

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).

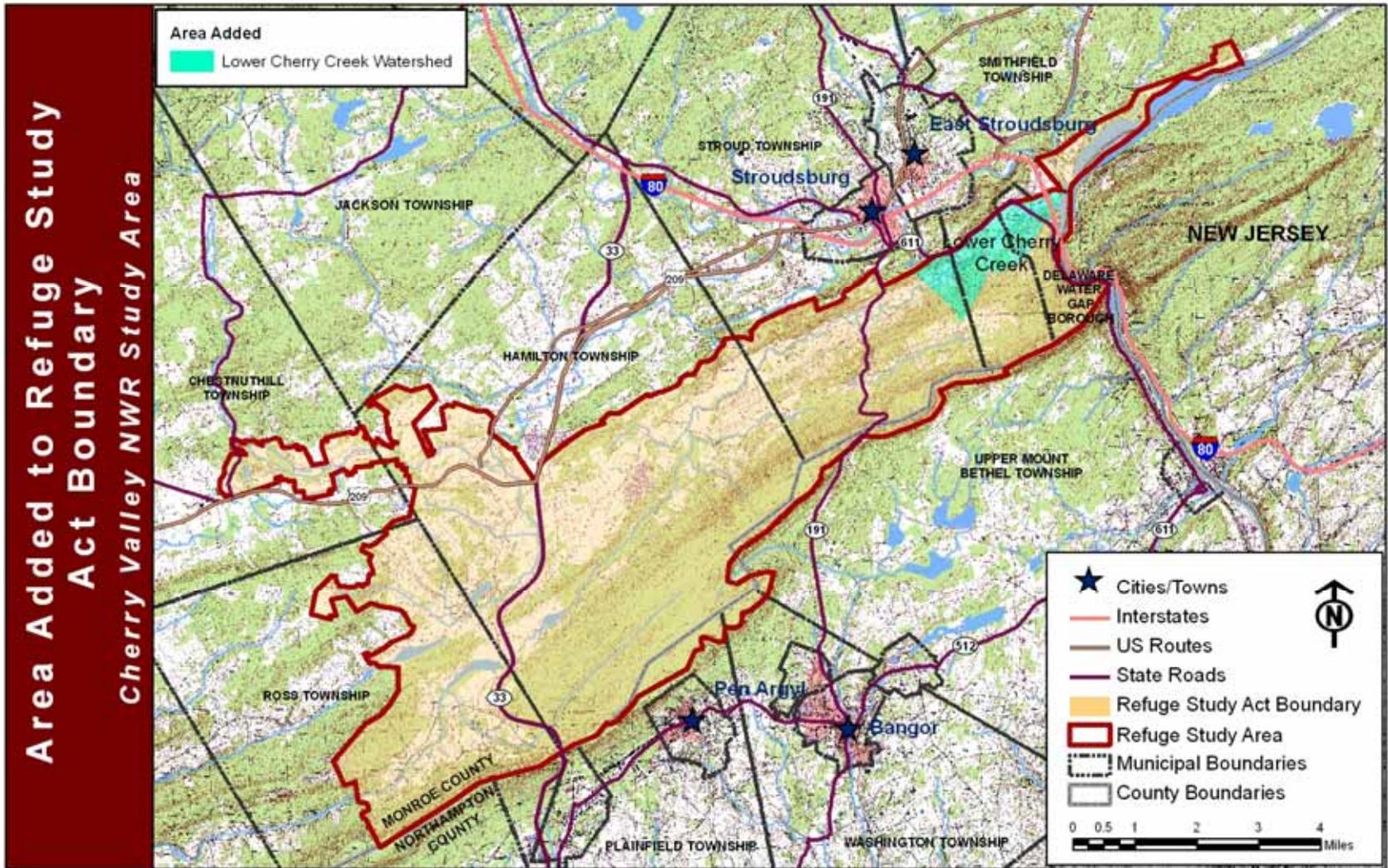


Figure 2-1. The Cherry Valley National Wildlife Refuge Study Act boundary and the Lower Cherry Creek addition included for this study. Together, these areas comprise the Cherry Valley National Wildlife Refuge Study Area. See text for a more detailed explanation.

