U.S. Fish & Wildlife Service

# Cherry Valley National Wildlife Refuge

*Draft Feasibility Study and Environmental Assessment*

*October 2008*

*This blue goose, designed by J.N. "Ding" Darling, has become the symbol of the National Wildlife Refuge System.*

The U.S. Fish & Wildlife Service is the principal federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The Service manages the 97-million acre National Wildlife Refuge System comprised of more than 548 national wildlife refuges and thousands of waterfowl production areas. It also operates 69 national fish hatcheries and 81 ecological services field stations. The agency enforces federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restore wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid Program which distributes hundred of millions of dollars in excise taxes on fishing and hunting equipment to state wildlife agencies.

This draft document is intended to help fulfill the purpose of the Cherry Valley National Wildlife Refuge Study Act of 2006 to complete a study evaluating fish and wildlife habitats in Cherry Valley, Pennsylvania, for their potential acquisition by the U.S. Fish and Wildlife Service for inclusion in the National Wildlife Refuge System. Upon release, public meetings will be held and this draft document will be available for comment for 30 days. After the 30-day comment period, comments received will be summarized, and, where appropriate, addressed in the final Study Report and Environmental Assessment.

# Cherry Valley National Wildlife Refuge Draft Feasibility Study and Environmental Assessment

| | |
|---|---|
| **Type of Statement:** | Draft Environmental Assessment (EA) |
| **Lead Agency:** | U.S. Department of the Interior<br>U.S. Fish and Wildlife Service (Service) |
| **Responsible Official:** | Marvin Moriarty, Regional Director, Region 5 |
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**Abstract:** In accordance with the National Environmental Policy Act (NEPA), as amended, the Service has developed a draft EA in response to the Cherry Valley National Wildlife Refuge Act of 2006 (Study Act). This document offers proposed refuge purposes, vision, and goals. It also presents a detailed description of the physical, biological, and socioeconomic environment within which the study takes place, thus defining the area that may be affected by a refuge. Most important, the study proposes the establishment of a refuge (Alternative B), which is believed by the Service to be the best alternative for fulfilling the intent of the Study Act, and the proposed refuge purposes, vision, and goals. In addition to the proposed action, two other reasonable alternatives are presented for comparison purposes. The three alternatives are summarized briefly below:

- Alternative A: No Refuge -- This is the "No Action" alternative. It serves as a baseline to which the other alternatives are compared. In this alternative, there would be no new refuge and no designated acquisition boundary. Habitat protection and management would continue to be done by existing organizations and government programs.
- Alternative B: Cherry Valley Diverse Habitat Complex -- This is the proposed action. It proposes protection of up to approximately 20,466 acres for a potential refuge. Protection of lands would be done through fee title (about 50 percent of the acres) and conservation easements (about 50 percent of the acres). This alternative would provide protection for more extensive habitat areas, compared to Alternatives A and C, that potentially would better enable the Service to meet the needs of both rare and more common species of wildlife.
- Alternative C: Cherry Valley Wetlands and Ridge Forests Complex -- This alternative proposes protection of up to approximately 14,124 acres for a potential refuge. Protection of lands would be done through fee title (about 65 percent of the acres) and conservation easements (about 35 percent of the acres).

# Department of the Interior
# U.S. Fish and Wildlife Service

# Cherry Valley National Wildlife Refuge
# Draft Feasibility Study and Environmental Assessment

## October 2008

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This draft document is intended to help fulfill the purpose of the Cherry Valley National Wildlife Refuge Study Act of 2006 to complete a study evaluating fish and wildlife habitats in Cherry Valley, Pennsylvania, for their potential acquisition by the U.S. Fish and Wildlife Service for inclusion in the National Wildlife Refuge System. Upon release, public meetings will be held and this draft document will be available for comment for 30 days. After the 30-day comment period, comments received will be summarized, and, where appropriate, addressed in the final Study Report and Environmental Assessment.

# Executive Summary

The Cherry Valley National Wildlife Refuge Study Report and draft Environmental Assessment (Study Report) helps fulfill the purpose of the Cherry Valley National Wildlife Refuge Study Act of 2006 to complete a study evaluating fish and wildlife habitats within Cherry Valley, Pennsylvania, for their potential inclusion by the U.S. Fish and Wildlife Service (Service, we, our) in the National Wildlife Refuge System. Consideration of a refuge within Cherry Valley is largely based on its known wildlife and natural habitat resources.

If creation of a refuge is approved, a boundary line for the refuge would be established that authorizes acquisition of land within that boundary. Landowners within a refuge acquisition boundary are under no obligation to sell their property to the Service. The Service would only acquire land from willing sellers, and can make offers to purchase land from or enter into management agreements with willing landowners within the approved boundary. A new refuge would officially be created upon acquisition of the first parcel of land within the acquisition boundary. Management of a new refuge would follow thereafter, initially under a Conceptual Management Plan, and ultimately under a more detailed Comprehensive Conservation Plan.

The National Environmental Policy Act of 1969 (NEPA) requires federal agencies to consider the environmental effects of any proposed federal action, as well as reasonable alternatives to the proposed federal action, prior to initiating the federal action. Creating a new refuge is a federal action; therefore, this document has been structured as an Environmental Assessment to meet the requirements of NEPA and the Cherry Valley National Wildlife Refuge Study Act. The Service will accept public comments on this draft document during public meetings and a 30 day comment period. Comments received will be summarized, and, where appropriate, addressed in the final Study Report and Environmental Assessment**.** After the public comment period is completed, the document will be submitted to Service's headquarters for additional review and a final decision by the agency's Director.

The Study Report provides an “Introduction” and is presented in six chapters: 1. Study Purpose and Planning Considerations, 2. Affected Environment, 3. Alternatives, 4. Environmental Effects, 5. List of Preparers, and 6. Consultation and Coordination with Others. It also includes a number of appendices that provide further information on the study. The essential outline of the study enables the reader to understand the reason for the study, where the proposed refuge may be established, why Cherry Valley is being evaluated for a national wildlife refuge, what various options or alternatives exist for creating a refuge, how lands might be acquired and managed, and what might be the results or effects of establishing a national wildlife refuge in the valley.

U.S. Representatives Paul Kanjorski (11th District of Pennsylvania) and Charles Dent (15th District) co-sponsored a bill (H.R. 5232) to study the valley for potential inclusion into the National Wildlife Refuge System, which was successfully passed as the Cherry Valley National Wildlife Refuge Study Act of 2006 as Title VI of H.R. 4957 (Public Law No.: 109-363). This act requires the Secretary of the Department of the Interior to submit a report containing the results of the study to the Committee on Resources, U.S. House of Representatives, and to the Committee on Environment and Public Works, U.S. Senate. Proposing the creation of a new refuge is a federal action subject to NEPA, which requires that all federal agencies proposing an action consider the environmental effects of the action, and that alternatives to the proposed federal action be considered. This draft Study Report was developed in concert with relevant laws and policies of the Service and the National Wildlife Refuge System, along with existing fish and wildlife conservation plans that might be influenced by a refuge in the valley. This draft Study Report also considers the suggestions, comments, and issues raised during public meetings held on the potential refuge in March 2008.

This study offers proposed refuge purposes, vision, and goals (Chapter 1 – Study Purpose and Planning Considerations). It also presents a detailed description of the physical, biological, and socioeconomic environment within which the study takes place, thus defining the area that may be affected by a refuge (Chapter 2 – Affected Environment). Most important, the study proposes the creation of a refuge, which is believed by the Service to be the best alternative for fulfilling the intent of the Study Act, and the proposed refuge purposes, vision, and goals (Chapter 3 –Alternatives). In addition to the proposed refuge, two other alternatives are offered. Environmental impacts, including to the physical environment, biological resources, and the socio-economic environment in Cherry Valley are also evaluated (Chapter 4 – Environmental Consequences).

The proposed refuge purposes, vision, and goals are first presented in Chapter 1. Purposes establish the legal foundation for a refuge. A vision offers a description of the desired future conditions envisioned for a refuge. Goals are broad statements of management intent. Ultimately, goals drive management action. The proposed goals for a Cherry Valley National Wildlife Refuge are:

> Goal 1. Protect and enhance habitats for federal trust species and species of management concern, emphasizing migratory birds and species listed under the federal Endangered Species Act, along with protection of wetlands and Kittatinny Ridge habitats.
>
> Goal 2. Create opportunities for hunting, fishing, wildlife observation and photography, and environmental education and interpretation, while promoting activities that complement the purposes of the refuge and other protected lands in the region.

Goal 3 Promote science, education, and research through partnerships to inform land management decisions and encourage continued responsible stewardship of the natural resources of Cherry Valley.

The Cherry Valley Study Act Boundary, comprised of approximately 30,000 acres in southeastern Monroe County, Pennsylvania, harbors several nationally-rare ecosystems, several federally-listed, endangered or threatened species, and over 30 plant and animal species considered by the Commonwealth of Pennsylvania as species of conservation concern (Chapter 2. Affected Environment). A diverse mosaic of habitats, including extensive forests along the Kittatinny Ridge, wetlands along Cherry Creek, and pastures scattered throughout the valley, have helped to sustain diverse wildlife populations within a two hour drive of more than 20 million people. Among the outstanding conservation priorities in the valley is one of the largest known collections of bog turtle populations, important foraging habitats for every raptor species that migrates along Kittatinny Ridge, and globally rare calcareous fen habitats.

The three alternatives considered are:

*Alternative A.* -- *"*No Refuge*"* -- This is the No Action alternative required by NEPA and serves as a baseline to which other alternatives are compared. In this alternative, there would be no new refuge and no designated acquisition boundary. Habitat protection and management would continue to be done by existing organizations and government programs. Currently there are 6,313 acres of lands protected by agricultural easements, private conservation organizations, and municipal, state, and federal ownerships within Cherry Valley. Of these, 4,811 acres contain 12 of the defined Cherry Valley ecosystems. There would be no new opportunities for refuge-based, wildlife-dependent public uses, partnerships, or scientific research.

*Alternative B* -- "Diverse Habitat Complex" -- This is the Service's <u>proposed action</u>. It proposes an acquisition boundary to include up to 20,466 acres containing portions of 13 of the valley and ridge's defined ecosystems. Protection of lands would be accomplished through fee title (about 50 percent of the acres) and conservation easements (about 50 percent of the acres). This alternative would provide protection for more extensive habitat areas than the other alternatives, and would better enable the Service to meet the needs of both rare and more common species of wildlife. It would offer more substantial opportunities for compatible public uses than either Alternative A or C, and would also enable refuge-based partnerships and scientific research.

*Alternative C* --"Wetlands and Ridge Forests" -- This alternative proposes an acquisition boundary of up to 14,124 acres containing portions of 12 of the valley and ridge's defined ecosystems. Protection of lands would be done through fee title (about 65 percent of the acres) and conservation easements (about 35

percent of the acres). It would offer opportunities for wildlife management, compatible public uses, along with new refuge-based partnerships and scientific research, although these opportunities would be less than those for Alternative B.

Environmental effects of creating a refuge (Chapter 4) in the valley are described for each of the three alternatives. Environmental effects are described in broad categories – physical (air, water, soil, and sound), biological (habitats and species), and socioeconomic (public use, land use, tax revenue, and cultural and historic resources), providing essential background information for assessing potential effects on that environment due to the establishment of a refuge in the valley. Providing a comparison of potential effects due to each alternative provides the Service and the public with important information about what may be the best way to protect valuable wildlife resources within Cherry Valley, yet remain sensitive and knowledgeable about how those land protection measures, and subsequent management activities, may affect the valley. Generally, we concluded that the environmental effects of establishing a refuge in Cherry Valley would be positive for all of the physical, biological, and socioeconomic aspects noted above, although we recognize that refuge management activities and public use activities could have some negative effects on the valley habitats. The effects of not creating a refuge could exacerbate negative effects that already exist because of expanding changes in land use with associated impacts to air and water quality, noise levels, displacement of valuable habitats, and lost opportunities for wildlife-dependent recreational opportunities (e.g., hunting and fishing).

The Study Report also presents a draft Conceptual Management Plan, a draft Land Protection Plan, and a draft Realty Feasibility Study in the appendices. The draft Conceptual Management Plan provides general, interim management direction for the proposed new refuge. It identifies proposed purposes, interim goals, management objectives, and potential staffing structure for a refuge. It also addresses any pre-existing, compatible, and wildlife-dependent recreational uses that we would allow to continue (on an interim basis) on any land acquired for a refuge. The purposes of the draft Land Protection Plan are to provide landowners and the public with an outline of Service policies, priorities, and protection methods for land in the proposed refuge area, assist landowners in determining whether their property lies within the proposed refuge boundary, and inform landowners about our long-standing policy of acquiring land only from willing sellers. The draft Realty Feasibility Study provides a broad estimate of the cost to acquire all lands, waters, and interests that have been deemed appropriate for refuge status under the proposed action, recognizing that land protection occurs over fairly long periods of time and that not all lands within an approved refuge acquisition boundary are suitable for wildlife conservation.

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# Introduction

The United States National Wildlife Refuge System is the world's largest collection of lands and waters set aside specifically for conserving wildlife and protecting ecosystems. Currently, 548 national wildlife refuges encompassing over 95 million acres are part of the national network. Refuges are found in every state and several island territories. Each year, more than 40 million visitors hunt, fish, observe and photograph wildlife, or participate in environmental education or interpretation activities on refuges. Currently, there are two refuges in Pennsylvania, the Erie National Wildlife Refuge in the extreme northwest part of the State and the John Heinz National Wildlife Refuge just outside Philadelphia along the Delaware River. Detailed information about the National Wildlife Refuge System can be found on the U.S. Fish and Wildlife Service's website (http://www.fws.gov/refuges/).

John Heinz National Wildlife Refuge

This document assesses the feasibility of and proposes creating a new refuge in Cherry Valley, Pennsylvania. It was prompted by the Cherry Valley National Wildlife Refuge Study Act of 2006 (Title VI in Public Law No: 109-363, see also Appendix A) and prepared by National Wildlife Refuge System staff, Northeast Region, U.S. Fish and Wildlife Service, Department of the Interior, with assistance from numerous other agencies, organizations, and individuals.

Our consideration of a refuge within Cherry Valley is largely based on its wildlife and natural habitat resource values. Cherry Valley lies within the Delaware River watershed and is contained within the Ridge-and-Valley geologic province of the Appalachian Mountains. Cherry Valley is located primarily in Monroe County, with a narrow section running atop the Kittatinny Ridge in Northampton County, Pennsylvania. It lies along the eastern border of Pennsylvania nearly equally distant from Philadelphia and New York City and is valued for its rural landscape, recreational opportunities, and its wildlife resources. Cherry Valley encompasses land in the townships of Ross, Chestnuthill, Hamilton, Stroud, Smithfield, and Delaware Water Gap Borough. The valley currently supports, or has supported in the past, several nationally-rare ecosystems, five federally-listed, threatened or endangered species, many migratory birds, and over 30 plant and animal species listed as threatened or endangered by the Commonwealth of Pennsylvania. It is recognized as one of the most unique and important areas for the federally-listed, threatened bog turtle (*Clemmys muhlenbergii),* migrating raptors, and inter-montane wetlands.

If creation of a national wildlife refuge is approved, a boundary line for the refuge would be established that authorizes the U.S. Fish and Wildlife Service to protect land within that boundary. An approved refuge acquisition boundary identifies the important and sensitive habitat areas that qualify for inclusion in the National Wildlife Refuge System and can be managed under the system's policies. Landowners within a refuge acquisition boundary are under no obligation to sell their property to the U.S. Fish and Wildlife Service. We would only acquire land from willing sellers, and can make offers to purchase land from or enter into management agreements with willing landowners within the approved boundary. The new refuge would officially be created upon acquisition of the first parcel of land within the acquisition boundary. Management of the new refuge would follow thereafter.

Land protection within the valley has been promoted by a variety of measures including a $25 million Monroe County open space bond initiative that has been exhausted due to land protection demand. These measures have been insufficient to protect the county's valuable wildlife habitats. Recognizing the valley's valuable wildlife habitat resources, residents, local elected officials, community leaders, and private conservation organizations within the community took action to encourage permanent protection of these areas within Cherry Valley as part of the National Wildlife Refuge System. Consequently, U.S. Representatives Paul Kanjorski (11$^{th}$ District of Pennsylvania) and Charles Dent (15$^{th}$ District) co-sponsored a bill (H.R. 5232) to study the valley for potential inclusion into the National Wildlife Refuge System. This bill was successfully passed as the Cherry Valley National Wildlife Refuge Study Act of 2006 as Title VI of H.R. 4957 (Appendix A).

This document fulfills Section 603 of this act, titled: "Study of Refuge Potential and Future Refuge Land Acquisition," and is presented as an Environmental Assessment under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.; Stat. 852), as amended (NEPA). This document also adheres to relevant federal directives and National Wildlife Refuge System policies. These policies, some of which are briefly described in Chapter 1, are designed to guide decisions consistent with the National Wildlife Refuge System's overriding legislation – The National Wildlife Refuge Administration Act of 1966 , as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-668ee).

The document is divided into six chapters and several appendices:

**Chapter 1 – Study Purpose and Planning Considerations.** This chapter provides an overview and describes the purpose and need for preparing this document and the decision the Service is intending to make, while setting the stage for the subsequent chapters and appendices. It describes the mandate of the Cherry Valley National Wildlife Refuge Study Act of 2006, evaluating the potential for a National Wildlife Refuge in Cherry Valley, and describes National Wildlife Refuge System policies, and national and regional conservation plans or directives that influenced this report.

Chapter 1 also presents our proposed vision and goals for the proposed refuge, discusses possibilities for refuge administration, explains the planning process we followed in developing this report, and describes the key issues, concerns, and opportunities identified that influenced the study.

**Chapter 2 – Affected Environment.** This chapter describes the valley's physical environment, habitats and species, and human environment. It provides a thorough description of the valley and its current features so that the beneficial and adverse effects of the proposed refuge can be weighed within the larger context of the broader Cherry Valley region, the Delaware River watershed, and the Appalachian Ridge-and-Valley geologic province.

**Chapter 3 – Description of Alternatives.** This chapter presents three alternatives for establishing a refuge in Cherry Valley, including our proposed action (Alternative B). The represents a range of reasonable alternatives for establishing a refuge in Cherry Valley, and thus fulfilling one of the tenets of NEPA. The alternatives include:

- *Alternative A: No Refuge* -- This is the "No Action" alternative required by NEPA and serves as a baseline to which the other alternatives are compared.
- *Alternative B: Cherry Valley Diverse Habitat Complex* -- This is the Service's proposed action. It includes protection of up to 20,466 acres for a refuge.
- *Alternative C: Cherry Valley Wetlands and Ridge Forests Complex* -- This alternative proposes protection of up to 14,124 acres for a refuge.

**Chapter 4 – Environmental Effects.** This chapter evaluates possible environmental effects (beneficial and adverse) of implementing each of the alternatives so that the projected effects of establishing a refuge in the valley can be fully considered. Effects discussed cover the biological and physical environment, cultural features, and socio-economic considerations. Not only are effects discussed as beneficial or adverse, but also whether they are direct, indirect, cumulative, or unavoidable. Once effects are described, a determination can be made on whether creation of a new refuge would significantly affect the quality of the human environment, and whether there is any need to prepare an Environmental Impact Statement.

**Chapter 5 – List of Preparers.** This chapter documents writers and contributors to the Study Report.

**Chapter 6 – Consultation and Coordination with Others.** This chapter summarizes how the public and our partners were involved in the preparation of this document. Public involvement was a requirement of the act and is a key component of the NEPA process.

**Appendices –** Additional information relevant to this document is provided in the various appendices including a draft Conceptual Management Plan, a draft Land Protection Plan, a draft Realty Feasibility Study, and additional information on the economics analysis.

# 1 Purpose and Planning Considerations

## 1.1 Purpose and Need

### 1.1.1 Purpose

The proposed action is to establish a national wildlife refuge (NWR, refuge) in Cherry Valley, Pennsylvania. The purpose of the proposed action is to contribute to the mission and goals of the National Wildlife Refuge System (Refuge System) by:

1. Protecting and enhancing habitats for federal trust species and species of management concern, with special emphasis on migratory birds and species listed under the federal Endangered Species Act (ESA), along with protection of wetlands and the Kittatinny Ridge.
2. Creating opportunities for hunting, fishing, wildlife observation and photography, and environmental education and interpretation, while promoting activities that complement the purposes of the refuge and other protected lands in the region.
3. Promoting science, education, and research through partnerships to inform land management decisions and encourage continued responsible stewardship of the natural resources of Cherry Valley.

After reviewing the analysis in this document, including the attached appendices and any public comments, the Regional Director will determine whether to formally recommend to the Director of the U.S. Fish and Wildlife Service (Service, we, our) that a new refuge be established in Cherry Valley. At that time, the document, including any revisions, will be submitted to Service's headquarters for additional review and a final decision by the agency's Director.

### 1.1.2 Need

Male Scarlet Tanager

Finding Cherry Valley to be of unique value to numerous wildlife species and habitats, and recognizing strong community support for a refuge in the valley, the 109th Congress passed the Cherry Valley National Wildlife Refuge Study Act of 2006 (Study Act; see Appendix A), calling on the Secretary of the Department of the Interior (Secretary) to conduct a study: *"to evaluate the fish and wildlife habitat and aquatic and terrestrial communities located in Northeastern Pennsylvania and identified on the map entitled 'Proposed Cherry Valley National Wildlife Refuge – Authorization Boundary' dated February 24, 2005, for their potential acquisition by the United States Fish and Wildlife Service through donation, exchange, or willing seller purchase, and subsequent*

*inclusion in a future Cherry Valley National Wildlife Refuge."* The referenced study boundary map is shown in Figure 1-1.

The Study Act calls for a study to determine the benefits Cherry Valley provides to fish and wildlife diversity, threatened or endangered species, aquatic and wetland habitats, wildlife-dependent recreation, scientific research, and environmental education and interpretation. Additionally, the study is to determine how protecting habitats in the valley may support fulfillment of international obligations of the United States (U.S.) with respect to fish, wildlife, and their habitats (e.g., Migratory Bird Treaty Act of 1918). More specifically, the study will determine the total area of lands and habitats within the valley that are recommended for land protection and inclusion into the Refuge System, up to a maximum of 30,000 acres.

The Study Act requires the Secretary to submit a report containing the results of the study to the Committee on Resources, U.S. House of Representatives, and to the Committee on Environment and Public Works, U.S. Senate. The report is to include: 1) a map that identifies and prioritizes specific lands, waters, and interests therein for future acquisition, and that delineates an acquisition boundary, for a potential Cherry Valley NWR, 2) a cost estimate for the acquisition of all lands, waters, and interests therein that are appropriate for refuge status, and 3) an estimate of potentially available acquisition and management funds from non-federal sources.

This document (Study Report) fulfills Section 603 of the Study Act. In addition, the Service is using this document to propose the creation of a new refuge . The National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.; Stat. 852), as amended (NEPA) requires that any federal action consider the direct, indirect, and cumulative effects of the action, and that alternatives to the action be considered. Creating a new refuge is a federal action, therefore, the Study Report is also structured and presented as an Environmental Assessment (EA) to assist the Service in complying with NEPA.

The Study Act also requires the Service to consult with others as the study is conducted (Sec. 603 (b)). Therefore, to formally initiate the study, the Service formed the Cherry Valley Study Team (CVST; Table 1-1). The CVST was instrumental in identifying priorities for the study, gathering essential information, assuring that necessary issues and concerns are addressed, and helping to coordinate with the public. The CVST will continue to help bring the report to its final form. Further details about the consultation process are provided in Chapter 6.

Table 1-1. Members of the Cherry Valley Study Team (CVST) created to provide information on establishing a national wildlife refuge in Cherry Valley, Pennsylvania.

| Type of Organization | Name of Organization |
|---|---|
| Federal Agencies | U.S. Fish and Wildlife Service |
| | National Park Service |
| State Agencies | Pennsylvania Fish and Boat Commission |
| | Pennsylvania Game Commission |
| | Pennsylvania Natural Heritage Program |
| Local Agencies | Monroe County Conservation District |
| | Monroe County Planning Commission |
| Academic Institutions | East Stroudsburg University |
| | Northampton Community College |
| Non-governmental Organizations | The Nature Conservancy |
| | Pocono Avian Research Center |

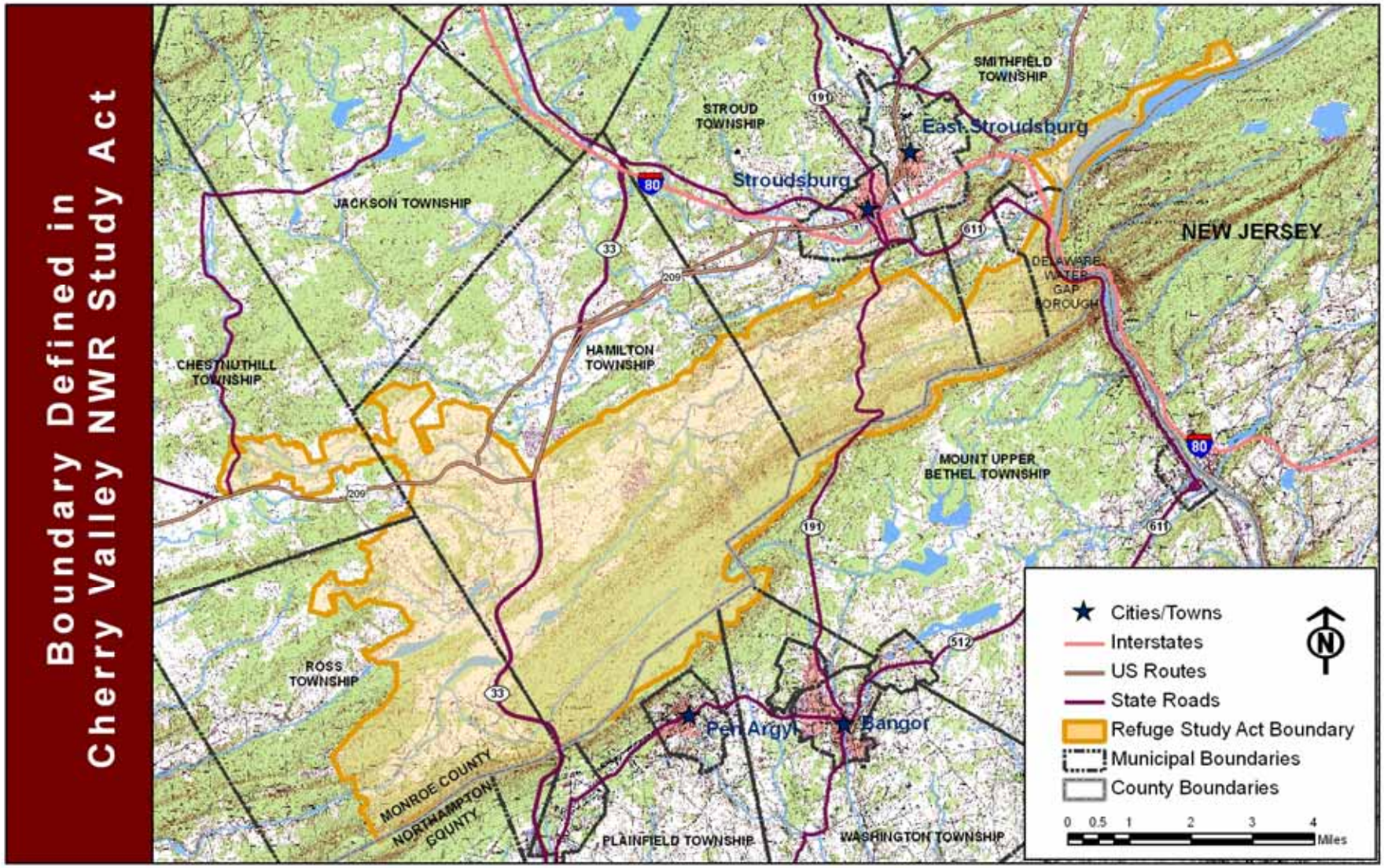


Figure 1-1. Study boundary defined in the Cherry Valley National Wildlife Refuge Study Act of 2006 (Title VI of Public Law.

## 1.2 Regional Context

Cherry Valley is largely defined by the Delaware River watershed within the Ridge-and-Valley geologic province of the Appalachian Mountains (Figure 1-2). The Ridge-and-Valley province extends from northern New Jersey, westward into Pennsylvania, and southward into Maryland, West Virginia, Virginia, Tennessee, and Alabama (Nationmaster 2008). Cherry Creek and its 13,343 acre watershed define most of Cherry Valley. Fed by many tributaries originating from limestone aquifers, the creek meanders 15 miles through a steep-sided valley between Kittatinny Mountain to the south and Godfrey Ridge to the north, and eventually empties into the Delaware River Gap, a world-renowned geologic feature located at the confluence of Cherry Creek and the Delaware River. Most of the water resources in Cherry Valley can be attributed to groundwater. Additional details on the Cherry Valley environment are presented in Chapter 2 – Affected Environment.

## 1.3 The Service and the National Wildlife Refuge System: Policies and Mandates Guiding Planning

The Service, as part of the Department of the Interior, administers the Refuge System along with many other conservation programs. The Service mission is: "Working with others, to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people." Congress entrusts the Service with the conservation and protection of national trust resources such as migratory birds and fish, species listed under the federal Endangered Species Act as amended (ESA), inter-jurisdictional fish, national wildlife refuges, wetlands, and certain marine mammals. The agency also enforces federal wildlife laws and international treaties on importing and exporting wildlife, assists states with their fish and wildlife programs, and helps other countries develop conservation programs. The Service Manual contains the standing and continuing directives on implementing our authorities, responsibilities, and activities (http://www.fws.gov.directives/direct.html). The Service publishes special directives that affect the rights of citizens or the authorities of other agencies separately in the Code of Federal Regulations (CFR).

In 1997, Congress passed the National Wildlife Refuge System Improvement Act (Public Law 105–57) (Refuge Improvement Act), amending the National Wildlife Refuge System Administration Act of 1966. Among other things, the Refuge Improvement Act states that the Refuge System must focus on wildlife conservation, and it established a unifying mission for the Refuge System:

> To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

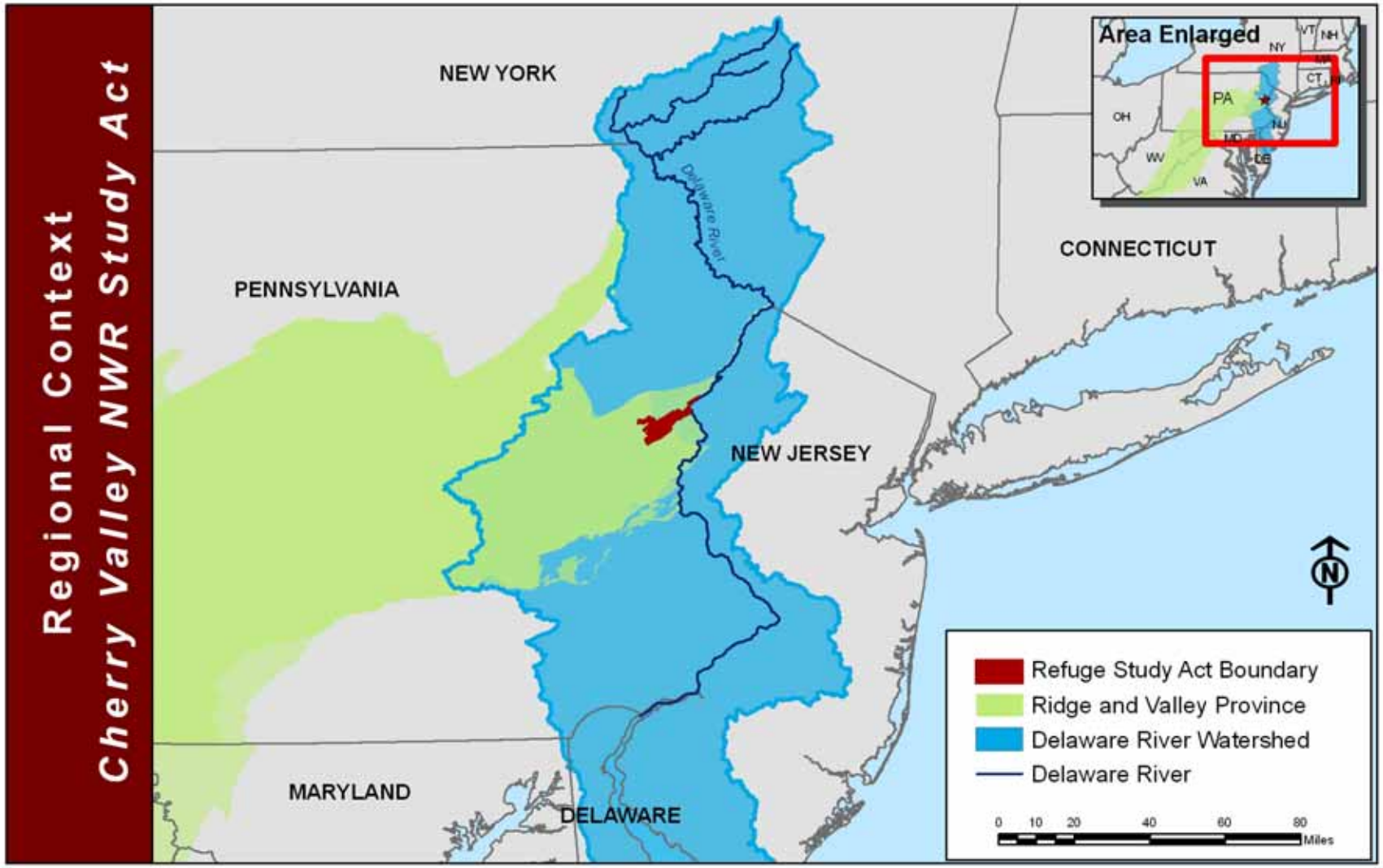


Figure 1-2. Regional location of the study act boundary defined in the Cherry Valley National Wildlife Refuge Study Act, Pennsylvania

It further states that the mission of the Refuge System, coupled with the purpose(s) for which a refuge was established, will provide the principal management direction for refuges. The Refuge Improvement Act established a foundation for Refuge System policies used to effectively implement the Refuge System. These policies are described briefly below and can be found at http://www.policy.fws.gov/library/00fr62483.pdf.

### 1.3.1 Service Policies

*Policy on the National Wildlife Refuge System Mission, Goals, and Purposes (601 FW 1)* sets forth the Refuge System mission noted above, how it relates to the Service mission, and explains the relationship of the Refuge System mission, and the purpose(s) of each unit in the Refuge System. In addition, it identifies the following Refuge System goals: conserve a diversity of fish, wildlife, and plants; develop and maintain a network of habitats; conserve those ecosystems, plant communities, and wetlands that are unique within the United States; provide and enhance opportunities to participate in compatible, wildlife-dependent recreation; and, help to foster public understanding and appreciation of the diversity of fish, wildlife, and plants and their habitats. This policy also establishes management priorities for the Refuge System: conserve fish, wildlife, and plants and their habitats; facilitate compatible wildlife-dependent recreational uses; and, consider other appropriate and compatible uses.

*Refuge System Planning Policy (602 FW 1, 2, 3)* provides guidance for Refuge System planning, including Comprehensive Conservation Plans (CCPs) and step-down management plans. This policy helps to ensure that wildlife comes first in the Refuge System, and that refuge management reflects the Refuge System mission and purpose(s) for which each refuge was established. Among other features, this policy ensures NEPA compliance, including ensuring that opportunities to participate in the refuge planning process are available to our other programs; federal, state, and local agencies; tribal governments; conservation organizations; adjacent landowners; and the public. It also states that the Service will manage all refuges in accordance with an approved CCP.

*Appropriate Use Policy (603 FW 1).* This policy is used to decide whether various uses are appropriate on a refuge. When we find a use is appropriate, we must then determine if the use is compatible before we allow it on a refuge. This policy also clarifies and expands on the compatibility policy (see below), which describes when refuge managers should deny a potential use without determining compatibility. This policy applies to all proposed and existing uses in the Refuge System only when we have jurisdiction over the use, and does not apply to refuge management activities or situations where reserved rights or legal mandates provide we must allow certain uses.

*Compatibility Policy (603 FW 2).* The Refuge Improvement Act is the key legislation regarding management of public uses and compatibility with wildlife conservation on

refuges. The Refuge Improvement Act declares that all existing or proposed public uses of a refuge must be compatible with refuge purpose(s). After affirming that a proposed use is appropriate (see above), the refuge manager determines compatibility after evaluating an activity's potential impact on refuge resources, and ensuring that it supports the Refuge System mission and does not materially detract from, or interfere with, refuge purpose(s). This act also stipulates six wildlife-dependent public uses that are to receive enhanced consideration in CCPs: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Draft compatibility determinations for select public uses on a proposed Cherry Valley NWRcan be found as an Attachment to the draft Conceptual Management Plan (Appendix B) along with additional information on the process.

*Maintaining Biological Integrity, Diversity, and Environmental Health Policy (601 FW 3)* provides guidance on maintaining or restoring the biological integrity, diversity, and environmental health of the Refuge System, including the protection of a broad spectrum of native fish, wildlife, and habitat resources found in refuge ecosystems. It provides refuge managers with a process for evaluating the best management direction to prevent the additional degradation of environmental conditions and to restore lost or severely degraded environmental components. It also provides guidelines for dealing with external threats to the biological integrity, diversity, and environmental health of a refuge and its ecosystem(s).

*Wildlife-Dependent Recreation Policy (605 FW 1).* The Refuge Improvement Act establishes that six compatible wildlife dependent recreational uses (i.e., hunting, fishing, wildlife observation, photography, environmental education and interpretation) are the priority general public uses of the Refuge System, and are to receive enhanced consideration over other public uses in refuge planning and management. These often are referred to as the "Big-6" public uses. This policy explains how we will provide visitors with opportunities for those priority public uses on units of the Refuge System and how we will facilitate participation in these priority public uses.

### 1.3.2 Laws and Mandates

Consideration of other laws and mandates is conducted during planning for a new refuge. Although Service and Refuge System policies and the purpose(s) of each refuge provide the foundation for its management, other federal laws, executive orders, treaties, interstate compacts, and regulations on conserving and protecting natural and cultural resources also affect how we select lands for inclusion into the Refuge System and ultimately how we manage refuges. Many of these are described in the Service's "Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service" (http://www.fws.gov/laws/lawsdigest/indx.html). As required, the Service would adhere to these laws and mandates upon creation of a new refuge in Cherry Valley.

Federal laws require the Service to identify and preserve its important historic structures, archaeological sites, and artifacts. NEPA mandates our consideration of cultural resources in planning federal actions. The Refuge Improvement Act also requires consideration of archaeological and cultural values. Some additional laws that pertain to cultural, archaeological, and historic resources are described below:

*The Archaeological Resources Protection Act (16 U.S.C. 470aa–470ll; Pub.L. 96–95)* establishes protections for archaeological resources on federal or Native American lands.

*The Historic Sites, Buildings and Antiquities Act* (16 U.S.C. 461–462, 464–467; 49 Stat. 666, as amended by Pub.L. 89–249, 79 Stat. 971), popularly known as the Historic Sites Act, declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges (e.g., National Historic and Natural Landmarks). Implementation of this act is strengthened by provisions of *The Archeological and Historic Preservation Act* (16 U.S.C. 469–469c; Pub.L. 86–523; 74 Stat. 220, as amended by Pub.L. 93–291, 88 Stat. 174).

*The National Historic Preservation Act of 1966* (16 U.S.C. 470–470b, 470c–470n), Pub.L. 89–665, 80 Stat. 915) provides for the preservation of significant historical features (buildings, objects and sites) through a grant-in-aid program to the states. It establishes a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468–468d).

The Service also owns and cares for some museum properties. The most common are archaeological, zoological, and botanical collections, historical photographs, historic objects, and art. Each refuge maintains an inventory of its museum property. The Service ensures that those collections will remain available to the public for learning and research.

Other resource laws are also integral in refuge planning and may play an important role in refuge establishment or management, notably: Migratory Bird Treaty Act (MBTA; 16 U.S.C. 703-712), Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531–1544), as amended, The Wilderness Act of 1964 (16 U.S.C. 1131–1136), and The Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271-1287).

Chapter 4, “Environmental Effects,” evaluates this document’s compliance with the legislation noted above (e.g., MBTA), the Clean Water Act of 1977 as amended (33 U.S.C. 1251, et seq.; Pub.L. 107–303), and the Clean Air Act of 1970 as amended (42 U.S.C. 7401 et seq.). Finally, we designed this draft Study Report to comply with NEPA and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500–1508).

## 1.4 Conservation Plans and Initiatives Guiding Planning

Refuge planning must consider conservation goals and objectives of existing ecosystem plans for the landscapes in which the refuges are located to determine how a refuge can best contribute to the functioning of the ecosystems. The Service must coordinate refuge planning with other governments, other government agencies, nongovernmental organizations, and, to the extent practicable, refuge plans will be consistent with the fish and wildlife conservation plans of the state and the conservation programs of tribal, public, and private partners within the ecosystem. The following plans were considered while developing this document.

### 1.4.1 Multi-Species and Regional Plans

*State of Pennsylvania Wildlife Action Plan (2008).* In 2001 U.S. Congress passed the Department of the Interior and Related Agencies Appropriations Act of 2002 which created the State Wildlife Grants (SWG) program. These grants are available to state fish and wildlife agencies "for the development and implementation of programs for the benefit of wildlife and their habitat, including species that are not hunted or fished." Each state had to develop a Wildlife Action Plan (WAP; officially known as a Comprehensive Wildlife Conservation Strategy) focusing on the species of greatest conservation need to be eligible for grants. Pennsylvania's WAP is a blueprint for the Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission to effectively manage and protect game and nongame species and their habitats (Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission 2008). The WAP highlights many sensitive and declining species, and begins to identify and prioritize the pressing research, management, and recovery needs of species and habitats of greatest conservation concern throughout Pennsylvania. Both commissions anticipate that interested individuals and organizations will join them in working toward the worthwhile goal of comprehensive fish and wildlife conservation in the Commonwealth.

Of the species listed as species of conservation concern in Pennsylvania's WAP, as many as 61 occur within or near the Cherry Valley study boundary. This includes at least 13 of the 37 species identified in the WAP as Pennsylvania's species of greatest conservation concern (Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission 2008).

*The Appalachian Mountain Bird Conservation Region (AMBCR)* originated from the North American Bird Conservation Initiative (NABCI). NABCI is a coalition of many governmental agencies, private organizations, academic organizations, and private industry leaders in Canada, the United States, and Mexico. It was formed to address the need for coordinated bird conservation that will benefit all birds in all habitats. The AMBCR, often referred to as Bird Conservation Region (BCR) 28, is one of 37 BCRs across the United States. BCRs are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues.

NABCI's approach to bird conservation is regionally-based, biologically driven, and landscape-oriented. It draws together the major bird conservation plans already in existence for water birds, shorebirds, waterfowl, and land birds, fills in knowledge gaps, and implements conservation actions through dynamic partnerships.

Cherry Valley lies within the AMBCR, which includes portions of 15 states and 11 Partners in Flight (PIF) physiographic regions and covers approximately 105 million acres. This region includes the Blue Ridge, the Ridge and Valley Region, the Cumberland Plateau, the Ohio Hills, and the Allegheny Plateau. The primary purposes of BCRs are to facilitate communication among the bird conservation initiatives; facilitate a regional approach to bird conservation; promote new, expanded, or restructured partnerships; and identify overlapping or conflicting conservation priorities. Members of the Appalachian Mountains Joint Venture partnership have developed the Appalachian Mountains Bird Conservation Initiative to guide AMBCR conservation priorities in the region (Appalachian Mountains Bird Conservation Partnership 2005).

*The North American Waterfowl Management Plan (NAWMP)* is designed to promote partnership-based habitat conservation for waterfowl and other wetland birds. It was first developed in 1996 and has been revised twice since, most recently in 2004 (NAWMP 2004). The NAWMP established "Joint Venture" partnerships across the continent. Joint venture partnerships tribal nations, local businesses, conservation organizations, individual citizens, and involving federal, state, and provincial governments are assembled for the purpose of protecting habitat within those areas. The 2004 plan among the United States, Canada, and Mexico outlines their strategy to restore waterfowl populations through habitat protection, restoration, and enhancement (NAWMP 2004). Cherry Valley falls within the Atlantic Coast Joint Venture (ACJV). The goal of the ACJV is to: "Protect and manage priority wetland habitats for migration, wintering, and production of waterfowl, with special consideration to black ducks, and to benefit other wildlife in the joint venture area." The ACJV Implementation Plan served as a basis for evaluating waterfowl management opportunities within the valley.

*Partners in Flight Bird Conservation Plan: Physiographic Area 17, Northern Ridge and Valley.* In 1990, PIF was conceived as a voluntary, international coalition of government agencies, conservation organizations, academic institutions, private industry, and other citizens dedicated to reversing the trends of declining bird populations and to "keeping common birds common." The foundation of PIF's long-term strategy for bird conservation is a series of scientifically-based bird conservation plans, using physiographic provinces as planning units. Cherry Valley lies in the Northern Ridge-and-Valley Physiographic Province, Bird Conservation Area 17, which is included in the AMBCR. The goal of each PIF plan is to ensure long-term maintenance of healthy populations of native birds, primarily non-game landbirds. Within each physiographic area, the plans rank bird species according to their

conservation priority, describe desired habitat conditions, develop biological objectives, and recommend conservation actions. Habitat loss, population trends, and vulnerability of a species and its habitats to regional and local threats are all factors used in the priority ranking.

*North American Waterbird Conservation Plan (2002).* This plan represents a partnership among individuals and institutions with the interest in and responsibility for conserving colonial nesting waterbirds and their habitats (Kushlan et al. 2002). Its primary goal is to ensure that the distribution, diversity, and abundance of populations and habitats of breeding, migratory, and non-breeding waterbirds are sustained or restored throughout the lands and waters of North America, Central America, and the Caribbean (Kushlan et al. 2002). It provides a framework for conserving and managing colonially nesting water-dependent birds, and facilitates continent-wide planning and monitoring, national, state, and provincial conservation, regional coordination, and local habitat protection and management.

