out of production for a 14- to 15-year period. Although there would be less acreage in production in the DRB CREP area, there are no negative impacts to employment anticipated from the program. In adjacent counties in Pennsylvania where CREP was implemented, farm employment was steady or increased. Chester and Carbon counties, both adjacent to the DRB CREP area and located within the Chesapeake Bay Watershed CREP, saw increases in farm labor with the implementation of CREP. In 2002, prior to the implementation of the Chesapeake Bay Watershed CREP, hired farm employment in Chester County was 6,390 and in Carbon County it was 28. In 2007, hired farm employment was 7,708 and 198, respectively. Neither county lost farmworkers, and in fact, both counties added farmworkers in the years following implementation. Therefore, no negative impact on employment as a result of the DRB CREP and no loss of farmworker wages is anticipated as a result of the CREP.

The implementation of the CREP would affect sales of fertilizer, farm chemicals, seeds, trees, and petroleum products, as less would be needed. The value of these expenditures in 2007 in the DRB CREP counties was \$56,515,000. Based on this, the loss of these sales each year is estimated to be \$3.4 million. Using a discount factor of 3.45 percent, the total loss to the local

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economy from loss of the above-mentioned production expenditures would be \$42 million. The benefit to the economy from rental payments and incentives, again assuming a discount factor of 3.45 percent, is \$67 million. This would result in a net benefit to the local economy of \$25 million over the 15 years of the CREP program. However, these numbers do not take into account the non-market benefits to the region. Therefore, the non-market benefit to wildlife of the CREP program would be \$15 million. Adding the wildlife benefit to the rental benefit would result in a net benefit to the local economy of \$40 million.

Additionally, the PGC anticipates that enrollment in the CREP would improve wildlife habitat for game species (e.g., eastern cottontail rabbit and ring-necked pheasant) and non-game species (e.g., eastern meadowlark and grasshopper sparrow; PGC). This improved and expanded wildlife habitat would be likely to increase wildlife-related recreation opportunities within the DRB CREP area. This increased/improved habitat would be likely to improve wildlife-recreation-generated economic activity within the DRB.

While the implementation of the CREP may result in some product sales losses, it would provide landowners with a steady stream of rental income and would lead to benefits to wildlife and water quality in the region; this would increase hunting, fishing, and wildlife viewing opportunities and expenditures.

CREP is a voluntary enrollment program that is open to all landowners or operators who meet the eligibility requirements. The program does not target or exclude any applicant because of race or income. To date, there is no data that provides details on the demographic characteristics of CREP participants; however, as discussed previously, the minority percentage of farm owners in the DRB CREP counties in the most recent census was 2.7 percent. Since the DRB would not be considered an area of concentrated minority population or a poverty area and there would be no adverse impacts from selecting the Proposed Action, there would be no DRB-wide impacts due to environmental justice.

An issue of note is the way in which the CREP program affects tenant farmers. CREP's landlord-tenant provisions state that landlords must provide tenants who have an interest in the acreage being offered at the time of sign-up, 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 landlords violating the provisions will be ineligible to earn CRP/CREP payments.

County Committees (COCs) are responsible for determining whether landlord tenant provisions have been violated before approving the CRP contract (CRP-1). Determination of whether a violation occurred 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 being tenant farmed if the 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

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sign a copy of the CRP-1 indicating that they fully understand the provisions relating to tenants and landlords.

## *5.0 Cumulative Impacts and Irretrievable Commitment of Resources*

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## 5.0 CUMULATIVE IMPACTS AND IRRETRIEVABLE COMMITMENT OF RESOURCES

This section examines the potential cumulative impacts that may result from implementation of the Proposed Action. A cumulative impact is the effect on the environment that could result from the incremental impact of the Proposed Action when added to other past, present, or reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over time. Accordingly, a cumulative impact analysis identifies and defines the scope of other actions and their interrelationship with the Proposed Action if they overlap in space and time. In accordance with 40 CFR Part 1500-1508, the federal CEQ requires that federal agencies consider the environmental consequences of their actions, including cumulative effects.

Cumulative impacts analysis is resource specific and is limited to those resources that are directly impacted by the proposed federal action. Direct impacts are also anticipated to productive farmland, water quality, wildlife habitat and species, and outdoor recreation.

Past, present, and currently foreseeable conservation programs that may have potential for cumulative impacts on resources in the DRB CREP area are listed in Table 5.1.

**Table 5.1. Conservation Programs in the DRB CREP Area.**

<b>PROGRAM/ADMINISTRATOR</b>	<b>SUMMARY</b>
CRP/USDA-NRCS	The CRP reduces soil erosion, protects the nation's ability to produce food and fiber, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filterstrips, or riparian buffers. Farmers receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices.
Environmental Quality Incentives Program (EQIP)/ USDA-NRCS	EQIP is a voluntary conservation program that provides technical and financial assistance to help farmers and forest landowners implement CPs to reduce pollution and improve natural resources.
Wildlife Habitat Incentives Program (WHIP)/USDA-NRCS	A voluntary program for people who want to develop and improve wildlife habitat on private agricultural land and non-industrial private forestland. Through WHIP, USDA-NRCS provides technical and financial assistance to establish and improve fish and wildlife habitat. WHIP priorities in Pennsylvania are targeted at improving habitat for bog turtles and golden-winged warblers in a partnership with USFWS.
Conservation Stewardship Program (CSP)/USDA-NRCS	CSP provides financial and technical assistance to eligible producers to conserve and enhance soil, water, air, and related natural resources on their lands.
WRP/USDA-NRCS	The WRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their properties. The USDA-NRCS provides technical and financial support to help landowners with their wetland restoration efforts. Pennsylvania NRCS has identified priority areas for WRP enrollment to benefit recovery of the bog turtle and the eastern massasauga.