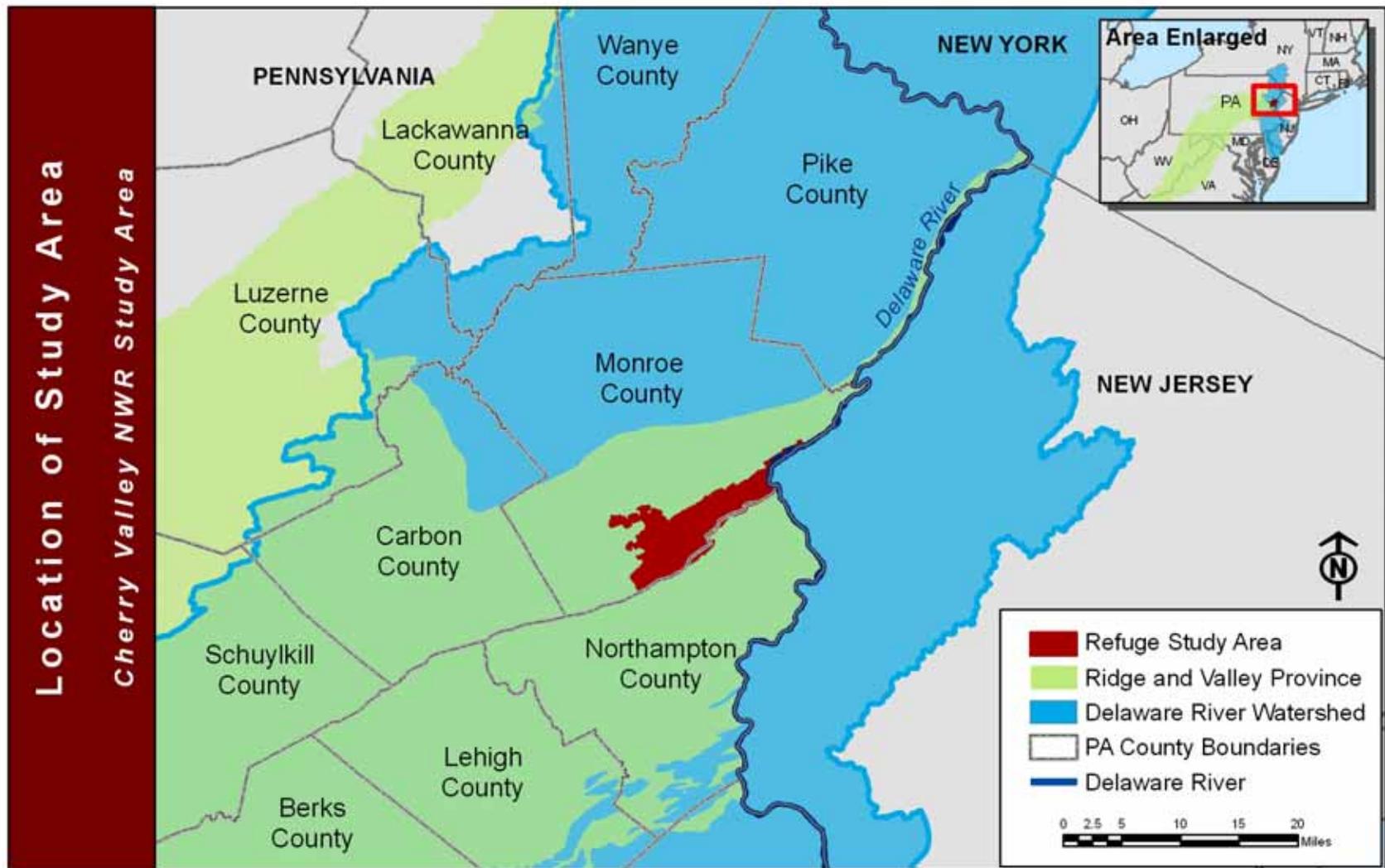


Figure 2-2. Location of the Study Area for a potential Cherry Valley National Wildlife Refuge in relation to the Delaware River Watershed and the Ridge and Valley Province, Pennsylvania..