In 2006, the Mid-Atlantic New England Working Group began drafting the Waterbird Conservation Plan for the Mid-Atlantic/New England/Maritimes (MANEM) Region (MANEM Waterbird Working Group, in prep.). This plan, being implemented between 2006 and 2010, contains technical appendices on (1) waterbird populations including occurrence, status, and conservation needs, (2) waterbird habitats and locations within the region that are crucial for waterbird sustainability, (3) MANEM partners and regional expertise for waterbird conservation, and (4) conservation project descriptions that present current and proposed research, management, habitat acquisition, and education activities. Summarized information on waterbirds and their habitats provides a regional perspective for local conservation action.

*U.S. Shorebird (2001, 2nd Edition) and North Atlantic Regional Shorebird (2000) Plans*
Concerns about shorebirds led to the creation of the U.S. Shorebird Conservation Plan (Brown et al. 2001). Developed in a partnership with individuals and organizations throughout the United States, the plan presents conservation goals for each U.S. region, identifies important habitat conservation and research needs, and proposes education and outreach programs to increase public awareness of shorebirds and of threats to them. The North Atlantic Regional Shorebird Plan was created to help address specific regional priorities (Clark et al. 2000).

*Birds of Conservation Concern Plan (2002) – Northeast Region, U.S. Fish and Wildlife Service*. The Birds of Conservation Concern Plan (BCC) identifies nongame migratory birds that, without strong conservation action, are likely to become candidates for listing under the ESA (USFWS 2002a). The BCC compiles the highest ranking species of conservation concern from these major nongame bird conservation plans: PIF (species scoring >21), U.S. Shorebird Conservation Plan (species ranking 4 or 5), and North American Waterbird Conservation Plan (species ranking 4 or 5). We used the

BCC list to help us focus on which species might warrant special management attention.

*Conservation Plan for the Kittatinny Ridge (2006).* In 2006, Audubon Pennsylvania published the "Conservation Plan for the Kittatinny Ridge in Pennsylvania" designed to summarize what is currently known about the cultural and natural resources of the Kittatinny Ridge through Pennsylvania, and to provide recommendations on strategies and priorities for protecting the ridge corridor for people and for ecological integrity (Audubon Pennsylvania 2006). The 150-mile long Kittatinny Ridge is recognized as a globally significant migration flyway, concentrating up to 20,000 migrating fall raptors every year. This ridge is home to the world's first conservation area for birds of prey, Hawk Mountain Sanctuary, established in 1934 solely to protect migratory raptors. In 1978 the Pennsylvania Game Commission designated the entire length of the Kittatinny Ridge in Pennsylvania as the "Kittatinny Ridge Birds of Prey Natural Area." Cherry Valley lies northeast of the Hawk Mountain Sanctuary.

The 2006 "Conservation Plan for Kittatinny Ridge Conservation Corridor" describes the value of the ridge in detail and includes protection of ridge habitat as a critical priority (Audubon Pennsylvania 2006). The ridge serves as migration habitat for at least 16 species of North American raptors, including peregrine falcon, bald eagle, broad-winged hawk, Northern goshawk, and black vulture. There are 12 recognized hawk watching sites along the ridge. The large blocks of unfragmented forest throughout the ridge also serve as key breeding sites for many interior-forest birds, including ruffed grouse, wood thrush, ovenbird, scarlet tanager, cerulean warbler, worm-eating warbler, Louisiana waterthrush, Acadian flycatcher, and many others. Some of these are species of conservation concern that may be on the brink of being threatened or endangered, or are on the Audubon National Bird Conservation WatchList (Butcher et al. 2007).

The ridge suffers from loss of habitat, notably through residential and commercial changes in land use, and energy and mining development, and is challenged with over abundant white-tailed deer and invasive species. Recommendations from this plan focus on improving scientific knowledge, land protection, enhanced public policy and involvement, and strengthened environmental education.

*Partners in Amphibian and Reptile Conservation (PARC)* was created in response to the increasing national declines in amphibian and reptile populations. PARC members include diverse government agencies, conservation organizations, universities, zoological parks and nature centers, pet traders, private industries, and environmental consultants. Its five geographic regions—Northeast, Southeast, Midwest, Southwest and Northwest—focus on regional challenges in amphibian and reptile conservation. Regional working groups allow for region-specific communication. PARC published "Habitat Management Guidelines for Amphibians

and Reptiles of the Northeastern United States" in 2006 (Mitchell, Breisch, and Buhlmann 2006).

The National State Agency Herpetological Conservation Report (NHCR) is a summary report sponsored by PARC (PARC 2004). It provides a general overview of each state wildlife agency's support for reptile and amphibian conservation and research and includes lists of the amphibian and reptile species of concern for each state. The NHCR's purpose is to facilitate communication among state agencies and partner organizations throughout the PARC network to identify and address regional and national priorities for reptiles and amphibians. The next NHCR report will integrate a list of the PARC Species of Conservation Concern with each state's Wildlife Action Plan.

*U.S. Fish and Wildlife Service – Fisheries Program Northeast Region Strategic Plan (2004).* The Northeast Region Strategic Plan (USFWS 2004) is an extension of the Service's Fisheries Program Strategic Vision document (USFWS 2002b), describing more specifically how the Region will fulfill the goals and objectives identified in the Vision over five years (2004-2008). This plan, developed in cooperation with over 40 partners and stakeholders, addresses the decline of fish and other aquatic resources, and the economic impact of those declines. The plan is implemented with partners through annual project work plans.

*U.S. Fish and Wildlife Service – Regional Wetlands Concept Plan (1990).* In 1986, Congress enacted the Emergency Wetlands Resources Act (16 U.S.C. 3901(b)) to promote the conservation of our nation's wetlands. This act directs the Department of the Interior to develop a National Wetlands Priority Conservation Plan identifying the location and types of wetlands that should receive priority attention for land protection by federal and state agencies using Land and Water Conservation Fund appropriations. In 1990, our Northeast Region completed a Regional Wetlands Concept Plan to provide more specific information about wetlands resources in the Northeast (USFWS 1990). It identifies 850 wetland sites that warrant consideration for land protection to conserve wetland values in our region. This plan identifies two sites within or near the Study Act boundary: one of these sites occurs within the Cherry Creek watershed and another occurs in the Aquashicola Watershed.

*Appalachian Trail MEGA-Transect (2008).* The goals of the Appalachian Trail (AT) MEGA-Transect are to enhance management and protection of the AT environment (Dufour and Crisfields 2008). The AT and its surrounding 250,000 acres of protected lands are a priceless ecological resource. AT lands harbor rare, threatened, and endangered species, encompass important water resources, and shelter wildlife. Threats to the environment of the AT (e.g., encroaching development, acid rain, invasive species, polluted water, and climate change) represent threats to the health of everyone downwind and downstream of the AT. Because of the magnitude of this project, partner and volunteer engagement is vital to this effort. Citizen scientists

will play an active role, participating in monitoring activities and providing policy-makers, scientists and land managers with the data needed to protect the AT. A Cherry Valley NWR may offer an opportunity to work collaboratively with this AT initiative.

### 1.4.2 Species-Specific Plans

*Dwarf Wedgemussel Recovery Plan (1993).* The dwarf wedgemussel (*Alasmidonta heterodon*) was federally-listed as an endangered species in March 1990. Its recovery plan identifies this goal: "maintain and restore viable populations to a significant portion of its historical range in order to remove the species from the federal list of threatened and endangered species" (USFWS 1993). Currently, the species is not known to occur in Cherry Valley, although it is documented in the Delaware River several miles upstream and downstream from Cherry Valley. It is likely that the valley offers potential habitat for this species. Surveys are needed to fully determine their presence, absence, or the possibilities for their introduction, along with the presence of their host fish, the tessilated darter (*Etheostoma olmstedi*). Besides listing goals and objectives and describing mussel ecology and life history, the Recovery Plan identifies specific, major recovery tasks.

*Bog Turtle Northern Population, Recovery Plan (2001).* The northern population of the bog turtle was listed as a threatened species under the federal ESA in November 1997. The overall objective for the recovery plan is to protect and maintain existing populations of this species and its habitat, enabling its eventual removal from the federal list of endangered and threatened wildlife and plants (USFWS 2001). The recovery plan identifies a number of specific recovery tasks: 1) protection through existing regulations, 2) secure long-term protection of bog turtle populations, 3) conduct surveys of known, historical, and potential bog turtle habitat, 4) investigate the genetic variability of the bog turtle throughout its range, 5) reintroduce bog turtles into areas from which they have been extirpated or removed, 6) manage and maintain bog turtle habitat to ensure its continuing suitability for bog turtles, 7) conduct an effective law enforcement program to halt illicit take and commercialization of bog turtles, and 8) develop and implement an effective outreach and education program about bog turtles.

Five bog turtle recovery units and their subunits are identified in the plan. Cherry Valley lies within the Delaware [river watershed] recovery unit, which is the most populated of the five units. The Delaware recovery unit is the most ecologically diverse of the five recovery units, encompassing inner Coastal Plain, Piedmont, river valleys, Appalachian plateau areas, and fens. It contains both glaciated and non-glaciated habitats. This unit contains the highest densities of roads and major urban areas and has the highest number of lost sites range wide. There is less agricultural pressure here; however, urban sprawl and habitat fragmentation are major conservation challenges, as is maintaining ground water quality and quantity. The goal for the Delaware unit is to protect 80 viable bog turtle populations and

sufficient habitat to ensure the sustainability of these populations. This recovery unit is divided into east and west subunits, of which Cherry Valley lies in the Delaware west subunit, consisting of the Delaware River watershed west of the Delaware River. To meet the recovery criterion for this unit, at least 20 populations must be protected in the Delaware West Subunit.

*Indiana Bat (Myotis sodalis) Draft Recovery Plan (2007).* In 1967, the federal government listed the Indiana bat (*Myotis sodalis*) as endangered under the Endangered Species Preservation Act of 1966 (80 Stat. 926; 16 U.S.C. 668aa(c)) because of declines in their numbers documented at their seven major hibernation sites in the Midwest. Although population numbers are down, surveys in most states' hibernation sites indicate that populations increased or at least remained stable in 2004 and 2005. In 2005, Indiana bats were found hibernating in areas near Hibernia and Mount Hope, New Jersey, areas less than 50 miles from Cherry Valley. While Indiana bats have not been documented in Cherry Valley since 1950, the proximity to known populations and presence of suitable habitat make it likely that this species uses the valley for summer roosting and foraging. The valley's Hartman's Cave may offer potential hibernation habitat for the species since it was the 1950 site location. The Service would implement recovery plan tasks (USFWS 2007c) for this species as appropriate if the Indiana bat was documented within the potential refuge boundary.

*National Bald Eagle Management Guidelines (2007).* In July 2007, the Service issued a final ruling to remove the bald eagle from the federal list of endangered and threatened species. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). The Service developed National Bald Eagle Management Guidelines (USFWS 2007b) to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. The guidelines help minimize impacts on bald eagles, particularly where people may constitute a "disturbance," which the Eagle Act prohibits. The guidelines are intended primarily as a tool for landowners and planners who seek information and recommendations on how to avoid disturbing bald eagles.

*Conserving the Eastern Brook Trout: Action Strategies (2008).* The eastern brook trout (*Salvolinus fontinalis*) is the only salmonid native to Pennsylvania and is the official state fish (EBTJV 2008a). In the U.S., brook trout are declining throughout their range (Hudy et al. 2005). Concern over this species lead state and federal agencies (including the Service and Pennsylvania Fish and Boat Commission), conservation groups, and academics from across their native range to form The Eastern Brook Trout Joint Venture (EBTJV) in 2004 (EBTJV 2007). The EBTJV has developed several documents, including *Conserving the Eastern Brook Trout: Action Strategies* (EBTJV 2008), to help prioritize and guide brook trout conservation and

restoration efforts in the U.S. As part of this document, Pennsylvania has identified specific goals and objectives for its brook trout population (EBTJV 2008). The Service would integrate its activities in Cherry Valley with state goals in this area whenever feasible.

## 1.5 The Refuge Planning Process

The Service initiated work on the study during the spring of 2007, formulating a general approach to accomplishing the task. Progress has been hampered since funding authorized by the Study Act (Sec. 603 (e)) has not been appropriated by Congress. Nevertheless, the Service continued with the study with the assistance of many dedicated partners. Notably, the Service joined together with The Nature Conservancy to establish baseline information for the study evaluation. A mailing list and e-mail list of all known interested individuals, groups, and organizations were developed to increase awareness of the proposal. In February 2008, we distributed copies of a study planning newsletter to everyone on that list.

Following initial efforts with The Nature Conservancy, the Service invited a number of representatives from select government agencies, universities, and conservation organizations to form the CVST already mentioned above. The CVST met in October and December 2007 to begin gathering relevant information for the study, and to discuss species and habitat priorities for a potential new refuge. The Service and the CVST also began to prepare for public meetings designed to inform private citizens and interested groups and organizations about the refuge proposal and to obtain public participation in the study process.

On March 26 and 27, 2008, two public meetings were held to solicit information about the potential refuge. Over 200 people attended the meetings. The March 26th meeting was attended by Representative Paul Kanjorski. Through the CVST meetings and public meetings, a number of general concerns, issues, and questions arose that were used to guide development of the study (see Section 1.9 Issues, Concerns, and Opportunities).

Since the public meetings were held, the Service and the CVST have used all gathered information along with requirements of the Study Act, NEPA, and the Refuge Improvement Act and its policies to develop the current draft study report, including the refuge alternatives described in Chapter 3. We have also developed a website to support study activities:
www.fws.gov/northeast/planning/Cherry%20Valley/lcphome.html.

Following public meetings on this Study Report to be held during a 30 day comment period, comments received will be summarized. Substantive comments will be addressed in the final Study Report/EA. A planning update newsletter will be developed, posted on the website, and distributed to the mailing list.

Once we have prepared the final Study Report, we will submit it to our regional director. The Study Report/EA will then be sent to the Director of the Service with the regional director's recommendation to approve or not approve a new refuge in Cherry Valley.

## 1.6 Refuge Purposes

The Service, with assistance from the CVST, considered the purposes and intents of the Study Act along with longstanding legislation available to the Service for establishing refuges to develop the following proposed refuge purposes:

> *"for use as an inviolate sanctuary, or for any other management purpose, for migratory birds…." 16 U.S.C. §715d (Migratory Bird Conservation Act), and*
>
> *"to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" 16 U.S.C. §1534 (Endangered Species Act of 1973), and*
>
> *"the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..." 16 U.S.C. §3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986), and*
>
> *"for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. §742f(b)(1) (Fish and Wildlife Act of 1956).*

These purposes, if accepted with the approval of an acquisition boundary for a Cherry Valley NWR, would serve as the core justification for management of refuge habitats and public use. All decisions related to a potential refuge would first be based upon their relation to and compatibility with these refuge purposes.

## 1.7 Refuge Vision Statement

The CVST developed this proposed vision statement to provide a guiding philosophy and sense of purpose for a new refuge:

> *On the Cherry Valley National Wildlife Refuge, birds will freely migrate and raise their young in native habitats of forest, wetlands, and grasslands. Bog turtles will thrive in valley bogs, and other rare wildlife and plants will find a safe harbor. We will manage refuge lands and waters with an emphasis on trust species whose populations have declined, assisting them on the road to recovery.*

*The refuge will serve as an outdoor classroom, where students of all ages will study nature's complexity, contributing to our understanding and appreciation of the natural world and the National Wildlife Refuge System. It will also serve as an outstanding area for scientific research intended to benefit this valuable ecosystem. All those who visit will find enjoyment in the presence of healthy and abundant fish, wildlife, and plants, and will leave with a renewed personal commitment to land conservation and stewardship.*

*In partnership with others, we will contribute to Cherry Valley communities, helping renew the health and vitality of Cherry Valley and its vibrant landscape. We will complement the rich traditions of hunting, fishing, forestry and agriculture on Pennsylvania's eastern border.*

## 1.8 Refuge Goals

The CVST developed three goals after considering the proposed refuge purposes and vision statement, the findings of the Study Act, the missions of the Service and the Refuge System, and the mandates, plans, and conservation initiatives above. These goals are intentionally broad, descriptive statements of purpose. They highlight elements of the vision for the refuge that we would emphasize in its future management.

*Goal 1. Protect and enhance habitats for federal trust species and species of management concern, with special emphasis on migratory birds and species listed under the ESA, along with protection of wetlands and the Kittatinny Ridge.*

This goal supports the principal findings of the Study Act (Sec. 602) on the need to protect important wildlife and associated habitats that are of special concern. It supports the essential purpose of the Refuge Improvement Act for conserving wildlife, and complements the mission of the Refuge System and the trust resource responsibilities of the Service.


Milton Friend / USFWS

*Goal 2. Create opportunities for hunting, fishing, wildlife observation and photography, and environmental education and interpretation, while promoting activities that complement the purposes of the refuge and other protected lands in the region.*

This goal supports a component of the Study Act (Sec. 603 (c)) to consider opportunities for wildlife-dependent recreation, and complements similar

provisions in the Refuge Improvement Act and its associated Wildlife-Dependent Recreation Policy. It also provides for a new refuge to complement the AT, wherever possible.

*Goal 3. Promote science, education, and research through partnerships to inform land management decisions and encourage continued responsible stewardship of the natural resources of Cherry Valley.*

This goal also supports the Study Act's findings (Sec. 602) on the need to protect the unique geologic and water quality features of the valley, rare plant communities, and the need to offer the refuge as an outdoor laboratory for scientific research and environmental education. This goal also supports the Refuge Improvement Act, the Refuge System mission, and its policy on "Maintaining Biological Integrity, Diversity, and Environmental Health Policy."

## 1.9 Issues, Concerns, and Opportunities

The Study Act (Sec. 603 (b)) and NEPA require consultation with the public and others as the study is performed to assure that interested parties are provided opportunities to participate and that the study benefits from information, concerns, or issues they may have. We define an issue as: any matter requiring management action. For example, that may include actions related to a resource management problem, threat to a resource, an ongoing initiative, upcoming opportunity, conflict in public use, or a public concern. Issues arise from many sources, including the public, our staff, other Service programs, state agencies, other federal agencies, our partners, neighbors, user groups, or Congress.

The key issues derived from the CVST and public consultation, together with the Study Act requirements and the potential refuge goals, form the basis for developing and comparing the management alternatives we analyze in Chapter 3. The wide-ranging opinions on how to address key issues while adhering to the Study Act and potential refuge goals and objectives, contributed to the alternatives offered. Key issues are those the Service has the jurisdiction and authority to resolve. We describe them in more detail below.

### 1.9.1 Habitat and Species Management

The Refuge System's primary purpose is to conserve, protect, enhance, and restore wildlife and their habitats. This overarching purpose serves as the foundation for all that is done. This Study Report accounts for how a new refuge in Cherry Valley may contribute to that broad purpose, how a refuge would fulfill the intent of the Study Act to protect important valley wildlife and habitats such as bog turtles and migratory birds, and how a refuge generally would help to protect federal trust resources and contribute to the mission of the Refuge System. Chapter 3 – Alternatives – presents how a new

refuge would fulfill these needs, and Appendix B – draft Conceptual Management Plan – provides greater detail on species and habitat management priorities.

We heard from CVST members and many from the public about the urgency to protect essential habitat areas in the valley for the declining bog turtles, migratory birds, rare plant communities, wetlands, and game species. Several participants simply encouraged open space protection and others noted a need to incorporate a new refuge into a healthy landscape that also encouraged organic farming and related new industries. Others recognized the opportunity the refuge could provide for the native brook trout, American eel, and native mussels, including some potential in the future for the dwarf wedgemussel. The following species and habitat issues arose from the CVST and public meetings:

- What species and habitats are most in need of protection by a refuge?
- How would we protect valuable habitat in the valley during expanding changes in land use?
- Could we protect valuable habitats outside the Study Area?
- How could we enhance plant and animal inventories in the valley?
- How would we best protect, restore, and or enhance valley wetlands?
- How might a new refuge manage invasive, exotic, and overabundant species?

### 1.9.2 Land Protection

Ongoing changes in land use and associated impacts that threaten the integrity of natural resources in Cherry Valley area are increasingly a concern (see Chapter 2 Affected Environment, pages 2-40 and 2-41). Lands that once provided contiguous habitat are being sub-divided, primarily into residential lots. Although local communities and businesses may desire some of that development, the level of concern rises when those activities destroy or degrade important wildlife habitat, degrade water quality, restrict what was once public access to recreation areas, or detract from the valley's rural landscape. In addition, those changes elevate the potential threat from invasive and non-native plants, which are becoming increasingly widespread and difficult to control.

We heard directly from people who would support efforts to acquire and manage important habitat areas for inclusion in the Refuge System. Others were supportive as long as the Service would allow public use and access on those lands. Some individuals indicated that, if a refuge was approved, they would prefer lands be acquired primarily through the purchase of conservation easements, rather than purchase in full fee title. Others expressed concerns that the Service might take land out of the local tax base or might take agricultural land out of production, or possibly eliminate traditional uses such as hunting. We evaluate and address these concerns in Chapter 3 – Alternatives and Appendix B – draft Conceptual Management Plan.

A number of organizations, including state and federal agencies, are involved in protecting and conserving some lands in the valley. The Study Act, however, recognizes that there are additional lands that may best contribute to wildlife conservation. We have worked with the CVST to identify sensitive wildlife habitat in need of protection or restoration, notably habitat benefitting trust resources. Service land protection, through either fee purchase or purchase of conservation easements from willing sellers, is one of the most important tools we use to conserve important areas of wildlife habitat (further details on land protection are available in Appendices E and F). The following issues and concerns arose about land protection and acquisition:

- Could lands outside the study area be considered for the refuge?
- Would a new refuge conflict with traditional agricultural land production or already planned developments in the valley, and could the Service lease land back to farmers?
- Would a new refuge affect organic farming, which is important to the valley and should be encouraged.
- How would the establishment of a refuge affect businesses such as expanding commercial developments, mining, and other resource extraction?
- How would the local tax base be affected? How would property values be affected?
- How should we prioritize lands for protection, and how would we manage the conservation easements purchased for the refuge?
- Would the Service use condemnation to acquire land for the refuge?
- Would land use change for areas owned by the National Park Service if a refuge was established?
- Is Hamilton Township changing zoning regulations as a result of the refuge study?

### 1.9.3 Public Use and Community Relations

A principal element of any refuge is to conserve wildlife for the continuing benefit of the American people. Our goal is for the refuge to become an integral part of the socioeconomic health and quality of life of the communities affected by it. Our challenge is to understand the visions of the respective communities and our role in them while adhering to our Refuge System mission. We also would need to determine how best to nurture and cultivate mutually beneficial relationships using the resources we have available.

During public meetings we learned that many people are vaguely aware of the Refuge System, but are not necessarily knowledgeable about the opportunities and services that might be offered by a refuge. Some participants desire greater educational opportunities, others wanted hunting and fishing opportunities. Generally, more outdoor recreational activities were favored. Conversely, some also commented that the refuge should not permit hunting while others expressed that a new refuge should not limit current hunting activities, and that a new refuge should not be open to hunters from outside the valley. Yet others expressed feelings that these types of activities are

the best way to increase community interest and involvement in the refuge. In response to those comments and the issues below, our alternatives evaluate a range of quality, wildlife-dependent recreational opportunities, and propose measures to promote Service visibility, community understanding, and support for refuge programs.

Some non-priority public uses may be allowed in order to facilitate wildlife-dependent public uses. For example, cross-country skiing and snowshoeing are not themselves priority public uses, but may be allowed to facilitate wildlife observation and photography, for example. There are other non-priority public uses such as jogging, bicycling, or horseback riding that some visitors would argue also facilitate priority public uses. These activities, however, often take place at a sensitive time of year when wildlife use the refuge for feeding, resting, migrating, or breeding, and the activities often cause unacceptable disturbance to wildlife. Usually there are opportunities for the public to partake in these kinds of activities on other public lands not far from a refuge. The following are key issues or concerns that arose about public uses and community relations.

- What specific opportunities could we provide for the community to enjoy a new refuge?
- How could a refuge increase education and stewardship about the valley?
- How and where could a refuge afford public access to valley lands?
- How would we find ways to complement activities of the Appalachian Trail?
- How could we maintain a vibrant farming community?
- Does the Service consider cultural resources when planning a refuge, if so how?
- It is important to educate new and existing landowners about preserving their property for generations to come.
- Are there ways for the refuge to be a multi-use area that people can use to hunt, fish, hike, bicycle, and ride horses.
- The refuge should not limit current hunting activities.
- How would the Service prevent trespass on private lands?
- If established, the refuge area has potential to be used as an outdoor classroom and natural laboratory where students can learn about the environment and scientists can conduct research.

### 1.9.4 Refuge Creation and Future Administration

Creating a new refuge stimulates a need for a dependable source of funding to assure success of the new refuge. The potential refuge, if approved, would need to be managed and administered locally in some meaningful fashion and more broadly within the Northeast Region of the Service. Administration typically includes staffing, funding, travel, habitat management, planning, trails management, land protection, research, special use permits, facilities management, law enforcement, information management, visitor services, and community relations. Potential administration of the Cherry Valley

NWR is available in Appendix B – draft Conceptual Management Plan. The following are key issues or concerns that arose about refuge creation and administration.

- How would costs for staffing and maintenance of the refuge be assured and managed?
- What administrative facilities or roads would be needed to manage the refuge?
- Could partnering with local government or conservation organizations be used to help manage a refuge?

# 2 Affected Environment

This chapter describes the Cherry Valley National Wildlife Refuge Study Area (Study Area), in Pennsylvania and its local and regional setting. The majority of the Study Area lies within southeastern Monroe County,; however, the Study Area also includes a narrow strip of land along Kittatinny Ridge in Northampton County. This chapter also describes the valley's physical environment, habitats, species, and human environment. This description provides a thorough overview of the valley and its current features so that the impacts, or effects, of the study proposal (i.e., feasibility of establishing a refuge) can be weighed within the larger context of Cherry Valley, Monroe County, the Delaware River Basin and the Appalachian Ridge and Valley province.

Based on comments received from the public meetings held in March 2008 along with discussions by the CVST, we decided that an area just outside the Study Act boundary, south of Highway 611 and north of the Delaware Water Gap, should be included within the Study Area (Figure 2-1). Notably, individuals familiar with the conceptual study area prior to it being incorporated into the Study Act boundary recognized that the area illustrated in Figure 2-1 was mistakenly omitted from the official Study Act boundary. Due to this apparent omission, an additional 1,500 acres located in this adjacent area were included in the various analyses. We believe including this land in the Study Area honors the intent of the Study Act and public expressions of support.

## 2.1 Physical Environment

Pennsylvania's Cherry Valley is carved out by Cherry Creek, which flows through the southeastern corner of Monroe County, Pennsylvania before feeding into the Delaware River (Figure 2-2). The 31,500-acre Study Area is topographically and geologically unique, and harbors several nationally-rare ecosystems (Noss et al. 1995), as many as five federally-listed threatened or endangered species (two historic), and over 30 plant and animal species of special concern that are listed as rare, threatened, or endangered by the Commonwealth of Pennsylvania (see Table 2-3). The valley's physical environment is discussed in more detail below.

## 2.2 Topography

The Study Area falls within the physiographic Appalachian Ridge and Valley province, which is characterized by long, parallel, sharp-crested ridges separated by narrow valleys. Elevations range from 300 feet in valley bottoms to just over 1,600 feet along ridge tops. Unfolding in a northeast-southwest direction across Pennsylvania's southern Monroe County, most of the Study Area falls within the province's Blue Mountain section, also known in the region as the Kittatinny Ridge. The Kittatinny Ridge forms the southern boundary of the potential refuge and forms part of the Central Appalachians. The Central Appalachians extend from northern New Jersey, westward into Pennsylvania, and southward into Maryland, West Virginia, and Virginia (BLOSS Associates 2004, Way 2002, Department of Conservation and Natural Resources [DCNR] 2008).

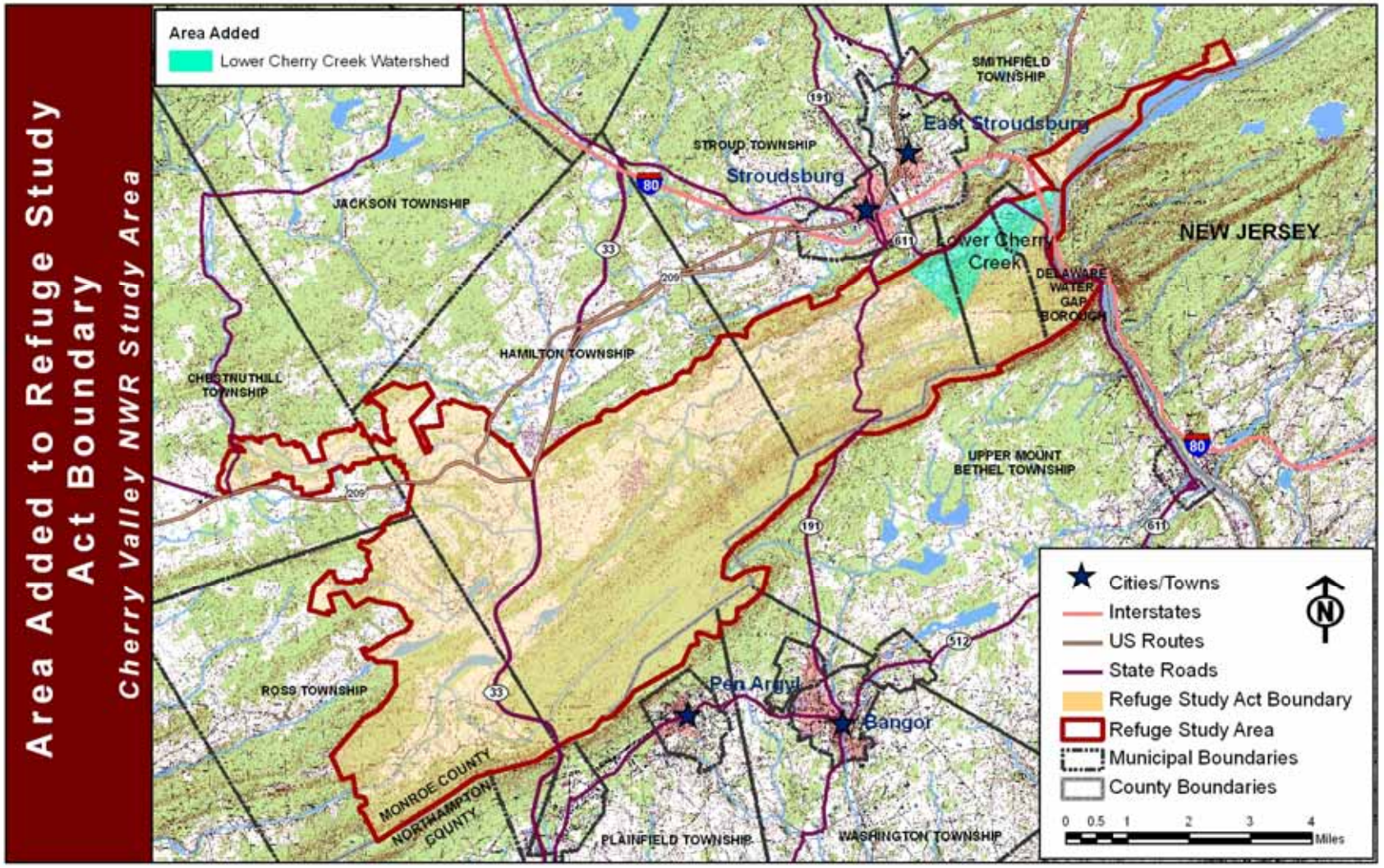


Figure 2-1. The Cherry Valley National Wildlife Refuge Study Act boundary and the Lower Cherry Creek addition included for this study. Together, these areas comprise the Cherry Valley National Wildlife Refuge Study Area. See text for a more detailed explanation.

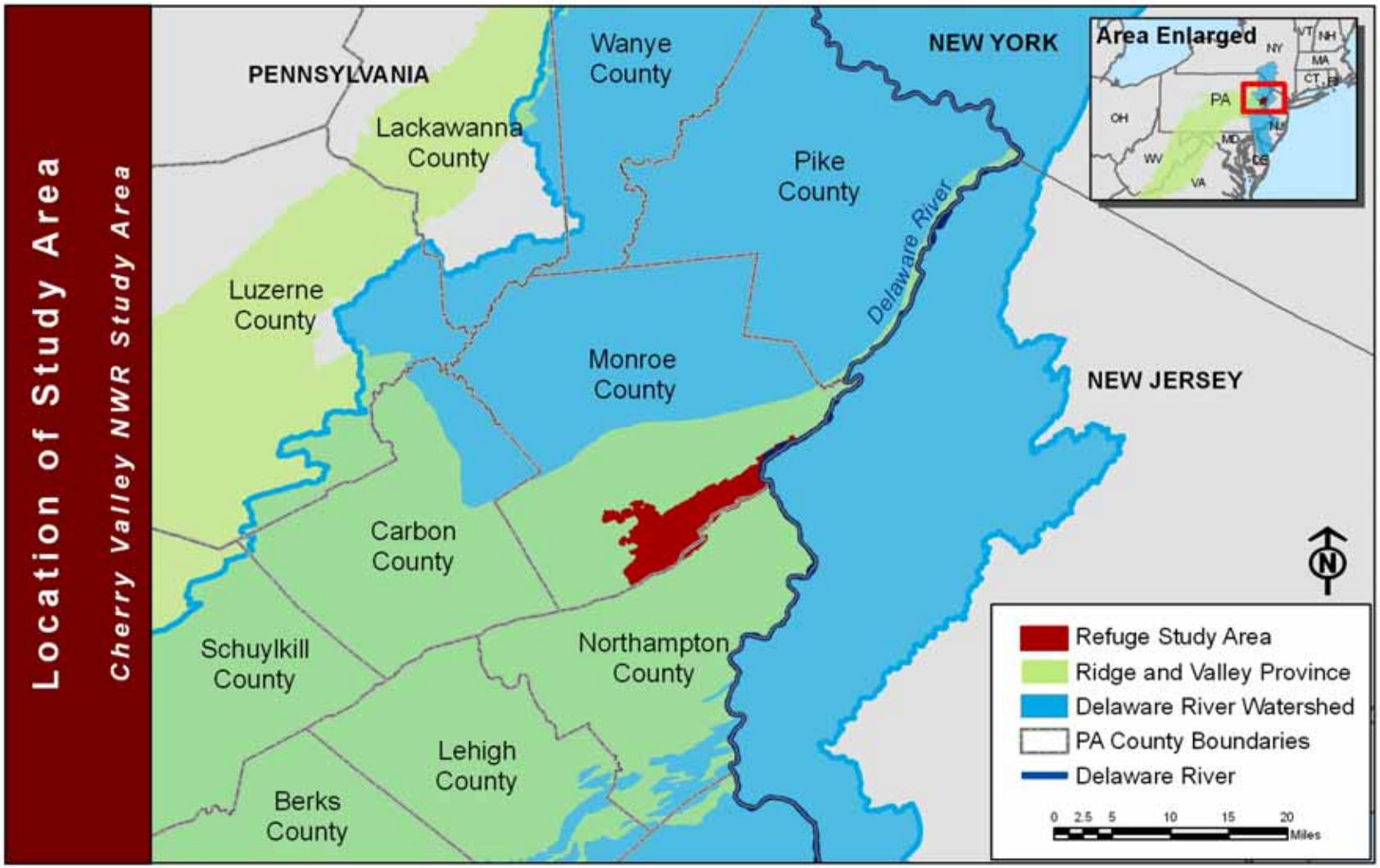


Figure 2-2. Location of the Study Area for a potential Cherry Valley National Wildlife Refuge in relation to the Delaware River Watershed and the Ridge and Valley Province, Pennsylvania..

Cherry Valley is narrowly wedged between two very different and major geologic features to the north and south. To the south, on the other side of the Kittatinny Ridge, lies a portion of the 700-mile long Great Appalachian Valley, which has served as an important north-south travel route for humans and wildlife since prehistoric times. To the north rises the Pocono Glaciated Plateau.

### 2.2.1 Geology

Estimated to be as old as 480 million years, the Appalachians are characterized by thrusted faults, folds, ancient ocean floors and sedimentary and volcanic rock. These mountain ranges were once higher than today's Himalaya mountain range (U.S. Geological Survey 2008). In addition to the surrounding ridges, Cherry Valley offers abundant proof that a continental ice sheet existed during North America's last major glacial period taking place between 12,500 and 18,500 years ago. During that time, the Wisconsin Glacier terminal moraine, reaching 1,800 feet above the valley floor, began to recede northward, leaving several interesting features.

Side-by-side kames (knob-like conical hills) and kettle holes (depressions) cover the landscape. Glacial striae (scratches appearing on large boulders) abound in Cherry Valley. In some locations, glacial till and boulders cover the valley. At a place called Table Rock, the largest glacial groove in Pennsylvania measures six feet wide and seventy feet long (BLOSS Associates 2004).

Ridges and mountaintops located within the Study Area typically consist of sandstone and shale, with smaller amounts of limestone, diabase, granitic rocks and other rock types (Perles and Podniesinki 2004). One of the most prominent rock types in the Blue Mountain section includes the Shawangunk Formation, a mapped bedrock unit named after the Shawangunk Ridge in New York, where it is the dominant rock type.

Almost all other areas falling within Study Area are covered with rapidly-weathering, loosely-packed silt, sand, and gravel sediments that were reshaped or deposited during glacial melting. Rock fragments in the glacial sediments are generally similar to the composition of the underlying bedrock and are thus assumed to be locally derived (Brodhead Watershed Association 2008). Colluvium (soil and rocks deposited at the base of steep inclines) decreases the topographic slope at the base of most hills throughout the basin. Alluvium (sediment deposited by flowing water) consists of sand, gravel, and cobbles from eroded till deposits and is common to many of the streams (BLOSS Associates 2004).

The limestone and dolostone in Cherry Valley have been extensively quarried for a variety of purposes including crushed stone and cement manufacturing. Several active quarries operate in the area today, including two within the Study Area. In fact, the Wisconsin Glacier terminal moraine is responsible for shaping conditions that have encouraged farming, vineyards, tree farms, trout hatcheries and quarry operations in Cherry Valley.

### 2.2.2 Soils

There are five major soil types in the Study Area, and most are formed from glacial till (Table 2-1). Others are formed from a mixture of glacial till and residuum, a mixture of glacial till and colluvium, glacial outwash, recent stream alluvium, old stream alluvium and outwash, and organic material. Alluvial and recently originated organic materials are still being deposited.

Table 2-1. Soil Types in Cherry Valley, Pennsylvania.

| Soil Names | Description |
|---|---|
| **Lackawanna-Wellsboro-Oquaga** | Nearly level to sloping, deep and moderately deep, well drained and moderately well drained soils underlain by reddish glacial till. Soil types range from Lackawanna, being well drained but slow permeating, Wellsboro, being moderately well drained with a high seasonal water table and Oquaga, being moderately deep and well drained. The Lackawanna, Wellsboro and Oquaga series were formed in glacial till derived from sandstone, siltstone and shale. |
| **Mardin-Bath-Volusia and Weikert-Hartleton** | Make up a small portion of northeastern portion of Cherry Valley. Unit 13 is gently sloping to sloping, shallow and deep, well drained soils underlain by gray to brown shale bedrock and glacial till and is derived of pre-Wisconsin glacial till and frost churned materials derived from shale, siltstone, and sandstone. Unit 9 is nearly level to sloping, deep, well drained to somewhat poorly drained soils underlain by brownish to gray glacial till and are formed in glacial till derived from sandstone, siltstone and shale. |
| **Dekalb-Hazleton-Laidig** | Sloping to moderately steep, moderately deep and deep, well drained soils underlain by brownish glacial till and colluvium. This unit extends along the southern boundary of the Cherry Creek Watershed and is situated between Cherry Creek and the Kittatinny Ridge. The Hazelton series formed in pre-Wisconsin glacial till and colluvial material derived from sandstone, siltstone and some shale. The Laidig series formed in colluvium derived from sandstone and shale. The Dekalb series formed in glacially influenced materials derived from sandstone, siltstone and some shale. |

| Soil Names | Description |
|---|---|
| **Benson-Rock outcrop** | This map unit extends along the northern edge of the Cherry Creek Watershed. Moderately steep to very steep, shallow, well drained soils and areas of rock outcrop underlain by calcareous and noncalcareous shale, slate, sandstone and quartzite. Benson soils were formed in glacial till derived from limestone, calcareous shale, slate sandstone, and quartzite. |
| **Wyoming-Chenango-Pope** | Nearly level to sloping, deep, somewhat excessively drained and well drained soils underlain by glacial outwash and alluvium. Pope was formed in alluvium derived from sandstone, siltstone, and shale. The Wyoming series formed in glacial outwash derived from sandstone and siltstone with some shale. Chenango formed in outwash derived from sandstone and siltstone. This is the soil type that is adjacent to Cherry Creek, situated on terraces and floodplains. According to Bloss Associates and the Brodhead Watershed Association, most of this area has been cleared and is used for crops. |

Sources: United States Department of Agriculture 1981; BLOSS Associates and the Cherry Creek Sub-Association of the Brodhead Water Association 2004

### 2.2.3 Climate

Cherry Valley can be described as having a humid continental climate. Lower elevations experience cold winters, modest snowfall, and frequent thawing. Summers are humid and warm. Higher elevations have cooler, less humid summers. Winters may be cold and snowy with less frequent thawing. This contributes to persistent snow cover from December through March, especially on north-facing slopes.

The most accurate recorded climate history in the area is from the town of Stroudsburg, Pennsylvania, which has an approximate elevation of 479 ft above sea level. In this area, winters are cold with average minimum temperatures of -8.5C (16.7F) and average maximums of 1.7C (35.1F). During summer, temperatures are warm with an average minimum of 15.1C (59.2F) and an average maximum of 29.9C (85.8F). The average annual rainfall is 48 inches, with February typically the driest month (3 inches) and July the wettest (4.6 inches), making for a relatively equitable precipitation pattern (World Climate 2008). Annual snowfall ranges from 40-50 inches per year. The freeze-free season lasts between 140 and 180 days (Rossi 2002).

### 2.2.4 Hydrology and Water Quality

*Water Resources*

Cherry Creek is a second-order stream originating near Twin Ponds, south of the town of Saylorsburg, in Monroe County, Pennsylvania. Its 13,343 acre watershed defines most of Cherry Valley. Fueled by large and numerous tributaries erupting from limestone aquifers under Kittatinny Mountain to the south and Godfrey's Ridge to the north, the creek meanders for approximately 15 miles through a steep-sided valley and eventually empties into the Delaware River at the Delaware Water Gap, a world-renowned geologic feature (BLOSS Associates 2004). Cherry Creek descends about 370 feet from its source to its mouth.

While Cherry Creek is fed by numerous small streams and wetlands, most of the water resources in Cherry Valley are attributed to groundwater. As of 1990, groundwater accounted for 95 percent of the 6 to 20 million gallons of water used per day in Monroe County. In Monroe County, most water is accessed through springs, storage reservoirs fed by streams, or drilled wells (USDA 1981). Some of the largest yields come from artesian aquifers created by glacial deposits in the underlying bedrock.

*Water Quality*

Because of the limestone formations, Cherry Creek has higher pH, alkalinity, and total dissolved solids than is found in most area streams, which are generally acidic and have a low mineral content. While different, water quality throughout the Cherry Creek watershed is generally excellent (Brodhead Watershed Association 2008).

To ensure that water quality remains high, nine monitoring sites on Cherry Creek are tested each month as part of the Cherry Creek Streamwatch Program (Brodhead Watershed Association, Cherry Creek Watershed Sub-Association: Streamwatch Program). Tests completed each month include: air and water temperature, pH, water level, water color and clarity, current weather, odor, sulfates, nitrates, phosphates, total dissolved oxygen, specific conductivity, and alkalinity. The program reports unusual results and repeats the test(s) to verify test results. Measurements beyond safe parameters are reported to the Pennsylvania Department of Environmental Protection for follow-up and action.

While water quality scoring for repeat sites through 2003 has displayed an upward trend, strong growth pressures in the region and urban-sprawl patterns could have negative effects on both the quality and quantity of the watershed's surface and groundwater. Rooftops, parking lots, and streets are slowly replacing forests and fields. Rain and snowmelt run rapidly off these artificial surfaces instead of soaking into the ground. This storm water runoff can carry sediment and pollutants into streams, accelerate steam-bank erosion, and raise stream temperatures (BLOSS Associates 2004).