<b>PROGRAM/ADMINISTRATOR</b>	<b>SUMMARY</b>
Grassland Reserve Program (GRP)/USDA-NRCS	A voluntary program that assists landowners and operators with conserving and restoring grassland resources on eligible private lands through rental contracts, easements, and restoration agreements. GRP emphasizes supporting haying and grazing operations, maintaining and improving plant and animal biodiversity, and protecting grasslands from the threat of conversion to other uses.
Partners for Fish & Wildlife/USFWS	A voluntary program administered by the USFWS. Began in Pennsylvania in 1988 to help protect, enhance, and restore wildlife habitat. The program is designed for use on privately owned (non-federal) lands, providing landowners with technical and financial assistance to restore fish and wildlife habitats.
Cooperative Farm-Game Program/PGC	The Cooperative Farm-Game Program, which is governed by a term-lease agreement, creates a partnership between the PGC and landowner whereby they work in concert to improve public hunting opportunities and wildlife habitat on enrolled properties.
Farmland Preservation Program	Agricultural Security Act Pennsylvania enacted the Farmland Preservation Program by amending the <i>Agricultural Area Security Law</i> (P.L. 128, No. 43) in 1988. The regulations that implement the Act are the <i>Agricultural Area Security Law</i> regulations (14 Pa. Code §§ 902-915) and the <i>Agricultural Conservation Easement Purchase Program</i> (7 Pa. Code 138e). Combined, these regulations give Pennsylvania's state, local, and county governments the ability to permanently preserve farmland.
Growing Greener Program	The Growing Greener Program assisted the Farmland Preservation Program by increasing the number of acres preserved for farmland. A total of \$100 million was reserved for farmland preservation over a five-year period. As a result of Growing Greener 2 Initiative, an additional \$80 million was reserved for the Farmland Preservation Program in 2005.
Pasture Stream Bank Fencing Program	The purpose of this program is to establish habitat along stream corridors to provide access to the public for hunting. Participating landowners must maintain a fence for a ten-year period to stabilize banks.
Partners for Fish and Wildlife	The Pennsylvania Partners for Fish and Wildlife Program began in 1989 and is an initiative that provides technical advice about restoring habitats to landowners. Several agencies, organizations in eastern Pennsylvania, and the USFWS help landowners restore wetlands and grasslands, install riparian fencing, and restore threatened and endangered species habitat.
The Pennsylvania Farmland and Forest Land Assessment Act	The Clean and Green tax law provides an incentive for landowners to devote land to agriculture, forests, or open space by taxing land in these uses by their use value rather than their market value.

Pennsylvania leads the nation in the number of farms and acres permanently preserved for agricultural production. There are more than 450,000 acres on 4,100 farms in the agricultural easement program statewide. In addition, other programs such as the EQIP, WHIP, and CSP enroll over 100,000 acres in voluntary conservation programs. Even with these existing programs, there are over \$30 million in unfunded applications for Farm Bill programs in Pennsylvania (DEP 2012).

With the implementation of the Proposed Action, up to 20,000 acres of marginal farmland would be enrolled in CPs for a period of 14 to 15 years. For the period of enrollment, the annual rental fees to the landowner would provide financial support that would contribute to maintaining the agricultural operation.

While the CREP region would have up to 20,000 less acres in production, the incremental impacts of the Proposed Action, when considered in combination with other past, present, and

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reasonably foreseeable actions, is expected to have positive and beneficial impacts on water quality, wildlife habitat and species, and outdoor recreation.

## *6.0 List of Preparers*

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## 6.0 LIST OF PREPARERS

Pam Anderson  
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Project Manager, A.D. Marble & Company  
M.S., Biology, West Chester University, 1998  
30 Years of Experience

## *7.0 Persons and Agencies Contacted*

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## 7.0 PERSONS AND AGENCIES CONTACTED

The following persons and agencies were contacted as part of the scoping process. FSA mailed letters to 29 agencies and individuals requesting assistance in identifying resources and issues relevant to the EA. A copy of the scoping letter and the five written responses received follow. A summary of scoping comments is provided in Table 7.1.

<b><u>Name</u></b>	<b><u>Title/Organization</u></b>
Chrystal Fetzer	Program Specialist, USDA FSA
Bill Wehry	State Executive Director, USDA FSA
Barry Isaacs	State Biologist, USDA-NRCS
Kelly Jean Heffner	Deputy Secretary, Office of Water Management, DEP
Michael Pruss	Private Lands Section Chief, PGC
Bernard W. Sweeney	Director, Stroud Water Research Center
Maya K. van Rossum	Delaware Riverkeeper, Delaware Riverkeeper Network
Karl Brown	Executive Secretary, State Conservation Commission
George Greig	Secretary, Pennsylvania Department of Agriculture
Robert B. Miller, Jr.	Executive Director, House Commerce Committee
David Thomas	Chairman, Southeastern Pennsylvania Resource Conservation & Development Council
Carol Collier	Executive Director, DRBC
Diana M. Day	Conservation Coordinator, PFBC
Cynthia A. Dunn	Deputy Secretary, Office of Conservation and Engineering Services, PADCNR
Gretchen Schatschneider	District Manager, Bucks County Conservation District
William McFadden	District Manager, Lehigh County Conservation District
Edward M. Magargee	District Manager, Delaware County Conservation District
Gus Meyer	District Manager, Montgomery County Conservation District
James Wilson	Watershed Specialist/Ag Technician, Northampton County Conservation District
Craig Todd	District Manager, Monroe County Conservation District
Sally Corrigan	Executive Director, Pike County Conservation District
Jeffrey L. Marshall	President, Heritage Conservancy
Shon Robbins	Regional Wildlife Biologist, Pheasants Forever, Inc., and Quail Forever
Jeremy Mercer	Regional Director – Central/East, Ducks Unlimited, Inc.
Walter Bingaman	Regional Director, National Wild Turkey Federation

<u>Name</u>	<u>Title/Organization</u>
Tom Davidock	SAN Coordinator, Partnership for the Delaware Estuary
Clint Riley	Project Leader/Supervisor, USFWS, Pennsylvania Field Office
Kim Damon-Randall	Endangered Species Coordinator, NMFS, Protected Resources Division
Jean Cutler	Director, PHMC, SHPO