## 2.3 Biological Environment

The Study Area includes all of Cherry Valley, adjacent sections of the Kittatinny Ridge, and sections of the Delaware River, Brodhead, McMichael, Buckwha and Aquashicola Creek watersheds (Figure 2-3). Biological information already assembled by The Nature Conservancy, the Pennsylvania Natural Heritage Program, and the Service identified over 90 species and natural communities of concern in Cherry Valley and surrounding areas, including:

- 3 federally-listed, endangered species (1 historic)
- 2 federally-listed, threatened species (1 historic)
- 20 state-listed, endangered species
- 13 state-listed threatened species
- 5 state-listed, rare species
- 2 state-listed, at-risk species
- 1 critically endangered ecosystem
- 1 nationally-listed, endangered ecosystem
- 1 nationally-listed, threatened ecosystem
- 3 state-identified, special concern natural communities
- 3 U.S. Fish and Wildlife Service aquatic species of special concern
- 24 U.S. Fish and Wildlife Service nongame species of management concern
- 8 North America Wetland Conservation Act priority waterfowl species
- 15 U.S. Fish and Wildlife Service bird species of regional concern

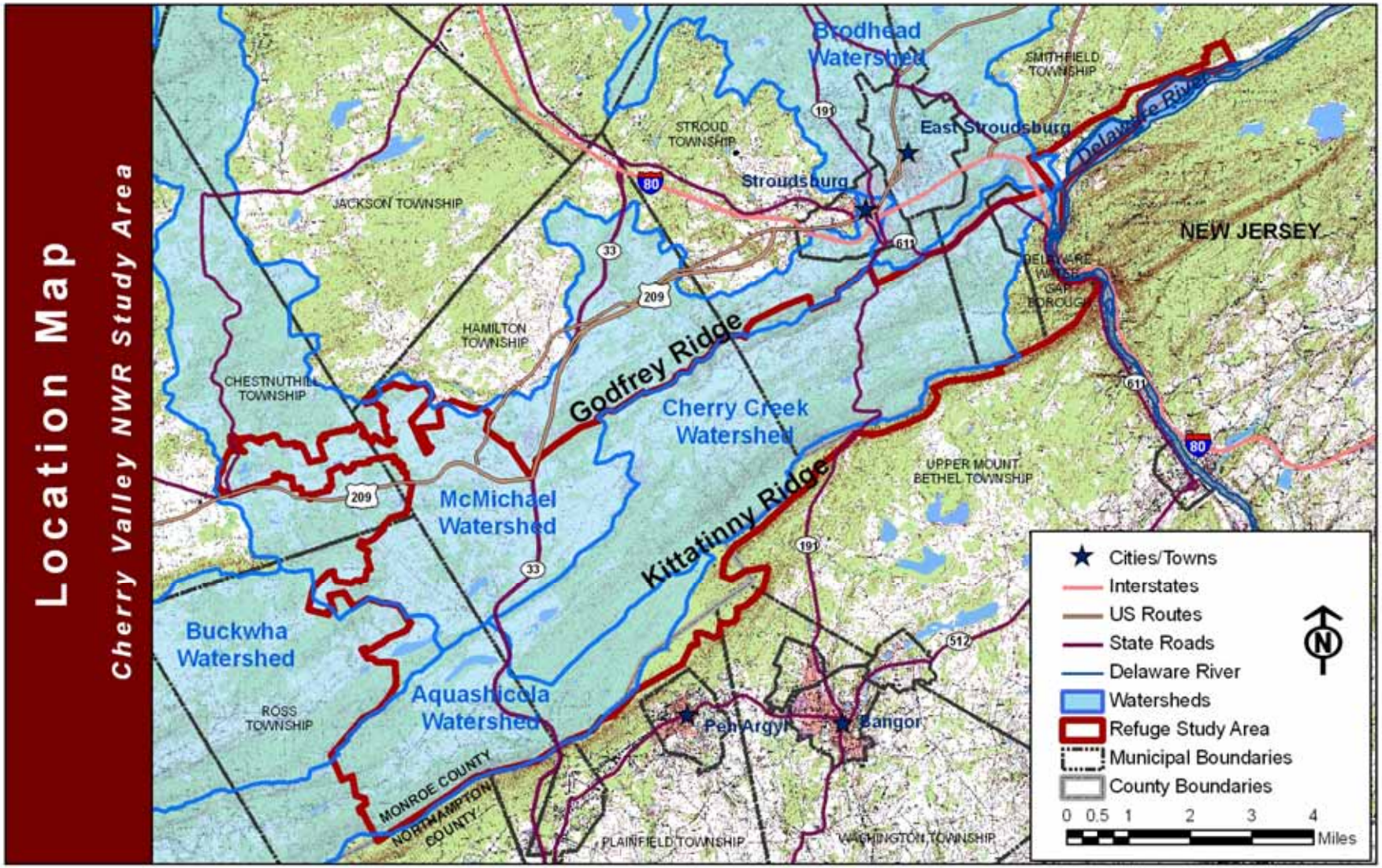


Figure 2-3. Watersheds within the Cherry Valley National Wildlife Refuge Study Area, Pennsylvania.

### 2.3.1 Habitats

Bounded on the north by Godfrey's Ridge and to the south by the Kittatinny Ridge, Cherry Valley's geologic history of uplift and folding of the earth's crust, combined with more recent periods of glaciation and present-day hydrologic forces, have created a diversity of habitats worth highlighting because of the distinctive plants and animals they support and contain.

*Forested Ridges*

In Cherry Valley, ridges and hills are cloaked in mixed hardwood and conifer forest, while chestnut oak, gray birch, quaking aspen, white pine, and pitch pine populate flat ridge tops once cleared for pasture and logging. Some juniper and Virginia pine can be found on recently abandoned farmland. Oaks, red maple, black cherry, hemlock and tulip poplar dominate in other areas. These upland forests are the most common habitat type and total nearly 18,800 acres, nearly 60 percent, of the Study Area. The forest has been logged at least once, and at least some of the area was cleared for pasture until recently.

The forest on the Kittatinny Ridge, most famous as a destination for migrating birds of prey, also provides an ideal migration corridor for songbirds, waterfowl, and bats. It has been designated an Important Bird Area by the Pennsylvania Audubon Society (Audubon 2006). The forests provide rooting and foraging habitat for many species of bat in the summer. The federally-listed Indiana bat has been documented nearby in the summer, and likely uses the Study Area for summer roosting and foraging as well.

In addition to its designation as an Important Bird Area, the National Audubon Society has referred to the Kittatinny Ridge as the premier raptor and songbird migration corridor in the northeastern U.S., and one of the leading migratory raptor and songbird sites in the world, with more than 140 bird species regularly recorded during fall migration. Every raptor species known to migrate along the Kittatinny Ridge has been seen in Cherry Valley. The extensive and relatively unfragmented forests along the ridge also provide habitat for resident animal species including large mammals such as white-tailed deer, black bear, coyote, and numerous smaller mammals including the Pennsylvania-threatened (and globally rare) Allegheny woodrat. Game birds can also be found in these forest habitats including ruffed-grouse in early successional forest, woodcock in mesic and wet forest areas, and wild turkey in many habitats.

The Kittatinny Ridge also supports cliffs and associated rocky talus slopes that provide habitat for black vultures, turkey vultures, and common ravens. Though totaling a relatively small ten acres or so, the cliffs also support several reptile species such as the five-lined skink, fence lizard, timber rattlesnakes, and other snake species.

*Rivers, Streams, and Wetlands*

While Cherry Creek carves out Cherry Valley, the Delaware River and numerous creeks and streams shape portions of the surrounding landscape. In most areas, riparian vegetation is well-established and stable, providing a thick canopy important to fish, especially trout populations, including native brook trout in upper reaches of Cherry Creek. Some creeks and streams are more vulnerable to point- and non-point source pollution, depending on their proximity to development.

In addition to streams and creeks, a variety of forested and open wetlands are found in the valley bottom and total nearly 1,750 acres, approximately 5.7 percent of the Study Area. These wetlands host a variety of wildlife including waterfowl, wading birds, river otter, beaver, and several dozen species of reptiles and amphibians.


Cherry Valley Wetland

Vernal pools represent another distinctive type of wetland found in Cherry Valley. While there is no system designation to cover these ephemeral pools, they are scattered across Cherry Valley. Only one site, near Hamilton Square, contains a cluster of pools. Referred to as herbaceous vernal ponds by Fike (1999), those located in the Study Area may be unvegetated or contain shrubs. The rare northeastern bulrush, a federally-listed, endangered plant, is often found in ponds receiving at least partial sunlight, and has been documented at one location within the Study Area. Approximately 33 species of salamanders, frogs, turtles, and snakes have been documented at vernal pool habitats at the Minsi Lake area located just over the Kittatinny Ridge from Cherry Valley and just outside of the Study Area.

In addition to vernal pools, Cherry Valley's limestone-enriched groundwater and unique surface geology combine to create rare calcareous fens. Several significant wildlife habitats found in Cherry Valley, especially these wetlands, have disappeared from other localities in their range. Although relatively small (an estimated 15 acres), these habitats support several globally rare species including bog turtles, yellow sedge, and thin-leaved cotton grass.

*Caves*

Pennsylvania has more than 1,600 caves that could serve as habitat for a variety of animal species (B. Herr, personal communication, 25 September 2008). Unfortunately, caves are ecologically fragile and sensitive to increasing threats posed by a number of factors including people interested in the sport of caving (Ganter 2001).

Cherry Valley contains one significant cave, known as Hartman's Cave. It has been listed as a special concern bat hibernaculum by the Pennsylvania Game Commission because at least five species of bat are using or have used the cave for hibernating (WPC 2008).

The federally-listed Indiana bat once hibernated there, but has not been documented there since 1950. However, temperatures in the cave are within the range used by Indiana bats during hibernation and it could be recolonized in the future (Hart 2003). The cave was gated by The Nature Conservancy in 2006, increasing the probability for Indiana bat recolonization. Similar measures taken at other locations have resulted in recolonization in other parts of Monroe and Northampton counties. The importance of Hartman's Cave as a hibernaculum for bats is notable in part because it is one of the few natural sites for hibernating bat populations in Monroe County.

### 2.3.2 Ecological Systems

In 2008, the Pennsylvania Natural Heritage Program identified and mapped 13 ecological system types (Table 2-2) totaling 20,548 acres within the Study Area (WPC 2008). The ecological systems cover about 70 percent of the Study Area and are located within a mosaic of forest, wetlands, agriculture (active and abandoned fields), quarries, villages, and housing developments (Figure 2-4).

Table 2-2. Ecological Systems in the Cherry Valley National Wildlife Refuge Study Area, Pennsylvania.

| Ecological System | Description |
|---|---|
| **Laurentian-Acadian Freshwater Marsh** | This system has been mapped in valley basins throughout the Study Area, and along stream corridors where vegetation is predominantly a mix of emergent grasses, sedges, robust emergent species like cattails, and some shrubs and trees. Soils are either mucky peat or mineral and designated as circumneutral or acidic. Birds like herons, rails, waterfowl, and red-winged blackbirds and other passerines are likely to use these wetlands. Frogs, salamanders, and turtles, such as bog and spotted turtles, are possibly found in these systems. Insects are abundant and attract swallows and other insectivorous birds during the day, and bats at night. |
| **Laurentian-Acadian Wet Meadow-Shrub Swamp** | Similar to the Laurentian-Acadian Freshwater Marsh, this system has a more prominent collection of shrubs and trees. |
| **North-Central Appalachian Acidic Swamp** | Located in valley bottoms and low slopes underlain by acidic sandstone and shale or glacial materials derived from acidic bedrock, this wetland system is primarily forested with red maple, hemlock, and other species but may include areas dominated by shrubs or graminoid species, or both. The wetlands may be on peat. This habitat is used by many birds, reptiles, amphibians, and mammals. |
| **North-Central Interior and Appalachian Rich Swamp** | Found on low slopes and basins of Cherry Valley and Minsi Lake in Northampton County, this system is underlain by limey till or limestone. Species diversity is high, including numerous plant species, and may include rare species. Dominant species |

| Ecological System | Description |
|---|---|
| | at Bear Swamp (The Nature Conservancy 2005) include red maple, eastern hemlock, swamp white oak, and yellow birch in the overstory; spicebush, highbush blueberry, and great rhododendron in the shrub layer; and a variety of herbaceous species. Green Ridge Marsh (The Nature Conservancy 1999) along McMichael Creek is actually a mix of forested wetland, graminoid marsh, and scrub-shrub wetland. Hemlock parsley, a state-listed, endangered plant, is found in this type of wetland. Birds such as Canada warbler and common yellowthroat, mammals including black bear and deer, and a variety of reptiles and amphibians may be found. These systems are rare in northeastern Pennsylvania and may be used by bog and spotted turtles. These forested wetlands shelter the creeks that flow through them, making the creeks more suitable for trout. |
| **North-Central Appalachian Seepage Fen** | This system represents the rarest (G1G2) community type in the study. Fike (1999) calls this the Poison Sumac-Red Cedar-Bayberry Fen. These systems are underlain by limey till or limestone. Species diversity is high with numerous plant species, including some rare species like yellow sedge and thin-leaved cotton grass. Birds, mammals, amphibians, and bog turtles (state- and federally-listed), and possibly spotted turtles, (as well as other reptiles) may be found using these extremely rare systems. |
| **North-Central Interior Wet Flatwoods** | The system is found on outwash and glacial lake deposits along Cherry Creek. It was observed at a couple of locations but may occur throughout the lower part of the stream corridor where the valley is broadest. Swamp white oak and pin oaks are characteristic, but red maple and other tree species are possible. It is likely that birds like wood ducks and herons, reptiles, amphibians, and mammals use these systems. |
| **Central Appalachian River Floodplain** | Closer to the Delaware River and some of its larger tributaries, such as the lower Brodhead and McMichael creeks, this system is dominated by silver maple and sycamore. Young sycamores, river birch, grasses, and forbs are common in frequently scoured areas. Soils are alluvial and range from silty to cobble and gravel. Regular flooding makes these systems vulnerable to invasion by exotic species. Birds use these systems both for nesting and as migration corridors. Mammals such as mink use these riparian systems. State-listed, endangered sand cherry is sometimes associated with the cobble-gravel grassland communities in this system. |

| Ecological System | Description |
|---|---|
| **Central Appalachian Stream and Riparian** | Located near smaller streams, the system and its associated vegetation were not easily separable while mapping. Both upland and wetland associations may be included. Birds, including herons and songbirds like the Louisiana waterthrush, use these areas. Mid-size mammals such as mink, river otter, and beaver are found in these systems, as well as bats. The streams are habitat and dispersal corridors for wood turtles. Vegetation shading streams is important to maintaining cool water temperatures and reducing the amount of sediments reaching the watercourse. |
| **North-Central Interior and Appalachian Acidic Peatland** | Up on the ridges, this highbush blueberry and sphagnum-dominated system is scattered with red maple and conifers (pitch pine, hemlock, white pine), and underlain by sandstone and acidic till. Soils are shallow peat in the Cherry Creek area. Rare plants such as swamp dog hobble are possible in these wetlands. Birds like swamp sparrows, some warblers and other passerines may use these areas. It is possible that golden-winged warblers, and mammals such as shrews, voles and larger mammals, use the system. Bats are attracted by the abundance of insects. Raptors and timber rattlesnakes are attracted by the presence of small prey. Frogs and salamanders are likely as well. |
| **Northeastern Interior Dry-Mesic Oak Forest** | Tulip poplar, northern red oak, red maple, sugar maple, white ash, some hemlock and white pine, with various amounts of white oak, black birch, basswood, black cherry and other hardwoods, dominate this system. It forms the matrix forest of the toe slopes of the ridges and high valleys. Shrub cover may be sparse to abundant. Birds such as scarlet tanager and a variety of warblers use this forest system for nesting and migration. Mammals such as black bear and deer use this system. This system also serves as the matrix forest for the Minsi Lake Vernal Ponds (located just outside of the Study Area) and a cluster of ponds near Hamilton Square. As such, it is an important buffer for the ponds and the salamanders and other species that use the ponds. |
| **Central Appalachian Pine-Oak Rocky Woodland** | In open woodland, this system is typically dominated by chestnut oak, hickories, and pitch pine with shrubs such as scrub oak, lowbush blueberries and black huckleberry, and herbaceous species such as Pennsylvania sedge and little bluestem grass, along with lichens. These areas are more likely to have timber rattlesnakes and Allegheny woodrats because of availability of forage and cover. Rattlesnakes may bask or |

| Ecological System | Description |
|---|---|
| | hibernate if there are sufficiently deep caves or crevices located in the system. Some birds (e.g., turkey vultures) use these areas for nesting or sunning. Golden-winged warblers may use these areas. |
| **Central Appalachian Dry Oak-Pine Forest** | This globally-rare (G3) system represents the matrix forest of the Kittatinny Ridge and includes the Dry Oak-Heath Forest and Dry Oak-Mixed Hardwood Forest dominated by chestnut oak and other dry oaks, hickories, sassafras, gray birch and aspen, along with blueberry, huckleberry and mountain laurel (Fike 1999). Hemlock, white pine and pitch pine are rare to common. Ravines are dominated by hemlock and were initially called Appalachian (Hemlock)-Northern Hardwood Forest. However the co-dominants in these areas are chestnut oak and black birch. Variable sedge occurs in this forest type in the Study Area. Forests on the low ridges and valley slopes north of Kittatinny Ridge are hemlock-dominated in many areas or mixed hardwoods and hemlock-dominated. White pines are scattered throughout while quaking aspen is common on the flat ridgetops in some areas, possibly indicating past clearing for pasture. Some juniper and Virginia pine were found on abandoned farm land. Oaks, red maple, black cherry, and tulip poplar may dominate in some areas. Timber rattlesnakes and copperheads use the forests on Kittatinny Ridge. Deer, bear and other mammals are common. |
| **Appalachian (Hemlock)-Northern Hardwood Forest** | Eastern hemlock, red and sugar maples are dominant where the forest is mixed, while sugar and red maples and tulip poplar along with varying amounts of northern red oak, black and yellow birch, and white ash are dominant where the forest is all hardwoods. Great rhododendron may be an important shrub species in areas of greater moisture and cooler temperatures. This system is also important to nesting and migrating birds such as parula and black-throated green warblers. It is a minor component of the Study Area, apparently relegated to east- or north- facing valleys underlain by limestone, limey shales or limey till. Black bear, white-tailed deer and a variety of small mammals and birds utilize this forest type. |

Source: Pennsylvania Natural Heritage Program 2008

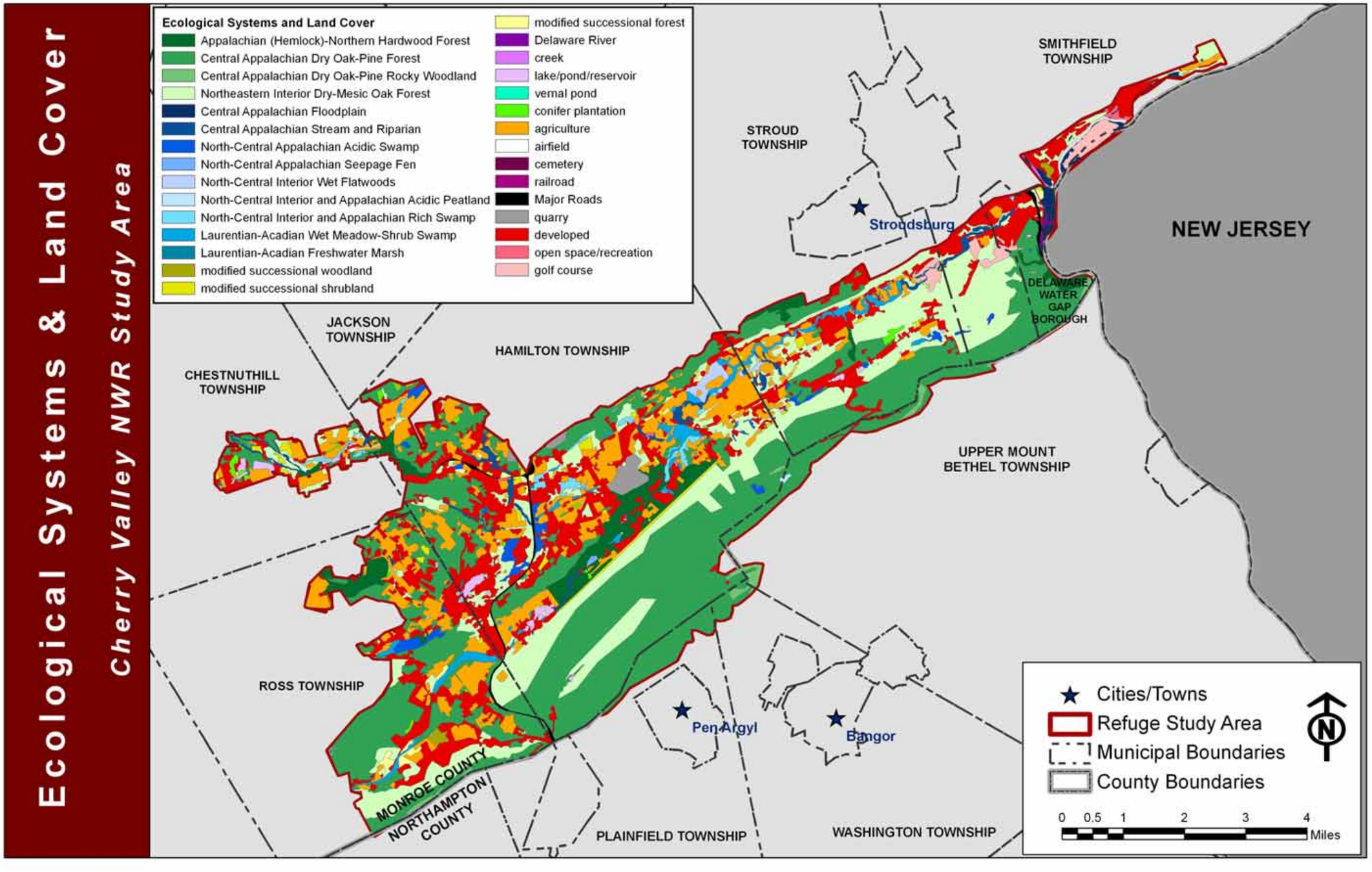


Figure 2-4. Ecological Systems in the Cherry Valley National Wildlife Refuge Study Area, Pennsylvania.

### 2.3.3 Plants and Animals

The Study Area provides habitat for a wide range of species (see Appendix C for select species lists). At least 40 species of national, regional, or state concern either live within, near, or migrate through the area during their life cycle (Table 2-3). Five species federally-listed as endangered or threatened under the ESA have been documented within or near Cherry Valley. The federally-listed, threatened bog turtle and northeastern bulrush have been documented in the Study Area. The federally-listed, endangered dwarf wedgemussel is nearby in the Delaware River. Historically, the federally-listed, endangered Indiana bat was documented in the Study Area and efforts are underway to re-establish favorable conditions for this species. The federally-listed, threatened small-whorled pogonia was also historically documented in Monroe County, likely near Delaware Water Gap (S. Klugman, personal communication, 2 September 2008). Bald eagles, federally protected but recently delisted under the ESA, are frequent visitors and are nesting in the valley. In addition, the Service has recognized six migratory bird species within the Study Area as birds of conservation concern: wood thrush, prairie warbler, cerulean warbler, worm-eating warbler, Louisiana waterthrush, and peregrine falcon (USFWS 2002b; also see Appendix C, Table C-2).

Table 2-3. Federal and state species identified as at-risk, rare, threatened, or endangered species within or near the Cherry Valley National Wildlife Refuge Study Area, Monroe County, Pennsylvania (-- = not listed under the federal ESA[1]).

| | **Common Name** | **Species Name** | **State Conservation Status** | **Federal ESA Status** |
|---|---|---|---|---|
| Animals | Dwarf wedgemussel | *Alasmidonta heterodon* | Endangered | Endangered |
| | Indiana bat[2] | *Myotis sodalist* | Endangered | Endangered |
| | Bog turtle | *Glyptemis muhlenbergi* | Endangered | Threatened |
| | Allegheny woodrat | *Neotoma magister* | Threatened | -- |
| | Bald eagle | *Haliaeetus leucophalus* | Threatened | -- |
| | Bridle Shiner | *Notropis bifrenatus* | Endangered | -- |
| | Eastern small-footed bat | *Myotis lebeii* | Threatened | -- |
| | Eastern pearlshell[3] | *Margaritifera margaritifera* | Endangered | -- |
| | Green-winged teal | *Anas crecca* | Rare | -- |
| | Ironcolor shiner | *Notropis chalybaeus* | Endangered | -- |
| | Osprey | *Pandion haliaetus* | Threatened | -- |
| | Peregrine falcon | *Falco peregrinus* | Threatened | -- |
| | Northern harrier | *Circus cyaneus* | At-Risk | -- |
| | Northern long-eared bat | *Myotis sepentrionalis* | At-Risk | -- |
| | Timber rattlesnake | *Crotalus horridus* | Rare | -- |
| | Wilson's snipe | *Gallinago delicata* | Rare | -- |
| Plants | Bebb's sedge | *Carex bebbii* | Endangered | -- |

| | Common Name | Species Name | State Conservation Status | Federal ESA Status |
|---|---|---|---|---|
| Plants (cont.) | Brook lobelia | *Lobelia kalmii* | Endangered | -- |
| | Carolina grass-of-Parnassus | *Panassia glauca* | Endangered | -- |
| | Downy willow-herb | *Epilobeum strictum* | Endangered | -- |
| | Hemlock-parsley | *Conioselinium chinense* | Endangered | -- |
| | Northeastern bulrush | *Scirpus ancistrochaetus* | Endangered | Endangered |
| | Northern water plantain | *Alisma trivale* | Endangered | -- |
| | Sand cherry | *Prunus pumila v. depressa* | Endangered | -- |
| | Small floating manna grass | *Glycera borealis* | Endangered | -- |
| | Small-whorled pogonia[4] | *Isotria medeoloides* | Endangered | Threatened |
| | Sojak Smith's bulrush | *Schoenplectus smithii* | Endangered | -- |
| | Spreading globeflower | *Trollius laxus* | Endangered | -- |
| | Variable sedge | *Carex polymorpha* | Endangered | -- |
| | Wild bleeding hearts | *Dicentra exima* | Endangered | -- |
| | A sedge | *Carex tetanica* | Threatened | -- |
| | American holly | *Ilex opaca* | Threatened | -- |
| | Hoary willow | *Salix candida* | Threatened | -- |
| | Lesser bladderwort | *Utricularia minor* | Threatened | -- |
| | Matter spike-rush | *Eleocharis intermedia* | Threatened | -- |
| | Susquehanna sand cherry | *P. pumila v. susquehannae* | Threatened | -- |
| | Thin-leaved cotton grass | *Eriophorum viridicarinatum* | Threatened | -- |
| | Yellow sedge | *Carex flava* | Threatened | -- |
| | Capitate spike-rush | *Eleocharis olivacea* | Rare | -- |
| | White water crow-foot | *Ranunculus aquitilis* | Rare | -- |

[1] ESA = Federal Endangered Species Act of 1976 (as amended)
[2] Hibernating bats last documented in Cherry Valley in 1950, but likely summer inhabitant.
[3] Previously documented in Cherry Creek but habitat at known population location has since been destroyed. Currently there are no known populations in Cherry Creek.
[4] Historic occurrence in Monroe County, habitat present but species not recently documented in area.
source: Pennsylvania Natural Heritage Program 2008

*Animals*

Mammals

The most well-known mammal species in Cherry Valley are game animals, including black bear and white-tailed deer. Squirrel, raccoon, woodchuck, skunk, and opossum are found in the more developed areas of the watershed. Common furbearers include mink, muskrat, beaver, and otter, all of which are associated with, and depend upon,

clean water (BLOSS Associates 2004). Over 25 species of mammals are thought to occur in or near the Study Area (see Appendix C, Table C-1 for a species list of mammals).

Cherry Valley is also designated as an Important Mammal Area (Important Mammal Areas Project Website 2008) because of Hartman's Cave and the four bat species currently using the cave. Approximately 350 hibernating bats were counted during a quick survey in April 2001. It is likely that additional bats hibernate in portions of the cave that are not accessible to humans. Hartman's Cave is also significant due to its potential for sheltering Indiana bats in the future. The Indiana bat was last found in the cave in 1950 (Hart 2003).

Birds

Cherry Valley's diverse habitats support an array of breeding and migratory birds (see Appendix C, Table C-2 for species list of birds). Distinctive bird habitats include wetlands, riparian forest, agricultural fields and meadows, upland forest, ridge top shrublands, and rocky outcrops.

The Kittatinny Ridge is world renowned for its use by fall-migrating, diurnal raptors. Every species of diurnal raptor found in the northeastern United States and Canada, including northern goshawk, golden eagle, peregrine falcon and northern harrier, has been recorded along the Kittatinny Ridge. Reports of bald eagle and osprey are becoming much more frequent along the ridge top and Cherry Creek. Owls and nightjars are found throughout the watershed. The most common of the nocturnal raptors is the barred owl, which is associated with swamps and bottomland forests. The great-horned owl and screech owl can be found in the dryer forests and in some more developed areas. There is some evidence that the smallest of nocturnal raptors, the northern saw-whet owl, uses the valleys of the Cherry Creek watershed as migration corridors (BLOSS Associates 2004).

Wetlands in Cherry Valley regularly host at least seven species of shorebirds during spring migration including: greater yellowlegs; lesser yellowlegs; spotted, solitary, and least sandpipers; short-billed dowitcher; and Wilson's snipe. Migrating waterfowl commonly include green-winged teal, hooded merganser, and black duck, while mallards and wood duck nest in wetlands throughout the valley. Great egrets are regular visitors during the fall migration. Great blue herons also are frequently seen in wetlands and streams throughout the valley, and green herons and least bitterns are known to visit as well. Bald eagles and osprey are often seen foraging and roosting where Cherry Creek flows through emergent wetlands, and are known to nest nearby.

Cherry Valley's long agricultural tradition has created a mosaic of fields and pastures that support grassland birds including bobolink (commonly seen in the Bossardsville area), and (more sporadically) eastern meadowlark and grasshopper sparrow. Open fields also favor winter foraging habitat for several raptors most commonly including northern harriers, American kestrels, and rough-legged hawks.

Cherry Valley's forests contain its most extensive bird habitat and host many resident and neotropical species of conservation concern. Bottomland riparian forests host Acadian flycatchers, black-throated green warblers, golden-crowned kinglet, ovenbird and wood thrush. Drier slopes and ridge tops favor nesting sites for scarlet tanager (20 percent of the world's population nests in Pennsylvania) and worm-eating and cerulean warblers. Surveys conducted by the Pocono Avian Research Center (2004) indicate that the cerulean warbler, a species showing severe population declines across much of its historic breeding range, is doing well on the Kittatinny Ridge.

Game birds can be found throughout the watershed. Mourning dove, ruffed grouse, ring-necked pheasant, and wild turkey call the valley's fields, forests, and hedgerows home. American woodcock commonly display during their annual courtship ritual in the valley's scrub/shrub lands while adjacent woodlands provide cover for nesting (WPC 2008).

The heavily forested nature of the watershed also makes it prime habitat for rarer species such as red-headed woodpecker, pileated woodpecker, and the yellow-bellied sapsucker (BLOSS Associates 2004). Depending on conditions, several species of northern finches including evening grosbeak, pine siskin, common redpolls and crossbills can be found throughout the watershed during winter.

Reptiles and Amphibians

Spotted turtles, wood turtles, four-toed salamanders and marbled salamanders, all thought to be declining, can be found within the valley's wetlands and vernal pools. While outside of the Study Area, the nearby Minsi Lake Corridor, located just to the south in Northampton County, is particularly known for its vernal pools and associated rare species of plants and animals. Timber rattlesnakes occur within rock outcrops and boulders of the Kittatinny Ridge's dry oak forests and woodlands. This species is considered vulnerable to collection and habitat destruction by the Pennsylvania Fish and Boat Commission (WPC 2008).

Federally-listed, threatened bog turtles represent the rarest vertebrate species in the Study Area (WPC 2008). Bog turtle experts suspect that Cherry Valley may be the most important site throughout the species' range from Maryland to Massachusetts. This is most likely because of the interconnectedness of creeks, fens, seeps, and other wetlands located within Cherry Valley. Bog turtles also require the type of open, mucky wetlands and clean water that occur throughout the Study Area. In 2001, the Service published the Bog Turtle Northern Population Recovery Plan (USFWS 2001) to manage and maintain bog turtle habitat to ensure its suitability for bog turtles. Soon after, The Nature Conservancy published guidelines and recommendations on the identification, management, and maintenance of bog turtle habitat at selected sites in Cherry Valley and surrounding areas (Perles and Podniesinki 2004). The Nature Conservancy is

currently working to maintain and restore bog turtle habitat at roughly half of those sites.

Fish and Mussels

Brown trout occur along the entirety of Cherry Creek, while native brook trout are limited to the upper reaches and tributaries. Since brook trout are generally intolerant of environmental perturbations, their occurrence indicates good stream quality (Hudy et al. 2005). However, brook trout numbers decline rapidly in mid-sections of Cherry Creek, most likely due to a decline in habitat quality, warmer water temperatures (BLOSS Associates 2004), and competition with non-native wild brown trout. The primary food source of trout is aquatic macroinvertebrates, many of which are also sensitive to water quality factors such as pollution and sedimentation.

Brook trout

There are two state-listed, endangered fishes that have been historically documented in the Study Area, the bridle shiner and the ironcolor shiner (Table 2-3 and Appendix C, Table C-3). The bridle shiner is typically found in small, warm-water creeks and ponds to large lakes and rivers. It is generally found with moderate to abundant submerged vegetation (Pennsylvania Natural Heritage Program 2007).

Maintaining free flowing streams will also benefit American eel, a federal species of concern that is found in the Cherry Creek watershed. American eels are catadromous. In other words, they breed in the ocean and grow and mature in freshwater. American eel adults breed in the Sargasso Sea. Larvae drift to coastal estuaries, where they metamorphose to juvenile fish before swimming upstream to freshwater. Eels remain in freshwater for eight or more years before returning to the sea.

In addition to trout and American eel, over 40 fish species have been identified within the Study Area (see Appendix C, Table C-3 for a list of fish species). A September 2000 study documented 15 species in Cherry Creek including: brown trout, rainbow trout, brook trout, white sucker, American eel, blacknose dace, common shiner, cutlip minnow, tessellated darter, fallfish, pumpkinseed, rock bass, redfin pickerel, slimy sculpin, and longnose dace (Hartzler 2001). Preliminary data from a subsequent survey in September 2008 found all but three of these species (rock bass, pumpkinseed sunfish, and slimy sculpin) and identified several additional species: largemouth bass, shield darter, sea lamprey (tentative-awaiting lab confirmation), and creek chub (D. Fischer, personal communication, 5 September 2008).

Three mussel species recently have been identified in Cherry Creek. The relatively common eastern elliptio and creeper mussels appear to have stable populations (R. Anderson, pers. comm., 5 August 2008.), while the triangle floater has been classified as vulnerable by the Pennsylvania Natural Heritage Program. The federally-listed, endangered dwarf wedgemussel is found in the Delaware River, upstream from the mouth of Cherry Creek. The Eastern pearlshell mussel, a state-listed, endangered species, once occupied habitat in the Cherry Creek watershed. However, recent surveys revealed that the aquatic habitat at its former known location no longer exists and no mussels were located. Since the Eastern pearlshell prefers unpolluted, small streams to medium-sized rivers, the Cherry Creek watershed could be targeted for reintroduction in the future.

*Plants*

The limestone rock underlying Cherry Valley provides more basic conditions (higher pH, i.e., calcareous) in waters and soils that create conditions that support a diversity of special plants and natural communities unable to tolerate the more acidic (lower pH) conditions found on adjacent bedrock types. The restriction of many of these plants to calcareous wetlands accounts for their rarity (BLOSS Associates 2004).

According to The Pennsylvania Natural Heritage Program (WPC 2008), at least ten globally rare plant species exist in Cherry Valley, including habitat for the federally-listed, threatened small-whorled pogonia (an orchid), and spreading globeflower, a small aquatic buttercup that prefers wetlands in limestone valleys. Most of the rare plants can be found in the base-rich waters of fens and other wetlands, or in open water creeks and ponds. Other fen species include brook lobelia, yellow sedge, thin-leaved cotton grass, state-endangered grass-of-parnassus, and downy willow herb. Swamps and hillside seeps may harbor spreading globe flower and hemlock parsley.

Of the plant species found in the Study Area, floating manna grass and the globally-rare and federally-listed, endangered northeastern bulrush are often found together in partially shaded vernal ponds, while the water plantain and yellow water crowfoot may be found in shallow, muddy ponds. The more acidic wetlands contain hoary willow, swamp dog hobble, and matted spikerush. In the uplands, the variable sedge is probably the rarest plant, preferring acidic sites that are mesic to dry and often disturbed by fire. It can be found on the Kittatinny Ridge along with American holly, bleeding hearts, and the “Susquehanna” sand cherry variety (WPC 2008).

## 2.4 Land Use and Management Status

Distinct landforms, breathtaking vistas, unique habitats, and species of special concern make Cherry Valley an area of unique value. Understanding land use and ownership is important for assessing the impact of conservation actions including establishing a refuge. Within the Study Area, a majority of lands are considered to be in “open” (not developed) land uses and most parcels are in private ownership. Nevertheless, land uses and ownership are quite diverse across the Study Area.

### 2.4.1 Local Government Structure and Zoning

The Study Area straddles parts of six townships in southeastern Monroe County and a narrow strip of land in Northampton County. No single municipality falls completely within the Study Area. A variety of land-use zoning designations exists within the Cherry Valley National Wildlife Refuge Study Area (Table 2-4).

Land use within the Study Area has been classified into ten general categories, which are based on Monroe County tax records (Table 2-5). For this analysis, these ten categories were grouped into open space parcels and developed parcels. Developed parcels, which include residential and industrial properties, collectively account for about one-third of the Study Area. Residential properties, alone, cover nearly 20 percent of the Study Area. Open space parcels, which include agriculture, parks, forest, vacant, and in this case, property owned by utilities, together account for nearly 70 percent of the Study Area.[1] Figure 2-5 shows developed and open space lands within the Study Area.

[1] Land classified for use by utilities comprises 10 percent of the total. This area is largely reflective of the land holding by Penn American Water, which owns over 3,000 acres of nearly contiguous property in the southwestern portion of the Study Area. This land remains largely undeveloped.

Table 2-4. Monroe County municipalities, size, percent of municipality within the Study Area, and zoning districts in the Cherry Valley National Wildlife Refuge Study Area, Pennsylvania.

| Municipality | Total Acres | Acres Within Study Area | Percent Within Study Area | Zoning Districts Within Study Area |
|---|---|---|---|---|
| **Chestnuthill Township** | 23,935.50 | 1,428.94 | 5.97% | RR - Rural Residential; R-1 - Low Density Residential; R-S - Special residential; LIC & I - Industrial; VC - Village Commercial/Residential; GC - General Commercial |
| **Delaware Water Gap Borough** | 1,264.60 | 745.99 | 58.99% | S-1 Conservation |
| **Hamilton Township** | 24,645.00 | 15,455.87 | 62.71% | A - Special Residential; B - Medium Density Residential; C-Commercial; C-1 – Limited Commercial; D – Industrial, E – Low Density Residential |
| **Ross Township** | 14,673.50 | 8,005.46 | 54.56% | RR – Rural residential; R-1 – Low Density Residential; R-2 – Low Medium residential; VC – Village Commercial/Residential; GC – General Commercial; CR & SC – Special Conservation |
| **Smithfield Township** | 14,924.50 | 3,384.36 | 22.68% | R-1 – Low Density Residential; R-2 – Medium Density Residential |
| **Stroud Township** | 20,041.50 | 4,746.24 | 23.68% | O-1 – Conservation; S-1 – Recreation; C-3 - Commercial |
| ***Total*** | 99,484.60 | 33,766.85* | 33.94% | --------- |

Source: Monroe County parcel data from 2006; Lewis (2008)

* Boundary for the Study Area does not correspond to property lines. Total acres exceeds the 31,500 acres established for the Study Area because individual parcels were not clipped to reflect the boundary line.

Table 2-5. Land use categories and area (in acres) in the Cherry Valley National Wildlife Refuge Study Area, Monroe County, Pennsylvania.

| | | Acreage | Percent of Total Study Area Acreage |
|---|---|---|---|
| **Open Space Parcels** | Agriculture | 5,634 | 16.2 |
| | Communication/Transportation/Utilities | 3,444 | 9.9 |
| | Forest | 4,879 | 14.0 |
| | Public/Private Parks | 5,248 | 15.1 |
| | Vacant | 4,563 | 13.1 |
| | Subtotal | 23,768 | 68.2 |
| **Developed Parcels** | Hotels/Camps | 761 | 2.2 |
| | Industrial | 2,423 | 6.9 |
| | Residential | 7,012 | 20.1 |
| | Retail/Services | 646 | 1.9 |
| | Other | 259 | 0.7 |
| | Subtotal | 11,101 | 31.8 |
| **Grand Total** | | 34,869[1] | |

[1] Boundary for the Study Area does not correspond to property lines. Total acres exceeds the 31,500 acres established for the Study Area because individual parcels were not divided to reflect the boundary line.

Source: Monroe County parcel data 2007. GIS analysis by US Fish and Wildlife Service Division of Economics, August 2008.

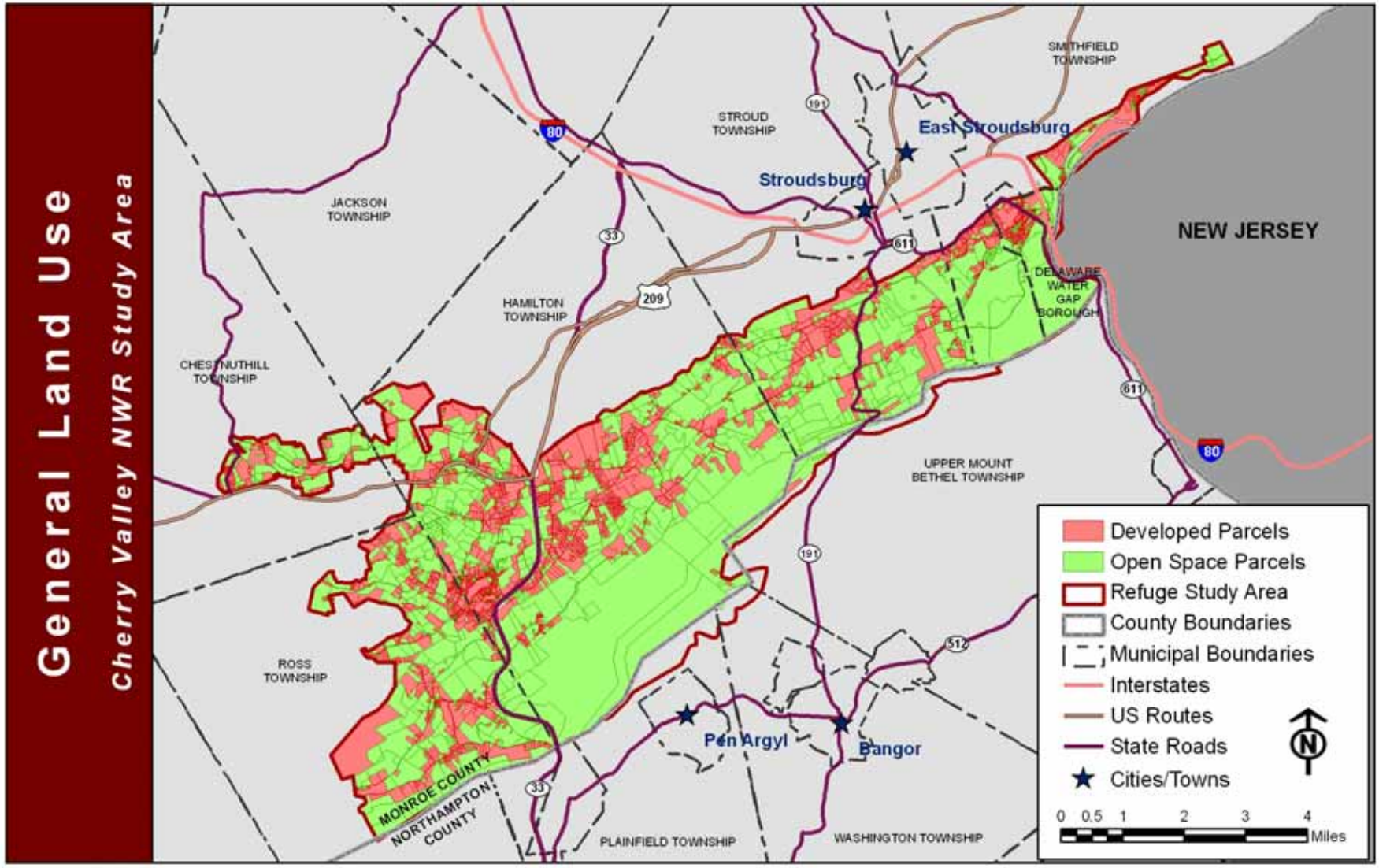


Figure 2-5. Location of developed and open space parcels in the Cherry Valley National Wildlife Refuge Study Area. Source: Monroe County Land Use data. Analysis conducted by Division of Economics, U.S. Fish and Wildlife Service, September 2008.

### 2.4.2 Ownership and Management

Land ownership within the Study Area is summarized by the land-use categories in Table 2-5 and the map in Figure 2-6. Additional information on land ownership by township can be found in Table 2-6 and in Appendix D (Economic Assessment).

*Developed Land*

Industrial Parcels

Industrial parcels are clustered in three main locations within the Study Area. Two clusters lie right on the border of the boundary line. There are 32 industrial parcels, which collectively account for 2,423 acres (or 7 percent) of the Study Area. Total assessment value of these properties is over $2.3 million.

Residential Parcels

Residential parcels occupy over 7,000 acres of the Study Area. This amounts to about 20 percent of the total area. Distribution of residential parcels is relatively uniform across the townships, with the exception of Delaware Water Gap and Smithfield. Collectively, residential parcels were assessed at over slightly more than $60 million back in 1988, which equates to about 60 percent of the total assessment value of all the parcels within the boundary.[2] There are over 2,500 residential parcels. The median parcel size is slightly over one acre with a corresponding median assessment of $23,500. Based on Monroe County's current market index, this equals a median current market price of $183,470.[3]

Retail/Services

Land parcels associated with retail or service establishments are primarily located near residential areas. Hamilton and Smithfield townships have the greatest acreage in these sectors (290 and 196 acres, respectively). While the Hamilton Township parcels are numerous and contain no large parcels (the largest parcels are less than 50 acres and are associated with church groups), the majority of the acreage in Smithfield consists of a single parcel owned by the Manwalamink Water Company (174 acres). This company is affiliated with the Shawnee on Delaware Corporation. The parcel, while classified as developed, likely supports many natural resource-related characteristics.

Hotels/Camps

Hotel and camp parcels collectively comprise 761 acres within the Study Area, and have a current assessed value of over $8.7 million. Smithfield Township contains 263 acres. Shawnee on Delaware Corporation owns the majority of this property (210 acres). Other large hotel/camp property owners include 181 acres owned by Forte, Inc., at the border of the Study Area in Stroud Township, and 85 acres owned by the Saylors Lake Fishing Association in Hamilton Township. Although initially classified as developed

[2] Monroe County latest reassessment occurred in 1988.
[3] Monroe County uses a current market index multiplier of 7.81.

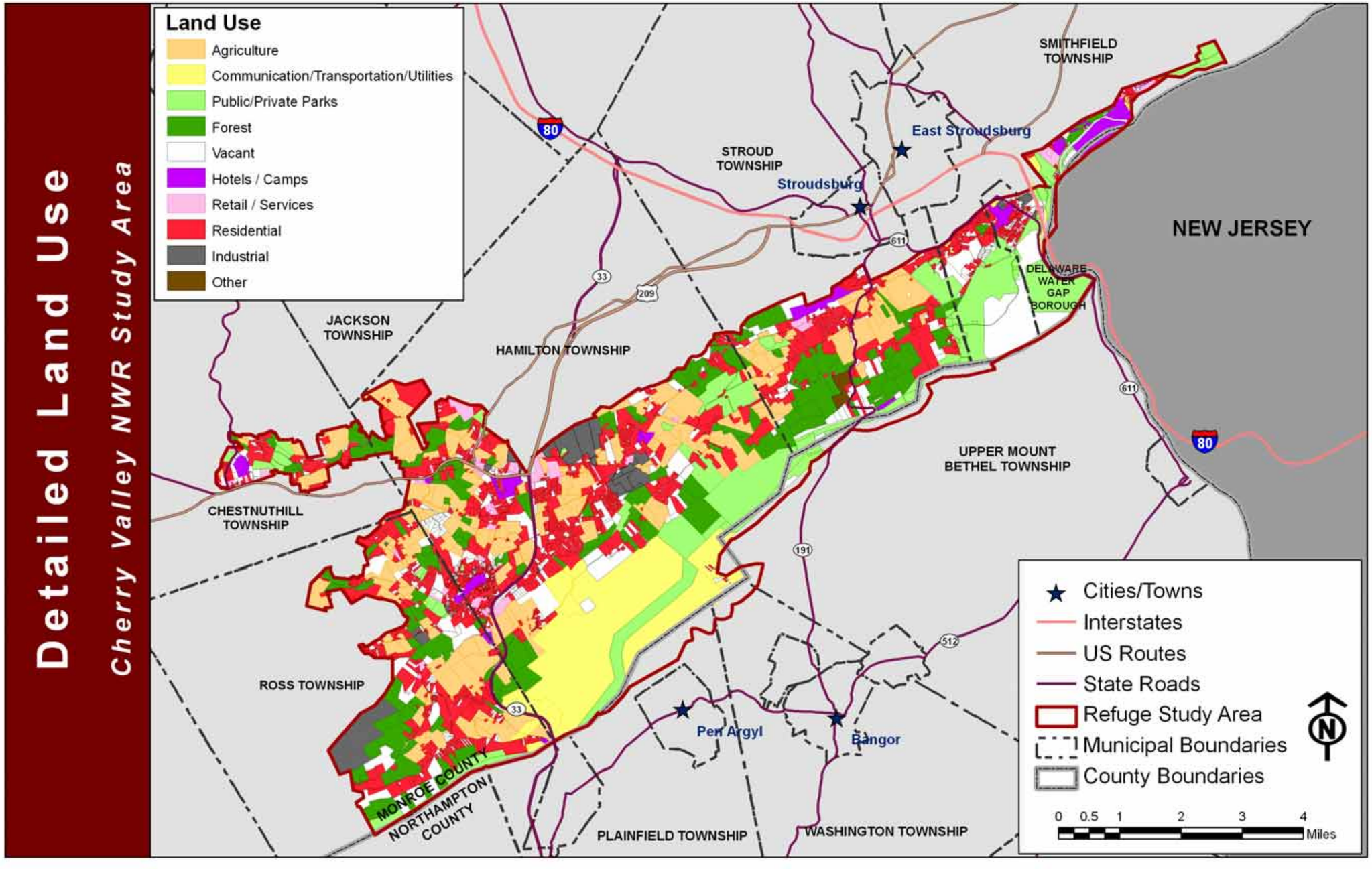


Figure 2-6. Detailed land-use in the Cherry Valley National Wildlife Refuge Study Area, Monroe County, Pennsylvania.

property, much open space area permeates these parcels and may support desirable habitat and species.

Other Classified Parcels

Approximately 259 acres classified as "otherwise" have development characteristics. Examples of land use in this category include scrap yards and educational and government services. These parcels account for less than one percent of the Study Area. The relatively large percent of parcels in Delaware Water Gap is comprised of property owned primarily by the Delaware River Joint Toll Bridge Commission.

*Open Space*

Agriculture

Agricultural lands occupy 5,634 acres within the Study Area. Collectively, this represents about 16 percent of the total acreage. These lands primarily lie along the valley floor, north of Cherry Valley Road and to the west of PA State Route 33. There nearly 140 agricultural parcels that range in size from one acre to over 200 acres. The average agricultural parcel size is about 40 acres. The total assessment of agricultural parcels in the Study Area is about $6.1 million. Hamilton Township contains the greatest amount (2,907 acres) of agricultural acreage of all the townships. Over 20 percent of the Study Area within Chestnuthill Township is in agriculture. Hamilton, Ross, and Stroud townships also have high percentages of agricultural use.

Communications/Transportation/Utilities

Over 3,400 acres in the Study Area are included in this category. Collectively, these parcels represent about ten percent of the Study Area. However, one company (the Pennsylvania American Water Company) owns the majority of this land. Specifically, the company owns about 3,050 acres in Hamilton Township. This property remains largely undeveloped.

Forestry

There are 4,879 acres of land identified as forested parcels within the Study Area. The majority of the forests lie in Hamilton, Ross, and Stroud townships. The ownership of these parcels is numerous and diffuse. There are over 100 forest parcels, the majority of which are owned by individuals. Parcel sizes range from less than one acre to 150 acres. The average parcel size is 30 acres. Stroud Township has nearly 25 percent of its total Study Area acreage classified as forest.

Parklands

There are over 5,000 acres in the Study Area classified as parkland by Monroe County. This constitutes about 13 percent of the Study Area. The U.S. government owns nearly 4,000 acres of parkland parcels, most of which lie in Smithfield and Stroud townships. The Nature Conservancy is the second largest landowner of park parcels. They own about 400 acres within the Study Area. Other large landowners (i.e., greater than 100

acres) of parklands include the Commonwealth of Pennsylvania, the Pocono Heritage Land Trust, and Smithfield Township.

Vacant Lands

There are 789 parcels classified as vacant by Monroe County. Vacant parcels make up about 13 percent of the Study Area. Smithfield Township has the largest percentage within the Study Area classified as vacant. The largest parcels are located in Smithfield and Delaware Water Gap townships and are owned by the Borough of Delaware Water Gap. These two adjacent parcels total 660 acres (512 acres and 148 acres, respectively) and are bounded by property owned by the U.S. National Park Service.

Table 2-6 shows private and public land ownership by township within the Study Area. Note: Acreage differences between Tables 2-5 and 2-6 are due to differences in how parcels on the Study Area boundary were included or excluded from the analysis.

*Tax Revenue Impacts*

Monroe County and its townships derive the majority of their tax revenues through real estate taxes. Real estate taxes fund school districts, libraries, and county and township government services. Monroe County uses millage to compute real estate taxes. Each mill represents one dollar in taxes for every $1,000 in value. Monroe County calculates current market value of property, for tax purposes, to be four times the 1988 assessment value.[4] Actual current market value is estimated at 7.81 times the 1988 assessment value[5].

Table 2-7 shows the total assessed value and calculated current market value of real estate parcels located within the Study Area. Market value for all parcels is estimated to be $783 million based on a total assessment of $100.3 million. Total tax revenue on this property is calculated to be about $63.4 million.

[4] Current assessment values are based on Monroe County's last reassessment conducted in 1988.

[5] Actual current market value is based on recent real estate sales in the Pennsylvania and is approximately 7.81 times the most recent assessment conducted in 1988.

Table 2-6. Land Ownership (in acres) for Monroe County Municipalities in the Cherry Valley National Wildlife Refuge Study Area.

| Landowner | Chestnuthill | Delaware Water Gap | Hamilton | Ross | Smithfield | Stroud | Grand Total | Percent Total |
|---|---|---|---|---|---|---|---|---|
| **County** | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.10 | 0.23 | 0.00% |
| **Federal** | 0.00 | 511.73 | 1,483.54 | 236.04 | 681.46 | 273.73 | 3,186.48 | 10.34% |
| **Municipal** | 40.72 | 164.50 | 46.64 | 53.46 | 666.60 | 153.99 | 1,125.90 | 3.65% |
| **No owner information** | 0.00 | 0.00 | 33.01 | 3.16 | 1.15 | 11.62 | 48.93 | 0.16% |
| **Private non-profit** | 109.12 | 0.00 | 446.61 | 10.47 | 0.00 | 31.79 | 597.99 | 1.94% |
| **Private** | 1,149.13 | 315.95 | 9,843.43 | 5,508.68 | 1,246.14 | 4,354.12 | 22,417.44 | 72.73% |
| **State Land** | 0.00 | 0.00 | 0.00 | 63.93 | 0.00 | 54.18 | 118.12 | 0.38% |
| **Water Companies** | 0.00 | 0.05 | 3,120.50 | 208.17 | 0.00 | 0.00 | 3,328.72 | 10.80% |
| **TOTAL** | 1,298.07 | 992.22 | 14,973.84 | 6,083.91 | 2,595.34 | 4,879.53 | 30,823.80[1] | ------ |

[1] Total is less than the 31,500 acre Study Area because parcels outside of Monroe County were excluded from the analysis.

Source: Monroe County parcel data from 2006

Table 2-7. Estimated Real Estate Tax Receipts by Township for Parcels within the Cherry Valley National Wildlife Refuge Study Area, Monroe County 2008

| | 2007 Assessment | Estimated Market Value[1] | 2008 Millage Rate[2] | Estimated Tax Receipts[3] |
|---|---|---|---|---|
| **Chestnuthill** | $5,661,630 | $44,217,330 | 0.153 | $3,464,918 |
| **Delaware Water Gap** | $7,577090 | $59,177,073 | 0.16835 | $5,102,412 |
| **Hamilton** | $43,144,270 | $336,956,749 | 0.15375 | $26,533,726 |
| **Ross** | $15,634,190 | $122,103,024 | 0.1505 | $9,411,782 |
| **Smithfield** | $15,328,350 | $119,714,414 | 0.16952 | $10,393,848 |
| **Stroud** | $12,920,950 | $100,912,620 | 0.16475 | $8,514,906 |
| **Total** | $100,266,480 | $783,081,209 | | $63,421,592 |

[1] Estimated current market value was calculated using the Pennsylvania state multiplier of 7.81 provided by the Monroe County Assessors Office, August 2008.
[2] Millage rates provided by Monroe County Assessors Office, September 2008.
[1] Estimated tax receipts computed as follows: (2007 assessment) * 4 * 2008 millage rate.

The fiscal impact to Monroe County and its townships, if a refuge is established, would depend on both the quantity of land acquired and the rate of acquisition. While land owned by the U.S. Government is not taxable by state or local authorities, the federal government has a program in place to compensate local governments for foregone tax revenues. The Refuge System typically makes an annual payment in lieu of taxes to local governments. The amount of the payment depends on the final Congressional budget appropriations for the Service for that year. Recently, the payment has been less than what the state or local government may have received through normal taxation. It should be noted that the parcels with the highest assessed value within the Study Area (i.e., residential, industrial, and retail) are parcels that have the least desirable characteristics for natural resource conservation.

Table 2-8 shows the breakdown of the most recent real estate assessment by land use conducted in 1988. Open space parcels account for 21 percent of the parcel assessments in the Study Area, while developed parcels account for the remaining 79 percent. This contrasts to the total acreage of open and developed space parcels, which accounted for nearly 70 and 30 percent of the Study Area, respectively. Given the likelihood of limited funding and the fact that open space parcels would most likely be targeted for land protection, if a refuge is established, it is expected to have minimal fiscal impact on the affected county and townships in the near future.

Table 2-8. Estimated Tax Receipts by Land Use Classification in the Cherry Valley National Wildlife Refuge Study Area, Monroe County, Pennsylvania.

| Land Category | Land Use | 2007 Assessment | Percent of Grand Total Assessment | Current Market Value[1] | Estimated Tax Receipts[2] |
|---|---|---|---|---|---|
| **Open Space Parcels** | Agriculture | $6,038,240 | 6.0 | $47,158,654 | $3,864,474 |
| | Communication/Transportation/Utilities | $1,583,010 | 1.6 | $12,363,308 | $1,013,126 |
| | Forest | $5,299,650 | 5.3 | $41,390,267 | $3,391,776 |
| | Public/Private Parks | $3,392,960 | 3.4 | $26,499,018 | $2,171,494 |
| | Vacant | $4,801,600 | 4.8 | $37,500,496 | $3,073,024 |
| | **subtotal** | **$21,115,460** | **21.1** | **$164,911,743** | **$13,513,894** |
| **Developed Parcels** | Hotels/Camps | $8,752,530 | 8.7 | $68,357,259 | $5,601,619 |
| | Industrial | $2,358,120 | 2.4 | $18,416,917 | $1,509,197 |
| | Residential | $60,091,860 | 59.9 | $469,317,427 | $38,458,790 |
| | Retail/Services | $5,128,190 | 5.1 | $40,051,164 | $3,282,042 |
| | Other | $2,820,320 | 2.8 | $22,026,699 | $1,805,005 |
| | **subtotal** | **$79,151,020** | **78.9** | **$618,169,466** | **$50,656,653** |
| **Grand total** | | **$100,266,480** | **100.00** | **$783,081,209** | **$64,170,547** |

[1] Estimated current market values were calculated using the Pennsylvania state multiplier of 7.81.

[2] Estimated tax receipts were calculated using the following equation: (2007 Assessment) * 4 * (average millage rate of 0.160.)

### 2.4.3 Land Use Trends

For generations, Cherry Valley's rural character has been preserved by local landowners. They have safeguarded the area's clean waters and unique habitats out of a long-held respect for the landscape. However, intergenerational land transfer, increasing land values and real estate taxes, and decreasing farm income are placing greater pressure on the landowners in Cherry Valley.

Located less than two hours by car from Philadelphia and New York City, Cherry Valley's quiet landscape is threatened by an onrush of residential development. Several small and modest-sized developments have popped up in the valley and single family home development is proceeding at a brisk pace. In addition to attracting new residents, the valley's rural character, quality of life, and lower taxes have also sparked a trend in the conversion of seasonal homes to year-round residences.

During the 1990s, housing starts increased dramatically in Monroe County (Table 2-9). For example, the number of housing units increased by 45 percent in Hamilton Township between 1990 and 2000 (HJP Open Space and Recreation Plan, 2003). Since

Table 2-9. Single family building permits per year for 1998 through 2007 for Monroe County, Pennsylvania.

| Year | Permits | Annual Change | Total Cost | Annual Change | Average Cost | Annual Change |
|---|---|---|---|---|---|---|
| **1998** | 1,130 | 0.00% | $137,446,018 | 0.00% | $121,634 | 0.00% |
| **1999** | 1,367 | 21.00% | $191,829,977 | 39.60% | $140,329 | 15.40% |
| **2000** | 1,481 | 8.30% | $207,892,568 | 8.40% | $140,373 | 0.00% |
| **2001** | 1,510 | 2.00% | $224,358,519 | 7.90% | $148,582 | 5.80% |
| **2002** | 1,573 | 4.20% | $253,352,319 | 12.90% | $161,063 | 8.40% |
| **2003** | 1,679 | 6.70% | $286,709,547 | 13.20% | $170,762 | 6.00% |
| **2004** | 1,645 | -2.00% | $306,610,397 | 6.90% | $186,389 | 9.20% |
| **2005** | 1,610 | -2.10% | $314,059,152 | 2.40% | $195,068 | 4.70% |
| **2006** | 1,399 | -13.10% | $311,573,822 | -0.80% | $222,712 | 14.20% |
| **2007** | 900 | -36% | $191,036,244 | -39% | $212,262 | -5% |

Source: U.S. Census Bureau, http://www.census.gov/const/www/permitsindex.html. [Online] Accessed May 2008.

2004, building permits have declined in Monroe County. For the six municipalities that overlap with the Study Area, total combined single family building permits began to decline in 2002 (Table 2-10). It is not entirely clear what has caused this decline, though similar trends are seen in other Monroe County municipalities. Similar to other areas in the country, Monroe County experienced record foreclosures in 2007 and looks to set a new record in 2008 as the mortgage credit crisis continues. According to a recent article in the Pocono Record there were 1,253 foreclosure filings in 2007 (Per. Meanwhile, after nearly doubling in value between 1998 and 2006, home prices fell by 5 percent in 2007 (Table 2-9).

Table 2-10. Single family building permits per year for 2000 through 2007 for townships within the Cherry Valley National Wildlife Refuge Study Area, Monroe County, Pennsylvania.

| Year | Chestnuthill | Delaware Water Gap | Hamilton | Ross | Smithfield | Stroud | Total |
|---|---|---|---|---|---|---|---|
| **2000** | 152 | 1 | 55 | 72 | 112 | 203 | 595 |
| **2001** | 160 | 0 | 75 | 64 | 46 | 264 | 609 |
| **2002** | 159 | 5 | 81 | 66 | 65 | 218 | 594 |
| **2003** | 169 | 3 | 53 | 44 | 59 | 217 | 545 |
| **2004** | 113 | 5 | 40 | 44 | 46 | 181 | 429 |
| **2005** | 88 | 2 | 27 | 26 | 55 | 114 | 312 |
| **2006** | 63 | 0 | 23 | 14 | 67 | 113 | 280 |
| **2007** | 46 | 0 | 17 | 18 | 11 | 80 | 172 |
| **Total** | **950** | **16** | **371** | **348** | **461** | **1,390** | **3,536** |

Source: Monroe County Planning Commission (2008)

### 2.4.4 Land Use Planning

In light of land use trends in Cherry Valley during the 1990s, local municipalities recognized the need for balancing environmental and resource protection with an increasing population base (The Stroud Region Open Space and Recreation Commission 2002). One outcome has been increasing support for more open space, greenways, and recreation areas (Table 2-11). For example, Monroe County's comprehensive plan, adopted in 1999 (Monroe County Planning Commission 1999), and the Monroe County Open Space Plan, adopted in June 2001 (Bloss Associates 2001), resulted in all 20 of the

county's municipalities preparing joint open space plans which were partially funded by a Growing Greener planning grant. This enabled municipalities, organized as regions, to develop park, recreation, and open space plans with the goal of addressing present and projected needs of the public and natural resources.

Table 2-11. Open Space Planning and Conservation Efforts in the Cherry Valley National Wildlife Refuge Study Area, Monroe County, Pennsylvania.

| **Organization** | **Planning Effort** |
|---|---|
| The Brodhead Watershed Association | The Brodhead Watershed Association is leading an effort to develop a conservation plan for the Cherry Creek Watershed, from the headwaters near Saylorsburg to the mouth in Delaware Water Gap. The Cherry Creek Watershed Conservation Plan will include an inventory of natural, recreation and cultural resources; an analysis of the current conditions; uses and issues facing the watershed and an action plan for improved conservation and management of the Cherry Creek watershed. |
| Monroe County Planning Commission | Administered by the Monroe County Planning Commission, the Monroe County Open Space Program works on the allocation of the $25 million bond that was passed by voter referendum in 1998. Funding was available for land acquisitions, conservation easements, and agricultural easements by municipalities, land trusts, and the county. Several projects in Cherry Valley have been partially funded from the open space bond. The Commission is also developing a Map of Potential Conservation Lands identifying those parts of undeveloped properties where the municipalities have preliminarily determined the importance of designing new development in such a way that an interconnected network of conservation land can be protected. |
| Delaware Water Gap Open Space Committee | Following up on the recently completed Eastern Monroe Regional Open Space Plan, the Delaware Water Gap Open Space Committee is looking at several properties as potential park sites. |

| Organization | Planning Effort |
|---|---|
| Hamilton, Jackson, Pocono Townships (HJP) Regional Open Space Committee | The HJP Open Space and Recreation Plan is a comprehensive Multi-Municipal Plan developed to establish both short- and long-term goals for each township's open space conservation, recreation and resource protection objectives. This Plan is in draft format. |
| Smithfield Township Open Space Committee | Following up on the recently completed Eastern Monroe Regional Open Space Plan, the Smithfield Open Space Committee is looking to acquire select park properties for active recreation, passive recreation, and trail links. |
| Stroud Township Environmental Advisory Committee (EAC) | The Stroud Township EAC makes recommendations to the Township Supervisors on the acquisition of land and/or conservation easements. The EAC is currently developing acquisition criteria and program procedures. The program is funded with a 0.25% Earned-Income Tax approved by Township voters in November 2001. |
| Growing Greener Subdivision Design Review | These audits provide recommendations on how the conservation subdivision design technique can be incorporated into a municipality's ordinances. Audits were conducted for Delaware Water Gap Borough and Hamilton, Smithfield, and Stroud Townships. Hamilton, Smithfield, and Stroud have been revising their ordinances to promote conservation techniques in the subdivision process. |
| Hamilton, Stroud, Pocono, Stroudsburg Comprehensive Plan Committee | This plan will help municipalities identify and address regional issues such as sewer and water, emergency services, agricultural preservation, transportation, and developments of regional scope. Planning jointly for these issues can eliminate duplication of efforts, encourage communication between municipalities and create opportunities for more efficient use of resources. |

Source: Friends of Cherry Valley (2008).

In addition to forward-thinking land use planning at the county and municipal level, there is growing interest in protecting an interconnected network of green space and trails in Cherry Valley. Preserving corridors of green space along streams and ridgelines will keep wildlife and fisheries habitat connected throughout the watershed.

Establishing a protected green infrastructure network in Cherry Valley could also have benefits for people, as some areas could have trails for walking, hiking, and bicycling (BLOSS Associates 2004). Such an effort would involve linking protected areas that are already in place at the federal, state, and local levels. Non-profit organizations, private landowners, and Monroe County are also collaboratively engaged in a number of voluntary programs to promote land and water conservation in the Cherry Valley Study Area (Table 2-12).

Table 2-12. Land and Water Conservation Activities in the Cherry Valley National Wildlife Refuge Study Area, Monroe County, Pennsylvania.

| **Program** | **Description** |
|---|---|
| Monroe County Agricultural Land Preservation Program | Protects and promotes agricultural uses of valuable agricultural lands through conservation easements from willing property owners. |
| Agriculture Security Areas | Agricultural Security Areas help protect our quality farmland from urbanization of rural areas. This voluntary program protects farmers from nuisance complaints, local ordinances affecting farming activity, and condemnation. An ASA also can qualify land for consideration under the Monroe County Agricultural Land Preservation Program at the landowner's request. Farmers create an ASA by submitting petitions to township supervisors. A minimum of 250 acres from among all participating farmers is required. |
| Resource Inventories | Cherry Creek Stream Watchers, The Nature Conservancy, Stream Walkers |
| Kittatinny Ridge Conservation Project | Collaborative effort of local, regional and state organizations and agencies to focus public attention on the importance of Blue Mountain as a way of fostering responsible stewardship for future generations. |

Source: The Nature Conservancy (2003)

## 2.5 Socioeconomic Environment

### 2.5.1 Local Culture

Local residents take pride in Cherry Valley and value the area's rural way of life. Several farms in the valley are still called by names of residents who many years ago made their mark on the area (Friends of Cherry Valley 2008). Activities commonly reported in Cherry Creek watershed include gardening, bird watching, hiking, biking, hunting, fishing, horseback riding, and cross-country skiing. The same values that have shaped the landscape over the years also frame concerns related to the loss of agricultural land and open space to development, air and water quality, litter, wetland destruction, and increased traffic (BLOSS Associates 2004).

### 2.5.2 Archeological and Historical Resources

*Native American History and Early Settlement*
People have been drawn to this stream corridor for at least ten thousand years. Although no comprehensive archaeological excavations have been undertaken in the valley, local farmers and residents continue to find artifacts of the Lenni-Lenape people whose occupation of the land preceded European settlers by thousands of years. Near the mouth of Cherry Creek along the Delaware River, archaeologists (under commission by the federal government) conducted numerous excavations during the 1960s and 1970s. They uncovered evidence of extensive habitation by Native Americans, including stone tools and sundry artifacts, and evidence of long-term settlement such as hearths, burial grounds, and postmold holes for longhouses.

Dating back to 8640 BC, and continuing to the time of European-Native American contact, the remains of the Lenape indicate that these people inhabited the valley continuously from Paleo-Indian times until and immediately following settlement of the area by European colonists. Early records of contact between Native Americans and European colonists in the area date to 1609, and there are detailed accounts of the 1742-meeting between Chief Kakowatchiky of the Shawnee and Count Zinzendorf, founder of the Moravian Church.

Although still considered frontier during the French and Indian War, Cherry Valley was well settled by European colonists before the middle 18th century. Baptismal records of the Christ Hamilton Lutheran Church date as early as 1752 and provide the names of a large congregation of mostly German settlers who lived and worshiped within the valley. This church remains a vital part of Cherry Valley today, and the structure and its cemetery are listed on the National Register of Historic Places.

*Agriculture*
The fertile soil and relatively flat landscape of Cherry Valley have long supported the area's farming tradition. The continuous use of Cherry Valley for agriculture is

evidenced by the present-day agricultural fields found throughout the valley that are dotted with the farmhouses of some of the original families who settled the area. Among the oldest is the still-occupied Aaron Depui House, a stone structure built in 1725 by Aaron Depui, son of Nicholas Depui, the first European settler in Monroe County. Others include the 1748 Shaw-McDowell Farmhouse as well as the 1816 Peter Kester House. Kester had served as a contractor for the Christ Hamilton Church, and the church's parsonage, constructed in 1837, was modeled after his home. Although a number of other homes within the valley date to the late 1700s and early 1800s, none are currently listed on the National Register for Historic Places.

Today, farms within Cherry Valley principally produce hay and corn for tenant farmers. An exception is the Porter Farm, site of Cherry Valley Community Supported Agriculture (CSA) initiative, which provides a variety of fresh produce to over eighty local families during the growing season. The diversity of crops grown by the CSA reflects centuries-old traditions within the valley. For example, the 1850 Agricultural Censuses for Smithfield and Middle Smithfield townships indicate that local farmers produced potatoes, buckwheat, hay and other crops for personal consumption and sale.

Cherry Valley provides an increasingly rare window into how pastoral landscapes once looked in much of eastern Pennsylvania, and provides unique habitats compared to the rock-covered woodlands of much of the Pocono Mountains. The long tradition of agriculture and life in the valley are threatened by changing land use patterns and by fields that are left fallow and are over-taken by invasive plant species.

### 2.5.3 Human Population

The population of Monroe County has increased significantly over the years. In fact, development pressure is a primary concern in the area as it threatens the county's ecology and natural beauty. According to data provided by the U.S. Census, the population in Monroe County has changed from 138,687 in 2000 to 165,685 in 2006 (Table 2-13). This equates to a nearly 20 percent increase in total population for the county. In contrast, the state population increased by approximately one percent over the same period. Population within the Study Area is estimated to be about 9,300 or approximately seven percent of the county's 2000 population. Table 2-13 provides a summary of how population has changed since 2000 within the Study Area, and compares this change to the overall change for Monroe County and the State of Pennsylvania.

A significant amount of population growth is attributable to an influx of workers and families from the greater New York metropolitan area seeking more affordable housing (Cohen 2008). Monroe County commuting time is over 30 percent higher than the state average. Many of these workers commute into Manhattan via Martz Trailways, nearly a two-hour journey along Interstate 80. The majority of the Monroe County newcomers reside in new housing developments built outside of the Study Area.

Table 2-13. Population in Cherry Valley National Wildlife Refuge Study Area and Monroe County, and Pennsylvania.

| | 2000 | 2006 | Percent change |
|---|---|---|---|
| **Study Area** | 9,304[1] | n/a | |
| **Monroe County** | 138,687 | 165,685 | 19.5 |
| **Pennsylvania** | 12,281,054 | 12,440,621 | 1.3 |

[1] Refuge boundary population estimates are based on census block groups and Division of Economics GIS analysis June 2008. Study Area population estimate does not include the addition of the Lower Cherry Creek section.
Source: www.fedstats.gov/qf/states/42/42089.html

Table 2-14 presents total population estimates in years 1990 and 2000 for the townships within the Study Area along with an estimate of the population residing within the Study Area boundary. Of the 9,300 individuals residing within the Study Area, over 60 percent resided in either Hamilton or Ross townships. Population increases were greatest in the townships of Chestnuthill, Smithfield, and Stroud. For the latter two, population increases within the Study Area were twice that of the townships in general.

Table 2-14. Population for Monroe County and Municipalities in the Cherry Valley National Wildlife Refuge Study Area

| | Total Population | | | Study Area Population[1] | | |
|---|---|---|---|---|---|---|
| **Municipality** | 1990 | 2000 | Change | 1990 | 2000 | Change |
| Chestnuthill | 8,554 | 14,598 | 71% | 969 | 1,642 | 69% |
| Delaware Water Gap | 436 | 562 | 29% | 113 | 52 | -54% |
| Hamilton | 6,511 | 7,004 | 8% | 3,537 | 3,509 | -1% |
| Ross | 3,671 | 5,768 | 57% | 1,629 | 2,288 | 40% |
| Smithfield | 6,106 | 6,692 | 10% | 470 | 841 | 79% |
| Stroud | 11,583 | 15,515 | 34% | 558 | 972 | 74% |
| Township Total | 36,861 | 50,139 | 36% | 7,276 | 9,304 | 28% |
| | | | | | | |
| Monroe County Total | 95,709 | 138,572 | 45% | -- | -- | -- |
| PA Total | 11,881,643 | 12,281,054 | 3.4% | -- | -- | -- |
| U.S. Total | 248,709,873 | 281,421,906 | 13.2% | -- | -- | -- |

[1] Study Area population estimates exclude the Lower Cherry Creek addition.
Source: 1990CensusMuniBnds.xls; CensusBlocks 2000 MuniBounds; US FWS Division of Economics GIS analysis (Monroe County Population). May 29, 2008.

Overall, between 1990 and 2000, the population within the Study Area increased 28 percent. This rate was less than the total growth rate for the townships that have property included in the Study Area (36 percent) and for Monroe County (45 percent), indicative of the relative rural nature of the area. Nonetheless, a 28 percent increase reflects significant change for the area. By comparison, state population changed by only 3.4 percent over the same period, while overall U.S. population changed by 13 percent, which reflects huge population growth in the Southeast and West. Future population growth in Monroe County is expected to remain strong with as many as 70,000 new residents expected by 2020 (BLOSS Associates 2001).

### 2.5.4 Economic Activities and Trends

Residents in the six municipalities overlapping with the Study Area tend to be younger, more affluent and better educated than the average person in Monroe County and in Pennsylvania (Table 2-15). Median household size also tends to be somewhat higher reflecting a higher proportion of families with dependent children.

Total employment in Monroe County in 2005 was 75,728.[6] Since 2001, Monroe County has experienced a net increase of over 7,600 new jobs. Over 40 percent of total employment in 2005 occurred in one of three economic sectors – government-related, retail trade, and services (Table 2-16). Of the three, government and government enterprises employed the greatest number of workers in 2005 (12,748) which represents almost 17 percent of total employment. Less than one-half of one percent of total County employment (264) worked on farms. Since 2001, farming employment has decreased by about four percent.

Table 2-15. Median household income, household size, education attainment and median age for Monroe County municipalities in the Cherry Valley National Wildlife Refuge Study Area, Pennsylvania.

| Municipality | Median Household Income | Average Household Size | High School or higher (%) | Bachelors or higher (%) | Median age |
|---|---|---|---|---|---|
| **Chestnuthill** | $50,210 | 2.91 | 84.7 | 18.9 | 36.8 |
| **Delaware Water Gap** | $37,708 | 2.16 | 84.6 | 30.3 | 36.0 |
| **Hamilton** | $47,327 | 2.64 | 84.6 | 23.8 | 39.9 |
| **Ross** | $48,750 | 2.87 | 80.5 | 17.5 | 37.9 |
| **Smithfield** | $51,607 | 2.66 | 85.4 | 22.9 | 38.5 |
| **Stroud** | $53,428 | 2.69 | 86.0 | 25.8 | 39.4 |

Source: U.S. Census Bureau 2000

[6] Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce; CA25N Footnotes; http://www.bea.gov/regional/reis/CA25Nfn.cfm; Accessed December 13 2007.

The fastest growing employment sectors in the county were educational services, and transportation and warehousing. The total employment in these sectors grew by 88 percent and 43 percent, respectively, since 2001. In addition to farming, Monroe County also saw a decrease in employment in the manufacturing and wholesale trade sectors. All other sectors had a net gain in employment between 2001 and 2005. Table 2-16 provides a detailed description of employment in Monroe County in the years 2001 and 2005.

Despite these larger trends, Cherry Valley continues to host a number of active farms and other enterprises that are compatible with open space conservation including a winery, an apiary, two golf courses, and a tree nursery. The tourism industry thrives in Cherry Valley as a result of its proximity to the Pocono Mountain area (Brodhead Watershed Association 2008).

Table 2-16. Monroe County, Pennsylvania Employment Data

| | 2005 | % of total | 2001 | % of total | % Change 2001 - 2005 |
|---|---|---|---|---|---|
| **Total employment** | 75,728 | 100.0% | 68,112 | 100.0% | 11.2% |
| **Farm employment** | 264 | 0.3% | 275 | 0.4% | -4.0% |
| **Nonfarm employment** | 75,464 | 99.7% | 67,837 | 99.6% | 11.2% |
| **Forestry, fishing, related activities, and other** | 65 | 0.1% | n/a | n/a | n/a |
| **Mining and Utilities** | 179 | 0.2% | 135 | 0.2% | 32.6% |
| **Construction** | 5,691 | 7.5% | 4,828 | 7.1% | 17.9% |
| **Manufacturing** | 5,373 | 7.1% | 5,423 | 8.0% | -0.9% |
| **Wholesale trade** | 1,387 | 1.8% | 1,401 | 2.1% | -1.0% |
| **Retail trade** | 10,932 | 14.4% | 10,314 | 15.1% | 6.0% |
| **Transportation and warehousing** | 3,888 | 5.1% | 2,708 | 4.0% | 43.6% |
| **Information, Finance, Insurance, and Real Estate** | 6,591 | 8.7% | 6,474 | 9.5% | 1.8% |
| **Professional, management, admin & waste services** | 7,668 | 10.1% | 6,511 | 9.6% | 17.8% |
| **Educational services** | 852 | 1.1% | 452 | 0.7% | 88.5% |
| **Health care and social assistance** | 6,375 | 8.4% | 5,192 | 7.6% | 22.8% |
| **Arts, entertainment, and recreation** | 2,686 | 3.5% | 2,144 | 3.1% | 25.3% |
| **Accommodation and food services** | 6,831 | 9.0% | 7,339 | 10.8% | -6.9% |
| **Other services, except public administration** | 4,198 | 5.5% | 3,750 | 5.5% | 11.9% |
| **Government and government enterprises** | 12,748 | 16.8% | 11,048 | 16.2% | 15.4% |

Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce; CA25N Footnotes; http://www.bea.gov/regional/reis/CA25Nfn.cfm. Accessed December 13, 2007

### 2.5.5 Recreational Activities and Trends

As a limestone valley surrounded by a number of unique ecosystems, it's no surprise that numerous local residents and visitors enjoy Cherry Valley's natural resources and scenic beauty for recreation. Some of the more prominent recreational areas and activities include:

*Exploring the Appalachian Trail.*

Within Cherry Valley, the AT runs along Kittatinny Ridge, which serves as the Study Area's southern boundary. Completed in 1937, the AT "traverses the wild, scenic, wooded, pastoral, and culturally significant lands of the Appalachian Mountains"(National Park Service, "Appalachian National Scenic Trail"). It consists of 2,175 miles of footpath that stretches through 14 states from Maine to Georgia (National Park Service "Appalachian National Scenic Trail"). The AT traverses eight National Forests, six National Park Service units, one National Wildlife Refuge and about six dozen state parks and forests and is often referred to as the nation's longest and most accessible National Park. Each year, between three and four million visitors spend time along portions of the AT, including at Wolf Rocks in Stroud Township, which is considered one of the outstanding viewpoints along the AT in eastern Pennsylvania (USDA 2008).

*Visiting the Delaware Water Gap National Recreation Area*.

The Delaware Water Gap National Recreation Area ranked number eight on the list of top ten National Parks visited during 2007, with 4.84 million visitors (National Park Service, "NPS Stats, Ranking Report for Recreation Visits."). One of the most striking natural features in Pennsylvania, the highly scenic Delaware Water Gap National Recreation Area encompasses approximately 70,000 acres along 40.6 miles of the Delaware River (National Park Service, Delaware Water Gap National Recreation Area Park Management). Because it is close to urban areas and major transportation corridors, this National Recreation Area is highly accessible to the ever-growing numbers of vacationers and new residents being drawn to the Poconos and the Delaware Highlands regions for the natural beauty and intensive water-oriented recreational activity.

*Hunting, Fishing, Wildlife Viewing.*

Its forests and streams, ponds and bogs, and dramatic ridges make Cherry Valley an ideal place for some of the region's most charismatic and well-known species, including white-tailed deer, black bear and beaver. Many of these species are abundant, attracting sport and game enthusiasts to the area throughout the year.

Common in Pennsylvania, hunting is an important tool for managing wildlife populations. Bear and deer attract hunters to the Kittatinny Ridge, and hunting occurs on private lands throughout the valley. Turkey, ruffed grouse, and American woodcock

populate many forest areas while a variety of waterfowl frequent wetlands and lakes especially during spring and fall migrations (WPC 2008). In 2006, over 7,000 residential adult hunting licenses were sold in Monroe County. The Pennsylvania Game Commission maintains harvest estimates at the Wildlife Management Unit level (WMU) for deer and bear. Cherry Valley is in WMU 3D (one of 17 WMUs in Pennsylvania), which had an estimated deer harvest of 10,793 and a documented bear harvest of 193 in 2007 (Pennsylvania Game Commission 2008). Specific estimates for the Study Area are not available.

Cherry Valley also represents a popular destination for fishing. Much of the Cherry Creek watershed is classified as a high quality cold water and migratory fishery under Pennsylvania's water quality criteria (PA Code Title 25, Chapter 93). The Pennsylvania Fish and Boat Commission classifies a portion of the creek and several tributaries in the watershed as Class A wild trout streams, signifying the presence of significant populations of wild brook and brown trout. The Pennsylvania Fish and Boat Commission reports over 13,000 residential fishing licenses were sold in Monroe County in 2006. At least one private fishing club has purchased fishing right for Cherry Creek.

In addition to hunting and fishing, Cherry Valley serves as a destination for wildlife viewing. Most notably, the Kittatinny Ridge retains some of the most extensive natural areas in southeastern Pennsylvania, and has long been recognized as one of the major east coast fall flyways for migrating raptors.

### 2.5.6 Soundscape

Emerging science on natural soundscapes shows the importance of recognizing and documenting local, natural soundscapes. These soundscapes are considered to be an essential part of a landscape, its representative and "vocal" wildlife, and one's personal experience in the wild, whether in a park, wilderness, refuge, or similar form of natural landscape. As with other regions in North America, natural soundscapes have suffered greatly, mostly within the last 20 years. There are two main contributors to these changes: habitat destruction and an increase in human noise due to aircraft and land-based machinery the impact of which is observed miles from the source (Krause 1999).

There is no specific information on the soundscape of Cherry Valley but there are clearly the sounds and noises of a developed community. Traffic, airplanes, heavy equipment operation, farm machinery, building construction, road construction, and the like, contribute to community noise and disturbance in varying degrees. These disturbances can be a feature of a degraded environment, and impacts due to human-induced noise need to be mitigated wherever possible. Areas with the loudest human-induced noise are likely to be a corridor along Pennsylvania Route 33 (a four lane divided highway) and within close proximity to the quarry in Hamilton Township.

## 2.6 Conclusion

Cherry Valley is home to at least 80 species and natural communities of concern. Generations of local landowners have exercised great stewardship in caring for these resources, and there are many existing programs in place to help protect local landowners who are interested in conservation. However, the existing pressures are greater than the existing programs. A new refuge could provide local landowners with one additional tool to conserve their natural and cultural heritage as they consider the future of their land. And, importantly, it could bring significant financial resources to help meet the area's conservation challenges. In addition, a refuge could provide additional staff resources to help inventory, manage, and restore habitat for native plants and wildlife in the area.

# 3 Alternatives

This chapter presents the alternatives for a potential refuge in Cherry Valley including the Service's proposed action that we believe would best fulfill the intent of the Study Act and the proposed purposes, vision, and goals of a new national wildlife refuge in Cherry Valley, first presented in Chapter 1.

The goals are intentionally broad, descriptive statements of the desired condition of potential refuge land in Cherry Valley. They embrace the principal elements of the Study Act, the proposed refuge purposes, and the potential vision statement. Descriptions of the three alternatives, one of which is the proposed action, address the three proposed goals in narrative form, and offer an explanation of how the alternatives meet, or don't meet, the requirements of the Study Act and the proposed refuge's goals. The proposed action (Alternative B) is addressed in more detail in the draft Conceptual Management Plan (Appendix B). As described in Chapter 1, a Conceptual Management Plan provides general, interim management direction for a new refuge until approval of a considerably more detailed Comprehensive Conservation Plan. If a new refuge is approved, we will revise the draft Conceptual Management Plan based upon comments received on this document, including public comments. Developing a Comprehensive Conservation Plan would follow sometime thereafter.

Under NEPA, the proposed action defines what an agency plans to do or recommend, but cannot implement without considering other reasonable, environmentally sensitive alternatives to the proposed action. Other reasonable alternatives to the proposed action that could also be viewed as fulfilling the intent of the Study Act are described herein, thereby offering the Service and the reviewing public an opportunity to consider a range of reasonable alternatives for the proposed action, and thus fulfilling one of the key tenets of NEPA.

## 3.1 Formulating Alternatives

This chapter describes the process for formulating alternatives and the activities they share in common. For ease in comparison, at the end of this chapter, we have provided Table 3-4 that compares the acres of habitat associated with each alternative and Table 3-5 which compares the basic management approach for each alternative. Please refer to Chapter 2 – Affected Environment – for detailed descriptions of the Study Area's resources.

After identifying the goals for a potential Cherry Valley NWR, we began developing alternatives. Alternatives describe complementary management approaches for achieving the missions of the Service and the Refuge System, the purposes for which a refuge might be established, and its vision and goals, while responding to issues and

opportunities identified during the planning process. We relied on the Study Act to guide our decisions regarding the potential purposes for a new refuge.

We considered a number of alternatives but chose three to fully develop, including the NEPA required "No Action" alternative to provide a baseline for comparing the other two alternatives. There were two main alternatives we considered but did not fully develop. The first was an alternative focused mainly on protection of bog turtle habitat. We concluded that such a narrow approach would not honor the intent of the Study Act. The second included lands for protection in the Minsi Lake Corridor and Shawnee watershed (Figure 3-1) because of the recognized wildlife and habitat values, and the expressed interest from the public. However, we concluded these areas were never intended to be part of the study and should be considered for protection in a separate exercise. We believe the three alternatives presented in this document and their respective narrative descriptions represent a reasonable range of alternatives for achieving the Study Act purposes; the draft purposes, vision, and goals of the proposed refuge; and addressing the issues described in Chapter 1.

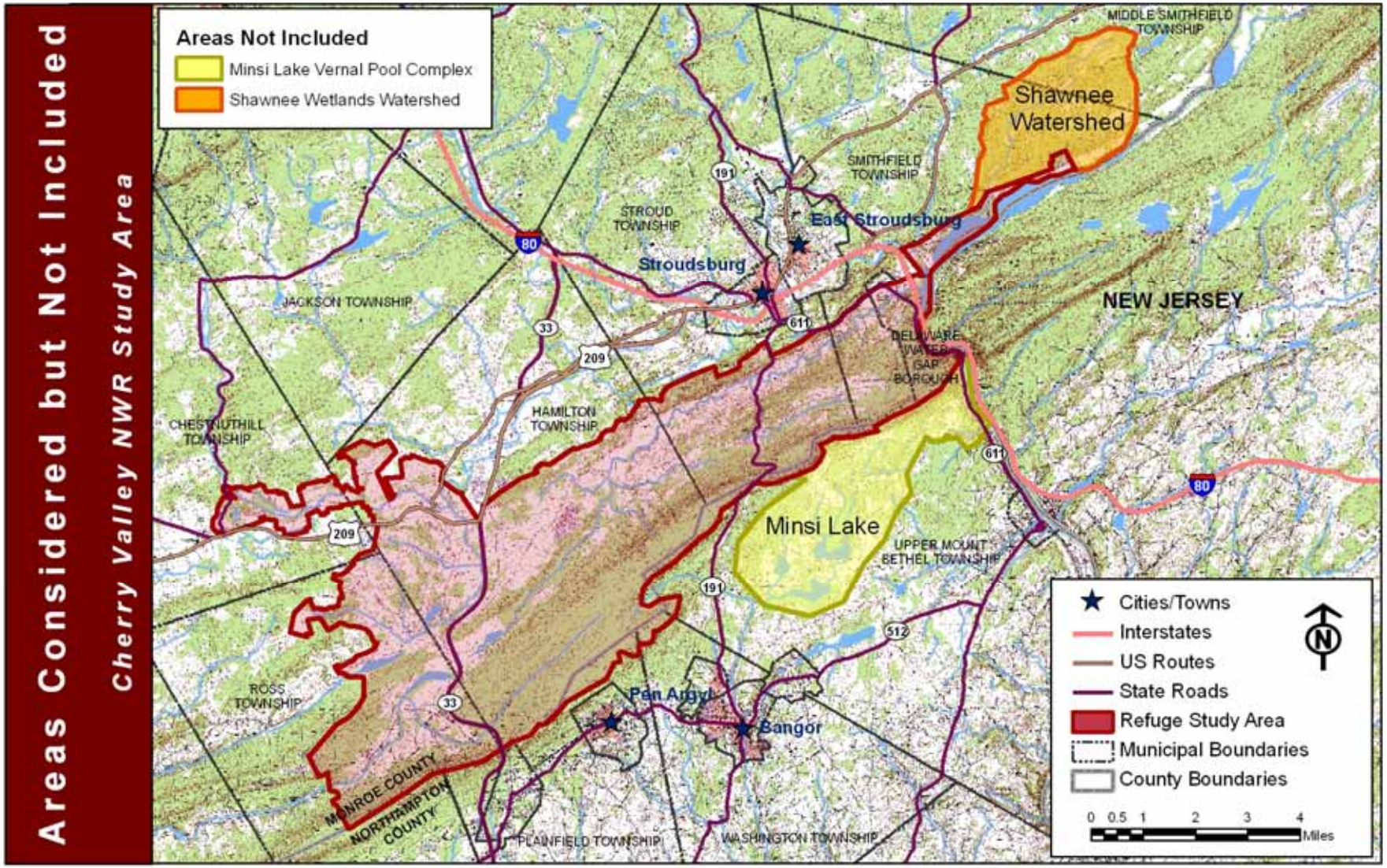


Figure 3-1. Areas outside of the Study Area that were considered but not included in the analysis of alternatives.

## 3.2 Alternatives

In brief, the alternatives we considered are:

*Alternative A. – "No Refuge"* This is the "No Action" alternative required by NEPA and serves as a baseline to which other alternatives are compared. In this alternative, there would be no new refuge and no designated acquisition boundary. Habitat protection and management would continue to be done by existing organizations and government programs. Currently there are 6,313 acres of lands protected by agricultural easements, private conservation, and municipal, state, and federal ownerships within the Study Area, of which 4,811 acres contain 12 of the defined Cherry Valley ecological systems (Table 3-1, Figure 3-2). There would be no new opportunities for refuge-based wildlife-dependent public uses, partnerships, or scientific research.