**Table 7.1. Summary of Scoping Comments.**

<b>AGENCY</b>	<b>COMMENT SUMMARY</b>
Stroud Water Research Center	Measures to avoid further impairment of stream health and to restore streams that are substantially impaired are both needed and cost effective. Riparian forest buffers in particular are a highly effective tool. PA CREP has been the single most effective tool for implementing forested buffers at the scale needed in PA. Stroud strongly supports the concept of making CREP available to the DRB.
Delaware River Basin Commission	The DRB CREP is a valuable tool for improving flows and water quality in the Delaware River and its PA tributaries. The CREP could help keep clean water clean within the Special Protection Waters in the non-tidal river and provide water quality improvements to the Delaware Estuary. DRBC is also interested in protection of riparian corridors to mitigate flood hazards in the basin.
Northampton County Conservation District	Implementing CREP will pay great dividends in achieving the riparian buffer recommendations identified in the 13 watershed conservation plans for streams in Northampton County.
U.S. Fish & Wildlife Service	USFWS is delighted to assist in implementing the conservation benefits of the proposed CREP. FSA will be required to access the PNDI Project Planning Tool to screen projects for potential impacts to species of special concern. We surmise that nearly all projects will result in positive effects to the endangered Dwarf wedgemussel. Projects that could potentially result in adverse impacts are those that occur on or along the main stem Delaware River and within 300 feet of the River or its tributaries in Monroe, Northampton and Pike counties. USFWS has conducted a formal consultation with NRCS regarding the threatened Bog turtle for many but not all practices that may be implemented in the DRB CREP. Direct planting of forested riparian buffers in or adjacent to occupied Bog turtle habitat needs to be avoided.
Natural Resources Conservation Service	NRCS is willing to participate in identifying resource needs for the DRB CREP EA.

January 31, 2013

Pennsylvania State  
FSA Office  
Suite 320  
One Credit Union  
Place  
Harrisburg, PA  
17110-2994

TO: Conservation Stakeholder

RE: **Environmental Assessment (EA) for the implementation of Delaware River Basin Conservation Reserve Enhancement Program (CREP)**

The USDA Farm Service Agency (Pennsylvania Office) in cooperation with the PA Department of Environmental Protection is preparing an EA for the proposed implementation of the Delaware River Basin CREP. The CREP would enroll 20,000 acres of land in the following Delaware River Basin counties: Pike, Monroe, Northampton, Lehigh, Bucks, Montgomery and Delaware. Approved conservation practices would be established on these lands and landowners would receive support for the costs of installing and maintaining such practices as well as annual rental payments for lands enrolled in the program.

Pursuant to the National Environmental Policy Act, we are requesting your participation in identifying relevant resources within the seven county region and issues related to the proposed CREP implementation. Please forward your response, via postal mail or email, by February 22, 2013 to our contractor:

A.D. Marble & Company  
375 E Elm Street  
Conshohocken, PA 19428  
Attn: Sharon Yates  
[syates@admarble.com](mailto:syates@admarble.com)

If you have any questions regarding this request or the proposed program, please contact Ms. Yates at 484-533-2548 or [syates@admarble.com](mailto:syates@admarble.com) . Thank you for your assistance in this matter.

Sincerely,

Bill L. Wehry  
State Executive Director

## Erin Carson

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**From:** Coleman, Denise - NRCS, Harrisburg, PA <Denise.Coleman@pa.usda.gov>  
**Sent:** Friday, February 01, 2013 7:41 AM  
**To:** Sharon Yates  
**Cc:** Frantz, Barry - NRCS, Harrisburg, PA; Thompson, Katrina - NRCS, Harrisburg, PA; Isaacs, Barry - NRCS, Harrisburg, PA; Coleman, Denise - NRCS, Harrisburg, PA; Wehry, Bill - FSA, Harrisburg, PA  
**Subject:** Participation with EA for Delaware CREP

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Ms. Yates,

NRCS is willing to participate in identifying resource needs for the Delaware CREP Environmental Assessment. There are a variety of individuals who should be included on any outgoing e-mails. They are cc'd on this message.

Thank you,

Denise



Denise Coleman | One Credit Union Place, Suite 340 | Harrisburg, PA | 717-237-2203 | [denise.coleman@pa.usda.gov](mailto:denise.coleman@pa.usda.gov)

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## Erin Carson

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**From:** Najjar, Ken <Kenneth.Najjar@drbc.state.nj.us>  
**Sent:** Tuesday, February 19, 2013 10:59 AM  
**To:** Sharon Yates  
**Cc:** Pindar, Chad; Tudor, Robert; Limbeck, Robert; 'diawilson@pa.gov'; 'rebecca.csutoras@pa.usda.gov'  
**Subject:** EA for Delaware River CREP

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Hi Sharon,

We are responding to the letter prepared by Bill L. Wehry of USDA on January 31, 2013 regarding the Environmental Assessment (EA) for the implementation of the Delaware River Basin Conservation Reserve Enhancement Program (CREP). The Delaware River Basin Commission (DRBC) was on the team preparing the CREP proposal in 2008-10 and we thank you for the opportunity to participate in the EA for implementation. The letter indicates that you are the contact for participation in the EA.

DRBC is a federal-interstate agency charged with managing the water resources of the Delaware River Basin (DRB) without regard to political boundaries. The Pennsylvania DRB CREP is a valuable tool for improving the flows and water quality in the Delaware River and its Pennsylvania tributaries. The DRBC has established an anti-degradation policy known as Special Protection Waters (SPW) in the non-tidal Delaware River running from Hancock, NY to Trenton, NJ. Thus, outcomes from the PA CREP could help “keep the clean water clean” in SPW as well as provide water quality improvements to the Delaware Estuary, downstream of Trenton.

As we shared with the team during the proposal stage, DRBC has established Interstate Control Points (ICPs) along the Mainstem Delaware River and Boundary Control Points (BCPs) at tributary confluence locations. The ICP and BCP locations and water quality targets have been adopted in our Water Quality Regulations. Chemical, physical and biological parameters of the ICPs and BCPs establish the baseline upon which degradation or potential degradation can be measured. Thus, improvements to and degradation of SPW can be monitored over time. DRBC is also interested in protection of riparian corridors to mitigate flood hazards in the basin.

DRBC staff can provide loading or load reduction targets that can be the basis of selecting a suite of BMPs to achieve a specific water quality outcome lower in the watershed and/or Basin. Reductions in nutrient and other loads (from agriculture and stormwater) are needed to maintain and improve water quality in the Delaware River. The Delaware River Basin offers a unique opportunity to link SPW Water Quality Targets with CREP Enhancement BMPs to achieve systematic water quality results (as opposed to site-by-site water quality benefits). DRBC can also provide resources and information regarding the flood mitigation strategies that were developed by the multi-state, multi-agency Delaware River Basin Flood Mitigation Task Force.

DRBC looks forward to participating in the EA for the DRB CREP with USDA and A.D. Marble.