*Alternative B. – "Diverse Habitat Complex*." This is the Service's proposed action, i.e., this is the option the Service is recommending to establish a refuge. This alternative includes an acquisition boundary of up to 20,466 acres containing portions of 13 of the Study Area's ecological systems (Table 3-2, Figure 3-3). Protection of lands would be done through fee title (approximately 50 percent of the acres) and conservation easements (approximately 50 percent of the acres). This alternative would provide protection for more extensive habitat areas compared to Alternatives A and B, and would better enable the Service to meet the needs of both rare and more common species of wildlife. It would offer more compatible public use opportunities than Alternatives A or C, and would also provide opportunities for extensive, refuge-based partnerships and scientific research.

*Alternative C.* --"*Wetlands and Ridge Forests*." Complementing the 4,811 acres of the defined Cherry Valley ecological systems already under some protection, this alternative proposes an acquisition boundary of up to 14,124 acres containing portions of 12 of the Study Area's defined ecological systems (Table 3-3, Figure 3-4). Protection of lands would be accomplished through fee title (approximately 65 percent of the acres) and conservation easements (approximately 35 percent of the acres). This alternative would provide important protections and management opportunities for wildlife and habitats in the valley, especially for wetlands and Kittatinny Ridge forests. However, benefits, particularly for riparian and stream species (e.g., brook trout) and species associated with forested wetland ecological systems (see Table 3-4) would be considerably less. Compared to the No Refuge alternative, it would offer substantial opportunities for compatible public uses, along with new refuge-based partnerships and scientific research, but these would be substantially less than with the proposed action (Alternative B).

Within the narrative descriptions of each alternative, we describe possible management activities that would help meet the goals of a proposed Cherry Valley NWR. Maps are used to illustrate lands that could be included within a new refuge (Figures 3-2 through

3-4). Following those descriptions, Tables 3-4 and 3-5 provide side-by-side comparisons of the alternatives. We designed the tables to give the reader a quick overview of: 1) differences in acres by habitat type (Table 3-4); and, 2) actions that distinguish the alternatives and their relationship to the potential goals and key issues (Table 3-5).

### 3.2.1 Alternative A – No Action

This alternative represents the current state of land protection activity in Cherry Valley without a refuge, thereby offering an important baseline to which the other alternatives can be contrasted. The Service would take no action within this alternative but would continue activities it has pursued over the last several years, noted below. We refer to this interchangeably as Alternative A, "No Action," or the "No Refuge" throughout this Study Report. Currently there are 6,313 acres of lands protected by agricultural easements, private conservation, and municipal, state, and federal ownerships within the Study Area, of which 4,811 acres contain 12 of the defined Cherry Valley ecological systems (Figure 3-2, Table 3-1).

*Goal 1. Protect and enhance habitats for federal trust species and species of management concern, with special emphasis on migratory birds and species listed under the ESA, along with protection of wetlands and the Kittatinny Ridge..*

Cherry Valley and its surroundings have areas of great natural resource value closely juxtaposed with areas of accelerated commercial and residential development. Residential properties, alone, cover nearly 20 percent of the Study Area. Open space parcels, which include agriculture, parks, forest, vacant, and in this case, property owned by utilities, together account for nearly 70 percent of the Study Area. To date, Cherry Valley has remained modestly developed, primarily due to the conservation ethic of residents, some of whom have negotiated the sale of their properties to conservation organizations. Other landowners have sold off the development rights to their property or placed their land in various types of agricultural and conservation easements. Funding for many of these projects was generated through a Monroe County Open Space Referendum that set aside monies to conserve open space throughout Monroe County; however, those funds are now exhausted.

Recently, however, development pressure has increased. Located less than two hours by car from Philadelphia and New York City, Cherry Valley's quiet landscape is threatened by the onrush of residential development. Several small and modest-sized developments have popped up in the valley and single family home development has been proceeding at a brisk pace. In addition to attracting new residents, the valley's rural character, quality of life, and lower taxes have also sparked a trend in the conversion of seasonal homes to year-round residences.

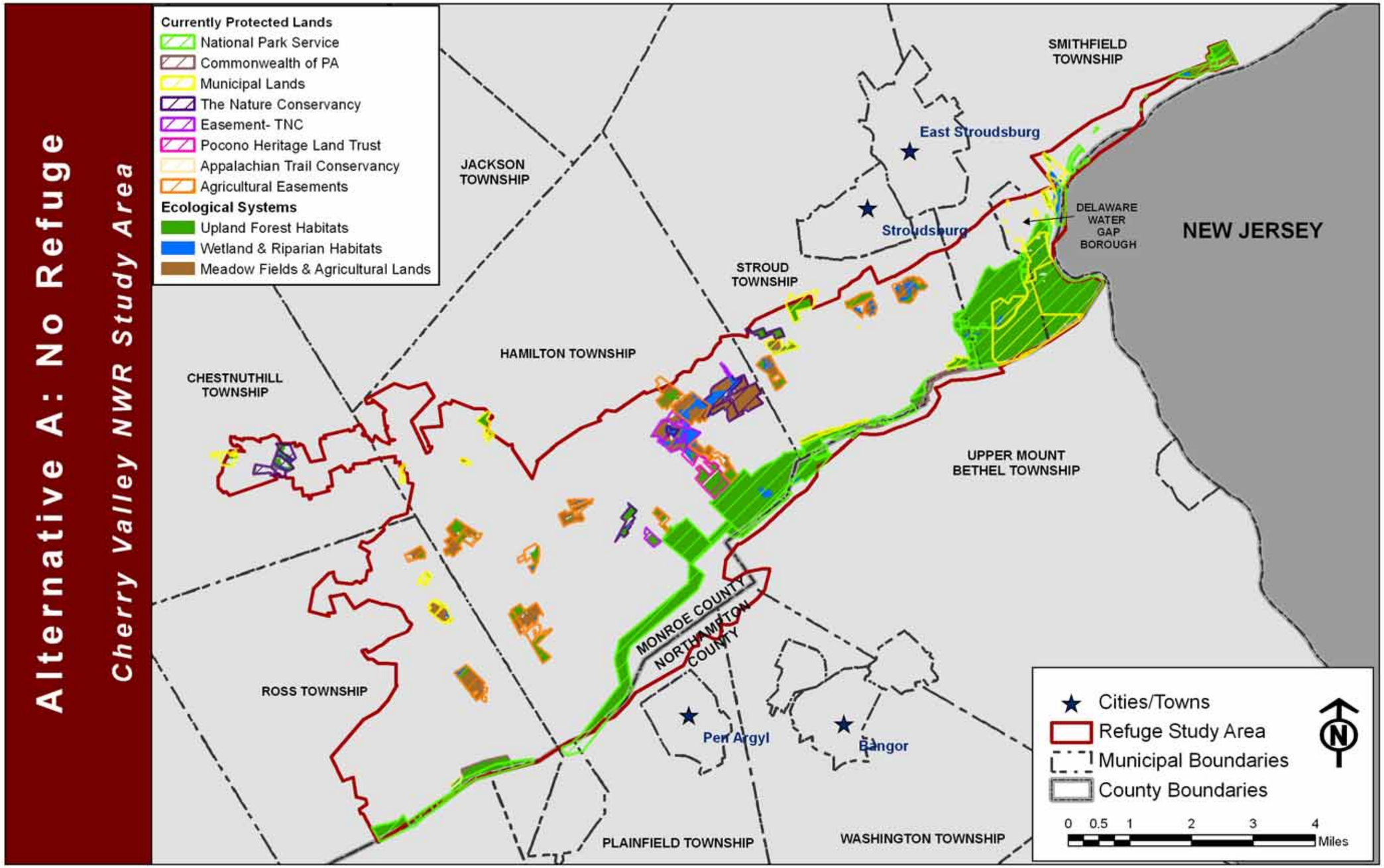


Figure 3-2. Map indicates existing conservation lands that would remain under Alternative A: No Refuge (No Action) within the Cherry Valley National Wildlife Refuge Study Area, Pennsylvania.

Table 3-1. Acres of ecological systems protected under Alternative A.

| | *Ecological Systems* | *Acres* | | | |
|---|---|---|---|---|---|
| | | **Agricultural Easements** | **Private Conservation** | **Municipal, State & Federal** | ***Totals*** |
| **Upland Forest Habitat** | **Appalachian (Hemlock)-Northern Hardwood Forest** | 8.30 | 64.40 | 138.08 | **210.78** |
| | **Central Appalachian Dry Oak-Pine Forest** | 134.62 | 47.11 | 2,635.55 | **2,817.28** |
| | **Central Appalachian Dry Oak-Pine Rocky Woodland** | 0.00 | 0.00 | 55.67 | **55.67** |
| | **Northeastern Interior Dry-Mesic Oak Forest** | 131.68 | 129.20 | 1,015.80 | **1,276.68** |
| **Wetlands & Riparian Habitat** | **Central Appalachian Floodplain** | 0.00 | 0.00 | 94.01 | **94.01** |
| | **Central Appalachian Stream and Riparian** | 43.70 | 29.32 | 5.39 | **78.41** |
| | **Laurentian-Acadian Freshwater Marsh** | 0.00 | 0.17 | 0.00 | **0.17** |
| | **Laurentian-Acadian Wet Meadow-Shrub Swamp** | 70.86 | 92.30 | 10.23 | **173.39** |
| | **North-Central Appalachian Acidic Swamp** | 4.13 | 0.00 | 30.38 | **34.51** |
| | **North-Central Appalachian Seepage Fen** | 0.00 | 0.00 | 0.00 | **0.00** |
| | **North-Central Interior Wet Flatwoods** | 10.87 | 26.88 | 0.00 | **37.75** |
| | **North-Central Interior and Appalachian Acidic Peatland** | 0.00 | 0.00 | 8.55 | **8.55** |
| | **North-Central Interior and Appalachian Rich Swamp** | 6.56 | 17.54 | 0.00 | **24.10** |
| | ***Ecological Systems Totals*** | **410.72** | **406.92** | **3,993.66** | **4,811.30** |
| | ***Total Parcel Acres[1] (31,585.8 total boundary acres)*** | **1,046.97** | **787.73** | **4,477.95** | **6,312.65** |

[1] Property lines do not coincide with the Study Area boundary. Parcels have been divided to match the Study Area boundary as closely as possible, but total parcel acres exceeds the total Study Area because of rounding errors during parcel adjustments.

Much of the land already managed or protected in this physiographic area is forested (e.g., Delaware Water Gap National Recreation Area, State Game Lands, state forests and parks). The AT passes through the potential refuge and the National Park Service and other partners own a buffer of land along the trail. The Service would continue to work closely with our conservation partners, all of whom are instrumental in helping us accomplish habitat restoration and protection activities, largely through our Partners for Fish and Wildlife Program, our statutory responsibilities under the ESA, and our advisory role under the Fish and Wildlife Coordination Act.

The Pocono Heritage Land Trust is a locally based conservation group dedicated to protecting important lands and waters, open space, agricultural landscapes, and the natural heritage of the Pocono Mountains region. It currently owns one large tract of land in the valley. Cooperative agreements with other conservation groups have resulted in restoration work on their property. The Nature Conservancy has been successful in Cherry Valley in protecting 1,000 acres through the purchase of land or conservation easements. The primary beneficiary of this effort has been the bog turtle, as numerous wetlands that provide habitat for this species have been protected and restored. Other prominent conservation partners with the Service include the Pennsylvania Natural Heritage Program, Pennsylvania Game Commission, Pennsylvania Fish and Boat Commission, and the Pennsylvania Department of Conservation and Natural Resources.

Taken together, the respective missions of the preceding groups provide an ability to assist in the protection of farmland, threatened and endangered species, scenic areas, grassland habitats, and open space that the local community has identified as significant. This collective ability, however, has proven to be too limited to meet the needs of an expanding population.

Based on this collective effort, the Alternative A would maintain protection of 6,313 acres of lands currently protected by agricultural easements, private conservation, municipal, state, and federal ownerships, of which 4,811 acres contain 12 of the defined ecological systems in the Study Area. Habitats and their respective ecological systems for trust species and species of special management concern would continue to be protected through maintenance of these 4,811 acres (Table 3-1 above). Over 2,800 acres of Central Appalachian Dry Oak-Pine Forest and nearly 1,300 acres of Northeastern Interior Dry Mesic Oak Forest would serve as valuable habitat to breeding forest interior birds such as parula and black-throated green warblers. Over 450 acres of diverse wetlands are protected, contributing to the conservation of foraging bats, wetland birds, waterfowl, shorebirds, bobolink, woodcock, Eastern meadowlark, bog turtles, diverse reptiles and amphibians, mink, river otter, and other species. Over 1,000 acres are held in agricultural easements. These could contribute, if managed appropriately, to the conservation of declining grassland birds such as grasshopper sparrows, bobolink, and Eastern meadowlark.

*Goal 2. Create opportunities for hunting, fishing, wildlife observation and photography, and environmental education and interpretation, while promoting activities that complement the purposes of the refuge and other protected lands in the region.*

The Service seeks opportunities to promote wildlife-dependent recreation on its refuges. There would be no refuge-based opportunities under the “No Action” alternative. A number of wildlife related recreational activities exit within the valley and would continue. Hunting and fishing occurs in the valley under regulations administered

by the Pennsylvania Game Commission and the Pennsylvania Fish and Boat Commission. Much hunting occurs on private lands. Public hunting is currently limited to approximately 1,200 acres of state and municipal lands. The Pennsylvania Game Commission actively encourages youth hunting through several programs which could benefit from the establishment of a refuge in Cherry Valley.

Fishing includes both cold and warm water species. Flyfishing is popular along Cherry Creek, but public access is very limited. The Delaware River provides a variety of fishing opportunities for warm water and migratory fish species. Public fishing access is available, principally within the Delaware Water Gap National Recreation Area**.**

The Kittatinny Ridge is well known to bird watchers, especially enthusiasts who enjoy watching the extensive hawk migrations throughout the ridge and valley environment. This ridge is home to Pennsylvania's most important greenway. In the 1930s, the Appalachian National Scenic Trail was created along its spine, and the world's first conservation area for birds of prey, Hawk Mountain Sanctuary, was also established here to protect migratory raptors. The 150 mile long Kittatinny Ridge is recognized as a globally significant migration flyway, concentrating up to 20,000 migrating fall raptors. There are 12 recognized hawk watching sites along the ridge. Cherry Valley lies between the Delaware Water Gap site immediately adjacent to the east and the Hawk Mountain Sanctuary (Bake Oven Knob), 30 miles to the west. The ridge is also where people hike, hunt deer, fish for trout, ride bicycles, canoe, and enjoy beautiful fall colors. It provides clean water and ample forest resources for tens of thousands of people. The 2006 "Conservation Plan for Kittatinny Ridge Conservation Corridor" (Audubon Pennsylvania 2006) describes the value of the ridge in detail and includes protection of ridge habitat as a critical priority. Within the No Action alternative, about 4,360 acres of forested ridge habitat would remain protected.

*Goal 3. Promote science, education, and research through partnerships to inform land management decisions and encourage continued responsible stewardship of the natural resources of Cherry Valley.*

As referenced under Goal 1, there is an active partnership structured to promote land protection in the valley. Other partnerships exist to promote other aspects of the valley's character, principally its natural resource values. The Friends of Cherry Valley, Inc., is a private conservation organization, formed in 2003, to advance conservation and protection of valley resources. It has been and remains a strong advocate of a refuge in the valley. Other important existing partnerships include the Monroe County Conservation District, The Nature Conservancy, Pocono Heritage Land Trust, local municipal governments, the Monroe County Open Space Program, and others.

Cherry Valley currently maintains a firm foundation for conducting science and research within the field of natural resource management. East Stroudsburg University hosts a strong Department of Biology that has participated in a variety of ecological studies over

the years. Research and field studies are carried out by most of the conservation partners mentioned already, notably the Pennsylvania Game, Fish and Boat, and Natural Heritage Commissions. Pennsylvania State University maintains a Cooperative Fish and Wildlife Research Unit, which, for example, has recently surveyed the distribution and status of the dwarf wedgemussel within the northern Delaware River, a species that potentially can reestablish in Cherry Valley. This Unit, a cooperative effort with Pennsylvania State University's School of Forest Resources, the commissions noted above, and The Wildlife Management Institute, also conducts diverse research on black bear, trout, ruffed grouse, stream ecology, and a host of other subjects that may be useful to the Cherry Valley area.

Environmental education currently is performed in each of the school districts for the valley's municipalities: Ross, Chestnuthill, Hamilton, Stroud, and Smithfield townships and Delaware Water Gap Borough. The Monroe County Conservation District maintains a strong and active environmental education program. Its facilities are well designed for large school groups and organizations, and it maintains a trail system, gift shop, and interpretative displays**.**

### 3.2.2 Alternative B – Diverse Habitat Complex (Proposed Action)

The "Diverse Habitat Complex" alternative is the Service's proposed action. It offers the most comprehensive habitat and wildlife conservation effort without including areas of minimal conservation value. This alternative would fulfill the intent of the Study Act by creating an acquisition boundary of up to 20,466 acres within the 31,500 acre Study Area (Table 3-2, Figure 3-3). Alternative B contains portions of 13 of the ridge and valley's defined ecological systems, compared to the 12 ecological systems protected in Alternatives A and C (i.e., Central Appalachian Floodplain). Protection of lands would be done through fee title (about 50 percent of the acres) and conservation easements (about 50 percent of the acres). The Service concludes that this alternative would provide valuable protection for the numerous wildlife species and habitats referenced in the Study Act. Alternative B also would provide extensive opportunities for wildlife-dependent recreation, new and dynamic partnerships, and scientific research.

Table 3-2. Acres of ecological systems protected under Alternative B (proposed action).

| | | *Acres* | | | | |
|---|---|---|---|---|---|---|
| | | *Potential Refuge Lands* | | | | |
| | *Ecological Systems* | No Current Protection | Agricultural Easements & Private Conservation | Totals | Municipal State & Federal | Grand Totals |
| Upland Forest Habitats | **Appalachian (Hemlock)-Northern Hardwood Forest** | 930.06 | 72.70 | 1002.76 | 138.08 | **1,140.84** |
| | **Central Appalachian Dry Oak-Pine Forest** | 7365.41 | 181.73 | 7547.14 | 2635.55 | **10,182.69** |
| | **Central Appalachian Dry Oak-Pine Rocky Woodland** | 17.88 | 0.00 | 17.88 | 55.67 | **73.55** |
| | **Northeastern Interior Dry-Mesic Oak Forest** | 4093.26 | 260.88 | 4354.14 | 1015.80 | **5,369.94** |
| Wetlands & Riparian Habitats | **Central Appalachian Floodplain** | 4.29 | 0.00 | 4.29 | 94.01 | **98.30** |
| | **Central Appalachian Stream and Riparian** | 261.97 | 73.02 | 334.99 | 5.39 | **340.38** |
| | **Laurentian-Acadian Freshwater Marsh** | 2.25 | 0.17 | 2.42 | 0.00 | **2.42** |
| | **Laurentian-Acadian Wet Meadow-Shrub Swamp** | 332.90 | 163.16 | 496.06 | 10.23 | **506.29** |
| | **North-Central Appalachian Acidic Swamp** | 275.39 | 4.13 | 279.52 | 30.38 | **309.90** |
| | **North-Central Appalachian Seepage Fen** | 13.70 | 0.00 | 13.70 | 0.00 | **13.70** |
| | **North-Central Interior Wet Flatwoods** | 76.25 | 37.75 | 114.00 | 0.00 | **114.00** |
| | **North-Central Interior and Appalachian Acidic Peatland** | 3.80 | 0.00 | 3.80 | 8.55 | **12.35** |
| | **North-Central Interior and Appalachian Rich Swamp** | 163.28 | 24.10 | 187.38 | 0.00 | **187.38** |
| ***Ecological Systems Totals*** | | **13,540.4** | **817.6** | **14,358.1** | **3,993.7** | **18,351.7** |
| ***Total Parcel Acres*** [1] ***(31,585.8 total boundary acres)*** | | **18,630.9** | **1,834.7** | **20,465.6** | **4,478.0** | **24,943.5** |

[1] Property lines do not coincide with the Study Area boundary. Parcels have been divided to match the Study Area boundary as closely as possible, but total parcel acres exceeds the total Study Area because of rounding errors during parcel adjustments.

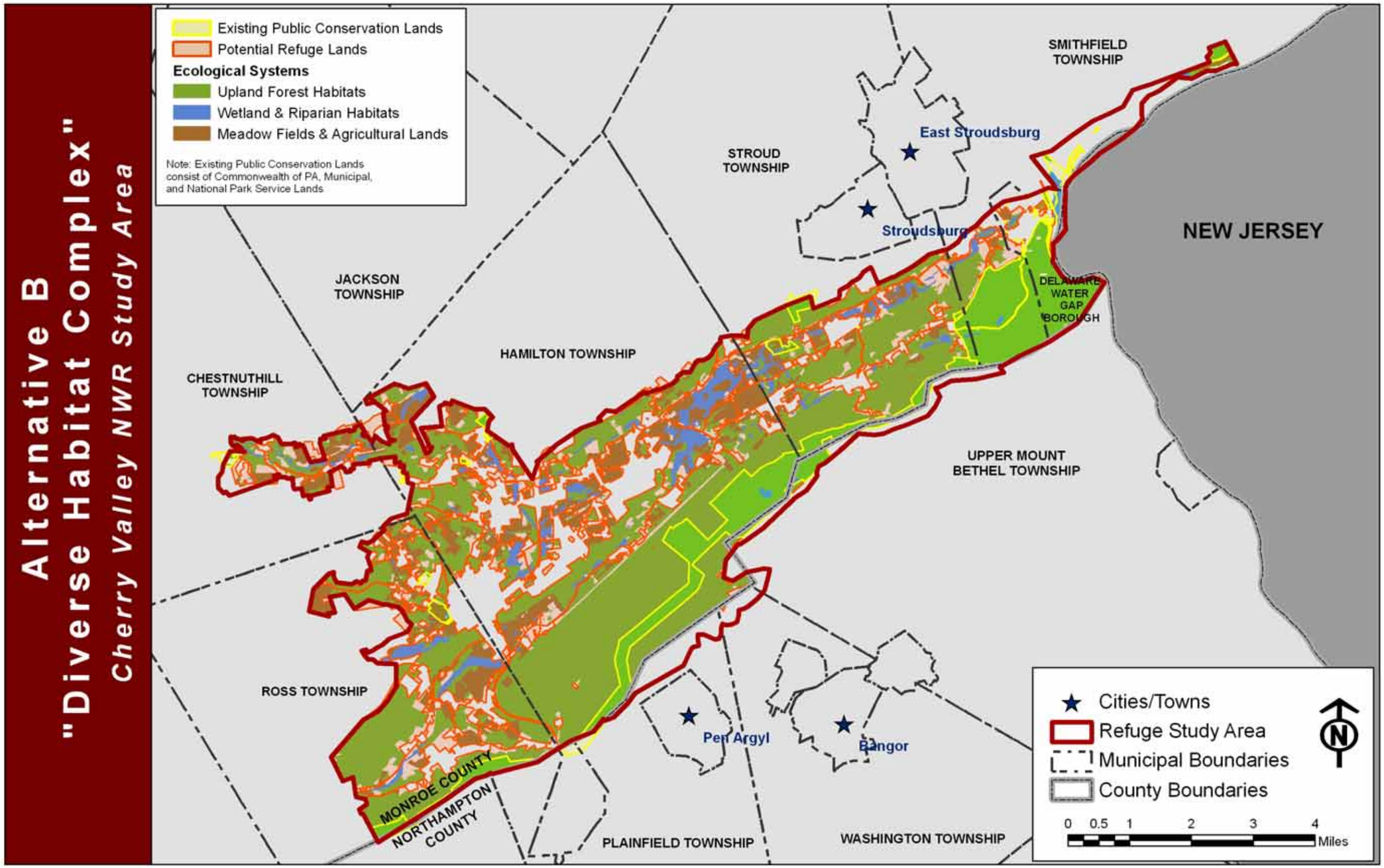


Figure 3-3. Map of ecological systems and habitats protected by Alternative B: Diverse Habitat Complex in the Cherry Valley National Wildlife Refuge Study Area, Pennsylvania.

*Goal 1. Protect and enhance habitats for federal trust species and species of management concern, with special emphasis on migratory birds and species listed under the ESA, along with protection of wetlands and the Kittatinny Ridge.*

Diverse habitats and their respective ecological systems for trust species and species of special management concern would be protected through this alternative (Table 3-2). Of the 20,466 acres identified for potential protection, over 12,400 acres of upland forests could be protected, over 12,100 more acres than Alternative A and over 2,800 more acres than Alternative C. Compared to Alternative A (No Action), roughly 4,700 additional acres of Central Appalachian Dry Oak-Pine Forest and nearly 3,000 additional acres of Northeastern Interior Dry Mesic Oak Forest would be protected. Appalachian (Hemlock) – Northern Hardwood Forest would increase by 79 percent under Alternative B with an additional 790 acres compared to the No Action Alternative. These forests serve as valuable habitat for birds that breed in interior forests such as ruffed grouse, wood thrush, Eastern wood pewee, scarlet tanager, black-throated blue warbler, and worm-eating warblers.

Over 1,000 additional acres of emergent, scrub-shrub, and forested wetlands could be protected, compared to the No Action Alternative. Protecting these habitats would contribute to the conservation of foraging bats, wetland birds, waterfowl, shorebirds, bobolink, woodcock, turkey, Eastern meadowlark, bog turtles, wood turtles, diverse reptiles and amphibians, mink, river otter, and others. Additionally, over 3,400 acres of agricultural lands could become available for protection and could contribute, if managed appropriately, to the conservation of declining grassland birds such as grasshopper sparrows, bobolink, and Eastern meadowlark. Conserving this habitat would allow the Service to manage these lands for rare grassland birds that require 50+ acre sites for nesting habitat. In addition, in smaller grassland areas adjacent to forests, there may be ways to manage for early successional shrub habitat for woodcock.

Species priorities would include improving habitats for federally-listed species known to be present on the refuge, or known to have a high likelihood of reestablishment. Other priorities for the potential refuge's habitat activities would include actions needed by neotropical forest birds, ridge-migrating raptors, migrating and wintering waterfowl, and grassland birds. Habitat management priorities would focus on wetland restoration, forest health and structural integrity, and maintaining and restoring grassland. The Service would consider appropriate means for controlling invasive plant species on the refuge and improving aquatic habitats for fish and invertebrates. Following are narratives for specific groups of plants and animals that may become subject to refuge management.

*Migratory Birds*

Cherry Valley lies within the Atlantic Flyway in northeastern Pennsylvania. Numerous neotropical songbirds, ridge migrating raptors, freshwater wetland birds, and waterfowl follow the Kittatinny Ridge as a travel corridor and take shelter, forage, and nest in the

forest, scrub-shrub, grassland, and wetland habitats that are found there. The potential refuge is located in the Northern Ridge and Valley physiographic area, located within NABCI's Appalachian Mountains Bird Conservation Region (AMBCR or BCR # 28) (see Chapter 1, p. 1-9). AMBCR includes portions of 15 states and 11 Partners In Flight (PIF) physiographic regions covering 105 million acres. Based on Breeding Bird Survey data analysis, 86 of the 234 bird species that breed and winter throughout the AMBCR are declining, some significantly (Sauer et al. 2005). Populations for at least 33 species have greater than ten percent of their population in the Appalachian Mountains and at least ten species have greater than 25 percent of their population in the Appalachians. Remarkably, almost 80 percent of the entire cerulean warbler population occurs in the AMBCR. Shorebirds and waterbirds are not considered a high conservation priority within the AMBCR; however, some species such as spotted sandpiper, upland sandpiper, and American bittern occur locally. In addition, the Service has recognized six migratory bird species found within the Study Area as birds of conservation concern: wood thrush, prairie warbler, cerulean warbler, worm-eating warbler, Louisiana waterthrush, and peregrine falcon (USFWS 2002b; also see Appendix C, Table C-2).

Cerulean Warbler

The Cherry Valley Study Area is located within the Delaware River Planning Unit of the Atlantic Coast Joint Venture (ACJV) partnership. The ACJV is designed to help support the North American Waterfowl Management Plan. The Delaware River is recognized by the ACJV as an important spring and fall migration corridor for ducks and geese (ACJV Focus Area Report Delaware River Basin, Pennsylvania Focus Area: Pike County). The Delaware River Unit covers over 1.8 million acres and includes the entire non-tidal Pennsylvania portion of the Delaware River, as well as the eastern half of the Pennsylvania portion of the river's drainage basin. The portion of the planning area north of the Kittatinny Ridge is in the Appalachian Plateau and Ridge and Valley Physiographic Provinces, and is characterized by a rolling to mountainous, predominantly forested landscape with an abundance of natural wetlands. Pike County, just north of Cherry Valley, has been identified as the unit's focus area because of its especially high concentration of exceptional quality wetlands. North of the Kittatinny Ridge, the primary importance of the planning area to waterfowl is as breeding habitat for black duck and wood duck. Breeding mallard and resident Canada geese are common. Common and hooded mergansers also occur.

The Kittatinny Ridge is recognized as a globally significant migration flyway, hosting up to 20,000 migrating fall raptors every year (Hawk Mountain Sanctuary 2008). This ridge is home to the world's first conservation area for birds of prey, Hawk Mountain Sanctuary, established in 1934 solely to protect migratory raptors (Hawk Mountain Sanctuary 2008). Cherry Valley lies northeast of the Hawk Mountain Sanctuary. The 2006 "Conservation Plan for Kittatinny Ridge Conservation Corridor" (Audubon

Pennsylvania 2006) describes the value of the ridge in detail and includes protection of ridge habitat as a critical priority. The ridge serves as migration habitat for at least 16 species of North American raptors, including peregrine falcon, bald eagle, broad-winged hawk, Northern goshawk, and black vulture. There are 12 recognized hawk watching sites along the ridge.

The large blocks of unfragmented forest throughout the ridge also serve as key breeding sites for many interior-forest birds, including: ruffed grouse, wood thrush, ovenbird, scarlet tanager, cerulean warbler, worm-eating warbler, Louisiana waterthrush, Acadian flycatcher, and many others. Some of these are species of conservation concern that may be on the brink of being listed as threatened or endangered, or are on the National Audubon Society's National Bird Conservation WatchList (Butcher et al. 2007). In addition to interior forest songbirds, other species that use the Kittatinny Ridge Corridor for nesting that are on Audubon Pennsylvania's list of "Birds of Concern" include: American woodcock, great egret, bald eagle, red-headed woodpecker, and peregrine falcon. This habitat matrix supports a variety of other species of special concern, including the Pennsylvania threatened Allegheny woodrat and Eastern small-footed myotis (a bat). Black bear, bobcat, wild turkey, and ruffed grouse are found in healthy numbers, not to mention an abundance of white-tailed deer. This alternative could protect up to 12,400 acres of upland forest habitat, thus greatly enhancing the number of acres of forested ridge habitat already protected in the valley area.

Roughly 50 percent of the undeveloped areas in the Cherry Valley Study Area is forested, including forested wetlands; 2 percent is emergent and scrub-shrub wetlands; and another 40 percent is agricultural land consisting primarily of old fields, hay meadows, pasturelands, and croplands. The potential refuge boundary identified in Alternative B provides a diverse mix of habitat types and as such provides habitat for numerous AMBCR and ACJV priority species as referenced in Appendix B (Table C-2) including:

- Emergent and Riparian Freshwater Wetlands (American black duck, wood duck, common and hooded mergansers, bald eagle, American bittern, etc.).
- Agricultural/Grassland (grasshopper sparrow, golden-winged warbler, bobolink, Eastern meadowlark, etc.)
- Shrub-Early Successional (golden-winged warbler, American woodcock, field sparrow, eastern towhee, willow flycatcher, brown thrasher, blue-winged warbler, prairie warbler, etc.)
- Deciduous Oak-Hickory and Riparian Forest (cerulean warbler, worm-eating warbler, wood thrush, Louisiana waterthrush, red-headed woodpecker, Eastern wood-pewee, scarlet tanager, Kentucky warbler, Northern oriole, etc.)
- Northern hardwood-mixed forest (eastern wood-pewee, wood thrush, Canada warbler, olive-sided flycatcher, Louisiana waterthrush, scarlet tanager, yellow throated vireo, etc.)

To the best of our knowledge, the majority of these species are well represented in the region. Indeed, Cherry Valley is recognized as a premiere birding location in the Northeast and is a destination site for birders, academic classes from local education institutions, and others.

The potential refuge described in this alternative would hold a unique position of offering a mosaic of habitats that aid a large diversity of avian species. One of the greatest opportunities in this regard may be the presence of larger, non-forested tracts that could be managed for shrubland birds. Scrub-shrub habitat is a high priority in the Northern Ridge and Valley, primarily because it continues to support numerous breeding populations of golden-winged warblers, one of the highest priority bird species in the area (Appalachian Mountains Bird Conservation Partnership 2005). The PIF plan considers managing for this species as a high priority wherever feasible. Other shrubland species have undergone significant population declines in this physiographic area due to the overall loss of early successional habitats.

The landscape composition around the potential refuge also presents a great opportunity to make significant contributions to the conservation of grassland birds. Grasslands throughout the physiographic area are being significantly degraded by succession and through colonization of these areas by invasive plant species. The expansion of fast spreading invasive species such as multiflora rose and autumn olive into grassland habitats very quickly makes these habitats unsuitable for grassland bird species. A well planned and organized invasive species control program would be crucial to grassland management, as well as management of the other habitats at the potential refuge.

Mature hardwood forest is the top conservation priority in the AMBCR. With much of the existing forestland in this physiographic area lying on ridges, bottomland forests are comparatively rare. Managing for forested bottomland corridors along the Cherry Creek and its tributaries would constitute a significant contribution to the overall goals for Area 17. Management of ridge and slope forested upland habitat and forested wetland habitats would support nesting interior-forest-dwelling birds of concern. Management of non-forested and forested wetland habitat would provide spring and fall migratory waterfowl and shorebird habitat. Extensive pockets of suitable waterfowl and shorebird habitat are present along the entire length of the Cherry Creek riparian corridor and elsewhere in Cherry Valley.

*Endangered and Threatened Species*

Bog turtle -- The Bog Turtle (*Clemmys muhlenbergii*) Recovery Plan (USFWS 2001) identifies eastern Pennsylvania as a stronghold of this federally-listed, threatened species. The area encompassed by Alternative B (see Figure 3-3 above) includes numerous documented bog turtle wetlands where the species is thriving, and other wetlands where turtles are present but the habitat is in need of restoration. A number of important partnerships between the Service's Partners for Fish and Wildlife program,

The Nature Conservancy, the Pocono Heritage Land Trust, private landowners, and others have resulted in the protection of some of these wetlands, as well as successful bog turtle habitat restoration projects throughout the valley. The potential refuge described in Alternative B would continue and expand upon these partnerships and management opportunities.

Bog turtles live in spring-fed wetlands throughout Cherry Valley. The existing riparian corridor along Cherry Creek and its tributaries provides good habitat connectivity for this species as well as other species of concern. Although some of the wetlands are, in a sense, protected due to conservation-focused easements and ownerships, many such wetlands remain unprotected and are therefore in peril. An additional challenge is that springs that provide water to these wetland systems have their genesis on the ridge and mountain slopes that flank Cherry Valley to the north and south. Only a small amount of these forested slopes is protected. This is of great concern because development or other alterations here would jeopardize the hydrologic link that supports the valley wetlands and the unique assemblage of species that inhabit them. Alternative B (and Alternative C) would provide opportunities to protect the wetlands, slopes, and riparian corridor areas of Cherry Valley.

Indiana Bat -- Indiana bats (*Myotis sodalis*) were present in the Cherry Valley region of eastern Pennsylvania based on historic records from Hartman's Cave. Currently, two bat hibernation sites are known within close proximity to Cherry Valley. They are located in historic mines at Hibernia and Mount Hope, New Jersey, approximately 35 miles away. A thriving summer population of Indiana bats is found at Great Swamp NWR, approximately 15 miles from these hibernation sites and about 65 miles from Cherry Valley. During the spring and summer, Indiana bats make their way to the Great Swamp NWR for foraging, birthing, and rearing of young. The habitat at the Great Swamp NWR that supports these activities consists of large dead snags and dying trees that lie within close proximity to open marshes and stream corridors. Proximity of the Cherry Valley region to the hibernation sites, the presence of high quality summer habitat consistent with that observed at the Great Swamp NWR, and the historical records of Indiana bats in Cherry Valley, all indicate there is a high likelihood that the species is present in the Study Area during the summer months. In addition, it is likely that wintering populations could be restored to the area if Hartman's Cave and other potential hibernation sites are protected from disturbance.

The best potential habitat for the Indiana bat in Cherry Valley, aside from the historical hibernation site at Hartman's Cave, would be late spring and summer foraging habitat in the riparian corridor of Cherry Creek (i.e., Central Appalachian Stream and Riparian ecosystem). Areas where this corridor coincides with large dead and dying snags (for roosting) and wooded and emergent wetlands (for foraging) would be the areas with the highest likelihood of occurrence. Survey work of the area would be merited to establish the current presence or absence of the species. Future management of the area to retain and restore appropriate habitat may serve to attract bats to the area and

expand upon current habitat use. Based on available information, protection and management of appropriate habitat in Cherry Valley has a high potential for aiding the recovery of this species. Surveys for Indiana bats would be a high priority if a refuge is established.

*Other Federally-Listed, Threatened and Endangered Species and Federal Species of Concern* -- Other species of concern that have been documented in the valley include the federally-listed, endangered northeastern bulrush, and a historical record of the federally-listed, threatened small-whorled pogonia (DCNR 2008). The northeastern bulrush became the second Pennsylvania plant to be federally listed as an endangered species. It is found in small wetlands, usually one acre or less, where the water level is high in spring and drops through the summer. At present, 26 populations are known in Pennsylvania, most have been discovered since the species was listed and brought to the attention of ecologists. This alternative (Alternative B) would allow the Service to provide habitat protection for the one known population of Northeastern bulrush in the Study Area. There is one historical record of small-whorled pogonia in Monroe County. It is thought that the specimen was observed near the Delaware Water Gap, but its exact location is unknown (S. Klugman, personal communication, 2 September 2008). In the Northeast, this orchid typically occurs in mid-successional, mixed deciduous and coniferous forest with gaps in the canopy. Typically soils are acidic sandy loam and topographic slope ranges from 8 to 15 percent, or at the base of steep slopes (Sperduto and Congalton 1996). Consequently, even though the species has not been recorded recently, protection of upland forests as described within this alternative may allow management for and protect of suitable habitat for this species.

Northeastern Bulrush

The American eel has been documented in Cherry Creek (Hartzler 2001, Fisher pers. comm.). The American eel is an interjurisdictional fish that breeds in saltwater and grows and matures in freshwater (i.e., it is catadromous). Because the species is thought to be in decline in some areas, a status review was initiated by the Service in 2004 to evaluate if ESA protection should be extended to the eel. The Service determined in 2007 that, although there was compelling evidence of eel decline in some areas, the overall population is not in danger of extinction nor is it likely to become so in the foreseeable future (USFWS 2007a). Regardless, nearly 335 acres of stream and riparian habitats described within Alternative B would be protected, and possibly enhanced, for the benefit of this and other stream-dependent species.

Cherry Creek also supports a population of eastern brook trout. In the U.S., eastern brook trout populations have declined across their range (Hudy et al. 2005). This

decline has been attributed to many causes, including increases in water temperatures, agriculture, urbanization, exotic fish species, and poor riparian habitat has the top reasons for this decline (Hudy et al. 2005). Within the Study Area, the most prominent reasons for decline of the species are thought to be high water temperature and urbanization (Hurdy et al. 2008). As part of the efforts of the EBTJV, Pennsylvania has identified several goals for this species, including conserving existing populations where they exist (EBTJV 2008). By protecting up to 335 acres of stream and riparian habitat, this alternative offers the best opportunity for conserving and improving the brook trout population in Cherry Creek, in concert with state and regional goals for this species.

Dwarf wedgemussel (an endangered species under the ESA), striped bass (interjurisdictional fish), and American shad (interjurisdictional fish) are documented nearby in the Delaware River. Although this species has not been documented in the Study Area to date, it has been documented in the Delaware River north of Cherry Valley by the Pennsylvania Cooperative Fish and Wildlife Research Unit, thus providing an indication that recovery steps are possible within the potential refuge boundary. Striped bass and American shad likely do not occur in Cherry Creek; however, the dwarf wedgemussel and these interjurisdictional fish species are aided by clean, unpolluted water coming from tributaries to the Delaware River. At a minimum, the Cherry Creek watershed provides a valuable ecological service in this regard.

*State-Listed Species* -- In Pennsylvania, three different agencies share responsibility for administering the state threatened and endangered species program as well as and other species of special concern. The Pennsylvania Fish and Boat Commission is responsible for fish, reptiles, amphibians, and other aquatic organisms. The Pennsylvania Game Commission is responsible for wild birds and mammals. The Department of Conservation and Natural Resources is responsible for native wild plants, terrestrial invertebrates, significant natural communities, and geologic features. The bog turtle, Indiana bat, and dwarf wedgemussel are identified in the Pennsylvania Wildlife Action Plan (WAP) as "Wildlife of Immediate Concern" in addition to their status as federally-listed, threatened or endangered species (Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission 2008). Alternative B is the only alternative that would afford protection of the Central Appalachian Floodplain Ecological System, possibly providing habitat for the state-listed, endangered sand cherry.

According to an inventory conducted by The Nature Conservancy and the Pennsylvania Natural Heritage Program, Cherry Valley supports 20 state-listed endangered and 13 state-listed threatened species (see Table 2-3, pg. 2-17 for the specific species). Alternative B offers a significant means of protecting a wide diversity of valley habitats that may help to promote the maintenance and potential recovery of these state-listed species.

*Ecosystems of Concern*

In addition to the individual species discussed above, Cherry Valley includes three ecosystems that deserve mention (Noss et al. 1995). Open Sedge Fens are located in the valley and are considered to be a National Critically Endangered Ecosystem. The Kittatinny Ridge mentioned above is considered to be a National Endangered Ecosystem, again highlighting its importance as a major migration corridor for birds of prey, waterfowl, and song birds. The Riparian Forest Ecosystem is considered to be a National Threatened Ecosystem, and in Cherry Valley provides habitat and habitat connectivity corridors for a great diversity of rare and common wildlife. All three of these ecosystems would be subject to protection within a refuge under Alternative B. Two other imperiled ecosystems, Northern Appalachian Acidic Cliff and Acidic Shrub Swamp, are present in the valley within the potential acquisition boundary for Alternative B and are designated as Pennsylvania Special Concern Ecosystems.

*Contributions to National Habitat Initiatives*

A refuge in Cherry Valley could contribute to several national habitat directives or initiatives. The migratory bird species already described are priority species under the North American Waterfowl Management Plan, Partners in Flight Plan, and/or the Regional Birds of Conservation Concern List. A refuge would help ensure that migratory bird habitat in the wetlands and uplands of Cherry Valley is protected in perpetuity. Many other birds of high conservation concern would benefit as well. Protection afforded to Cherry Valley on behalf of bog turtles and other species of federal concern would have the indirect effect of protecting habitat for numerous state-listed, threatened and endangered species as well as other species of concern.

<u>Promotes Biological Integrity and Diversity</u>

Recently, various conservation groups, the State of Pennsylvania, and the federal government began to recognize the significance of wildlife habitats in Cherry Valley. With resources tight and evolving community recognition of open space and ecology, initiatives aimed at protecting the valley began to take form at the local government and private levels. Issues related to migratory birds, the federal ESA listing of the bog turtle, and water quality degradation, elevated to a national level the political and resource management understanding of the issues associated with a potential Cherry Valley NWR. During this time conservation partners have been working hard to protect the valley, its surrounding habitats, and associated species to the extent practicable. As development continues to dominate the landscape in Monroe County to the north and Northampton County to the south, the relatively unfragmented habitat in Cherry Valley stands in stark contrast. Because of this, Cherry Valley has become known as an important regional and national asset. Furthermore, management actions by the Service and others have resulted in habitat enhancements that support greater numbers of bog turtles and other species. Biological surveys conducted by the Service and other conservation agencies and groups have documented more than 167 bird species, the location of various bog turtle populations and habitats, and the potential presence of

other species of concern. By creating a new refuge in Cherry Valley, the Service would contribute extensively to protecting the biological integrity and diversity of an important wildlife corridor in northeastern Pennsylvania.

Provides Habitat Connections

Refuge lands would provide a crucial link for migratory birds and crucial habitat for several species of concern. Our land management goals and objectives for a refuge would complement the management of adjacent and nearby conserved lands, both public and private, thus enhancing our wildlife management contribution to the regional landscape (Figure 3-3 above). Links to habitats owned and managed by the Commonwealth of Pennsylvania, The Nature Conservancy, and the Pocono Heritage Land Trust would also help to provide for a more contiguous and intact habitat complex within Cherry Valley. A refuge in Cherry Valley would provide local and regional benefits to wildlife by working in concert with existing conservation areas and partners, for example:

- Delaware Water Gap National Recreation Area and the Middle Delaware National Scenic River. Located just northeast and bordering the potential refuge is the Delaware Water Gap National Recreation Area. The recreation area encompasses 67,000 acres of mountain ridge, forest, and floodplain on both sides of the Delaware River in the states of New Jersey and Pennsylvania. Forty miles of the Middle Delaware River are within the park, as well as trout streams, lakes, and ponds. The mission of these areas is to provide outdoor recreation opportunities while conserving the natural, cultural, and scenic resources of the recreation area. In so doing, the park works cooperatively with surrounding communities and the public to achieve the conservation goals of the Delaware River region.
- Appalachian Trail**.** Running the length of a possible Cherry Valley NWR would be a key segment of the Appalachian Trail. The trail is a more than 2,175-mile long footpath stretching through 14 eastern states from Maine to Georgia, traversing the wild, scenic, wooded, pastoral, and culturally significant lands of the Appalachian Mountains (National Park Service, “Appalachian National Scenic Trail”). The trail is flanked on either side by buffer areas intended to maintain the wild character and scenery encountered along the length of the trail. Numerous partners in addition to the National Park Service hold title to these lands.
- Worthington State Forest. Just across the Delaware River is the nearly 6,600 acre Worthington State Forest, owned by the State of New Jersey. Although a bit more distant from Cherry Valley than the Appalachian Trail and Delaware Water Gap National Recreation Area, the forest continues a habitat block of protected lands that is associated with Cherry Valley by proximity, resource values, and habitats. The most mountainous terrain and scenic views of northern New Jersey are found in Worthington State Forest.