Thank you,  
Ken Najjar

~~~~~  
Kenneth F. Najjar, Ph.D., P.E.

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[www.drbc.net](http://www.drbc.net)

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## Erin Carson

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**From:** James Wilson <james-wilson@northamptoncd.org>  
**Sent:** Tuesday, February 26, 2013 12:11 PM  
**To:** Sharon Yates  
**Subject:** CREP EA Response  
**Attachments:** NorthamptonNotes-Winter2013.pdf; bushkill copy2.pdf

Sharon,

In my position here at the Conservation District, I've inherited or developed 13 watershed conservation plans of one kind or another & every one of them calls for the protection of existing riparian buffers & the restoration of lost buffers in order to reduce sediment, nitrogen, phosphorous & other NPS pollution to the county's waterways. The Conservation District also recognizes the need for riparian buffers to reduce flood damage, decrease stormwater management costs, protect drinking water, improve in-stream pollution removal, reduce stream bank erosion, cool waters & enhance stream and riparian habitats for aquatic insects, fish & wildlife. Implementing CREP here in the Delaware River Basin will pay great dividends in achieving the riparian buffer recommendations identified in these 13 watershed conservation plans for streams in Northampton County.

Additionally, each of the seven, volunteer, community watershed organizations I regularly work with also recognize the conservation & environmental values and benefits of riparian buffers & support CREP in the Delaware River Basin. I'm in the process of wrapping up a fairly large live stake riparian buffer project with two of the community watershed organizations I work with in Northampton County. This project included the planting of over 2,400 live stakes along local streams, as well as the development of web & print materials related to riparian buffers. Please see the two attached documents.

Thank you for considering my tardy response to the CREP EA, Sharon. Please call or email me with any questions or concerns you may have. Thanks.

Jim Wilson, Watershed Specialist  
Northampton County Conservation District  
610/746-1971



February 13, 2013

A.D. Marble & Company  
375 E Elm Street  
Conshohocken, PA 19428  
Attn: Sharon Yates

Dear Ms. Yates:

Thank you for your invitation to provide comment on the proposal for USDA to expand the Conservation Reserve Enhancement Program (CREP) to include the remaining counties in the Delaware River Basin.

The Stroud Water Research Center has been pursuing as part of its 40+ year mission a better understanding and stewardship of rivers and streams. To this end, the Stroud Center staff is currently carrying out basic and applied research projects on waterways throughout the United States and across the planet. These studies confirm that both the quality and quantity of fresh water is under serious threat everywhere, including right here in Southeast Pennsylvania.

Measures to both avoid further impairment of stream health and to restore streams that are substantially impaired are both needed and cost effective. US EPA estimates that each dollar invested in preventing non-point source pollution is worth roughly \$27 in avoided costs for preparing potable water for public use. Riparian forest buffers in particular are a highly effective tool for improving stream health and the vital ecological services that streams provide. For example, our research has shown that stream segments with riparian forests remove 2-9 times more nitrogen (a frequent drinking water concern, and driver of eutrophication in coastal waters) than stream segments without forest buffers.

To date, the Pennsylvania CREP has been the single most effective tool for implementing forested buffers at the scale needed in Pennsylvania. Other CREP practices have also greatly helped with water quality protection on additional sensitive lands in the Commonwealth. The Stroud Water Research Center strongly supports the concept of USDA making CREP available to the remaining counties in the Delaware River Basin.

Sincerely,

A handwritten signature in black ink, appearing to read "B. Sweeney".

Bernard W. Sweeney, Ph. D.  
Director and Senior Research Scientist



# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Pennsylvania Field Office  
315 South Allen Street, Suite 322  
State College, Pennsylvania 16801-4850

March 4, 2013

Sharon Yates  
A.D. Marble & Company  
375 E. Elm Street  
Conshohocken, PA 19428

RE: Environmental Assessment (EA) For Implementation of the Delaware River Basin Conservation Reserve Enhancement Program (CREP).

Dear Ms. Yates:

This responds to a January 31, 2013, letter from the U.S. Department of Agriculture's Farm Service Agency (FSA) to various conservation stakeholders. That letter requested identification of relevant resources in the proposed CREP seven county region, and any issues relevant to the proposed implementation of the Delaware River Basin CREP.

The U.S. Fish and Wildlife Service (Service) has been a long-time supporter of the various Farm Bill Programs, and greatly values our partnership with the USDA personnel and various programs at the local level. We have jointly delivered numerous on-the-ground projects across the Commonwealth of Pennsylvania, and are delighted to hopefully assist in implementing the conservation benefits of the proposed CREP in the Delaware River Basin.

## Federally Listed Species

The seven counties proposed in the Delaware River Basin CREP are within the range of federally listed and proposed endangered and threatened species. The following comments are provided pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to ensure the protection of endangered and threatened species.