- Hawk Mountain Sanctuary. Located along the Appalachian Flyway to the west of the potential Cherry Valley NWR, the 2,600 acre Hawk Mountain Sanctuary offers visitors an outstanding, year-round, nature experience with its mountaintop vistas, eight miles of hiking trails, and thrilling autumnal raptor migration. Hawk Mountain Sanctuary is one of the best places in the northeastern United States to watch the annual hawk migration. On average 20,000 hawks, eagles, and falcons pass along the Kittatinny Ridge by the Sanctuary's North Lookout each year (Hawk Mountain Sanctuary 2008).
- The Nature Conservancy. The Nature Conservancy has been successful in protecting 1,000 acres through the purchase of land or conservation easements in Cherry Valley.
- Pocono Heritage Land Trust. The Pocono Heritage Land Trust is a locally based conservation group dedicated to protecting important lands and waters, open space, agricultural landscapes, and the natural heritage of the Pocono Mountains region. It has been successful in protecting lands throughout the Pocono Region and currently owns one large tract of land in the Study Area. Cooperative agreements with The Nature Conservancy, the Service, and other conservation groups have resulted in habitat restoration work on this property.
- Pennsylvania Game Commission Game lands**.** The Pennsylvania Game Commission owns more than 1.4 million acres of State Game Lands and manages these lands for the benefit of wildlife and people. State Game Lands are public hunting grounds and lawful hunting and trapping are permitted during open seasons. The commission owns nearly 8,000 acres of mostly forested land in State Game Lands 168 (Northampton County) and State Game Lands 186 (Monroe County), respectively. These properties lie just to the west and north of Cherry Valley.
- County and Local Governments. Monroe County and other local governments, including Stroud Township, have been actively pursuing smart growth principles and protecting land and important landscape features and integrity in Cherry Valley. Although much of this effort in Monroe County has focused on concentrating development along established populations centers and existing highway arteries; along with the preservation of farmlands, woodlands, and open space; an indirect success has been the protection of important wildlife habitat within the valley (Bloss Associates 2001). Land protection within the valley has been promoted by a variety of measures including a $25 million Monroe County open space bond initiative that has been exhausted due to land protection demand.

*Invasive Species Control*

An inventory was conducted for Monroe County to help facilitate the preservation of native plants and control invasive species (The Nature Conservancy 1999). Alternative B would enable a partnership effort between the refuge and the Pennsylvania Bureau of

Forestry to inventory and control invasive plants such as common reed, purple loosestrife, multiflora rose, and Japanese knotweed.

*Goal 2. Create opportunities for hunting, fishing, wildlife observation and photography, and environmental education and interpretation, while promoting activities that complement the purposes of the refuge and other protected lands in the region.*

White tailed Deer

The Refuge Improvement Act establishes six priority public uses on refuges. Those priority uses depend on the presence, or the expectation of the presence, of wildlife. These uses are: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Although these priority uses must receive our consideration in planning for public use, they also must be compatible with the purposes for which a refuge is established and the mission of the Refuge System. Compatibility determinations, which evaluate the effects of a particular use (or activity) in the context of species or habitats in a refuge, aid in making those decisions. If refuge lands are acquired in Cherry Valley, compatibility determinations would be used to decide what and where public use opportunities would be permitted.

Public use opportunities contribute to the long-term protection of wildlife resources by promoting understanding, appreciation, and support for wildlife conservation. The six priority public uses would be accommodated to the maximum extent possible, where they would not have significant negative effects on wildlife. Environmental education is addressed in more detail in Goal 3 (below). All of the potential public use activities are contingent upon availability of staff and funding to develop and implement these programs. We would promote opportunities for volunteers and develop community appreciation and public support for the refuge. The Service would consider developing interpretive materials and programs to enhance the communities' awareness of and appreciation for valley wildlife resources. School and other group programs would be considered. We would open newly acquired lands for hunting if they can biologically, ecologically, and safely accommodate hunting within state guidelines. Newly acquired lands that traditionally have been hunted would remain open until we completed our planning process. Before closing any newly acquired lands, we would complete a separate public review process. We would provide an American with Disabilities Act (ADA)-compliant hunt, and would consider a Youth Hunt.

If a refuge is established in Cherry Valley, an increase in public use would be expected from new trails, parking areas, fishing accesses, interpretive overlooks, and observation platforms that would potentially be a part of a new refuge. We would allow public

access for day use on many of the newly acquired lands outside the sensitive bog turtle and bird nesting habitats. Generally, we would allow hunting, based on the Pennsylvania State hunting seasons and consistent with the refuge Annual Hunt Plan (once developed). We would allow fishing along Cherry Creek where accessible, and may be able to support fishing derbies for children. Working with state and local agencies, we would study the feasibility of converting existing historic logging roads into public use trails. A refuge also may provide interpretive and environmental education programs and increase partnership opportunities to interpret the cultural and natural resources within the refuge and the watershed.

This goal will enable the Service to help meet its potential goal herein by supporting the efforts of the Appalachian Trail (AT) MEGA-Transect, designed to enhance management and protection of the AT environment. The AT and its surrounding 250,000 acres of protected lands are a priceless ecological resource, and with its extensive habitat areas, the AT offers new opportunities to work with the National Park Service and the Appalachian Trail Conservancy to promote conservation awareness of the AT and new refuge lands.

It is worth noting that the Delaware Water Gap National Recreation Area has ranked eighth or ninth in recreational visits amongst all National Park System properties for at least the last ten years (1998-2007) (National Park System, "NPS Stats, Ranking Report for Recreation Visits"). Much of this visitation is from the nearby, rapidly expanding New York/northern New Jersey and Philadelphia suburban areas. The draw of the Water Gap would likely contribute to enthusiastic use of a new refuge.

*Goal 3. Promote science, education, and research through partnerships to inform land management decisions and encourage continued responsible stewardship of the natural resources of Cherry Valley.*

Alternative B would allow for extensive, refuge-related science, education, and research opportunities throughout the Study Area.

Partnerships

Working partnerships with surrounding landowners would be critical to successful refuge management. This document was developed cooperatively with our state fish and wildlife agency partners, and is supported by our land conservation partners working in eastern Pennsylvania. We will continue to cooperate with our conservation partners, all of whom are instrumental in helping us accomplish habitat management goals and objectives. The strength of potential partnerships is illustrated by the team that contributed to the development of this Study Report:

- U.S. Fish and Wildlife Service
- National Park Service (Delaware Water Gap National Recreation Area)
- Pennsylvania Natural Heritage Program

- Pennsylvania Game Commission
- Pennsylvania Fish and Boat Commission
- The Nature Conservancy
- Monroe County Conservation District
- Monroe County Planning Commission
- East Stroudsburg University
- Northampton County Community College
- Pocono Avian Research Center

Taken together, the respective missions of the preceding groups cover the protection of farmland, threatened and endangered species, scenic areas, grassland habitats, and open space that the local community has identified as significant. Based on this effort, Alternative B (proposed action) identifies over 20,400 acres within Cherry Valley that would preserve the areas most critical for maintaining the biological integrity, diversity and environmental health of the potential refuge, and would provide habitat connectivity to other areas of protected land.

As noted in detail above, many of the organizations with whom we are collaborating have already protected key habitats in Cherry Valley and its environs and will continue to do so within the limits of their available resources. Should a Cherry Valley NWR become reality, there is a clear need for continued local and state support. We recognize our inability to solve the problems of habitat fragmentation and land protection on our own. Therefore, we would work to combine our efforts with those of our existing partners, as well as numerous other partners yet to be identified. With Alternative B the Service would be able to establish partnerships and cooperate in creating refuge opportunities and joint conservation initiatives in Hamilton, Ross, Chestnuthill, Smithfield, and Stroud townships, as well as Delaware Water Gap Borough. The Service would seek opportunities to work with local farmers and landowners to manage refuge lands in ways that benefit the goals and interests of the refuge and its neighbors. The Service would also seek opportunities to aid landowners with conservation projects on their own land. The Service and the Refuge System would work toward the biological, cultural, and public use goals that are outlined in Chapter 1 and Appendix B (draft Conceptual Management Plan) in this document. It is clear that partnerships with the public, landowners, neighbors, conservation organizations, and local, county, state, and other federal government agencies would be the only path to a successful Cherry Valley NWR.

Environmental Education

Environmental education, one of the six priority wildlife-dependent uses encouraged on refuge lands, incorporates on-site, offsite, and distance-learning materials, activities, programs, and products that address the audience's course of study, the mission of the Refuge System and the management purposes of the refuge. The goal of environmental education is to promote an awareness of the basic ecological foundations for the

interrelationships between human activities and natural systems. Through curriculum-based environmental education, both on- and off-refuge, refuge staff and partners hope to motivate students and other persons interested in learning the role of management in the maintenance of healthy ecosystems and conserving our fish and wildlife resources.


For years, Service refuges have been connecting children with the land and with the agency's conservation mission. It is now apparent that such connections are of immense importance. New information shows that instead of being outdoors enjoying self discovery of wild "things," most children spend their time indoors glued to television, video games, and even cell phones rather than experiencing nature. Author Richard Louv (2005), whose book *Last Child in the Woods: Saving Our Children from Nature Deficit Disorder* documents this trend, argues that increased urbanization, parental anxiety, residential development restrictions and structured play have kept children inside rather than out. This separation from the natural world can result in a host of physical and mental ailments, Louv warns, from childhood obesity to Attention Deficit Hyperactivity Disorder, and can erode future support for conservation. As the nation's primary conservation agency, the Service has a significant role in addressing this concern. We would also have a strong incentive to promote children in nature activities with the AT MEGA Transect and the Delaware Water Gap National Recreation Area, in addition to the strong effort already underway at the Monroe County Conservation District.

The Service would attempt to work with school districts and teachers to develop environmental education programs featuring unique species or communities at the refuge. We would work with our partners such as the Monroe County Conservation District and the Delaware Water Gap National Recreation Area to promote environmental education, thereby maximizing the use of resources and time commitments for each partner organization. And, we would consider the role of a new refuge in other potential opportunities such as small habitat restoration projects, docent-led trail walks, birding festivals, guest lecturers, youth hunting and fishing efforts, and even simple monitoring of various forms of wildlife on and off the refuge.

Research

The Service would encourage and support research and management studies on refuge land that will improve scientific knowledge and contribute to natural resource management decision-making. The refuge manager would encourage and seek research projects that are relevant to approved refuge objectives and that clearly improve land management and promote adaptive management. Priority research addresses

information that would enhance management of the Nation's biological resources, is important to agencies of the Department of the Interior, the Service, the Refuge System, and state fish and game agencies, and that addresses important management issues or demonstrates techniques for the management of species or habitats.

Refuge staff would maintain a list of research needs that would be provided to prospective researchers or organizations upon request. Refuge support of research directly related to refuge objectives may take the form of funding, partnerships in grant applications, in-kind services such as housing or the use of other facilities, direct staff assistance with the project in collecting data, providing historical records, conducting management treatments, or providing other appropriate assistance. All researchers on refuges, present and future, are required to submit a detailed research proposal following Service policy in Refuge Manual chapter 4, section 6. Proposals would be prioritized based on need, benefit to the refuge, compatibility with refuge purposes and the Refuge System mission, and funding required. Any special use permits that may be issued must also identify a schedule for annual progress reports, on which the Service would base our decisions for continued research activities. We would ask our regional refuge biologists, other Service divisions, state agencies, and appropriate subject matter experts to review and comment on proposals.

The Service would also consider research for other purposes, which may not relate directly to specific refuge objectives, but contributes to the broader enhancement, protection, use, preservation, or management of native populations of fish, wildlife, plants, and their natural diversity in the region or flyway. Those proposals must comply with the Service compatibility policy.

Alternative B would embrace a science-based strategy of adaptive management to keep the management of the refuge relevant and current through scientific research and management. We acknowledge that our information on species and ecosystems is incomplete, provisional, and subject to change as our knowledge base improves. Objectives and strategies must be adaptable in responding to new information and spatial and temporal changes. We would continually evaluate management actions, both formally and informally, through monitoring or research to reconsider whether their original assumptions and predictions are still valid. In that way, management becomes an active process of learning what works best. The refuge manager is responsible for changing management actions or objectives if they do not produce the desired conditions

### 3.2.3 Alternative C – Wetlands and Ridge Forests

The "Wetlands and Ridge Forests" alternative would create an acquisition boundary of up to 14,124 acres within the 31,150 acre Study Area, containing portions of 12 of the valley and ridge's defined ecosystems (Figure 3-3, Table 3-2). Protection of lands would be accomplished through fee title (about 65 percent of the acres) and conservation

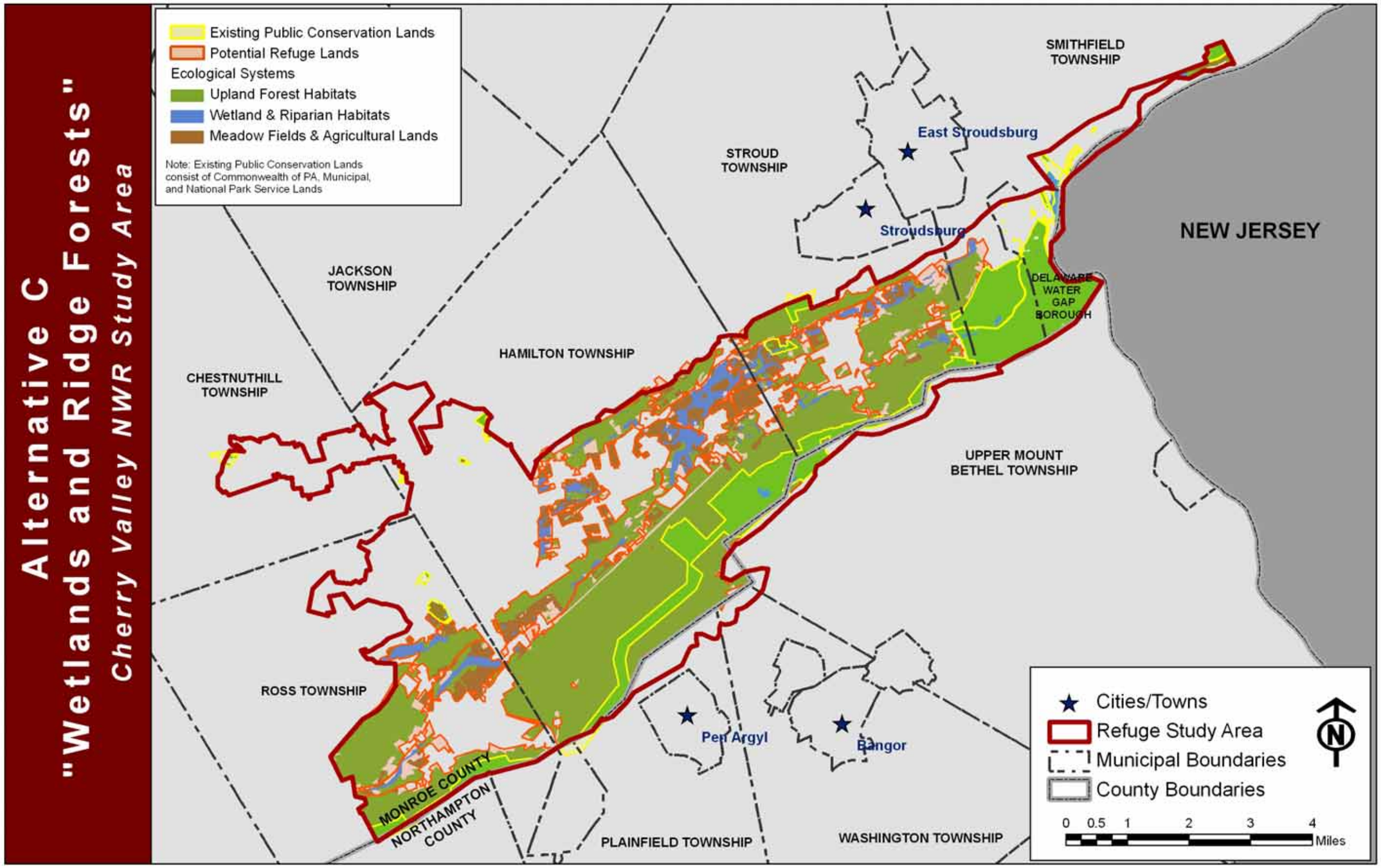


Figure 3-4. Map of ecological systems and habitats protected by Alternative C: Wetlands and Ridge Forests in the Cherry Valley National Wildlife Refuge Study Area, Pennsylvania.

easements (about 35 percent of the acres). Compared to the No Action Alternative, Alternative C would provide substantial protection or rare and unique habitats and species within the Study Area. It would also provide valuable opportunities for opportunities for wildlife-dependent recreation, new partnerships, and scientific research. However, the Service concludes that, compared to the proposed action (Alternative B), this alternative would provide less desirable levels of protection for the numerous wildlife species and habitats referenced in the Study Act. It would also provide fewer opportunities for wildlife-dependent recreation, new partnerships, and scientific research.

Table 3-3. Acres of identified ecological systems protected by Alternative C.

| | | ***Acres*** | | | | |
|---|---|---|---|---|---|---|
| | | ***Potential Refuge Lands*** | | | | |
| | ***Ecological Systems*** | **No Current Protection** | **Agricultural Easements & Private Conservation** | **Totals** | **Municipal State & Federal** | **Grand Totals** |
| Upland Forest Habitats | Appalachian (Hemlock)-Northern Hardwood Forest | 610.37 | 64.4 | **674.77** | 138.08 | **812.85** |
| | Central Appalachian Dry Oak-Pine Forest | 5623.00 | 41.78 | **5,664.78** | 2,635.55 | **8,300.33** |
| | Central Appalachian Dry Oak-Pine Rocky Woodland | 17.88 | 0.00 | **17.88** | 55.67 | **73.55** |
| | Northeastern Interior Dry-Mesic Oak Forest | 3344.22 | 209.67 | **3,553.89** | 1015.80 | **4,569.69** |
| Wetlands & Riparian Habitats | Central Appalachian Floodplain | 0.00 | 0.00 | **0.00** | 94.01 | **94.01** |
| | Central Appalachian Stream and Riparian | 90.95 | 63.49 | **154.44** | 5.39 | **159.83** |
| | Laurentian-Acadian Freshwater Marsh | 0.01 | 0.17 | **0.18** | 0.00 | **0.18** |
| | Laurentian-Acadian Wet Meadow-Shrub Swamp | 319.93 | 163.16 | **483.09** | 10.23 | **493.32** |
| | North-Central Appalachian Acidic Swamp | 176.79 | 0.72 | **177.51** | 30.38 | **207.89** |
| | North-Central Appalachian Seepage Fen | 13.70 | 0.00 | **13.70** | 0.00 | **13.70** |
| | North-Central Interior Wet Flatwoods | 76.25 | 37.75 | **114.00** | 0.00 | **114.00** |
| | North-Central Interior and Appalachian Acidic Peatland | 3.77 | 0 | **3.77** | 8.55 | **12.32** |
| | North-Central Interior and Appalachian Rich Swamp | 117.95 | 24.10 | **142.05** | 0.00 | **142.05** |
| ***Ecological Systems Totals*** | | **10,394.82** | **605.24** | **11,000.06** | **3,993.66** | **14,993.72** |
| ***Total Parcel Acres*** [1] ***(31,585.8 total boundary acres)*** | | **12,588.53** | **1,535.83** | **14,124.36** | **4,477.95** | **18,602.31** |

[1] Property lines do not coincide with the Study Area boundary. Parcels have been divided to match the Study Area boundary as closely as possible, but total parcel acres exceeds the total Study Area because of rounding errors during parcel adjustments.

*Goal 1 Protect and enhance habitats for federal trust species and species of management concern, with special emphasis on migratory birds and species listed under the ESA, along with protection of wetlands and the Kittatinny Ridge.*

Of the 14,124 acres that could be acquired under Alternative B, over 9,900 acres of upland forests would be protected. This would generally include roughly 5,700 additional acres of Central Appalachian Dry Oak-Pine Forest and over 3,500 additional acres of Northeastern Interior Dry Mesic Oak Forest compared to the No Action alternative. These forests would serve as valuable habitat for birds that breed in interior forests already mentioned in Alternative B. As with Alternative B, over 1,000 additional acres of emergent, scrub-shrub, and forested wetlands could be protected, contributing to the conservation of foraging bats, wetland birds, waterfowl, shorebirds, bobolink, woodcock, turkey, Eastern meadowlark, bog turtles, wood turtles, diverse reptiles and amphibians, mink, river otter, and others. About 1,700 acres of agricultural lands could become available for protection and could contribute, if managed appropriately, to the conservation of declining grassland birds such as grasshopper sparrows, bobolink, and Eastern meadowlark. Compared to the proposed action (Alternative B), this is about half of the agricultural lands that could be protected, thus substantially decreasing our ability to manage habitat for rare grassland birds that require 50+ acre sites for nesting habitat.

Compared to Alternative A, Alternative C provides about 90 additional acres of riparian and stream habitat; however, this is only 34 percent of the acres that would be protected under Alternative B. Excluding this habitat would result in substantially decreased benefits to associated fishes (e.g., American eel), freshwater mussels, and other species. In addition to more common species, this habitat is used by numerous species of concern, for example: for dispersal (e.g., bog turtle), or feeding and roosting (e.g., likely Indiana bat).

Species priorities and management essentially would be identical to Alternative B, recognizing the diminished management ability for grassland birds. The decrease in wetlands would decrease the benefit to all of the waterfowl and waterbirds discussed in Alternative B, as well as resident fishes, and other water-associated species. Alternative B encompasses the large tracts of forested land along the Kittatinny Ridge, thus benefitting the nesting interior forest birds already mentioned and protecting this important migratory corridor for raptors and migratory neotropical birds. Alternative C does not include the one known northeastern bulrush population in the Study Area; therefore, this

Bald Eagle

species would no longer directly benefit from the establishment of a refuge in Cherry Valley.

*Goal 2. Create opportunities for hunting, fishing, wildlife observation and photography, and environmental education and interpretation, while promoting activities that complement the purposes of the refuge and other protected lands in the region.*

As with Alternative B, there would likely be ample opportunities for the six wildlife-dependent recreational public uses with Alternative C (Environmental Education is covered in Goal 3.) However, because of the decreased land base in particular, this alternative would likely provide less opportunities for public uses. In particular, because this alternative could protect about half of the stream and riparian habitat of Alternative C, we would have fewer opportunities to facilitate fishing access. There would likely be less opportunity for wildlife interpretation, observation, and photography, and more limited trail establishment. Overall, this alternative has 6,300 fewer acres for these wildlife dependent recreational activities compared to Alternative B.

*Goal 3. Promote science, education, and research through partnerships to inform land management decisions and encourage continued responsible stewardship of the natural resources of Cherry Valley.*

Alternative C offers strong opportunities for refuge-related partnership and research opportunities. The decrease in land base compared to Alternative B would mean that direct opportunities to partner with Chestnuthill Township would be limited since this township would not be included in proposed refuge lands. Opportunities to partner with Hamilton and Ross townships would also be affected since proposed refuge lands within these townships are substantially less compared to Alternative B. The decrease in proposed refuge lands would not affect partnership opportunities with the AT or Delaware Water Gap National Recreation Area, although opportunities for science cooperation and field research would be somewhat diminished compared to Alternative B. Opportunities for environmental education also would decrease somewhat due to less extensive habitats and fewer municipalities (e.g., no lands in Chestnuthill). Compared to Alternative A, however, this alternative presents a strong basis for all three of the elements within this goal.

### 3.3 Summary Tables for Alternatives

Table 3-4. Comparison of acres of protected habitat by habitat type for Alternatives A, B, and C as described in this Study Report.

| | | ***Alternative A - Acres*** | | | | ***Alternative B – Acres (Proposed Action)*** | | | | ***Alternative C – Acres*** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***Currently Protected*** | | | | ***Potential Refuge Lands*** | | | | ***Proposed Refuge Lands*** | | | |
| | ***Ecological Systems*** | **Agricultural Easements** | **Private Conservation** | **Municipal State & Federal** | **Totals** | **No Current Protection** | **Currently Protected[1]** | **Totals** | **Grand Totals[2]** | **No Current Protection** | **Currently Protected[1]** | **Totals** | **Grand Totals[2]** |
| Upland Forest Habitats | Appalachian (Hemlock)-Northern Hardwood Forest | 8.30 | 64.40 | 138.08 | **210.78** | 930.06 | 72.70 | **1,002.76** | **1,140.84** | 610.37 | 64.40 | **674.77** | **812.85** |
| | Central Appalachian Dry Oak-Pine Forest | 134.62 | 47.11 | 2,635.55 | **2,817.28** | 7,365.41 | 181.73 | **7,547.14** | **10,182.69** | 5,623.00 | 41.78 | **5,664.78** | **8,300.33** |
| | Central Appalachian Dry Oak-Pine Rocky Woodland | 0.00 | 0.00 | 55.67 | **55.67** | 17.88 | 0.00 | **17.88** | **73.55** | 17.88 | 0.00 | **17.88** | **73.55** |
| | Northeastern Interior Dry-Mesic Oak Forest | 131.68 | 129.20 | 1,015.80 | **1,276.68** | 4,093.26 | 260.88 | **4,354.14** | **5,369.94** | 3,344.22 | 209.67 | **3,553.89** | **4,569.69** |
| Wetlands & Riparian Habitats | Central Appalachian Floodplain | 0.00 | 0.00 | 94.01 | **94.01** | 4.29 | 0.00 | **4.29** | **98.30** | 0.00 | 0.00 | **0.00** | **94.01** |
| | Central Appalachian Stream and Riparian | 43.70 | 29.32 | 5.39 | **78.41** | 261.97 | 73.02 | **334.99** | **340.38** | 90.95 | 63.49 | **154.44** | **159.83** |
| | Laurentian-Acadian Freshwater Marsh | 0.00 | 0.17 | 0.00 | **0.17** | 2.25 | 0.17 | **2.42** | **2.42** | 0.01 | 0.17 | **0.18** | **0.18** |
| | Laurentian-Acadian Wet Meadow-Shrub Swamp | 70.86 | 92.30 | 10.23 | **173.39** | 332.90 | 163.16 | **496.06** | **506.29** | 319.93 | 163.16 | **483.09** | **493.32** |
| | North-Central Appalachian Acidic Swamp | 4.13 | 0.00 | 30.38 | **34.51** | 275.39 | 4.13 | **279.52** | **309.90** | 176.79 | 0.72 | **177.51** | **207.89** |
| | North-Central Appalachian Seepage Fen | 0.00 | 0.00 | 0.00 | **0.00** | 13.70 | 0.00 | **13.70** | **13.70** | 13.70 | 0.00 | **13.70** | **13.70** |
| | North-Central Interior Wet Flatwoods | 10.87 | 26.88 | 0.00 | **37.75** | 76.25 | 37.75 | **114.00** | **114.00** | 76.25 | 37.75 | **114.00** | **114.00** |
| | North-Central Interior and Appalachian Acidic Peatland | 0.00 | 0.00 | 8.55 | **8.55** | 3.80 | 0.00 | **3.80** | **12.35** | 3.77 | 0.00 | **3.77** | **12.32** |
| | North-Central Interior and Appalachian Rich Swamp | 6.56 | 17.54 | 0.00 | **24.10** | 163.28 | 24.10 | **187.38** | **187.38** | 117.95 | 24.10 | **142.05** | **142.05** |
| ***Totals*** | | **410.72** | **406.92** | **3,993.66** | **4,811.30** | **13,540.44** | **817.64** | **14,358.08** | **18,351.74** | **10,394.82** | **605.24** | **11,000.06** | **14,993.72** |
| ***Total Parcel Acres (31,585.8 total boundary acres)*** | | **1,046.97** | **787.73** | **4,477.95** | **6,312.65** | **18,630.85** | **1,834.70** | **20,465.55** | **24,943.50** | **12,588.53** | **1,535.83** | **14,124.36** | **18,602.31** |

[1] Currently Protected consists of agricultural easements and private conservation that occur within the parcels (or portions of parcels) selected for this Alternative.

[2] Grand Totals consist of Potential Refuge Lands plus Municipal, State, and Federal lands that occur within the parcels (or portions of parcels) selected for this Alternative.

Table 3-5. Comparison of actions that distinguish the alternatives and their relationship to the potential goals and key issues for Alternatives A, B, and C evaluated in this Study Report to satisfy the requirements of NEPA and the Cherry Valley National Wildlife Refuge Study Act of 2006.

Goal 1. *Protect and enhance habitats for federal trust species and species of management concern, with special emphasis on migratory birds and species listed under the ESA, along with protection of wetlands and the Kittatinny Ridge.*

| | | Alternatives | | |
|---|---|---|---|---|
| **Habitat Types** | **Types of Resources Affected** | **Alternative A - No Refuge** | **Alternative B - Diverse Habitat Complex (Proposed Action)** | **Alternative C – Wetlands and Ridge Forests** |
| **All** | Total Acres of Protected Habitat | 6,312 | up to 20,466 | |
| **Emergent, Calcareous & Vernal Wetlands** | Ecosystems and acres included: | Laurentian-Acadian Freshwater Marsh; North Central Appalachian Seepage. 0.17 acres | Same as Alternative A but allows protection of almost 16 total acres of this habitat, over 15 more acres compared to Alternative A and two additional acres compared to Alternative C. | Same as Alternative A, but allows protection of up to 13.88 total acres of this habitat |
| | Trust Species Likely to Benefit: | bog turtle; herons, woodcock, rails, waterfowl, snipe, bobolink, Eastern meadowlark, black duck, solitary sandpiper. | Same as A, but includes only known population of northeastern bulrush and substantial increase in protected acres provides additional benefits particularly to bog turtle and other trust species. | Similar to B, but does not include known population of northeastern bulrush and is 13 percent smaller than Alternative B. |
| | Species of Concern Likely to Benefit: | spotted turtles; numerous other amphibians and reptiles; highly diverse and rare plants. | Same as Alternative A but expanded because more habitat could be protected. | Similar to A and B, but benefits decrease commensurate with 13 percent decrease in protected area |

Goal 1. *Protect and enhance habitats for federal trust species and species of management concern, with special emphasis on migratory birds and species listed under the ESA, along with protection of wetlands and the Kittatinny Ridge.*

| Habitat Types | Types of Resources Affected | Alternatives | | |
|---|---|---|---|---|
| | | **Alternative A - No Refuge** | **Alternative B - Diverse Habitat Complex (Proposed Action)** | **Alternative C – Wetlands and Ridge Forests** |
| **Scrub-Shrub Wetlands** | Ecosystems and acres included: | Laurentian-Acadian Wet Meadow & Shrub Swamp; North Central Interior & Appalachian Acidic Peatland. Approx. 182 acres. | Same as Alternative A but allows protection of up to 518.5 acres of this habitat, 336.5 more acres than Alternative A and 13 more acres than Alternative C. | Same as Alternative A, but allows protection of up to 505.5 acres of this habitat, 323.5 more acres than Alternative A but 13 less acres than Alternative B. |
| | Trust Species Likely to Benefit: | herons, woodcock, waterfowl, warblers; possibly golden-winged warbler, field sparrow, willow flycatcher, brown thrasher, blue-winged warbler | The same species as in A, but additional protected acres would provide additional benefits particularly to migratory birds. | The same species as in A and B. There would be substantial positive benefits compared to A because of the additional protected habitat. Benefits would be somewhat less than in B because fewer acres are protected. |
| | Species of Concern Likely to Benefit: | Rare plants such as swamp dog hobble, swamp sparrows, warblers, small mammals, and bats. | Same as Alternative A, but nearly three times more acres could be protected under this alternative, providing commensurate increases in benefits to these species. | The same species as in A and B. There would be substantial positive benefits compared to A because of the additional protected habitat. Benefits would be somewhat less than in B because fewer acres are protected. |

Goal 1. *Protect and enhance habitats for federal trust species and species of management concern, with special emphasis on migratory birds and species listed under the ESA, along with protection of wetlands and the Kittatinny Ridge.*

| Habitat Types | Types of Resources Affected | Alternatives | | |
|---|---|---|---|---|
| | | **Alternative A - No Refuge** | **Alternative B - Diverse Habitat Complex (Proposed Action)** | **Alternative C – Wetlands and Ridge Forests** |
| **Forested Wetlands** | Ecosystems included: | North Central Appalachian Acidic Swamp; North Central Interior Wet Flatwoods; North Central Interior & Appalachian Rich Swamp; Central Appalachian River Floodplain; Central Appalachian Stream & Riparian. Approx. 269 acres. | Same as Alternative A but allows protection of up to 1050 acres of this habitat, 781 more acres than Alternative A and 332 more acres than Alternative C. | Same as Alternative A, but allows protection of up to 718 acres of this habitat, 449 more acres than Alternative A, but 332 fewer acres than Alternative B. |
| | Trust Species Likely to Benefit: | breeding neo-tropical migratory birds, cerulean warbler, worm-eating warbler, red-headed woodpecker, eastern wood pewee, Northern oriole, woodcock, bald eagles, Louisiana waterthrush, scarlet tanager, wood duck, herons, Canadian geese, warblers. American eel. May benefit bog turtles and Indiana bats. | Same as Alternative A, but additional protected acres would provide additional benefits particularly for migratory birds, American eel, and bog turtles in select areas. This transitional habitat to be maintained through appropriate forest management applications. Control invasive species. | Same as Alternatives A and B, but Alternative C would provide significantly less habitat protection than Alternatives B, with commensurate decreases in benefits particularly for migratory birds, the American eel, and bog turtles in select areas. |

Goal 1. *Protect and enhance habitats for federal trust species and species of management concern, with special emphasis on migratory birds and species listed under the ESA, along with protection of wetlands and the Kittatinny Ridge.*

| Habitat Types | Types of Resources Affected | Alternatives | | |
|---|---|---|---|---|
| | | **Alternative A - No Refuge** | **Alternative B - Diverse Habitat Complex (Proposed Action)** | **Alternative C – Wetlands and Ridge Forests** |
| | Species of Concern Likely to Benefit: | Brook trout, wood turtles, possibly spotted turtles, mink, river otter, diverse plants including Hemlock parsley. | Same as Alternative A, but Alternative B would provide significantly more habitat protection than Alternatives A or C, with commensurate benefits for these species. | Same as Alternatives A and B, but Alternative C would provide significantly less habitat protection than Alternative B, with commensurate decreases in benefits to these species. |
| **Forested Uplands** | Ecosystems included: | Central Appalachian Pine-Oak Rocky Woodland; Central Appalachian Dry Oak-Pine; Northeastern Interior Dry-Mesic Oak; Appalachian Northern Hardwood; Northeastern Interior Dry Mesic Oak; Appalachian Northern Hardwood. Approx. 4,360.5 acres. | Same as Alternative A but allows protection of up to 16,767 acres of this habitat, 12,406.5 more acres than Alternative A and 3,010.5 more acres than Alternative C. | Same as Alternative A, but allows protection of up to 13,756.5 acres of this habitat, 9,396 more acres than Alternative A, but more than 3,000 fewer acres than Alternative B. |
| | Trust Species Likely to Benefit: | breeding neo-tropical migratory birds, possibly golden-winged warbler, black bear, deer, parula and black-throated green warblers | Same as Alternative A, but additional protected acres would provide additional benefits to migratory birds, large and small mammals, diverse reptiles and amphibians, common and rare plants. This climax habitat to be maintained through management applications. | Similar to Alternative B, but Alternative C would provide significantly less habitat protection than Alternative B, with commensurate decreases in benefits particularly for more common plants and animals. |

Goal 1. *Protect and enhance habitats for federal trust species and species of management concern, with special emphasis on migratory birds and species listed under the ESA, along with protection of wetlands and the Kittatinny Ridge.*

| Habitat Types | Types of Resources Affected | Alternatives | | |
|---|---|---|---|---|
| | | **Alternative A - No Refuge** | **Alternative B - Diverse Habitat Complex (Proposed Action)** | **Alternative C – Wetlands and Ridge Forests** |
| | Species of Concern Likely to Benefit: | Timber rattlesnakes, Allegheny woodrat | Same as Alternative A, but additional protected acres would provide additional benefits to species. | Same as Alternatives A and B, but Alternative C would provide significantly less habitat protection than Alternative B, with commensurate decreases in benefits to these species. |

Goal 2. *Create opportunities for hunting, fishing, wildlife observation and photography, and environmental interpretation, while promoting activities that complement the purposes of the refuge and other protected lands in the region.*

| Refuge Use Opportunities | Alternatives | | |
|---|---|---|---|
| | **Alternative A - No Refuge** | **Alternative B - Diverse Habitat Complex (Proposed Action)** | **Alternative C - Wetlands & Ridge Forests** |
| Hunting and Fishing | Continue existing hunting and fishing opportunities under State regulation. | New public hunting opportunities would be possible, and would complement activities of the Pennsylvania Game Commission. Opportunities to assist in effective management of white tail deer. ADA and Youth hunts possible. | New public hunting opportunities would be possible compared to Alternative A, but fewer compared to Alternative B. Effort would complement activities of the Pennsylvania Game. Opportunities to assist in effective management of white tail deer. ADA and Youth hunts possible. |
| Groups Addressed: Traditional hunters, particularly deer hunters and game bird hunters; recreational fishermen for both warm water and cold water fisheries. | | | |
| **Wildlife Observation, Intrepretation, and Photography** | Continue current wildlife observation and interpretation activities through existing state and county programs (e.g., Monroe County Conservation District). | New opportunities for wildlife observation, interpretation, and photography are possible with protection of new lands and habitats across many habitat types within the valley and throughout the municipalities within the Study Area. | Compared to Alternative A, more opportunities for wildlife observation, interpretation, and photography are possible with protection of lands and habitats across within the valley. These opportunities would be less than those offered in Alternative B, particularly in Chestnuthill, Ross, and Hamilton townships. |
| Groups Addressed: Students, wildlife enthusiasts, hikers, bird watchers, amateur and professional wildlife and nature photographers, botany enthusiasts, insect enthusiasts. | | | |

Goal 2. *Create opportunities for hunting, fishing, wildlife observation and photography, and environmental interpretation, while promoting activities that complement the purposes of the refuge and other protected lands in the region.*

| Refuge Use Opportunities | Alternatives | | |
|---|---|---|---|
| | **Alternative A - No Refuge** | **Alternative B - Diverse Habitat Complex (Proposed Action)** | **Alternative C - Wetlands & Ridge Forests** |
| Connection to public lands. | There would be no opportunity to seek mutual benefits of a refuge and the Appalachian Trail or other public lands. | New opportunities are possible to make a connection with a new, extensive refuge and the Appalachian Trail, Delaware Water Gap, and other public lands, due to the broad nature of the refuge embracing many habitat types. | Opportunities for connections to public lands are similar to those in Alternative B, particularly for the Appalachian Trail and Delaware Water Gap National Recreation Area. |
| Groups Addressed: Hikers, bird watchers, wildlife photographers, and others. | | | |

Goal 3. *Promote science, education, and research through partnerships to inform land management decisions and encourage continued responsible stewardship of the natural resources of Cherry Valley.*

| **Partnership, Science, and Environmental Education Opportunities** | **Alternatives** | | |
|---|---|---|---|
| | **Alternative A - No Refuge** | **Alternative B - Diverse Habitat Complex (Proposed Action)** | **Alternative C - Wetlands & Ridge Forests** |
| **Partnerships** | Activities of the Friends of Cherry Valley would continue but would be limited without the presence of a refuge. | Activities of the Friends of Cherry Valley could be expanded due to the presence of a refuge. We would be able to expand on the extensive partnerships that already exist as well as developing new partnerships throughout the area. Refuge staff would help to create new partnership efforts to improve a wide variety of activities beneficial to the wildlife resources of the valley. | Compared to Alternative A, activities of the Friends of Cherry Valley could be expanded due to the presence of a larger refuge. We would still be able to expand on the extensive partnerships that already exist as well as developing new partnerships throughout the area, but this would be reduced compared to Alternative B. Refuge staff would help to create new partnership efforts to improve a wide variety of activities beneficial to the wildlife resources of the valley. |
| **Scientific Research** | No new research opportunities would exist. Efforts with East Stroudsburg University, Pennsylvania State University, Pennsylvania Cooperative Fish & Wildlife Research Unit, etc., would continue. | The Service would encourage and support research and management studies on refuge land that will improve scientific knowledge and contribute to natural resource management decision-making on the refuge. The refuge would also consider research for other purposes that contribute to the broader protection, use, preservation or management of native | The Service would encourage and support research and management studies on refuge land that will improve scientific knowledge and contribute to natural resource management decision-making on the refuge. The refuge would also consider research for other purposes that contribute to the broader protection, use, preservation or management of native |

| Goal 3. *Promote science, education, and research through partnerships to inform land management decisions and encourage continued responsible stewardship of the natural resources of Cherry Valley.* | | | |
|---|---|---|---|
| **Partnership, Science, and Environmental Education Opportunities** | **Alternatives** | | |
| | **Alternative A - No Refuge** | **Alternative B - Diverse Habitat Complex (Proposed Action)** | **Alternative C - Wetlands & Ridge Forests** |
| | | populations of fish, wildlife, plants, and their natural diversity. New Refuge lands would be subject to adaptive management through science applications. | populations of fish, wildlife, plants, and their natural diversity. These opportunities would be reduced compared to Alternative B. New Refuge lands would be subject to adaptive management through science applications. |
| **Environmental Education** | There would be no opportunities for refuge-based environmental education. Current county efforts would continue. | New opportunities for environmental education and interpretation would be created due to the opening of extensive lands for public use, and the possibility of constructing facilities, trails, and programs for such purposes. New opportunities to promote "Children in Nature" activities. | New opportunities for environmental education and interpretation would be created due to the opening of fairly extensive lands for public use, and the possibility of constructing facilities, trails, and programs for such purposes. New opportunities to promote "Children in Nature" activities. These opportunities would be less than those offered in Alternative B, particularly in Chestnuthill, Ross, and Hamilton townships. |

# 4 Environmental Effects

Chapter 2 "Affected Environment" discussed the status and condition of Cherry Valley in terms of its physical (air, water, soil, and sound), biological (habitats and species), and socioeconomic environment (public use, land use, tax revenue, and cultural and historic resources), providing essential background status and trends information for assessing potential effects on that environment due to the establishment of a refuge in the valley. Chapter 3 presented alternatives to establishing a refuge and a number of management activities that may occur within each alternative. This chapter describes the foreseeable environmental effects (also impacts, results or consequences) to the Cherry Valley environment from implementing any of the three refuge alternatives described in Chapter 3. For quick reference, we created a table (Table 4-3) at the end of the chapter to compare and summarize the effects we predict for each alternative.

A comparison of potential effects from each alternative provides the Service and the public with important information about what may be the best way to protect valuable wildlife resources within Cherry Valley, yet remain sensitive and knowledgeable about what those land protection measures, and subsequent management activities, may effect in the valley. In this chapter, effects are considered in relation to the issues described in Chapter 1, "Study Purpose and Planning Considerations," and are addressed within three basic themes: physical, biological, and socioeconomic. Conclusions and discussions on effects are determined from published literature or other available information. In the absence of published and available information, we base our comparisons on our professional judgment and experience, and the professional judgment and experience of recognized experts. For details of the alternatives for establishing a refuge, see Chapter 3, "Alternatives." For details of the physical, biological, and human environment of the refuge, see Chapter 2, "Affected Environment."

When discussing effects we express them as "positive," "negative," or "no effect." A positive effect would benefit or enhance the fish and wildlife resources, or physical or socioeconomic environment under consideration and help accomplish Study Act and potential refuge goals. A negative effect arises from an action that we predict would be detrimental to the valley's natural resources, physical attributes, or socioeconomic environment, and that may impede our ability to achieve the intent of the Study Act and potential refuge goals. No effect means no recognized or discernible effect, either positive or negative. In addition, effects are discussed whether they are direct, indirect, or cumulative, and whether they are short-term or long-term.

As required by the Council on Environmental Quality (CEQ) and Service regulations implementing NEPA (Chapter 516 of the Departmental of Interior Manual), we assessed the importance of the effects of our alternatives based on their *context* and *intensity*. Their context ranges from site-specific to broad regional effects (Table 4-1). Although

any potential refuge would compose a small percentage of the context within the large regional ecosystems around it, we developed the alternatives in relation to how they may contribute to achieving fish and wildlife conservation in Cherry Valley. Context also addresses regional effects related to the socioeconomic and physical environment. We evaluated the intensity of effects based on the expected degree or percentage of natural resource, physical, or socioeconomic change from current conditions, and whether it is positive or negative, or neutral.

Table 4-1. Context Considerations for Potential Cherry Valley National Wildlife Refuge, Monroe County, Pennsylvania.

| Region or Locale | Acres |
|---|---|
| Northern Appalachian Ridge & Valley Province | 11.4 million acres |
| Appalachian Mountain Bird Conservation Region | 100 million acres |
| Delaware River Watershed | 8.66 million acres |
| Cherry Valley Watershed | 30,000 acres |
| Cherry Valley Study Area (CVSA) | 31,500 acres |
| CVSA Ecosystems | 20,550 acres |
| CVSA Developed Lands | 6,130 acres |
| CVSA Agricultural Lands | 3,860 acres |
| CVSA Open Space & Recreational Lands | 35 acres |
| CVSA Public Lands | 4,480 acres |

The refuge establishment alternatives and activities we propose are consistent with the mission of the Service, the mission of the Refuge System, and their respective policies and directives. They are also consistent with the international, national, state, regional, and local plans or initiatives identified in Chapter 1. At varying levels, each alternative would contribute neutrally or positively to larger, landscape-scale conservation. Finally, this chapter identifies any permanent commitment of resources and the relationship between short-term uses of the environment and its long-term productivity.

## 4.1 Effects on the Physical Environment

### 4.1.1 Effects on Air Quality

Monroe County is included in the Wilkes-Barre/Scranton, Pennsylvania airshed. Monroe County meets or is marginal for all regulated air pollutants including ozone, carbon monoxide, nitrogen diozide, sulfur dioxide, particulate matter and lead (DEP 2008). Two adjacent counties, however, are in non-attainment status including Northampton County, PA for 2.5 particulates and Warren County, New Jersey for sulfur dioxide (EPA 2008). No major stationary or mobile sources of air pollutants are present within the potential refuge boundary. None of the alternatives as defined herein would result in air quality exceeding EPA air quality criteria; all three would comply with the Clean Air Act. Wildfires are not a substantial concern in the region because they occur infrequently, and the rapid local response quickly limits their extent.