As the lead federal action agency, FSA will be required to access the Pennsylvania Natural Diversity Inventory (PNDI) Project Planning Environmental Review tool on the Pennsylvania Natural Heritage Program's website ([www.naturalheritage.state.pa.us](http://www.naturalheritage.state.pa.us)) to screen projects for potential impacts to species of special concern, including federally listed species. It is recommended that FSA screen these projects under the PNDI Primary Categories of Habitat Conservation and Restoration or Agriculture/Farming.

If a project is considered a “large project” as defined on the subject website, we ask that the Agency submit the project directly to our office for review, rather than using the online screening tool. For your information, we are including some specific information on two federally-listed species that would most likely be the subject of further review by utilizing the above process.

### **Dwarf wedgemussel**

Portions of the Delaware River (specifically Monroe, Northampton and Pike Counties in the project area) are inhabited by the federally listed, endangered Dwarf wedgemussel (*Alasmidonta heterodon*). Freshwater mussels are sedentary filter-feeders, and as such, they are vulnerable to substrate disturbance, silt deposition, scouring, water quality degradation, changes in channel morphology, and alterations of river hydrology.

Based on our knowledge of the CREP, and the anticipated highly successful benefits such as decreased sediment and nutrient loading, and improved water quality to streams and riparian areas, we surmise that nearly all projects will result in positive effects on the Dwarf wedgemussel. Projects that could potentially result in adverse impacts, would be those that occur on or along the main stem of the Delaware River and within 300’ of the Delaware River or its streams/tributaries in the above-mentioned Counties.

### **Bog turtle**

The bog turtle (*Clemmys muhlenbergii*), a species that is federally listed as threatened, and is currently found in several counties within the proposed Delaware River Basin CREP (Monroe, Northampton, Lehigh, Bucks, Montgomery and Delaware Counties). Bog turtles inhabit shallow, spring-fed fens, sphagnum bogs, swamps, marshy meadows, and pastures characterized by soft, muddy bottoms; clear, cool, slow-flowing water, often forming a network of rivulets; high humidity; and ideally, an open canopy. 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.

The Service conducted a formal consultation with the Natural Resource Conservation Service on many, but not all, practices that may be utilized in the Proposed Delaware River Basin CREP. The Service’s Biological Opinion (BO), and specific recommendations and can be found here: [http://www.fws.gov/northeast/pafo/bog\\_turtle.html](http://www.fws.gov/northeast/pafo/bog_turtle.html). Select *Bog Turtle Habitat Restoration: NRCS Biological Opinion* on the right-hand side of the screen. **Please note that this BO only applies to practices implemented by the Natural Resources Conservation Service (NRCS) for habitat restoration and management of bog turtle sites**, but it does address some specific practices that could result in adverse effects to bog turtles through implementation of the Delaware River Basin CREP (fencing, grazing, mowing, and herbicide application). A potentially significant issue that we will need to avoid is the direct planting of forested riparian buffers in or adjacent to occupied bog turtle habitat.

We are willing to discuss the issues of threatened and endangered species protection as the Delaware River Basin CREP moves forward and are confident that any issues related to potential adverse effects to the above species can be effectively resolved through the consultation process. Please contact Pam Shellenberger of my staff at 814-234-4090 if you have any questions or require further assistance.

Sincerely,

A handwritten signature in black ink, appearing to read "Sarah Gannon-Nagle". The signature is fluid and cursive, with a long horizontal stroke at the end.

Sarah Gannon-Nagle  
Acting Field Office Supervisor

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*Appendix A*

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**Invasive Plants in Pennsylvania**

# Invasive Plants in Pennsylvania

DCNR defines invasive plants as those species that are not native to the state, grow aggressively, spread and displace native vegetation. Invasive plants are generally undesirable because they are difficult and costly to control and can dominate whole habitats, making them environmentally destructive.

Not all non-native plants become invasive. In fact, it is a very small fraction that do. The plants listed here have been found to act aggressively in parts of Pennsylvania or throughout the whole state, negatively impacting ecosystems.

New species cross state borders and some plants that have been here for decades may suddenly become invasive due to changing land uses, changes in weather or climate, or genetic reasons, so this list may change over time and will be updated periodically. **This list is not regulatory.** It is merely a suggestion that these plants can become invasive under the right environmental conditions and it will be used to guide the management efforts of DCNR staff.

To learn more about invasive plants in Pennsylvania and how they can be controlled, visit [www.dcnr.state.pa.us/forestry/plants/invasiveplants/index.htm](http://www.dcnr.state.pa.us/forestry/plants/invasiveplants/index.htm).

## Herbs and Forbs

COMMON NAME	SCIENTIFIC NAME	OTHER COMMON NAMES
Beefsteak plant	<i>Perilla frutescens</i>	Chinese basil, purple mint
Black knapweed	<i>Centaurea nigra</i>	Lesser or common knapweed, hardheads
Bristled knotweed	<i>Persicaria longisetata</i>	Oriental lady's thumb, Asiatic smartweed
Brown knapweed	<i>Centaurea jacea</i>	Horse-knobs, rayed knapweed, hardheads
Bull thistle	<i>Cirsium vulgare</i>	
Canada thistle	<i>Cirsium arvense</i>	Canadian thistle
Dames rocket	<i>Hesperis matronalis</i>	Dame's violet, dame's gillyflower, dame's wort
Garlic mustard	<i>Alliaria petiolata</i>	Hedge mustard
Giant hogweed	<i>Heracleum mantegazzianum</i>	Giant cow parsnip or parsley, cartwheel flower
Giant knotweed	<i>Fallopia sachalinensis</i>	Sakhalin knotweed
Goatsrue	<i>Galega officinalis</i>	Holy hay, professor-weed, Italian fitch
Goutweed	<i>Aegopodium podagraria</i>	Bishop's weed, snow-on-the-mountain, holy hay
Greater celandine	<i>Chelidonium majus</i>	Tetterwort
Hairy willow herb	<i>Epilobium hirsutum</i>	Great willowherb
Japanese knotweed	<i>Fallopia japonica</i>	Fleeceflower, Mexican bamboo
Japanese pachysandra*	<i>Pachysandra terminalis</i>	Japanese spurge, Chinese fever vine
Jimsonweed	<i>Datura stramonium</i>	Jamestown weed, devil's trumpet, thorn apple
Lesser celandine	<i>Ranunculus ficaria</i>	Fig buttercup, pilewort
Moneywort	<i>Lysimachia nummularia</i>	Creeping Jenny or Charlie, wandering sailor
Musk thistle	<i>Carduus nutans</i>	Nodding thistle
Narrowleaf bittercress	<i>Cardamine impatiens</i>	Bushy rock-cress
Orange day-lily*	<i>Hemerocallis fulva</i>	
Poison hemlock	<i>Conium maculatum</i>	
Purple loosestrife	<i>Lythrum salicaria</i>	Swamp loosestrife
Spotted knapweed	<i>Centaurea stoebe</i>	
Star-of-Bethlehem	<i>Ornithogalum nutans/O. umbellatum</i>	Silver bells, drooping star-of-Bethlehem
Wild chervil	<i>Anthriscus sylvestris</i>	Cow parsley, keck, bur chervil
Wild parsnip	<i>Pastinaca sativa</i>	Garden parsnip
Yellow flag iris	<i>Iris pseudacorus</i>	

## Vines

### COMMON NAME

### SCIENTIFIC NAME

### OTHER COMMON NAMES

Bigleaf periwinkle*	<i>Vinca major</i>
Black swallow-wort	<i>Vincetoxicum nigrum</i>
Chinese wisteria*	<i>Wisteria sinensis</i>
Chocolate Vine	<i>Akebia quinata</i>
Common periwinkle*	<i>Vinca minor</i>
English ivy*	<i>Hedera helix</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Japanese hops	<i>Humulus japonicus</i>
Japanese wisteria*	<i>Wisteria floribunda</i>
Kudzu	<i>Pueraria lobata</i>
Mile-a-minute	<i>Persicaria perfoliata</i>
Oriental bittersweet	<i>Celastrus orbiculatus</i>
Pale swallow-wort	<i>Vincetoxicum rossicum</i>
Porcelain berry	<i>Ampelopsis brevipedunculata</i>
Wintercreeper*	<i>Euonymus fortunei</i>

Greater periwinkle
Louis' or Louise's swallow-wort
Fiveleaf akebia, raisin vine
Ground myrtle
Common ivy
Chinese honeysuckle
Vine that ate the South
Devil's tear-thumb
Asiatic or round-leaved bittersweet
European swallow-wort, dog strangling vine
Amur peppervine, porcelain vine
Climbing Euonymus, fortune's spindle

## Trees

Amur corktree*	<i>Phellodendron amurense</i>
Amur maple*	<i>Acer ginnala</i>
Bee-bee tree*	<i>Tetradium daniellii</i>
Callery pear	<i>Pyrus calleryana</i>
Empress tree	<i>Paulownia tomentosa</i>
European black alder	<i>Alnus glutinosa</i>
Japanese angelica tree	<i>Aralia elata</i>
Japanese corktree*	<i>Phellodendron japonicum</i>
Lavella corktree*	<i>Phellodendron lavellei</i>
Mimosa	<i>Albizia julibrissin</i>
Norway maple	<i>Acer platanoides</i>
Paper mulberry*	<i>Broussonetia papyfera</i>
Siberian elm	<i>Ulmus pumila</i>
Sycamore maple	<i>Acer pseudoplatanus</i>
Tree-of-heaven	<i>Ailanthus altissima</i>
White mulberry*	<i>Morus alba</i>

Korean Evodia
Bradford pear
Princess tree, royal paulownia
Common alder
Lavelle's cork tree
Persian silk tree, silktree, silky acacia
Mock plane
Chinese or stinking sumac, tree of hell
Common or Chinese or Russian white mulberry

## Aquatic Plants

Brazilian water-weed	<i>Egeria densa</i>
Carolina fanwort	<i>Cabomba caroliniana</i>
Curly pondweed	<i>Potamogeton crispus</i>
Didymo	<i>Didymoshenia geminate</i>
Eurasian water-milfoil	<i>Myriophyllum spicatum</i>
European water chestnut	<i>Trapa natans</i>
Floating seedbox	<i>Ludwigia peploides</i>
Hydrilla	<i>Hydrilla verticillata</i>
Narrow-leaved cattail	<i>Typha angustifolia</i>
Parrot feather watermilfoil	<i>Myriophyllum aquaticum</i>

Green Cabomba, fish grass, Washington grass
Curly-leaved or curlyleaf or crispy-leaved pondweed
Rock snot
Eurasian milfoil, spike watermilfoil
Devil pod
Water primrose
Esthwaite waterweed
Narrow lead cattail, nail rod
Parrotfeather

## Shrubs

COMMON NAME	SCIENTIFIC NAME	OTHER COMMON NAMES
Amur honeysuckle	<i>Lonicera mackii</i>	
Autumn olive	<i>Elaeagnus umbellata</i>	
Bell's honeysuckle	<i>Lonicera morrowii x bella</i>	Bella or showy bush or pretty honeysuckle
Border privet	<i>Ligustrum obtusifolium</i>	Blunt-leaved or obtuse-leaved or regal privet
Butterfly bush*	<i>Buddleja davidii</i>	Orange-eye butterfly bush
Chinese bushclover	<i>Lespedeza cuneata</i>	Chinese Lespedeza, sericea lespedeza
Chinese privet	<i>Ligustrum sinense</i>	
Common buckthorn	<i>Rhamnus cathartica</i>	Purging buckthorn
Common privet	<i>Ligustrum vulgare</i>	European privet, wild privet
Doublefile viburnum*	<i>Viburnum plicatum</i>	Japanese snowball bush
European barberry	<i>Berberis vulgaris</i>	Common barberry
Glossy buckthorn	<i>Frangula alnus</i>	
Gelder rose	<i>Viburnum opulus</i>	Cranberrybush viburnum, red elder, cramp bark
Japanese barberry	<i>Berberis thunbergii</i>	Red barberry, Thunberg's barberry
Japanese privet	<i>Ligustrum japonicum</i>	Waxleaf ligustrum, wax privet
Japanese spiraea	<i>Spiraea japonica</i>	Japanese meadowsweet, nippon spiraea
Jetbead	<i>Rhodotypos scandens</i>	Black jetbead
Linden viburnum*	<i>Viburnum dilatatum</i>	Linden arrowwood
Morrow's honeysuckle	<i>Lonicera morrowii</i>	
Multiflora rose	<i>Rosa multiflora</i>	Rambler or Japanese or baby or seven-sisters rose
Russian olive	<i>Elaeagnus angustifolia</i>	Oleaster, wild olive
Shrubby bushclover	<i>Lespedeza bicolor</i>	Shrubby lespedeza
Siebold viburnum*	<i>Viburnum sieboldii</i>	Siebold's arrowwood