*Alternative A -- No Refuge*

In considering Alternative A, the No Refuge alternative, we have determined that there will be as yet unquantifiable negative effects from increases in the degradation of air quality in general in Monroe County and the region because of the continuing development. Although building and residential development has declined since 2005, development continues. That development brings with it pollution due to long term increases in traffic, industrial discharge, and construction related emissions. The same values that have shaped the landscape over the years also frame concerns related to the loss of agricultural land and open space to development, clean air and water quality, litter, wetland destruction, and increased traffic (BLOSS Associates 2004). Not having a refuge in the valley will simply mean that current land protection measures will have to be relied upon to protect open space and wildlife habitats that can help to mitigate the effects of an increasing population and development pressure on air quality.

*Alternative B -- Diverse Habitat Complex*

The most positive effect of establishing a refuge would be the natural role an intact vegetated environment serves in processing carbon dioxide and oxygen, and purifying air. Trees and other plants absorb and use carbon during photosynthesis, to build plant tissue while releasing oxygen in that metabolic process. Thus, through photosynthesis process, trees and other plants naturally remove excess carbon from the air, often expressed as carbon sequestration. According to Vicki Wolf (2004) in her article "Trees: A resource we can't afford to waste," one acre of trees provides enough oxygen for 18 people and absorbs as much carbon dioxide as a car produces in 26,000 miles. Additionally, during photosynthesis, other airborne chemicals are removed from the atmosphere such as nitrogen oxides, benzene, formaldehyde, airborne ammonia, some sulfur dioxide, and ozone, that are part of smog and greenhouse effect problems. Trees are natural filters that can significantly improve air quality by collecting dust and other impurities which are later washed to the ground during a rainstorm. Exposure to air pollutants, including ozone, toxins, and particulate matter, is associated with respiratory disease, asthma, heart disease and other illnesses. Car and industrial fumes and odors often can be processed and neutralized by trees, or masked by the more-pleasing smells of blooming trees or shrubs and conifer forests. "Rapid urbanization during the past 50 years has been associated with increases in downtown temperatures of nearly 1° F per decade – largely caused by the increase in exposed heat absorbing surfaces, such as dark rooftops, parking lots, and streets" (Local Government Commission, "Livable Communities and Urban Forests" fact sheet, pg 2). Consequently, trees and other plants directly contribute to maintaining the air quality of Monroe County and the surrounding region. Managing habitats through restoration measures and potential silvicultural practices could keep the vegetated landscape actively growing, thus contributing to carbon sequestration.

By creating a refuge, another significant positive effect would be the protection of this area from development which has inherent liabilities regarding air quality. Development activities often remove vegetation and its air purifying functions, while creating air pollution through heavy equipment and construction activities (road, sewage, electrical, and building construction). Once developments are in place, traffic increases with associated increases in air pollution. Industrial pollution may occur depending on the character of the development. Hard surface environments adsorb heat, causing ambient temperatures to increase.

The potential negative air quality effects of a Cherry Valley NWR could include standard management activities such as setting prescribed fires to manage grasslands, applying herbicides to control invasive plants, blowing dust from construction sites, roads, and trails, and emissions from vehicles and equipment. These are manageable activities and measures can be taken to assure minimal effects. The Service limits the uses of the refuge to compatible, wildlife-oriented, consumptive and non-consumptive uses, and thus, curtails anthropogenic sources of emissions by maintaining forested and non-forested wetlands, grasslands, and early successional sites in natural vegetative cover. Trail maintenance and parking lot construction would cause negligible short term, localized effects from dust and vehicle and equipment exhausts. Operating the refuge facilities would continue to contribute slightly in local stationary source emissions. Therefore, in analyzing the effects on air quality, we considered only how Service actions at the refuge might affect criteria air pollutants, visibility, and global warming to a minimal degree, focusing instead on the potential for localized air quality impacts or improvement. None of the potential conceptual management activities would affect visibility due to emission haze.

In the future, positive effects on air quality could occur by restoring developed areas that are no longer needed for refuge administration or programs to natural conditions, thus eliminating these locations as potential air emission sources. To offset energy use at an established refuge that would be expected to have buildings and associated facilities, the Service would adopt energy efficient practices to reduce the refuge's contribution to emissions.

Projected annual refuge use levels are impossible to project at this time; however, we predict some increase in vehicle emissions on and near the refuge in the long term. The contribution to cumulative local and regional air quality effects would likely be compensated for to a large degree by precluding development in the refuge area. There would be virtually no localized increases on the refuge, compared to the current off-refuge contributions to pollutant levels and likely increases in air emissions from land development in the valley during the foreseeable future. The benefits of maintaining the refuge in natural vegetation would more than offset the predicted increase in vehicle emissions associated with creating a refuge. Consequently, we conclude that the emissions from sources on the refuge would not cause cumulative effects on air quality.

*Alternative C – Wetlands & Ridge Forests*

The effects of Alternative C on air quality would be largely positive, and would contribute all of the benefits as described in Alternative B. The benefits derived from this alternative would be somewhat less since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative.

### 4.1.2 Effects on Water Quality

Cherry Creek is a second-order stream contained within a 13,343 acre watershed (of which 12,958 acres are within the Study Area). It benefits from numerous tributaries erupting from limestone aquifers, which account for most of the available water in the valley (BLOSS Associates 2004). Because of the limestone formations, Cherry Creek has a higher pH, alkalinity, and total dissolved solids than is found in most area streams, which are generally acidic and have a low mineral content. Consequently, water quality throughout the Cherry Creek watershed is generally excellent (Brodhead Watershed Association 2008). Monitoring sites on Cherry Creek are tested each month as part of the Cherry Creek Streamwatch Program, which reports unusual results to Department of Environmental Protection for follow-up and action.

*Alternative A -- No Refuge*

While water quality scoring for repeat sites through 2003 by the Cherry Creek Streamwatch Program have displayed an upward trend, strong growth pressures in the region and sprawl development patterns could have adverse negative effects on both the quality and quantity of the watershed's surface and groundwater. Rooftops, increasing traffic, parking lots and streets are slowly replacing forests and fields. Rain and snowmelt run rapidly off these man-made surfaces instead of soaking into the ground. This storm water, non-point runoff carries sediment and petroleum based pollutants into the streams, accelerates steam-bank erosion and in-stream turbidity, and raises stream temperatures (BLOSS Associates 2004). These effects can have a direct effect on aquatic life in stream habitats, including submerged aquatic vegetation, breeding fish and invertebrates. The No Refuge alternative would result in the reliance on existing land protection and water quality control measures to help safeguard surface and ground water quality in the valley.

*Alternative B -- Diverse Habitat Complex*

By establishing a refuge up to 20,466 acres in land acquisition and easements, we would provide substantial additional watershed benefits by limiting land clearing and development, non-point sources of sediment-laden pollution and petroleum-

hydrocarbon pollution, and detrimental changes in local hydrology due to increases in impervious surfaces that might otherwise affect valley areas from development. Establishing a refuge under this alternative would enable the protection of emergent, shrub, and forested wetlands, creek and river segments, ponds, vernal pools, and extensive upland forests. Retaining these habitats would enable them to continue their ecological functions for dispersing flood waters along bottomlands and adsorbing precipitation, facilitating a more natural snow melt and surface flow runoff, promote groundwater recharge, and purify water through soil and bedrock percolation. Management of selected agricultural lands as grasslands could reduce or eliminate the use of herbicides and pesticides. Having refuge lands would promote improved water quality monitoring for early problem identification, and would improve cooperation of other landowners in watershed to influence water quality.

If a refuge were established, we would take a number of steps to insure that we have sufficient scientific data to support management decisions regarding refuge hydrology and water quality. We would work with State agencies and other conservation partners to identify sources of point and non-point sediment and nutrient loading (e.g. septic systems, erosion, etc) impacting refuge wetlands, and associated lakes and rivers, and address these sources where possible. We would closely monitor and mitigate all of our routine activities that have some potential to result in chemical contamination of water directly through leakage or spills or indirectly through soil runoff. These include control of weeds and insects around structures, use of salts and chemicals for de-icing roads and walkways, and use of soaps and detergents for cleaning vehicles and equipment. All staff would be trained in spill prevention and spill response, and all appropriate steps and training would be conducted to assure the effective control of invasive plants using herbicides.

The Service limits the uses of the refuge to compatible, wildlife-oriented, consumptive and non-consumptive uses, and thus, curtails anthropogenic sources of water-borne pollutants by maintaining forested and non-forested wetlands, grasslands, and early successional sites in natural vegetative cover. Currently there is no reliable way to estimate potential visitor use and effects on natural resources and water quality due to potential future use. We expect use would include walking trails and related “non-motorized” activities. These activities tend to be of minimal damage to a landscape unless use occurs in steep, highly erodible areas., which is avoided. In analyzing the effects of public use on water quality, we principally considered how Service actions at the refuge might affect criteria water pollutants locally, which will enable an ability to determine any effects on regional water quality conditions.

*Alternative C -- Wetlands & Ridge Forests*

The effects of Alternative C on water quality would be largely positive, and would contribute all of the benefits as described in Alternative B. The benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres

instead of 20,466 acres. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a slightly lesser degree due to the larger potential size of this alternative.

### 4.1.3 Effects on Soils

Soils are the structural matrix and nutrient source for plant productivity at the refuge and must be protected to sustain the variety of wetland, riparian, and upland habitats that would meet our habitat and species management goals. Most of the soil types within the Study Area were formed from glacial till, outwash, and alluvium, and tend to erode easily. Overall, however, the soils within the Study Area are productive and in good condition, with no substantive erosion, compaction, or contamination problems. In certain areas such as Kittatinny ridge cliffs, soils are absent or patchy, thin, and susceptible to disturbance so we would manage these areas to limit any human disturbance. We evaluated and compared the management actions suggested for each alternative on the basis of their potential to benefit or adversely affect upland soils and soils of the refuge's floodplains and riparian areas. Impacts of the alternatives to wetland soils are discussed in the wetlands section.

*Alternative A -- No Refuge*

Alternative A is the least desirable alternative in terms of potential benefits from acquisition and conservation of lands and the potential for habitat protection and soil preservation. Although development in the valley has declined since 2005, it continues nevertheless and the Service would not be able to contribute to measures that maintain and protect soils . There would be no opportunity for the USFWS to protect or restore roads, trails, or other existing sites within the potential acquisition boundary, thus soil impacts from development or unmanaged use of those lands would continue and likely would increase over the long term.

*Alternative B -- Diverse Habitat Complex*

Alternative B would provide positive effects compared to alternative A since creation of a Cherry Valley NWR would reduce the potential for large-scale development and related human disturbance on these lands and reduce the long term potential for the resulting soil impacts. Maintaining and improving extensive habitat areas for fish and wildlife would automatically provide for the retention of healthy soils. It is unlikely that any significant forest management operations or extensive land alterations would occur on new refuge lands. However, restoration of roads and trails and fire suppression practices on new refuge lands would help reduce soil erosion from such disturbed sites.

The potential adverse soil effects of conceptual refuge management activities that were evaluated included impacts from construction of buildings, parking facilities,

access roads, and interpretive trails forest management activities, including tree-cutting, and use of roads for focal species management, hiking and other refuge visitor activities. We would use best management practices in all management activities that might affect refuge soils to ensure that we maintain refuge soil productivity. We would restore developed sites with buildings or other infrastructure that have been acquired or that are no longer needed for refuge purposes to natural topography and hydrologic conditions and return to native vegetation as quickly as feasible. In general, existing main access roads would remain open to provide motorized and non-motorized access for approved activities. Other designated motorized access may be developed but cannot be defined at this time. Off-road vehicles, such as motorbikes and ATVs, would not be allowed on the refuge since these vehicles can cause serious soil disturbance, compaction, and erosion. Deteriorating forest roads can also be a locus for such soil impacts, and these would be eliminated or improved as appropriate.

Creation of a Cherry Valley NWR would stimulate visitor use of refuge lands. The Service limits the uses of the refuge to compatible, wildlife-oriented, consumptive and non-consumptive uses, and thus, curtails anthropogenic sources of soil disruption and erosion by maintaining forested and nonforested wetlands, grasslands, and early successional sites in natural vegetative cover. Currently there is no reliable way to estimate potential visitor use and effects on natural resources and soils due to potential future use. We expect use would include walking trails and related "non-motorized" activities. These activities tend to be of minimal damage to a landscape unless use occurs in steep, highly erodible areas, which is avoided. In some cases, for example, protective boardwalks and topographically sensitive trails are used to minimize soil disturbance. The potential negative soil effects of the suggested conceptual management activities could include, for example, burning prescribed fires, grazing to maintain bog turtle sites and grassland, constructing parking facilities, access roads, and interpretive trails, and providing refuge visitor activities and hunt programs. In analyzing the effects of public use on soils, we principally considered how Service actions at the refuge might affect soils locally, which will enable an ability to determine any effects on regional basis if necessary.

*Alternative C -- Wetlands & Ridge Forests*

The effects of Alternative C on soils would be largely positive, and would contribute all of the benefits as described in Alternative B. The benefits derived from this alternative would be smaller since the size of this refuge would be up to 14,124 acres instead of up to 20,466 acres. In a similar fashion, the negative effects would be minimal, and would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller size of the potential refuge in this alternative.

## 4.2 Effects on the Biological Environment

### 4.2.1 Effects on Habitats and Ecosystems

In 2008, the Pennsylvania Natural Heritage Program identified and mapped thirteen ecological system types (Table 2-2) totaling 20,548 acres within the Cherry Valley National Wildlife Refuge Study Area (WPC 2008). The ecological systems cover about 65 percent of the Study Area and are located within a mosaic of forest, wetlands, agriculture (active and abandoned fields), quarries, villages and housing developments (Figure 2-4). For convenience, these ecosystems are discussed in three broad habitat categories: wetland and riparian; forested uplands; and agricultural lands and grasslands. Within the Study Area there are 1,746 acres of wetlands and riparian areas, 18,800 acres of upland forest, and 3,864 acres of agricultural lands and grasslands. Of these, 6,312 acres are currently protected with the remaining acres subject to potential development and potential degradation. A summary of acres within each of the three broad habitat types by alternative is presented in Table 4-2.

Table 4-2. Summary of Broad Habitat Types Protected by each Alternative for establishing a Cherry Valley National Wildlife Refuge, Monroe County, Pennsylvania.

| Broad Habitat Type | Alternative A No Refuge | Alternative B Diverse Habitat Complex | Alternative C Wetlands and Ridge Forests |
|---|---|---|---|
| **Wetlands and Riparian** | 450 acres | 1,436 acres | 1,089 acres |
| **Forested Uplands** | 4,360 acres | 12,921 acres | 9,912 acres |
| **Agricultural Lands and Grasslands** | 1,502 acres | 3,425 acres | 1,713 acres |
| **Total Acres** | 6,312 | 17,782 acres | 12,714 acres |

*Alternative A -- No Refuge*

Currently 450 wetland acres, over 4,300 acres of upland forests, and 1,500 acres of agricultural lands and grasslands are protected in the valley. As discussed in Chapter 2 (Affected Environment) and Chapter 3 (Alternatives), these broad habitats provide habitat for a broad array of federal trust species and state species of importance, representing a major component of the valley's biodiversity and providing an intact environment for Cherry Creek. These habitats help protect the creek from the effects of nearby human activities and development. Some of the prominent wetland areas already protected include emergent wetlands and riparian areas along Cherry Creek conserved by The Nature Conservancy and the Pocono Heritage Land Trust. Expansive forest tracts already protected include lands along the top of Kittatinny Ridge managed by the National Park Service and the Pennsylvania Game Commission, and agricultural

lands and grasslands protected under Pennsylvania's agricultural easement program are scattered across the valley.

The no refuge alternative would likely present long term and cumulative negative effects since it would not provide any of the additional and needed protection measures for the valuable inter-montane wetlands, Kittatinny Ridge forests, and grasslands in the valley. Lack of strengthened protection measures would impede abilities to enhance habitat for federal trust species (e.g., bog turtle) and associated plants and animals. Continued development could lead to siltation and other forms of non-point source pollution, and also exacerbate the chronic struggle to prevent habitat fragmentation and its known negative effects on many species of wildlife and plants. Continued development invites the spread of invasive species, widely recognized as pioneer species that quickly establish in disturbed landscapes. Land and habitat protection efforts and programs noted in earlier chapters would continue to be the basis of protecting these areas, and conclusions have been reached already that these measures are inadequate. As noted earlier, development in Monroe County has declined somewhat since 2005. However, development pressure still exists and without further guarantees for protecting the wildlife habitat values in the valley, the development pressures in the valley could just as easily increase at some point in the future thereby jeopardizing or displacing these essential habitat areas.

*Alternative B -- Diverse Habitat Complex*

With Alternative B, the Service would potentially protect through conservation easement or fee title up to 20,466 acres of wetland , forested upland, and agricultural/grassland habitats, an additional 6,332 acres compared to Alternative C (Table 3-2). We conclude that establishing the refuge to embrace these habitats would be a major positive effect for Cherry Valley. This alternative would enable protection of over 1,400 wetland acres, 12,900 upland forest acres, and 3,400 acres of agricultural and grasslands (Table 4-2).

One of the primary benefits of Alternative B is the protection of various aquatic resources in the valley. The amount of protected wetlands and streams is more than triple the "No Action" alternative (Table 4-2). The extremely diverse wetlands and calcareous fens are of singular importance because their continuous groundwater seepage and open vegetation create habitat suitable for the threatened bog turtle as well as supporting an assemblage of plant species unique to this wetland type. Protecting additional riparian and creek habitat would benefit other aquatic resources as well including native brook trout, American eel, and possibly dwarf wedgemussel.

This area within Cherry Valley contains one significant cave, known as Hartman's Cave, which has been listed as a "special concern" bat hibernaculum by the Pennsylvania Game Commission because at least five species of bats have been known to use the cave (WPC 2008). Emergent wetlands provide spring and fall migratory waterfowl and

shorebird habitat, and foraging bats and wintering raptor foraging habitat. Upland forests would serve as breeding, foraging, migratory, and wintering habitat for a host of neo-tropical migratory birds and resident gamebirds. Maintenance of existing grasslands and conversion of select agricultural lands to grassland habitat would benefit bobolink, meadowlark, grasshopper sparrow, and other grassland birds suffering from habitat loss. Further details on habitat benefits for trust species and species of concern offered by this alternative are presented in Chapter 3 -- Alternatives B and C, and Chapter 2 -- Affected Environment.

This alternative would almost certainly present long term and cumulative positive effects since it would provide the additional and needed protection measures for the valuable inter-montane wetlands, Kittatinny Ridge forests, and grasslands in the valley. Having the ability to protect lands and habitats within a refuge would greatly strengthen protection measures, thereby enhancing abilities to improve habitat for bog turtle and associated wetland plants and animals. Buffering these sensitive habitats from development while maintaining the current vegetation cover, would impede siltation and other forms of non-point source pollution, and it would directly mitigate the threat of habitat fragmentation and its known negative effects on many species of wildlife and plants. Curtailed development provides a natural barrier to the spread of invasive species, thus preventing these pioneer species from quickly establishing stable and expanding populations in disturbed landscapes. Refuge land protection in concert with existing land and habitat protection efforts and programs noted in earlier chapters would represent a much stronger “tool box” of protection mechanisms to better guarantee the integrity of the valley’s natural and rural character. Management of new refuge habitats would conserve the values discussed above, through habitat improvements and progressive acquisition and protection of additional habitat areas.

We believe habitat management activities conducted by the Service, although not yet well defined, would have minimal negative effects. We would not significantly alter any of the intact habitats, but may conduct activities (e.g., forest cuttings, invasive species control, permitted grazing) that could have very temporary negative effects. Wetlands and floodplains may be at some minimal risk of indirect effects from Service activities in upland areas that drain into them from leaks or spill accidents involving chemicals or petroleum products used in refuge management operations. Our leak and spill prevention and emergency clean-up procedures should ensure that such occurrences are rare, small, and are addressed immediately, limiting those short-term effects to the immediate location. We would employ accepted forest management practices on these lands, typically with longer rotation ages than commercial timber operations use, which would result in increased carbon sequestration. The predominance of more mature stands would improve the health, diversity, and resilience of the forest to disturbance and disease and insect outbreaks, thus maintaining an important carbon “sink.” Conversion of select agricultural lands to grasslands through soil grading, preparation, and seeding, would present minimal negative effects, and any appropriate non-point source controls would be practiced

*Alternative C -- Wetlands & Ridge Forests*

In the "Wetlands and Ridge Forests" alternative, the Service would potentially protect through conservation easement or fee title up to 14,124 acres of wetland, forested upland, and agricultural/grassland habitats. We conclude that establishing the refuge to embrace these habitats would be a major positive effect for Cherry Valley. This alternative would enable protection of over 1,000 wetland acres, 9,900 upland forest acres, and 1,700 acres of agricultural and grasslands.

Alternative C would encompass many of the benefits of Alternative B; however, the benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative.

### 4.2.2 Effects on Migratory Birds

*Alternative A -- No Refuge*

There would be negative effects on migratory birds resulting from the No Refuge alternative, principally due to the lost opportunity to protect significant amounts of habitats relied upon by these species on a local, regional, and continental scale. All of the habitat types and ecosystem types within the valley offer different forms of habitat to nearly every group of birds that inhabit eastern North America – raptors, waterfowl, colonial nesting birds, shorebirds, secretive marsh birds, grassland birds, and a diverse array of neotropical migratory birds. These habitat types and ecosystem types would continue to be threatened by encroaching development and other disturbances of an expanding human population competing for lands and water. Species in decline, or that are otherwise of conservation concern (Table 2-4), would directly be effected by an inability to further protect their habitats through refuge acquisitions, and subsequent habitat management improvements. The negative effects would be cumulative over time, and in a broader context may contribute to a diminished regional habitat complex for these important denizens of the valley.

*Alternative B -- Diverse Habitat Complex*

In the "Diverse Habitat" alternative, the Service would potentially protect through fee and easement acquisition up to 20,466 acres of wetland , forested upland, and agricultural/grassland habitats (Table 3-2). Protection of these lands and habitats for migratory birds is a driving factor in the Study Act and this Study Report, and would have direct, immediate and long term positive effects on resident, breeding, migratory, and wintering species of migratory birds and game birds. Narrative background on the status of migratory birds in the valley, along with Table 2-4 in the Affected Environment

chapter, provides a clear indication of the species that are imperiled or in some stage of decline, and the habitats they rely upon.

As discussed in Chapter 2, the large blocks of unfragmented forest throughout the Kittatinny Ridge serve as key breeding sites for many interior-forest birds, including ruffed grouse, wood thrush, ovenbird, scarlet tanager, cerulean warbler, worm-eating warbler, Louisiana waterthrush, Acadian flycatcher, and many others. Some of these are species of conservation concern that may be on the brink of being threatened or endangered, or are on the Audubon National Bird Conservation WatchList. Others such as the bald eagle have improved significantly over their range and were removed from Endangered Species Act protections in 2007. As provided by the National Bald Eagle Management Guidelines, it is imperative to continue to protect vital eagle habitat and avoid habitat fragmentation and human disturbance.

Providing a diversity of habitats and ecosystems defined in Alternative B would contribute significantly to wellbeing and stability of birds in the valley while also contributing to the regional and continental goals of the Appalachian Mountain Bird Conservation Region and its associated conservation concept plan. Even more broadly, land protection carried out through Alternative B would contribute directly to goals of the Conservation Plan for the Kittatinny Ridge in Pennsylvania, and the other bird conservation plans noted in Chapter 1 – Study Purpose and Planning Considerations and Chapter 3 –Alternatives.

Once acquired, habitats would be managed to enhance their ecological function for migratory bird and to maintain their health and viability over the long term. Wetlands would be a priority for protection, and would be managed for waterfowl and associated colonial wading birds and secretive marsh birds. Forests would be managed to assure their value as breeding habitat for neotropical migrants, along with other needs such as black bear and balanced populations of white-tail deer. Grasslands would serve the needs of bobolink, meadowlark, and several sparrow species, and could be expanded into viable breeding units for select species through wildlife management applications on adjacent agricultural lands.

Further details on management for migratory birds are presented in Appendix B – Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the “Habitat and Ecosystems” section.

*Alternative C -- Wetlands and Ridge Forests*

In the “Wetlands and Ridge Forests” alternative, the Service would potentially protect through fee and easement acquisition up to 14,124 acres of wetland , forested upland, and agricultural/grassland habitats (Table 3-3). As described in Alternative B, protection of these lands and habitats for migratory birds is a driving factor in the Study Act and

this Study Report, and would have direct, immediate, and long term positive effects on resident, breeding, migratory, and wintering species of migratory birds and game birds.

Providing a diversity of habitats and ecosystems defined in Alternative C would contribute significantly to the wellbeing and stability of birds in the valley while also contributing to the regional and continental goals of the Appalachian Mountain Bird Conservation Region and its associated conservation concept plan. Even more broadly, land protection carried out through Alternative C would contribute directly to goals of the Conservation Plan for the Kittatinny Ridge in Pennsylvania, and the other bird conservation plans noted in Chapter 1 – Study Purpose and Planning Considerations and Chapter 3 –Alternatives.

Alternative C would encompass all of the benefits of Alternative B; however, the benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative.

### 4.2.3 Effects on Endangered and Threatened Species

*Alternative A -- No Refuge*

The no refuge alternative would likely present long term and cumulative negative effects on threatened and endangered species (i.e., listed species) since it would not provide any additional protection measures for the valuable inter-montane wetlands, Kittatinny Ridge forests, and grasslands in the valley. Lack of strengthened protection measures would impede abilities to enhance wetland habitat for bog turtle, and would directly impede opportunities to meet the multiple goals (re: Affected Environment – Chapter 2) of the bog turtle recovery plan which recognizes extant habitats in the Delaware recovery unit as critically important for the overall recovery of this threatened species (USFWS 2001) . Continued development could lead to siltation and other forms of non-point source pollution, and also exacerbate the chronic struggle to prevent habitat fragmentation and expansion of invasive plants, both known to have negative effects on this species, as well as most others. The no refuge alternative would also hamper any efforts to acquire and manage new habitats that may serve to attract formerly occurring listed species such as the Indiana bat and the dwarf wedgemussel, species that live nearby and could expand into the valley with appropriate habitat protections and management. Local land and habitat protection efforts and programs noted in earlier chapters would continue to be the basis of protecting these areas, and conclusions have been reached already that these measures are inadequate, especially for sensitive species such as bog turtle and dwarf wedgemussel. Without further guarantees for protecting the wildlife habitat values in the valley, the development pressures in the valley could ultimately jeopardize displacing habitats for these imperiled species.

*Alternative B -- Diverse Habitat Complex*

Narrative background on the status of listed species in the valley in Chapter 1 and 2, and Table 2-4 in the Affected Environment -- Chapter 2, provide ample information on the nature and status of listed species that are imperiled or in some stage of decline, and the habitats they rely upon.

Protection of these lands and habitats for threatened and endangered species, as with migratory birds, is also a driving factor in the Study Act and this Study Report, and would have direct, immediate, and long term positive effects on the bog turtle, and would offer immediate opportunities to assist in the recovery of the Indiana bat and the dwarf wedgemussel. For bog turtle, refuge wetland habitat protection would provide opportunities for the refuge to contribute to six of eight goals in the 2001 recovery plan: 1) secure long-term protection of bog turtle populations, 2) conduct surveys of known, historical, and potential bog turtle habitat, 3) investigate the genetic variability of the bog turtle throughout its range, 4) manage and maintain bog turtle habitat to ensure its continuing suitability for bog turtles, 5) conduct an effective law enforcement program to halt illicit take and commercialization of bog turtles, and 6) develop and implement an effective outreach and education program about bog turtles. Within the recovery plan, the goal for the Delaware recovery unit is to protect at least 80 viable bog turtle populations and sufficient habitat to ensure the sustainability of these populations. This recovery unit is divided into east and west subunits, of which Cherry Valley lies in the Delaware west subunit, consisting of the Delaware River watershed west of the Delaware River. To meet the recovery criterion for this unit, at least 20 populations must be protected in the Delaware West Subunit (USFWS 2001). Establishment of a refuge in the valley through Alternative B would, again, contribute directly to this goal.

The large blocks of unfragmented forest, and forested and shrub wetlands, throughout the ridge and valley are believed to serve as valuable foraging habitat for Indiana bats. Alternative B offers a chance to permanently secure Hartman's cave and its environs, widely recognized as a site that may once again serve as a hibernaculum for this species, if properly protected and managed. Acquiring select aquatic habitats and ecosystems defined in Alternative B offer an opportunity to secure habitats that could be improved for possible reintroduction of dwarf wedgemussel.

Once acquired, habitats would be managed to enhance their ecological function for listed species, notably bog turtle. Wetlands would be a priority for protection, and would be managed for bog turtles, and as mention previously, waterfowl, associated colonial wading birds, and secretive marsh birds. Forests would be managed to assure their value as foraging habitat and potential female maternity roosts in summer. While management activities could have some negative effects on listed species, there would be long-term benefits to the populations over time. Any effects on listed species associated with management activities would be addressed through consultation under the ESA. Further details on management for listed species is presented in Appendix B –

Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the "Habitat and Ecosystems" section.

*Alternative C -- Wetlands & Ridge Forests*

In this alternative -- "Wetlands and Ridge Forests" -- the Service would potentially protect through fee title and conservation easements up to 14,124 acres of wetland , forested upland, and agricultural/grassland habitats (Table 3-3). Alternative C would encompass all of the benefits of Alternative B; however, the benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative. As with Alternative B, management activities could have negative effects on listed species; however, there would be long-term benefits to the populations over time. Any effects on listed species associated with management activities would be addressed through consultation under the ESA.

### 4.2.4 Effects on Interjurisdictional Fish and Aquatic Organisms

*Alternative A -- No Refuge*

The No Refuge alternative would likely present long term and cumulative negative effects on interjurisdictional fish and aquatic organisms since it would not provide newly needed protection measures for the valuable inter-montane wetlands, streams, and riparian habitats. In most areas, riparian vegetation is well-established and stable, providing a thick canopy important to fish, especially trout populations, including native brook trout in upper reaches or tributaries of Cherry Creek. Currently, about 78 acres of stream and riparian habitat are protected, considerable less than the additional acres that could be offered in the other alternatives. Some creeks and streams are more vulnerable to point- and non-point source pollution, depending on their proximity to development, and this "No Refuge" alternative would negate any new efforts to impede non-point source pollution. As noted in the "Habitat and Ecosystems" section above, the greatest impediment with Alternative A is the continued inadequacies of land protection measures for the valley's fish and wildlife resources.

Lack of strengthened protection measures would impede abilities to enhance stream and riparian habitats that are known to be used by American eel, an interjurisdictional fish species facing significant declines due to an internationally-based high consumer demand (especially for juvenile glass eels), insufficient harvest limits, hydropower dams and other blockages on rivers and streams used by migrating eel, and a general degradation of freshwater habitats. Concern for the eel by the Atlantic States Marine Fisheries Commission resulted in the Service and the National Marine Fisheries Service considering the species for possible listing under the ESA, but the review indicated that although there remain serious concerns, listing was not warranted (USFWS 2007a).

Protection of eel habitat is an essential measure needed to safeguard this species, a safeguard not provided by Alternative A. The no refuge alternative would also hamper any efforts to protect and manage habitats that may serve to attract other interjurisdictional species such as herring (*Alosa* spp) and striped bass. Further details on management for listed species are presented in Appendix B – Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the "Habitat and Ecosystems" section.

In addition to interjurisdictional fish, over 40 other fish species have been identified within the Study Area (Appendix C, Table C-2). Three mussel species have been identified in Cherry Creek. The relatively common eastern elliptio and creeper mussels appear to have stable populations, while the triangle floater has been classified as vulnerable by the Pennsylvania Natural Heritage Program. The alewife floater and the yellow lampmussel may also be in decline, and having no further habitat protection abilities through the No Refuge alternative would be a negative effect for these aquatic organisms. As mentioned above, the federally-listed, endangered dwarf wedgemussel is found in the Delaware River, upstream from the mouth of Cherry Creek, and the Eastern pearlshell mussel, a state-listed endangered species, once occupied habitat in the Cherry Creek watershed. The No Refuge alternative would offer no ability for reintroductions into Cherry Creek.

*Alternative B -- Diverse Habitat Complex*

Alternative B would have essential, positive effects on interjurisdictional fish and aquatic organisms since it would provide additional and necessary protection measures for valuable stream and riparian habitats. With this alternative, over 250 acres of riparian habitat could be protected, compared to the current 78 acres of riparian habitat in Alternative A. Protecting these habitats, and managing vegetation along shorelines, could significantly mitigate non-point source pollution. As noted in the "Habitat and Ecosystems" section above, the greatest benefit to be gained from Alternative B is a heightened ability to protect the valley's interjurisdictional fish and aquatic resources.

In contrast to the No Refuge alternative, having a refuge that embraces new riparian habitats strengthens protection measures in the valley, thereby directly contributing to the conservation and potential recovery of the declining American eel, noted above. Protection of eel habitat is an essential measure needed to safeguard this species, a safeguard not provided by Alternative A. Alternative B would also strengthen efforts to acquire and manage new habitats that may serve to attract other interjurisdictional species such as herring (*Alosa s*pp) and striped bass. Further details on management for trust species is presented in Appendix B – Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the "Habitat and Ecosystems" section.

Alternative B would also directly benefit other fish and aquatic resources in the valley. It would benefit the other 40 other fish species have been identified within the Study Area (Appendix C, Table C-2), and the three mussel species have been identified in Cherry Creek noted above. Notably, this alternative would enable reintroductions of the federally-listed, endangered dwarf wedgemussel and the state-listed, Eastern pearlshell mussel, alewife floater, and yellow lampmussel.

In contrast to the positive benefits, negative effects on riparian areas and surface waters would not likely be much greater. The Service would follow best management practices for avoiding negative effects to riparian and aquatic habitats when implementing management activities. There would not likely be a need to build refuge structures in these areas and any other management activities would likely be able to avoid or minimize impacts to these habitats.

*Alternative C -- Wetlands & Ridge Forests*

Perhaps the largest difference between Alternative B and Alternative C, in terms of overall effects, is likely within this category. Alternative C would protect significantly less riparian habitat than Alternative B; about 90 additional acres of riparian conservation compared to over 260 acres of riparian habitat in Alternative B. While the general types and value of effects associated with this alternative are similar to Alternative B, the over all magnitude of benefits would potentially be much less.

As described in Alternative B, there would be direct benefits to other fish and aquatic resources in the area including the many species of fish documented in the area (see Appendix C, Table C-2) as well as native mussel species.

Negative effects on riparian areas and surface waters would be somewhat greater with Alternative C compared to Alternative B. Without protection, approximately 110 acres of stream and riparian habitats could be subject to disturbances (e.g., forest clearing or road building that causes siltation in streams) that compromise their conservation value that could have adverse impacts on interjurisdictional fish and aquatic species.

### 4.2.5 Effects on Other Wildlife

*Alternative A -- No Refuge*

Currently, the extensive and relatively unfragmented forests along the Kittatinny Ridge provide habitat for resident animal species including large mammals such as white-tailed deer, black bear, coyote, and numerous smaller mammals including the Pennsylvania-threatened (and globally rare) Allegheny woodrat, Eastern small-footed bat, and Northern long-eared bat. Other habitats within the nearly 6,300 acres of currently protected habitat include gray and red squirrel, raccoon, woodchuck, skunk, and opossum, often found in the more developed areas of the watershed. Common

furbearers include mink, muskrat, beaver, and otter. Cherry Valley is also designated as an Important Mammal Area (Important Mammal Areas Project Website, 2008) due to the presence of Hartman's Cave and four bat species using the cave. Game birds can also be found in these forest habitats including ruffed-grouse in early successional forest, woodcock in mesic and wet forest areas, and wild turkey just about anywhere. The Kittatinny Ridge also supports cliffs and associated rocky talus slopes that provide habitat for black vultures, turkey vultures and common ravens. Spotted turtles, wood turtles, four-toed salamanders and marbled salamanders, all thought to be declining, can be found within the valley's wetlands and vernal pools. Though totaling a relatively small ten acres or so, the cliffs also support several reptile species such as the five-lined skink, fence lizard, timber rattlesnakes and other snake species.

The No Refuge alternative would offer no further protections for these habitats and species of concern, and would likely present long term and cumulative negative effects. This "No Refuge" alternative would negate any new efforts to impede encroaching development and it's introduction of wildlife-urban interface problems involving foraging skunks, raccoons, fox, bear, and coyote. Such wildlife-urban interface problems easily distract fish and game officials from performing duties that enhance wildlife populations and wildlife-dependent recreational opportunities. Lack of strengthened protection measures would impede abilities to manage habitats for species of concern, or for recreational hunting and fishing opportunities.

*Alternative B -- Diverse Habitat Complex*

In contrast to the No Refuge alternative, Alternative B would have positive, long lasting effects on other wildlife described above, and it would provide additional protection measures for all of the diverse habitats needed by these species. With this alternative, up to 20,466 acres of habitat could be protected, considerably more than the current 6,300 acres of protected habitat. Protecting these diverse habitats, and managing them to fully realize their ecological function and integrity, could significantly mitigate a host of potential negative effects discussed above that are likely to occur without establishing a refuge. This alternative would significantly curtail encroaching development and it's introduction of wildlife-urban interface problems, thus better enabling fish and game officials to perform duties that enhance wildlife populations and wildlife-dependent recreational opportunities. Further details on management for other wildlife is presented in Appendix B – Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the "Habitat and Ecosystems" section.

*Alternative C -- Wetlands & Ridge Forests*

Alternative C would encompass all of the benefits of Alternative B; however, the benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects

would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative.

### 4.2.6 Effects on Plants

*Alternative A -- No Refuge*

Currently over 6,300 acres of valuable habitat is protected in the valley. As discussed in Chapter 2 (Affected Environment, Table 2-4) and Chapter 3 (Alternatives), these broad ecological systems provide habitat for a broad array plants, especially for unique and rare plants currently in decline. These plants, listed as endangered, threatened, or at-risk by either the federal or Pennsylvania-state governments, include the Northeastern bulrush, Northern water plantain, Bebbs sedge, Yellow sedge, Variable sedge, Hemlock parsley, wild bleeding heart, matter spike-rush, and capitates spike rush, strongly indicating reliance on the valley's wetlands habitats for most of these species but not all. According to The Pennsylvania Natural Heritage Program (WPC 2008), at least ten globally rare plant species exist in the Cherry Valley area, including spreading globe flower, a small blooming aquatic buttercup that prefers open wetlands valleys.

The valley also suffers, as do most communities and regions, with invasive plants that quickly establish themselves in disturbed land areas. Grasslands throughout the physiographic area are being significantly degraded by succession and through colonization of these areas by invasive plant species. The expansion of fast spreading invasive species such as multi-flora rose, autumn olive, purple loosestrife, Japanese knotweed, and Common reed (*Phragmites* spp) into grassland and wetland habitats very quickly makes these habitats unsuitable for many species of birds and other wildlife.

The No Refuge alternative would offer no further protections for these habitats and plant species of concern, and would likely present long term and cumulative negative effects. This "No Refuge" alternative would negate any new efforts to impede encroaching development and it's displacement of rare plants and its concomitant introduction of invasive plants and the extremely difficult and expensive control measures that are needed to curb their spread.

*Alternative B -- Diverse Habitat Complex*

Compared to the No Refuge alternative, Alternative B would have positive, long-lasting effects on native and rare plants in the valley. It would provide additional protection measures for all of the diverse habitats needed by these plant species, and would offer new opportunities to improve habitats that may attract the reemergence of species such as the small-whorled pogonia. With this alternative, up to 20,466 acres of habitat could be protected, considerably more than the current 6,313 acres of protected habitat. Protecting these diverse habitats for native plants, and managing them to fully realize their ecological function and integrity, could significantly mitigate a host of

potential negative effects discussed above that are likely to occur without establishing a refuge. This alternative would significantly curtail encroaching development and its introduction of invasive plants. Invasive plants can cause major damage to native plant assemblages and the wildlife they support, and we would take steps to insure that invasive species do not become established and degrade the wetlands and grasslands. Further details on management for other wildlife is presented in Appendix B – Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the "Habitat and Ecosystems" section.

*Alternative C -- Wetlands & Ridge Forests*

Alternative C would encompass all of the benefits of Alternative B; however, the benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects would be minimal, and would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative.

## 4.3 Effects on the Socioeconomic Environment

Socioeconomic environment identifies those elements of the environment that are susceptible to change and may be affected by any of the potential alternatives. Specific characteristics of these alternatives, such as changes in potential public use or access to the refuge or changes to budget and staffing for the refuge, can be important sources of potential impact for the user base of the refuge and the surrounding Monroe County community. Changes in public use opportunities potentially affecting refuge visitation and visitor spending in the surrounding local communities, changes in land use potentially affecting local open space needs and land values, and changes in overall refuge management would potentially affect the area around the refuge.

### 4.3.1 Effects on Public Use and Access

Providing opportunities for compatible wildlife-dependent public uses, including hunting, fishing, environmental education, interpretation, wildlife observation and photography, is integral in our overall management of the refuge. Those are priority uses of the National Wildlife Refuge System. Other refuge uses that we determine to be appropriate and compatible with our goals in managing the refuge can also provide public benefit.

*Alternative A -- No Refuge*

The No Refuge alternative would not prevent but would have a negative effect on facilitating any opportunities for wildlife-dependent recreational opportunities as defined above. Hunting is a prized activity by many of the residents of Cherry Valley. Private lands are largely posted, greatly limiting hunting access. Non-residents of Cherry

Valley are sometimes able to obtain permission from landowners for hunting, but this occurs on a limited basis. Cherry Creek is a valued trout fishery. Several fishing clubs lease land along the Cherry Creek. Like hunting, fishing is limited due to the posting of private land and limited public access. Cherry Valley provides a wealth of wildlife for observation and photography; however, viewing opportunities are limited by access. The narrow county and township roads running through the valley do not provide adequate pull-offs so safety is of the utmost concern. Environmental Education is limited by the lack of support facilities in the valley, although there is a strong Environmental Education program at the Monroe County Conservation District that reaches out to more than 25,000 students annually. Currently, the Conservation District brings every 4$^{th}$ grader to the Tannersville Cranberry Bog in nearby Pocono Township, but there are few other easily accessible nearby habitats to take students.

*Alternative B -- Diverse Habitat Complex*

For this alternative, the Service would potentially acquire up to 20,466 acres of wetland, forested upland, and agricultural/grassland habitats (Table 3-2). We conclude that establishment of a refuge to embrace these habitats would be a major positive effect for promoting a number of wildlife-dependent uses on the new refuge. As the refuge matures in size and staff over time, and as the CCP and Visitor Use Plans are developed, the specific types and limits on public use would be determined. It is expected, however, that early in the process there would be new opportunities for the "Big-6" public uses defined above. Most notably is the potential for creation of trails, hunting and fishing access, wildlife interpretation, and wildlife observation and photography. Environmental education is typically more intensive in nature and may take time to develop. Determinations have been drafted on the compatibility of these wildlife-dependent public uses and are incorporated into the Conceptual Management Plan – Appendix B.

Establishing trails at the refuge is likely, and would facilitate environmental education, wildlife observation and photography, and wildlife interpretation. Foot travel from visitors using the refuge for walking/hiking, backpacking, cross country skiing, snowshoeing, or conducting research on the refuge increases root exposure, trampling effects, and crushing of plants. We would continue to expect and encourage refuge visitors to stay on designated trails, thus minimizing vegetation compaction and soil loss. Those impacts would primarily occur in the trail footprint. Visitors may also spread invasive plants. When people move from one area to another, they can be pathways for the seeds or other propagules of invasive plants. Once established, invasive plants can out-compete native plants, thereby altering habitats and affecting wildlife. The threat of invasive plants establishing themselves will always be an issue that requires monitoring.

Hunting can cause disturbance to vegetation because of trampling, and if vehicles are permitted on refuge roads, there is soil disturbance with that activity. We expect,

however, trampling of vegetation would be minimal. In addition, most hunt seasons occur during the winter months, when vegetation is dormant. Direct impacts on wildlife can be expected wherever humans have access to an area. In general, human presence disturbs most wildlife, which typically results in a temporary displacement without long-term effects on individuals or populations. Some species will avoid areas frequented by people, such as developed trails and buildings, while other species seem unaffected or even drawn to a human presence. When visitors approach too closely to nests, they may cause adult birds to flush, exposing the eggs to weather events or predators. Overall, direct effects should be insignificant from non-consumptive visitor activities because use of refuge lands is fairly dispersed, and large areas are not accessible. The direct effects of any authorized hunting would be carefully documented and reviewed as official hunt plans are developed. Hunt plans account for what harvest levels can be sustained for a species without adversely affecting its overall population. As such, hunting results in individual losses, but the projected cumulative harvest should not jeopardize the viability of any harvested species' population. Some disturbance to non-target wildlife species may occur; however, those impacts should be minimal because hunting pressure is moderate and usually occurs outside of breeding seasons.

Any permitted fishing on the refuge would follow Pennsylvania regulations, including harvest limits for certain species. These limits are set to ensure that harvest levels do not cumulatively impact native fish resources to the point they are no longer self-sustainable.

A national wildlife refuge at Cherry Valley would expand the Monroe County Conservation District's Environmental Education Program's ability to provide students with a diverse set of habitats and field education experiences, which are currently focused at Tannersville Cranberry Bog in Pocono Township.

Overall negative effects from public use in Alternative B would not necessarily be much greater than for Alternative C. While there will be more opportunity for public use of the refuge because of the additional lands, impacts will be spread out over the properties likely resulting in similar densities of use.

*Alternative C -- Wetlands & Ridge Forests*

Alternative C would encompass all of the benefits of Alternative B; however, the public use benefits derived from this alternative would be smaller since the size of this refuge would be 14, 124 acres instead of 20,466 acres. This could result in fewer areas for public use activities compared to Alternative B. In a similar fashion, the negative effects would be minimal, and would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative. It is possible, however, that greater public use densities would occur in some areas under Alternative C due to the smaller refuge area and thus expose some sites to slightly more negative public use impacts.