Standish honeysuckle	<i>Lonicera standishii</i>	
Tartarian honeysuckle	<i>Lonicera tatarica</i>	
Wineberry	<i>Rubus phoenicolasius</i>	Wine raspberry, Japanese wineberry
Winged Euonymus	<i>Euonymus alata</i>	Burning bush, winged burning bush, winged wahoo

## Grasses

Cheatgrass	<i>Bromus tectorum</i>	Downy or drooping brome, bronco grass, June grass
Chinese silvergrass*	<i>Miscanthus sinensis</i>	Eulalia, zebra grass, maidenhair grass
Common reed	<i>Phragmites australis</i>	
Golden bamboo*	<i>Phyllostachys aurea</i>	Yellow grove bamboo, fish pole bamboo
Japanese stiltgrass	<i>Microstegium vimineum</i>	Nepalese browntop, packing grass
Johnson grass	<i>Sorghum halepense</i>	
Ravenna grass*	<i>Saccharum ravennae</i>	Hardy pampas grass
Reed canary grass	<i>Phalaris australis</i>	
Rough bluegrass	<i>Poa trivialis</i>	
Shattercane	<i>Sorghum bicolor ssp. x. drummondii</i>	
Small carpetgrass*	<i>Anthraxon hispidus</i>	Joint-head grass, hairy joint grass, jointhead
Tall fescue*	<i>Schedonorus arundinaceus</i>	
Wavyleaf basketgrass*	<i>Oplismenus hirtellus</i>	

Species marked with an asterisk (\*) are on DCNR's "Watch List," meaning that they are still sold in the landscape and nursery trade but can act aggressively, are not very common throughout the state but are a problem in certain locations, or are not yet in Pennsylvania but are in neighboring states and would pose a major threat to our natural ecosystems should they arrive here. Many of these species can be difficult to eradicate once they have become established, so think twice before planting them. Keep an eye out for these species, remove them where possible, and consider choosing native plants for your landscape.

*Appendix B*

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**Wildlife Action Plan Priority Species Associated  
with Grassland Habitat in Pennsylvania**

## Appendix B

### Wildlife Action Plan-Priority Species Associated with Grassland Habitats in Pennsylvania

<b>IMMEDIATE CONCERN</b>	<b>SPECIFIC HABITAT REQUIREMENTS</b>
<b>Blanding's Turtle</b> <i>Emys blandingii</i>	Mosaics of small marshes, wet meadows, small ponds, and slow-moving streams
<b>Eastern Massasauga</b> <i>Sistrurus catenatus catenatus</i>	Wetlands with surrounding old field and prairie habitats that contain sunny basking sites
<b>Kirtland's Snake</b> <i>Clonophis kirtlandii</i>	Damp vacant lots with debris for cover; open, damp woods/grassy areas in urban/suburban areas; prairie wetlands; wet meadows; the grassy edges of creeks, streams, and ponds; and relatively open, wet woods (often in urban/suburban settings) with crayfish burrows
<b>Loggerhead Shrike</b> <i>Lanius ludovicianus</i>	Open country with short grasses and forbs of low stature interspersed with bare ground and shrubs or small trees
<b>Northern Bobwhite Quail (native)</b> <i>Colinus virginianus</i>	Scattered shrubs and briars interspersed with moderately dense herbaceous or grassy vegetation in York, Lancaster, and Chester counties
<b>Sedge Wren</b> <i>Cistothorus platensis</i>	Densely vegetated wet meadows, hayfields, retired croplands, and upland pond and lake margins; and in coastal, brackish marshes with limited standing water
<b>Short-Eared Owl</b> <i>Asio flammeus</i>	Unmowed grassy fields of greater than 200 acres in extent with minimal incursion of shrubs and trees
<b>Upland Sandpiper</b> <i>Bartramia longicauda</i>	Large tracts of contiguous grassland with mosaics of tall (15-35 centimeters) stands of grass for nesting and short stands (greater than 15 centimeters), often in weed rich pasture for foraging
<b>HIGH LEVEL CONCERN</b>	<b>SPECIFIC HABITAT REQUIREMENTS</b>
<b>Dicksissel</b> <i>Spiza americana</i>	Old fields, grasslands with medium to high vegetation and moderate litter
<b>Eastern Ribbon Snake</b> <i>Thamnophis sauritus sauritus</i>	Riparian edges of emergent marshes, bogs, streams, rivers, ponds, and lakes with dense sedges, grasses, rushes, and emergent shrubs; and lots of frogs
<b>Eastern Spadefoot</b> <i>Scaphiopus holbrookii</i>	Temporary/ephemeral pools in depression areas in agricultural settings and woodlands with sandy to loamy soils
<b>Eastern Spotted Skunk</b> <i>Spilogale putorius</i>	Dry oak, Virginia pine, and pitch pine-forested rocky ridges and ravines; reverting farmland
<b>Henslow's Sparrow – R</b> <i>Ammodramus henslowii</i>	Indicator for large-scale grasslands; grassland obligate species
<b>Least Shrew</b> <i>Cryptotis parva</i>	Heavily vegetated grasslands and old fields near water

<b>Long-Eared Owl</b> <i>Asio otus</i>	Conifer (hemlock) woods intermingled with field and meadow
<b>New Jersey Chorus Frog</b> <i>Pseudacris triseriata kalmi</i>	Permanent and temporarily inundated habitats, including forested swamp, marshes, wet meadows, floodplains, riparian corridors, ditches, and canals
<b>Northern Harrier</b> <i>Circus cyaneus</i>	Large open grasslands (reclaimed strip mines); marshy meadows; wet, lightly grazed pastures; open bogs; freshwater and brackish marshes; and riparian woodland
<b>Shorthead Garter Snake – R</b> <i>Thamnophis brachystoma</i>	Riparian old fields and meadows with grasses, sedges, low herbaceous growth, and early successional perennials
<b>PENNSYLVANIA VULNERABLE</b>	<b>SPECIFIC HABITAT REQUIREMENTS</b>
<b>Coastal Plain Leopard Frog</b> <i>Rana sphenoccephala</i>	Marshes, ponds, wet meadows, and the edges of slow-moving rivers and streams; also brackish waters near coastal areas
<b>MAINTENANCE CONCERN</b>	<b>SPECIFIC HABITAT REQUIREMENTS</b>
<b>Barn Owl</b> <i>Tyto alba</i>	Low-altitude grasslands (meadows, hayfields, and abandoned arable fields) with natural and/or artificial cavities (barns, silos)
<b>Blue-Winged Warbler – R</b> <i>Vermivora pinus</i>	Early to mid-successional forests and thickets with openings; areas marked by patches of herbs, shrubs, and trees and often located near a forest edge