### 4.3.2 Effects on Land Use

Within the Study Area, a majority of lands are considered to be in "open" (not developed) land uses and most parcels are in private ownership. Land use within the Study Area, classified into ten general categories based on Monroe County tax records (Table 2-5), can be easily grouped into open space parcels and developed parcels. Developed parcels, which include residential and industrial properties, collectively account for about one-third of the Study Area. Open space parcels, which include agriculture, parks, forest, vacant, and in this case, property owned by utilities, together account for nearly 70 percent of the Study Area. Figure 2-5 shows developed and open space lands within the Cherry Valley National Wildlife Refuge Study Area.

*Alternative A -- No Refuge*

The No Refuge alternative would most likely have a negative effect on land use since it would result in a continued reliance of current protection measures for controlling development and protecting valuable habitats. These measures do not provide for adequate protection of habitats and development pressures would continue without further consideration of wildlife habitats. As noted above, development pressure in the valley has declined since 2005 and, even though that is an encouraging statistic, the decline is the result of market forces and not land conservation priorities. Not having the ability to secure valuable habitat lands for acquisition within a refuge eliminates a significant conservation and wildlife-oriented recreational tool for the valley and its citizens.

*Alternative B -- Diverse Habitat Complex*

In the "Diverse Habitat Complex" alternative, the Service would potentially acquire in excess of 20,466 acres of wetland , forested upland, and agricultural/grassland habitats (Table 3-3). This would have a direct and long term positive effect on curbing development encroachment while maintaining and enhancing a significant amount of wildlife habitat and open space in the valley. Currently about 6,313 acres are protected. Having the ability to acquire lands and habitats for a new refuge would enable protection of most of the 13 extant ecosystems (Table 2-2) remaining in the valley, thus helping to maintain the exceptional rural and natural quality of Cherry Valley, while opening new opportunities for conserving declining species and opening wildlife-dependent recreational activities.

*Alternative C – Wetlands & Ridge Forests*

The effects of Alternative C – Wetlands and Ridge Forests – on land use would be largely positive, and would contribute almost all of the benefits as described in Alternative B. The benefits derived from this alternative would be somewhat less since the size of this refuge would be 14,124 acres instead of 20,466 acres but would enable the protection of portions of all thirteen ecosystems in the valley. In a similar fashion, the negative effects would be minimal, and would be essentially identical to Alternative B but of an even lesser degree due to the smaller potential size of the Wetlands and Ridge Forests alternative.

### 4.3.3 Effects on Local Economy

*Alternative A – No Refuge*

There would be no expected change in the local economy under the No Refuge alternative, as current the development rate, tax revenues, business revenue, would remain subject to non-refuge influence. Changes would be due to existing influences and market forces. A potential yet unsubstantiated economic outcome of not having a refuge in the valley would be loss of refuge visitor expenditures at local businesses and establishments. Visitors to the valley would be expected to grow steadily as the size of the refuge grew and an public use opportunities were created. Typical public use activities such as hunting and fishing, hiking, bird watching, wildlife photography, plant identification, and general scenic appreciation would become a normal economic mainstay for the valley.

*Alternative B – Diverse Habitat Complex*

Recreational use on refuges generated almost $1.7 billion in total economic activity during fiscal year 2006, according to a report released by the U.S. Fish and Wildlife Service (2006). The report, titled *Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation* was compiled by Service economists. According to the study, nearly 35 million people visited refuges in 2006, supporting almost 27,000 private sector jobs and producing about $543 million in employment income. In addition, recreational spending on refuges generated nearly $185.3 million in tax revenue at the local, county, state, and federal levels. The economic benefit is almost four times the amount appropriated to the Refuge System in Fiscal Year 2006. About 87 percent of refuge visitors travel from outside the local area (USFWS, 2006). This information gives an indication of how the creation of a Cherry Valley NWR could be of economic benefit to the local economy.

The fiscal impact to Monroe County and its townships, if a refuge is established, would depend on both the quantity of land acquired and the rate of acquisition. While land owned by the U.S. Government is not taxable by state or local authorities, the federal

government has a program in place to compensate local governments for foregone tax revenues. The Refuge System typically makes an annual payment in lieu of taxes to local governments. The amount of the payment depends on the final Congressional budget appropriations for the Service for that year. Recently, the payment has been less than what the state or local government may have received through normal taxation. It should be noted that the parcels with the highest assessed value within the Study Area (i.e., residential, industrial, and retail) are parcels that have the least desirable characteristics for conservation. Additional details are provided in the Land Protection Plan (Appendix E) and the Conceptual Management Plan (Appendix B).

Local economies usually benefit from refuge staff who live and shop in the community. There is no ability yet to predict the staffing level at a potential refuge, although various scenarios are discussed in the Conceptual Management Plan (Appendix B). Once staff begin to be located in the Cherry Valley locale, there would be an expectation of some economic gain to the community, both with direct buying of goods and services by refuge staff but also secondary or multiplier effects for work generated by the various needs of the refuge resulting in some local financial output. Timber harvesting for saw timber, pulp, and fuelwood in support of local species habitat management is an economic activity that may be available to the local timber industry at some point in time. Such a determination would be made during development of the refuge's Habitat Management Plan or CCP.

*Alternative C – Wetlands and Ridge Forests*

The effects of Alternative C -- Wetlands & Ridge Forests – on the local economy would be largely positive, and would contribute almost all of the benefits as described in Alternative C. The benefits derived from this alternative would be somewhat less since the size of this refuge would be 14,124 acres instead of 20,466 acres, and there may be a smaller staff and work opportunities for the local community. In a similar fashion, the negative effects would be minimal, and would be essentially identical to Alternative C but of an even lesser degree due to the smaller potential size of the Wetlands and Ridge Forests alternative.

### 4.3.4 Effects on Cultural and Historic Resources

As noted in Chapter 2 – Affected Environment, there is some evidence of habitation in the valley and surrounding areas during pre-historic times by the Lenni-Lenape people whose occupation of the land preceded European settlers by thousands of years. Early records of contact between Native Americans and European colonists in the area date to 1609. Cherry Valley was well settled by European colonists before the middle 18th Century, and records show settlement by a large congregation of mostly German settlers who lived and worshiped within the valley.

*Alternative A -- No Refuge*

The No Refuge alternative would have a slight negative effect on the protection of historic and cultural resources, principally due to the lack of a continuous federal presence, which provides a clear responsibility for protection of these resources. There is an expectation on landowners and developers to take necessary precautions to ensure that no sites or structures on National Historic register would be affected by their activities in the valley. As part of our section 106 compliance, site disturbance activities will continue to be reviewed by the Pennsylvania State Historic Preservation Office (SHPO).

*Alternative B – Diverse Habitat Complex*

The Service's protection of up to 20,466 acres of habitat would benefit cultural resources by ensuring that none of the substantial impacts related to development for residential or commercial uses would affect known or undiscovered cultural and historic resources on those lands. Prior to any excavation or building site preparation, the refuge would conduct appropriate cultural and historic property surveys. There is some risk that refuge visitors may inadvertently or intentionally damage or disturb cultural and historic those sites; however, we would employ all means available to protect known sites, structures, and objects of importance for scientific study, public appreciation and socio-cultural use. We would also, where possible, promote archaeological research on, or relating to, refuge lands, add language from the Antiquities Resource Protection Act (ARPA) to appropriate public use materials to warn visitors about illegal looting, and maintain law enforcement personnel trained in ARPA enforcement.

*Alternative C -- Wetlands & Ridge Forests*

The effects of Alternative C -- Wetlands & Ridge Forests – on cultural and historic resources would be largely positive, and would contribute almost all of the benefits as described in Alternative B. The benefits derived from this alternative would be somewhat less since the size of this refuge would be 14,124 acres instead of 20,466 acres and the refuge would have a smaller area of influence. In a similar fashion, the negative effects would be essentially identical to Alternative B but of an lesser degree due to the smaller potential size of the Wetlands and Ridge Forests alternative.

### 4.3.5 Effects on the Soundscape

Emerging research from the National Park Service shows that there is serious concern about the effects of human induced sounds on the overall park experience. The agency also discovered that as many visitors said they were visiting parks to enjoy the "natural quiet" as much as to appreciate park's visual beauty (National Park Service, Effects of Sound). In addition, there is evidence that human induced noise can interfere with

various aspects of animal behavior including preventing predator warning signals, disrupting breeding behavior, and discouraging birds from singing during the day when noise levels are highest (Streater 2008). While the sounds of the wild are integral to the national park experience for visitors, reducing noise pollution is vital to the survival of wildlife, says the National Park Service (Streater 2008). Although there is no specific information about sound effects in the Cherry Valley area, the effects of man-induced sounds and noise on wildlife and visitors should not be underestimated.

*Alternative A -- No Refuge*

Distinct landforms, breathtaking vistas, unique habitats and species of special concern make Cherry Valley a special place for people and nature. Located less than two hours by car from Philadelphia and New York City, Cherry Valley's quiet landscape is threatened by the onrush of residential development. The Cherry Valley National Wildlife Refuge Study Area straddles parts of six municipalities in southeastern Monroe County. Developed parcels, which include residential and industrial properties, collectively account for about one-third of the Study Area. Residential properties, alone, cover nearly 20 percent of the total Study Area. Open space parcels, which include agriculture, parks, forest, vacant, and in this case, property owned by utilities, together account for nearly 70 percent of the Study Area, although much of the open space lands are not protected.

The No Refuge alternative for Cherry Valley would offer potential negative effects on increasing human-induced sounds due to the lack of new efforts to protect lands and waters that can serve as place of refuge from an anthropogenic landscape. With continuing development comes the associated sounds and noise from residential and commercial traffic, motorcycles, helicopters, other aircraft, heavy equipment, air conditioners, and the like.

*Alternative B – Diverse Habitat Complex*

Alternative B would provide positive effects compared to Alternative A since creation of a Cherry Valley NWR up to 20,466 acres would reduce the potential for large-scale development and related human generated noise. Maintaining and improving extensive habitat areas for fish, wildlife, and visitors will provide an expansive buffer against nearby urban noises, thus providing a less threatening environment for breeding and foraging wildlife and a more serene soundscape for the visiting public. Trees help reduce noise levels in urban and suburban areas. Even a fifty foot wide belt of trees can reduce noise levels by as much as 50 percent (USDA Forest Service 2006).

Creation of a Cherry Valley NWR potentially would stimulate some increase in human induced noise. Although visitors to a new refuge would generate traffic noise and some non-motorized noise (e.g., talking), it would be minimal in an overall landscape environment. The Service limits the uses of refuges to be compatible, wildlife-oriented,

consumptive and non-consumptive uses, and thus, greatly curtails anthropogenic sources of noise. Currently there is no reliable way to estimate potential visitor use and effects on potential refuge wildlife. However, we would employ our appropriate use and compatibility policies to ensure that noise levels would have no or minimal effects on wildlife. We expect use would include walking trails and related, non-motorized activities. These activities tend to generate low noise levels. The potential negative sound effects of the suggested conceptual management activities could include, for example, operation of refuge vehicles, constructing visitor interpretation and parking facilities, building refuge administrative headquarters, access roads, and constructing interpretive trails. We would use any available best management practices to help minimize noise levels at the refuge. In analyzing the effects of refuge management activities and public use on noise levels, we principally considered how Service actions at the refuge might affect sound locally, which will allow us to determine any effects on regional basis if necessary.

*Alternative C -- Wetlands & Ridge Forests*

The effects of Alternative C -- Wetlands & Ridge Forests – on the valley's soundscape would be largely positive, and would contribute almost of the benefits as described in Alternative B. The benefits derived from this alternative would be somewhat less since the size of this refuge would be 14,124 acres instead of 20,466 acres and the refuge would have a smaller area of influence on mitigating noise. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a lesser degree due to the smaller potential size of the Wetlands and Ridge Forests alternative.

**Cumulative Effects**

According to the Council on Environmental Quality NEPA implementing regulations at 40 CFR 1508.7, "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

**Physical Resources**. Alternative A – No Refuge – would likely contribute to an acceleration of poor air quality over the long term simply due to the expected continued increases in development and its concomitant contributions to pollutant emissions. Neither Alternative B (Diverse Habitats) or C (Wetlands and Ridge Forests) are expected to have significant cumulative adverse impacts on air quality locally or regionally since they would help retain the natural habitat qualities within the proposed refuge boundary. Some short-term, local deterioration in air quality would be expected from air emissions of motor vehicles used by refuge visitors and staff. With our partners, we would continue to contribute to improving air quality through cooperative land conservation and management of natural vegetation and wetlands. We do not

envision any activities that would have cumulative negative effects on soils or water quality, or to the local soundscape, and conclude that protection of lands and habitats in the refuge acquisition boundary would have clear positive benefits to these environmental attributes.

We expect none of the alternatives to have significant adverse cumulative impact on cultural resources in the valley. Beneficial effects would occur at various levels, depending on the alternative, because of proposed environmental education and interpretation programs, increased land protection, and increased field surveys to identify and protect any discovered sites. In alternatives B and C we would identify high probability sites to survey more intensely.

**Biological Resources.** Under Alternative A – No Refuge – there would be an expectation of cumulative negative effects on the biological resources over the long term due to the lack of additional habitat protection for the fish and wildlife resources in the valley. No significant cumulative adverse effects to biological resources under Alternative B or C is expected since valuable habitats would be protected and their ecological integrity would be retained. Management activities proposed in Alternatives B and C, along with the Conceptual Management Plan, would be expected to have long term beneficial effects to the valley's fish and wildlife resources. Biological resources that we would manage over time to prevent their introduction, limit, or eliminate, such as invasive plants, are not natural components of the valley ecosystem. Losses of those biotic components where they occur would not be considered adverse.

National Wildlife Refuges, and other protected areas harbor unique environments and wildlife not found elsewhere. This raises particular concerns about the vulnerability of these ecosystems to a changing climate. Many refuges are designated to protect rare natural features or particular species of plants and animals. Changes in climate could create new and potentially serious stresses on natural communities, and, in the absence of adaptation, lead to the loss of valued resources. National Wildlife Refuges and other protected areas are currently susceptible to events influenced by climatic variability, such as drought, wild fires, impaired air quality, and severe storms. Climate change may change the frequency and severity of these kinds of events. In some regions, the risk for drought and wildfire, for example, may increase with climate change (IPCC 2007). Along coastal regions, sea level rise could erode and inundate the beaches of coastal refuges, precipitating loss of salt marshes, beaches, loss of habitat in estuarine ecosystems, and damage to property and natural resources from storm surges (IPCC 2007).

The consequences of accelerating climate change on Cherry Valley are as yet unknown and difficult to predict. A warming climate would most likely affect plant species composition and distribution, thus having an effect of wildlife and aquatic resources. The timeframe for these potential changes are unknown but management of the habitats (e.g., prescribed fire applications) and facilities (e.g., minimizing the carbon

footprint) of a Cherry Valley National Wildlife Refuge would clearly encompass the potential effects of climate change.

**Socioeconomic Resources**. There would be no expected long term cumulative change in the local economy under Alternative A – No Refuge – as current development rates, tax revenues, and business revenues would remain subject to non-refuge influences. A potential yet unsubstantiated economic long-term, cumulative outcome of not having a refuge in the valley would be a loss of refuge visitor expenditures at local businesses and establishments. Over time, visitors to the valley would be expected to grow steadily as the size of the refuge grew and public use opportunities were created. Typical public use activities such as hunting and fishing, hiking, bird watching, wildlife photography, plant identification, and general scenic appreciation would become a predictable and long term economic mainstay for the valley.

**Unavoidable Adverse Effects.**

Unavoidable adverse effects are the effects of those actions that could cause significant harm to the human environment and that cannot be avoided, even with mitigation measures. There would be some minor, localized unavoidable adverse effects under all the alternatives. The No Action alternative would maintain the status quo for development and growth in the valley, thus contributing to the unavoidable effects of such development (e.g., increased air emissions, increased impervious surface and stormwater runoff, increased noise). Under Alternatives B and C, there would be, for example, localized adverse effects of building the new refuge headquarters and upgrading access roads. There would be property tax losses to towns and increased visitation that could have unavoidable effects. However, none of these effects rises to the level of significance. All would be mitigated, so there would in fact be no significant unavoidable adverse impacts under any of the alternatives.

**Relationship Between Short-term Uses of the Human Environment and Enhancement of Long-term Productivity.**

Alternative A – No Refuge – would be expected to diminish the long-term productivity and sustainability of natural resources of the valley. In contrast, Alternatives B and C would strive to maintain or enhance the long-term productivity and sustainability of natural resources on the refuge. These alternatives would strive to conserve our Federal trust species and the habitats they depend on, as evidenced by management activities described in the Conceptual Management Plan. These alternatives outline outreach and environmental education activities that would encourage visitors to be better stewards of our environment.

**Potential Irreversible and Irretrievable Commitments of Resources.**

Alternative A – No Refuge – would no long term effect on potential irreversible and irretrievable commitments of federal financial resources. Establishing a refuge as described under Alternatives B and C may contribute to irreversible and irretrievable commitments of federal financial resources. For example, one would be the possible construction of a refuge office and associated visitor facility and access road, typically requiring long term commitments of resources. Another irreversible commitment of resources impacting local communities is Service land acquisition. Once these lands become part of the refuge, it is highly unlikely they would ever revert back to private ownership

**Environmental Justice.**

Executive Order 12898 " Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (February 11, 1994), requires that Federal Agencies consider as part of their action, any disproportionately high and adverse human health or environmental effects to minority and low income populations. Agencies are required to ensure that these potential effects are identified and addressed. The communities surrounding the refuge are relatively homogenous; minority groups do not represent a substantial portion of the affected community. No differential impacts based on minority status would therefore be anticipated under any of the alternatives.

### 4.3.6 Summary of Effects

Table 4-3. Comparison of environmental effects from potential Alternatives for a Cherry Valley National Wildlife Refuge, Pennsylvania.

| Environment | Alternatives | | |
|---|---|---|---|
| | **Alternative A No Refuge** | **Alternative B Diverse Habitat Complex** | **Alternative C Wetlands & Ridge Forests** |
| **Air Quality** | Likely to degrade further due to continued development emissions; less carbon sequestration | Likely to improve due to curtailed development emissions and plant photosynthesis; greater carbon sequestration | Likely to improve due to curtailed development emissions and plant photosynthesis; greater carbon sequestration |
| **Water Quality** | Likely to degrade further due to continued development | Likely to improve due to curtailed development and water filtering through habitats and root zone | Likely to improve due to curtailed development and water filtering through habitats and root zone |
| **Soils** | Likely to erode due to continued development | Likely to be stable and functional due to curtailed development | Likely to be stable and functional due to curtailed development |
| **Habitat and Ecosystems** | Continued threat of development | U Up to 20,466 acres protected for benefit of wildlife and new public use opportunities p to | 14,124 acres protected for benefit of wildlife and new public use opportunities |
| **Migratory Birds** | Continued threat of development jeopardizes their habitat | Up to 20,466 acres of diverse habitats protected for benefit of waterfowl, neo-tropical migrants, and raptors | Up to 14,124 acres protected of wetlands and forests for benefit of waterfowl, neo-tropical migrants, and raptors |
| **Threatened and Endangered Species** | Continued development threatens recovery of bog turtle and other federal and state listed species | Up to 20,466 acres protected of wetlands and forests for benefit of bog turtle, Indiana bats, small-whorled pogonia, and other listed federal and state species | Up to 14,124 acres protected of wetlands and forests for benefit of bog turtle, Indiana bats, small-whorled pogonia, and other listed federal and state species |

| Environment | Alternatives | | |
|---|---|---|---|
| | **Alternative A No Refuge** | **Alternative B Diverse Habitat Complex** | **Alternative C Wetlands & Ridge Forests** |
| **Interjurisdictional Fish and Aquatic Organisms** | Continued development degrades habitat for American eel, dwarf wedge mussel, and other aquatic organisms of conservation concern | Up to 20,466 acres protected of wetlands and forests for benefit of American eel, dwarf wedge mussel, and other aquatic organisms of conservation concern | Up to 14,124 acres protected of wetlands and forests for benefit of American eel, dwarf wedge mussel, and other aquatic organisms of conservation concern |
| **Other Wildlife** | Continued development degrades habitat for state species of concern, game mammals and birds, and small mammals and amphibians and reptiles | Up to 20,466 acres protected of wetlands and forests for benefit of state species of concern, game mammals and birds, and small mammals and amphibians and reptiles | Up to 14,124 acres protected of wetlands and forests for benefit of state species of concern, game mammals and birds, and small mammals and amphibians and reptiles |
| **Plants** | Continued development degrades habitat for federal and state species of concern; curtails ability to provide habitat for small-whorled pogonia and other declining plants | Up to 20,466 acres protected of wetlands and forests for benefit of federal and state species of concern, and provide habitat for small-whorled pogonia and other declining plants | Up to 14,124 acres protected of wetlands and forests for benefit of federal and state species of concern, and provide habitat for small-whorled pogonia and other declining plants |
| **Public Use** | No new opportunities for wildlife-dependent recreation: wildlife observation, photography, interpretation, environmental education, or hunting and fishing | Creates ample new opportunities for wildlife-dependent recreation: wildlife observation, photography, interpretation, environmental education, or hunting and fishing; refuge will contribute to “Children in Nature” initiative | Creates ample new opportunities for wildlife-dependent recreation: wildlife observation, photography, interpretation, environmental education, or hunting and fishing; refuge will contribute to “Children in Nature” initiative |

| Environment | Alternatives | | |
|---|---|---|---|
| | **Alternative A No Refuge** | **Alternative B Diverse Habitat Complex** | **Alternative C Wetlands & Ridge Forests** |
| **Land Use** | Continued threat of development will decrease percent of wildlife habitat and open space | Up to 20,466 acres protected of wetlands and forests will increase percent of wildlife habitat and open space | Up to 14,124 acres protected of wetlands and forests will increase percent of wildlife habitat and open space |
| **Local Economy** | No benefits from refuge staff living in valley and procuring goods and services, and no work opportunities for locals that would exist with a refuge | "Banking on Nature" report documents economic benefits of refuges for local economies; there would be expected benefits from refuge staff living in valley and procuring goods and services, and work opportunities for locals that would exist with a refuge; refuge revenue sharing funds provided to local government to offset loss of property taxes from lands acquired by the refuge | "Banking on Nature" report documents economic benefits of refuges for local economies; there would be expected benefits from refuge staff living in valley and procuring goods and services, and work opportunities for locals that would exist with a refuge; refuge revenue sharing funds provided to local government to offset loss of property taxes from lands acquired by the refuge |
| **Cultural and Historic Resources** | Cultural and historic resources retain protection through State Historic Preservation Office | Cultural and historic resources retain protection through State Historic Preservation Office but also become fully protected by presence of refuge and the federal oversight and responsibilities the refuge has to protect these resources | Cultural and historic resources retain protection through State Historic Preservation Office but also become fully protected by presence of refuge and the federal oversight and responsibilities the refuge has to protect these resources |
| **Soundscape** | Noise levels likely to increase due to continued development | Noise levels likely to remain low, and could be further mitigated, providing pleasant and quite experience for visitors to refuge | Noise levels likely to remain low, and could be further mitigated, providing pleasant and quite experience for visitors to refuge |

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This document would not have been possible without the substantial assistance and contributions from the following individuals and organizations.

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# 6 Consultation and Coordination with Others

One of the requirements of the Cherry Valley National Wildlife Refuge Study Act is to provide an opportunity for public participation. Specifically, the Study Act states that "The Secretary … shall consult appropriate State and local officials, private conservation organizations, major landowners and other interested persons, regarding the identification of eligible lands, waters, and interests therein that are appropriate for acquisition for a national wildlife refuge and the determination of boundaries within which such acquisitions should be made." (Section 603 (b)). The Service met this requirement through a variety of methods including briefings, formation of the CVST, and public meetings.

## 6.1 Communication and Coordination with Agencies and Organizations

The Service began coordinating with other agencies and organizations shortly after the passage of the Study Act. In February 2007, Service staff held preliminary scoping meetings and site visits with the Pennsylvania state director of The Nature Conservancy and members of his staff, along with the manager of the Monroe County Conservation District and the Executive Director of the Monroe County Planning Commission. In October 2007, Service staff briefed aides to Rep. Paul Kanjorski, Senator Bob Casey, and Senator Arlen Specter. We also briefed the Executive Director of the Pennsylvania Game Commission and aides to the Executive Director of the Pennsylvania Fish and Boat Commission on plans to initiate the study. Also in October 2007, Service provided a briefing at the annual meeting of Friends of Cherry Valley.

As discussed in Chapter 1, to help complete the study and to provide more opportunity for public participation, the Service established the Cherry Valley Study Team (CVST). Members of the CVST include: representatives from a variety of agencies, organizations, and local academic institutions (see Table 1-1 for a list of participating agencies and organizations). Between October 2007 and September 2008, the CVST met four times to collect information to develop the study, provide updates on the current status of the study, and to solicit comments on the Service's over-all approach.

## 6.2 Public Participation and Issue Identification

In addition to the briefings and CVST meetings, the Service held two public meetings in March 2008 to solicit public comments on a potential Cherry Valley National Wildlife Refuge. The Service also offered a public comment period from March 2008 through the end of April 2008 where written comments on potentially establishing a refuge in Cherry Valley were accepted. Issues, questions, and concerns were identified through comments received during the public meetings and in letters and emails. More than 200 people attended the meetings, and 15 organizations and agencies, along with numerous individuals, presented oral comments at the meetings.

To assist the Service in communicating with interested parties and obtaining public participation, we developed a newsletter and a website (www.fws.gov/northeast/planning/Cherry%20Valley/lcphome.html). We distributed approximately 650 copies of a FWS Cherry Valley newsletter by email and U.S. Postal Service to municipal officials, community leaders, and other interested parties. In addition, the following organizations distributed the newsletter to their mailing lists: Monroe County Federation of Sportsmens Clubs, Lehigh Gap Nature Center, Monroe County Open Space Update Committee, Pennsylvania Federation of Sportsmens Clubs, and The Nature Conservancy. In total, we estimate that over 1,500 copies of the newsletter were distributed. The newsletter provided information about the study as well as the scheduled public meetings. The Service distributed a news release prior to the public meetings to 12 media in the Cherry Valley region and received extensive coverage in the Pocono Record, the major daily newspaper serving Monroe County.

Issues and concerns identified through public participation opportunities have been considered in developing the objectives and alternatives presented in this document. Over-all, the public comments and questions were very supportive of establishing a Cherry Valley National Wildlife Refuge. Expressions of support for a National Wildlife Refuge were given by**:**

- Area residents
- Appalachian Trail Conservancy
- Brodhead Watershed Association
- Cherry Valley Community Supported Agriculture Project
- Friends of Cherry Valley
- Paul Kanjorski, Member of Congress
- Lehigh Valley Audubon Society
- Lenape tribe
- Monroe County Commissioners
- Monroe County Federation of Sportsmen's Clubs
- Pocono Environmental Education Center
- Pocono Heritage Land Trust
- Pocono Builders Association
- Pocono Mountains Visitors Bureau
- Shawnee on Delaware Preservation Society
- Stroud Township
- Stroudsmoor Country Inn (with conditions, see full notes)

## 6.3 Specific Questions, Comments, and Concerns

Comments from the public meetings and the public comment period were usually fell within nine general categories. Some of these comments were already discussed in

Chapter 1. Following is a more detailed list of comments made at the public-meetings by categories.

*The NWR process/policies/study area*

- Shawnee Creek Valley and Mosier's Knob should be included in the study area because of their natural resource values (e.g., presence of bog turtles)
- Can areas to the southeast (like Minsi Lake and Mount Bethel fens) be included into the study area?
- What does the line/boundary of the study area represent and how was it chosen?
- Does the Service consider cultural resources when planning a refuge?
- Do long-range plans address already planned developments?
- How long does the process of creating a NWR usually take?
- How are National Wildlife Refuges funded?
- Does the FWS use condemnation to acquire land for a refuge?
- What will prevent landowners from selling wetland to the Service and selling farmland to developers anyway?
- Does the Service lease land back to farmers?

*Stewardship/land management*

- It is important to educate new and existing landowners about preserving their property
- The people living here have been those who want to live in close harmony with the land: farmers, birdwatchers, hunters, fishers, gardeners, rabbit and bee-keepers, etc. The Friends of Cherry Valley will continue to be good stewards, whether or not members sell land to the refuge.
- How will residents be assured the costs for maintenance of the refuge will continue to be paid?
- A concern about the status of the Service's budget was expressed.
- Under the Service's management, will vistas disappear because farmland will be allowed to succeed to forest?
- Is there a possibility of partnering with local government or conservation organizations to provide adequate staffing if this is a problem for the Service?

*Access/Activities*

- The refuge has the support of the Monroe County Federation of Sportsmen's Clubs, and may get the support of the state federation as well.
- The study team should publicize more that the refuge will be a multi-use area that people can use to hunt, fish, hike, cycle, etc. to help build the grassroots effort and yield greater involvement.

- One resident expressed deep concerns about his hunting activities and the restrictions that would be placed on them by the establishment of a refuge.
- What will public access to the refuge be like?
- How will FWS prevent trespass on private lands? What recourse is available for residents to prosecute trespassers?
- Will horseback riding be included as an acceptable use?

*Habitat/conservation of species*

- Preserving plants and animals is most important; we should not impact nature.
- There is a need for increased conservation of the area surrounding the Appalachian Trail, not just the right of way.
- One resident recommended a full natural resource inventory of Cherry Valley.
- The designation of Cherry Valley as a refuge supports each of the local conservation plans, and supports what hundreds of residents have said they want at other public meetings: preservation of open space.
- How much of the valley is currently protected, and is the protection permanent?

*Local Economic Effects*

- How will the establishment of a refuge affect the economic situation of businesses in the valley and the livelihoods of people who depend on them?
- Can the Service ensure that the Stroudsmoor Country Inn, if within the refuge area, will not be at a competitive disadvantage, or expected to meet a higher bar, making it impossible to expand in the future?
- What will the changes/benefits be to current residents?
- How will the local tax base be affected?
- How will property values be affected?

*Farming*

- Keeping land in farms is important; when land is developed, “houses are the last crop it will ever grow.”
- The changing attitudes of younger generations towards farming pose a threat to the habitat and way of life of Cherry Valley.
- Organic farming is important to the valley.

*What makes the area attractive*

- The main reasons the area is attractive to visitors, include “ease, authenticity, and refreshment,” built upon the preservation of the natural environment, coupled with sustainable development.

- The area's scenic views and habitat are important to retaining residents and attracting them to the area. There is a place for everything, and this [the refuge/preservation] is the best use of this land.

*Education / research opportunities*

- The refuge area has potential to be used as an "outdoor classroom/natural laboratory" where students can learn about the environment.
- The area is already being used for research/educational opportunities, which will no longer exist if the NWR is not created.

*Land Use / Zoning Regulations*

- Will land use change for areas owned by the National Park Service after the establishment of the refuge?
- Is Hamilton Township changing zoning regulations as a result of the refuge study?

# Glossary

**adsorb:** to gather (a gas, liquid, or dissolved substance) on a surface in a condensed layer

**alluvium:** a deposit of sand, mud, etc., formed by flowing water. The sedimentary matter deposited within recent times, especially in the valleys of large rivers.

**alternative**: a reasonable way to fix an identified problem or satisfy a stated need [40 CFR 1500.2]

**Appalachian Flyway:** is a migratory route for birds that extends along the Appalachian Mountains

**apiary:** a place where bees and beehives are kept, especially a place where bees are raised for their honey

**appropriate use:** a proposed or existing use on a refuge that meets at least one of the following three conditions:

1. The use is a wildlife-dependent use.
2. The use contributes to fulfilling the refuge purpose(s), the National Wildlife Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the National Wildlife Refuge System Improvement Act was signed into law.
3. The use has been determined to be appropriate as specified in section 1.11 of the National Wildlife Refuge System Improvement Act.

**approved acquisition boundary:** a project boundary that the Director of the U.S. Fish and Wildlife Service (Service) approves upon completion of the planning and environmental compliance process. An approved acquisition boundary only designates those lands that the Service has authority to acquire or manage through various agreements. The approval of an acquisition boundary does not grant the Service jurisdiction or control over lands within the boundary and it does not make lands within the boundary part of the National Wildlife Refuge System (Refuge System). Lands do not become part of the Refuge System until the Service buys them or they are placed under an agreement that provides for their management as part of the Refuge System.

**aquifer:** a formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

**Atlantic Flyway:** is a migratory route for birds that extends from the offshore waters of the Atlantic Coast west to the Allegheny Mountains where, curving northwestward across northern West Virginia and northeastern Ohio, it continues in that direction across the prairie provinces of Canada and the Northwest Territories to the Arctic Coast of Alaska (http://www.birdnature.com/flyways.html).

**biological diversity (or biodiversity):** the variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur

**biological integrity:** biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities

**biotic:** Of or having to do with life or living organisms. Produced or caused by living organisms.

**bog:** a poorly drained area rich in plant residues, usually surrounded by an area of open water, and having characteristic flora; a type of peatland.

**buffer (or buffer area):** land bordering and protecting critical habitat or water bodies by reducing runoff and nonpoint source pollution input; areas created or sustained to lessen negative effects of land development on animals, plants, and their habitats.

**calcareous:** Composed of, containing, or characteristic of calcium carbonate, calcium, or limestone; chalky.

**carbon sequestration**: the provision of long-term storage of carbon in the terrestrial biosphere, underground, or the oceans so that the buildup of carbon dioxide (the principal greenhouse gas) concentration in the atmosphere will reduce or slow.

**carnivore:** An animal that feeds chiefly on the flesh of other animals.

**catadromous:** an organism that spends most of its life growing and maturing in freshwater, but migrates to saltwater to reproduce.

**categorical exclusion:** pursuant to the National Environmental Policy Act (NEPA), a category of federal agency actions that do not individually or cumulatively have a significant effect on the human environment [40 CFR 1508.4]

**circumneutral soils:** soils with pH values near neutral (i.e., near pH 7).

**colluvium:** a loose deposit of rock debris accumulated through the action of gravity at the base of a cliff or slope.

**compatible use**: "The term 'compatible use' means a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director [of the U.S. Fish and Wildlife Service], will not materially interfere with or detract from the fulfillment of the mission of the [National Wildlife Refuge] System or the purposes of the refuge." – National Wildlife Refuge System Improvement Act of 1997 [Public Law 105-57; 111 Stat. 1253]

**compatibility determination:** the process in which a wildlife-dependent use or any other public use on a refuge is found to be compatible or incompatible with the fulfillment of the National Wildlife Refuge System mission or the purposes of the refuge. This determination is a requirement for wildlife-dependent uses or any other public uses on a refuge.

**compatibility policy**: "The refuge manager will not initiate or permit a new use of a national wildlife refuge or expand, renew, or extend an existing use of a national wildlife refuge unless the refuge manager has determined that the use is a compatible use." [Service Manual 603 FW 2.3]

**Comprehensive Conservation Plan (CCP):** Mandated by the National Wildlife Refuge System Improvement Act of 1997, a document that provides a description of the desired future conditions and long-range guidance for the refuge manager to accomplish purposes of the Refuge System and the refuge. CCPs establish management direction to achieve refuge purposes. [Public Law 105-57; Service Manual 602 FW 1.6]

**Cumulative impact:** according to NEPA, the impact on the environment which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

**Delaware River Basin:** The Delaware is the longest un-dammed river east of the Mississippi, extending 330 miles from the confluence of its East and West branches at Hancock, N.Y. to the mouth of the Delaware Bay where it meets the Atlantic Ocean. In all, the basin contains 13,539 square miles, draining parts of Pennsylvania; New Jersey; New York; and Delaware. Included in the total area number is the 782 square-mile Delaware Bay.

**Delaware Water Gap:** geological formation formed by water. The Gap is a mile wide, and extends from New Jersey's Mount Tammany to Pennsylvania's Mount Minsi. It is about 1200 feet deep from the tops of the mountains to the surface of the Delaware River.

**diurnal:** occurring or active during the daytime rather than at night

**easement:** an agreement by which landowners give up or sell one of their rights on their property [e.g., landowners may donate rights of way across properties]. It is a non-possessory interest in a real property owned by another imposing limitations or affirmative obligations with the purpose of returning or protecting the property's conservation values.

**ecology:** the branch of biology dealing with the relations and interactions between organisms and their environment, including other organisms

**ecosystem**: a community of organisms together with their physical environment, viewed as a system of interacting and interdependent relationships and including such processes as the flow of energy and the cycling of nutrients through living and nonliving components of the system

**emergent wetland:** wetlands dominated by erect, rooted, herbaceous plants

**endangered species:** a species legally protected under the federal Endangered Species Act or a state Endangered Species Act that is in danger of becoming extinct throughout all or a significant portion of its range

**Endangered Species Act of 1973 as amended (ESA):** The Endangered Species Act (ESA) provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. protects plants and animals that are listed by the federal government as "endangered" or "threatened." ESA § 9 makes it unlawful for anyone to "take" a listed animal, and this includes significantly modifying its habitat. This applies to private parties and private land. Section 7 applies to federal agencies, and requires federal agencies to ensure that their actions (including permitting) are not likely to jeopardize the continued existence of a listed species (plant or animal) or result in the destruction or modification of critical habitat (i.e., "take"). [16 U.S.C. 1531-1544, as amended, Public Law 93-205]

**Environmental Assessment (EA):** a concise public document, prepared in compliance with the National Environmental Policy Act (NEPA), that discusses the purpose and need for an action, alternatives that were considered, and provides sufficient evidence and analysis of the action's effects to determine whether it is necessary

to prepare an Environmental Impact Statement (see immediately below) or a Finding of No Significant Impact (FONSI) [40 CFR 1508.9].

**Environmental Impact Statement (EIS):** a detailed, written analysis of the environmental effects of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources [40 CFR 1508.1 1]

**federally-listed species:** a species listed as either endangered or threatened, or a species at risk under the federal Endangered Species Act of 1973 (as amended)

**federal trust species:** species that the federal government holds in trust (i.e., is responsible for looking after) for the people through law or administrative act, this includes migratory birds, federally-threatened or endangered species, interjurisdictional fish, marine mammals, and other species of concern [16 U.S.C. 3772]

**fee title:** is a real estate term that means the type of ownership giving the owner the maximum interest in the land, entitling the owner to use the property in any manner consistent with federal, state and local laws and ordinances

**fen:** low land covered wholly or partially with water; boggy land; a marsh

**Finding of No Significant Impact (FONSI):** supported by an environmental assessment, a document that briefly presents why a federal action will have no significant effect on the human environment, and for which an environmental impact statement, therefore, will not be prepared [40 CFR 1508.13]

**forbs:** a broad-leaved herb (i.e., other than a grass), especially one growing in a field, prairie, or meadow

**glacial drift:** sediment that has been deposited by a glacier

**glacial groove:** scratches or gouges cut into bedrock by process of glacial abrasion

**glacial outwash:** glacial drift deposited away from the glacier by meltwater streams coming from the glacier

**glacial striae:** scratches, commonly parallel, on smooth rock surfaces due to glacial abrasion

**glacial till:** sand, pebbles, and boulders deposited by a glacier

**graminoid species:** grasses and grasslike plants such as sedges and rushes

**Great Appalachian Valley**: a chain of valley lowlands that stretches about 700 miles from Canada to Alabama and has been an important north-south route of travel since prehistoric times

**groundwater:** the water beneath the surface of the ground, consisting largely of surface water that has seeped down: the source of water in springs and wells.

**habitat:** the area or natural environment in which an organism or population normally lives. A habitat is made up of physical factors such as soil, moisture, range of temperature, and availability of light as well as biotic factors such as the availability of food and the presence of predators.

**hibernacula:** the shelter of a hibernating animal

**hydrology:** The scientific study of the properties, distribution, and effects of water as a liquid, solid, or gas on the Earth's surface, in the soil and underlying rocks, and in the atmosphere.

**insectivore:** an organism that feeds mainly on insects

**interjurisdictional fish:** populations of fish that are managed by two or more states or national or tribal governments because of the scope of their geographic distributions or migrations

**issue:** any unsettled matter that requires a management decision, e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition [FWS Manual 602 FW 1.6]

**kame:** a small hill or ridge consisting of layers of sand and gravel deposited by a meltwater stream at the margin of a melting glacier

**kettle holes:** kettles form in glacial drift when glacial ice (ice block) melts and leaves a usually steep-sided, generally circular depression, which may or may not fill with water

**lagomorph:** any member of the family of mammals generally known as rabbits, hares, or the less common pikas

**Land Protection Plan (LPP):** a document that identifies and prioritizes lands for potential U.S. Fish and Wildlife Service acquisition from a willing seller, and also

describes other methods of providing protection (e.g., easements). This document is released with environmental assessments.

**marsupial:** group of mammals whose young are born in an immature state. Females usually carry and nurse their young in pouches or in a pouch-like area on their abdomens.

**mesic:** of, pertaining to, or adapted to an environment having a balanced supply of moisture

**millage rate:** (also known as the tax rate) is a figure applied to the value of a property to calculate the property tax liability. One "mill" is one dollar of tax on every thousand dollars of taxable value.

**National Environmental Policy Act of 1979 (NEPA):** requires all agencies, including the U.S. Fish and Wildlife Service, to examine the environmental impacts of their actions, incorporate environmental information, and utilize public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements and prepare appropriate NEPA documents to facilitate better environmental decision making. NEPA requires federal agencies to review and comment on federal agency environmental plans and documents when the agency has jurisdiction by law or special expertise with respect to the environmental impacts involved. [42 U.S.C. 4321-4327] [40 CFR 1500-1508]

**National Wildlife Refuge (refuge).** "A designated area of land, water, or an interest in land or water within the Refuge System, but does not include Coordination Areas." [Service Manual 603 FW 2.5 N]

**National Wildlife Refuge System (Refuge System):** "All lands, waters, and interests therein administered by the U.S. Fish and Wildlife Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, coordination areas, and other areas for the protection and conservation of fish and wildlife including those that are threatened with extinction as determined in writing by the Director or so directed by Presidential or Secretarial order. The determination by the Director may not be delegated." [Service Manual 603 FW 2.5 I]

**passerines:** perching birds -- technically members of the taxonomic order Passeriformes. Birds in this order are characterized by having four toes, three directed forward and one backward, all joining the foot at the same level. Roughly 60 percent of all bird species are passerines. Song birds are included in this group.

**physiographic province:** a landform region, an area delineated according to similar terrain that has been shaped by a common geologic history

**Pocono Glaciated Plateau**: the Pocono Glaciated Plateau is bounded on all sides by escarpments that rise to between 1,800 and 2,300 feet in Monroe, Pike, Carbon, Lackawanna, and Luzerne counties. The plateau features numerous lakes, ponds, bogs, and glacial till that are legacies from the Wisconsinan glaciation.

**postmold holes:** Posthole is the cavity created when a hole is dug for a support post; and postmold is the filling of that cavity by a post and the backfill used to keep the timber in place. Over time, the wood decays and leaves a patch of earth that differs in color and texture from the surrounding soil.

**Proposed Action**: according to NEPA, a plan that contains sufficient details about the intended actions to be taken, or that will result, to allow alternatives to be developed and the environmental impacts analyzed [40 CFR 1508.23]

**propagules:** any of various usually vegetative portions of a plant that can give rise to a new individual, such as corms, tubers, offsets, or runners. Seeds and spores are also propagules.

**public use**: any of the many activities that individuals, organizations, non-governmental groups; officials of federal, state, and local agencies, Native American tribes, and foreign nations, may want to engage in on refuge land.

**rodent:** any of various very numerous, mostly small mammals of the order Rodentia, having large front teeth used for gnawing. Rodents make up about half the living species of mammals, and include rats, mice, beavers, squirrels, lemmings, shrews, and hamsters.

**raptor:** a bird of prey, such as a hawk, eagle, or owl

**residuum:** weathered bedrock; found predominately in the Highlands and Piedmont provinces; soil textures dependent on type of rock from which the soil is weathered

**Ridge and Valley Province:** one of the six physiographic provinces in Pennsylvania. It occupies much of central and northeastern Pennsylvania and encompasses parts of the following counties: Monroe, Northampton, Lehigh, Berks, Lebanon, Dauphin, Cumberland, Franklin, Fulton, Bedford, Huntingdon, Blair, Centre, Clinton, Mifflin, Juniata, Perry, Northumberland, Union, Lycoming, Columbia, Luzerne, Carbon, Schuylkill, and Montour.

**riparian:** relating to or inhabiting the banks of a natural course of water

**second order stream:** the smallest streams in a drainage network have no tributary streams. These are called first order streams. Two first order streams unite to form a second order stream. Second order streams only have two or more first-order streams as tributaries.

**Shawangunk Formation:** a mapped bedrock unit in eastern Pennsylvania, New Jersey, and New York. It is named for the Shawangunk Ridge for which it is the dominant rock type.

**silviculture: t**he care and cultivation of forest trees; forestry.

**species of special management concern:** this is an informal term commonly used to refer to species that are declining or appear to be in need of conservation efforts. Many entities, including state agencies and non-governmental organizations, maintain lists of at-risk species. These species would then fall within this category.

**Study Act:** the 109th Congress successfully passed a bill to study Cherry Valley for potential inclusion into the National Wildlife Refuge System. The bill was passed as the Cherry Valley National Wildlife Refuge Study Act of 2006, Title VI of H.R. 4957 (Public Law No.: 109-363). This act requires the Secretary of the Department of the Interior to submit a report containing the results of the study to the Committee on Resources, U.S. House of Representatives, and to the Committee on Environment and Public Works, U.S. Senate. The report is to include: 1) a map that identifies and prioritizes specific lands, waters, and interests therein for future acquisition, and that delineates an acquisition boundary, for a potential Cherry Valley NWR, 2) a cost estimate for the acquisition of all lands, waters, and interests therein that are appropriate for refuge status, and 3) an estimate of potentially available acquisition and management funds from non-federal sources.

**Study Area:** The Cherry Valley National Wildlife Refuge Study Act identified a 30,000 acre area of land that should be studied for potential inclusion in the National Wildlife Refuge System. The U.S. Fish and Wild life Service identified an additional 1,500 acres that we deemed appropriate to include in the study as well. We refer to the combined 31,500 acre area as the Study Area in this document.

**succession:** the gradual replacement of one type of ecological community by another in the same area, involving a series of orderly changes, especially in the dominant vegetation

**talus slopes:** an accumulation of rock debris at the base of a cliff or steep mountain slope

**terminal moraine:** a terminal, or end, moraine consists of a ridge-like accumulation of glacial debris pushed forward by the leading edge of a glacier and dumped at the outermost edge of any given ice

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