<b>Bobolink</b> <i>Dolichonyx oryzivorus</i>	Moist meadows and fields of hay, clover, alfalfa, and other herbaceous vegetation
<b>Brown Thrasher</b> <i>Toxostoma rufum</i>	Brushy mosaic habitats (“odd areas” – hedgerows, multiflora rose thickets, overgrown fields and pastures, and forest edges); prefer large (greater than 0.5 hectare) overgrown fields with open foraging areas, thick brushy nesting areas, and an abundance of song perches
<b>Common Nighthawk</b> <i>Chordeiles minor</i>	Gravel rooftops in cities and towns
<b>Eastern Box Turtle</b> <i>Terrapene carolina</i>	Deciduous forests, old fields, ecotonal areas, and marshy areas
<b>Eastern Fence Lizard</b> <i>Sceloporus undulatus</i>	Open areas adjacent to deciduous forest or in ecotonal areas where forests and old fields meet; open rock faces and talus in forest
<b>Eastern Hognose Snake</b> <i>Heterodon platirhinos</i>	Sandy clearings in forests and grasslands; often associated with sandy floodplains along waterways
<b>Eastern Meadowlark</b> <i>Sturnella magna</i>	Prairies, pastures, hayfields, and fallow lands
<b>Fowler’s Toad</b> <i>Bufo fowleri</i>	River bottoms, lake edges, sandy places, urban gardens, and grasslands with alluvium deposits of dry, gravelly, and sandy substrate

<b>Grasshopper Sparrow</b> <i>Ammodramus savannarum</i>	Indicator for large-scale grasslands; grassland obligate species
<b>Northern Leopard Frog</b> <i>Rana pipiens</i>	Temporary pools and wet meadows for breeding, with adjacent grass/old field foraging areas
<b>Smooth Green Snake</b> <i>Liochlorophis vernalis</i>	Open herbaceous upland habitats, such as old fields, pastures, and forest clearings
<b>Solitary Sandpiper</b> <i>Tringa solitarius</i>	Wherever water collects, including parking lots, lawns, and ditches; as well as grassy and muddy shorelines of marshes, woodland streams, pastures, and rivers
<b>Southern Bog Lemming</b> <i>Synaptomys cooperi</i>	Old-field communities, mixed deciduous/coniferous woodlands, spruce-fir forests, and margins of freshwater wetlands
<b>Tundra Swan – R (migr.)</b> <i>Cygnus columbianus columbianus</i>	Large agricultural fields (greater than 40 acres) of winter wheat or harvested corn in Lancaster/Lebanon counties; sheet water may make fields more desirable
<b>Willow Flycatcher</b> <i>Empidonax traillii</i>	Low-elevation shrub swamp, wet meadow, and brushy habitats along streams and the edges of ponds and marshes; sometimes dry upland sites
<b>Wilson’s Snipe</b> <i>Gallinago delicata</i>	Wet meadows and poorly drained pastures where cattle maintain the vegetation in a cropped condition
<b>Yellow-Breasted Chat</b> <i>Icteria virens</i>	Low, dense shrub habitats with an open or partially open tree canopy in regenerating clearcuts, forest edges, abandoned farmland, burned forest, and shrubby margins

Source: PGC and PFBC 2008

## *Appendix C*

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### **Socioeconomic Analysis**

**Appendix C:  
Socioeconomic Analysis**

**Socioeconomic Analysis Assumptions**

Discount Rate: 3.45%  
 Base Year: 2013  
 Land Rental: \$87.50  
 Value of Lost Sales: \$3,400,000  
 Total Acres: 20,000

**Rental Income and Incentives**

Rental Income: \$63,629,395.00  
 Incentive Payments: \$3,300,000.00  
 CP2-Incentive Payment: \$240,000.00  
 Total Income\*: \$67,169,395.00

\*Includes discount rate

***Losses and Wildlife Benefit with Discount Rate.***

<b>Year</b>	<b>Discount Rate=3.45%</b>	<b>Loss of Sales from Production Expenditures</b>	<b>Total Loss with Discount Factor</b>	<b>Wildlife Benefit**</b>
2013	1	3,400,000.00	3,400,000.00	950,000.00
2014	0.9655	3,400,000.00	3,282,700.00	950,000.00
2015	0.93219025	3,400,000.00	3,169,446.85	950,000.00
2016	0.900029686	3,400,000.00	3,060,100.93	950,000.00
2017	0.868978662	3,400,000.00	2,954,527.45	950,000.00
2018	0.838998898	3,400,000.00	2,852,596.25	950,000.00
2019	0.810053436	3,400,000.00	2,754,181.68	950,000.00
2020	0.782106593	3,400,000.00	2,659,162.42	950,000.00
2021	0.755123915	3,400,000.00	2,567,421.31	950,000.00

<b>Year</b>	<b>Discount Rate=3.45%</b>	<b>Loss of Sales from Production Expenditures</b>	<b>Total Loss with Discount Factor</b>	<b>Wildlife Benefit**</b>
2022	0.72907214	3,400,000.00	2,478,845.28	950,000.00
2023	0.703919151	3,400,000.00	2,393,325.11	950,000.00
2024	0.679633941	3,400,000.00	2,310,755.40	950,000.00
2025	0.65618657	3,400,000.00	2,231,034.34	950,000.00
2026	0.633548133	3,400,000.00	2,154,063.65	950,000.00
2027	0.611690723	3,400,000.00	2,079,748.46	950,000.00
2028	0.590587393	3,400,000.00	2,007,997.13	950,000.00
<b>TOTAL</b>		<b>54,400,000.00</b>	<b>42,355,906.27</b>	<b>15,200,000.00</b>

This analysis assumes full enrollment from the first year. While this will not actually be the case, this was assumed for ease of calculations and to be able to complete the cost benefit analysis.

\*\*Does not include discount rate

***Production Expenditures.***

<b>County</b>	<b>Fertilizer Sales</b>	<b>Chemicals</b>	<b>Seeds</b>	<b>Petroleum</b>	<b>Total Expenditures</b>	<b>Total Production Expenses</b>
Bucks	3,617,000.00	1,974,000.00	5,703,000.00	4,254,000.00	15,548,000.00	67,272,000.00
Delaware	118,000.00	45,000.00	859,000.00	450,000.00	1,472,000.00	9,524,000.00
Lehigh	4,446,000.00	2,593,000.00	7,815,000.00	4,844,000.00	19,698,000.00	70,023,000.00
Monroe	539,000.00	224,000.00	325,000.00	644,000.00	1,732,000.00	9,459,000.00
Montgomery	1,265,000.00	630,000.00	3,209,000.00	2,618,000.00	7,722,000.00	36,971,000.00
Northampton	3,977,000.00	1,283,000.00	1,990,000.00	2,582,000.00	9,832,000.00	26,846,000.00
Pike	129,000.00	38,000.00*	99,000.00	245,000.00	511,000.00	3,374,000.00
<b>Total</b>					<b>56,515,000.00</b>	<b>223,469,000.00</b>
<b>Expenditures per Acres</b>					<b>170.34</b>	<b>1.524495825</b>
<b>Total Expenditures</b>					<b>3,406,775.57</b>	

\* 2002 number, 2007(d)