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 thrust 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 Hazleton 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 stream-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

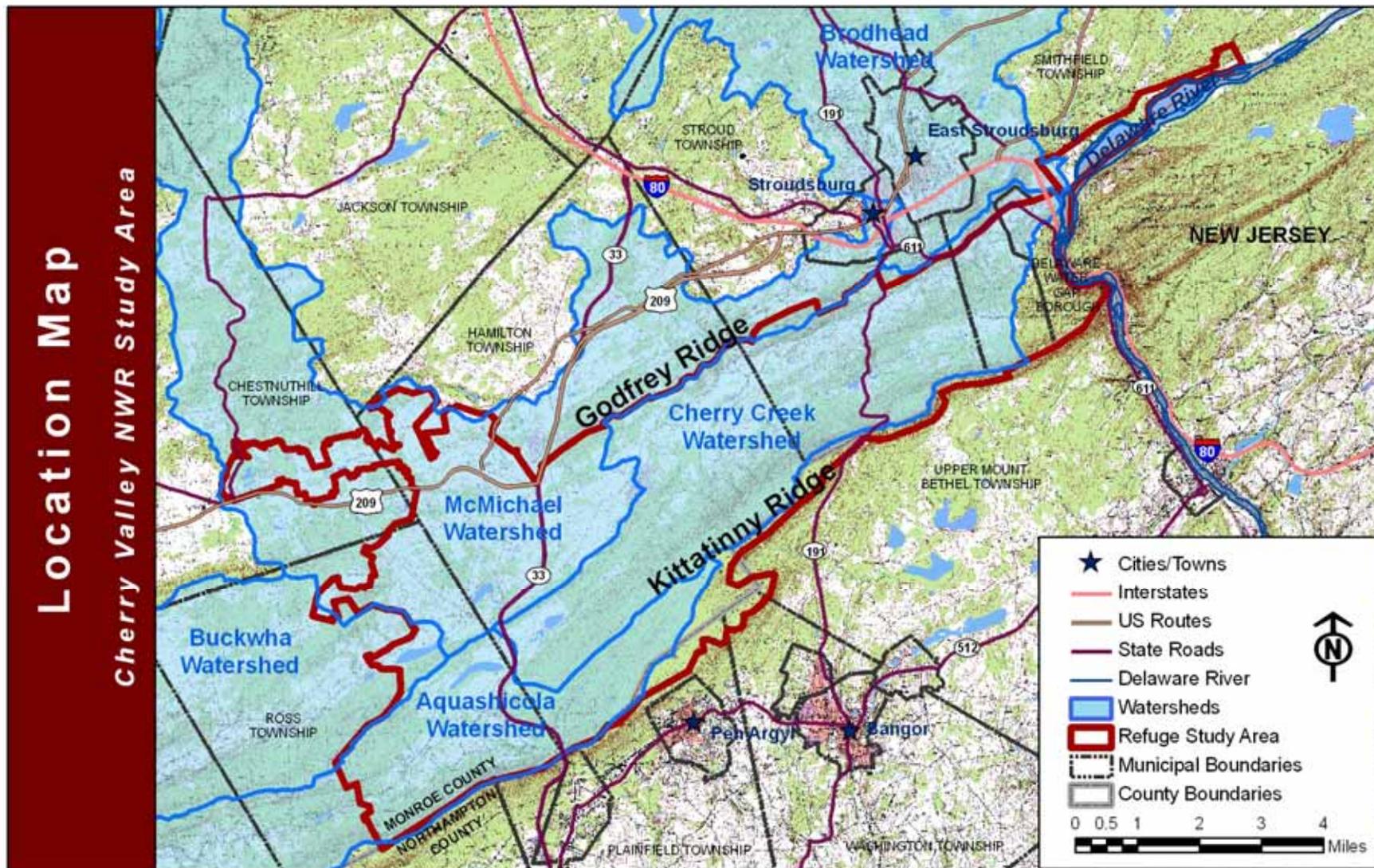


Figure 2-3. Watersheds within the Cherry Valley National Wildlife Refuge Study Area, Pennsylvania.

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 roosting 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.

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
	<p>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.</p>
<p>North-Central Appalachian Seepage Fen</p>	<p>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.</p>
<p>North-Central Interior Wet Flatwoods</p>	<p>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.</p>
<p>Central Appalachian River Floodplain</p>	<p>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.</p>

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
Central Appalachian Dry Oak-Pine Forest	<p data-bbox="634 247 1451 394">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.</p> <p data-bbox="634 407 1451 1171">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.</p>
Appalachian (Hemlock)-Northern Hardwood Forest	<p data-bbox="634 1184 1451 1684">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.</p>

Source: Pennsylvania Natural Heritage Program 2008

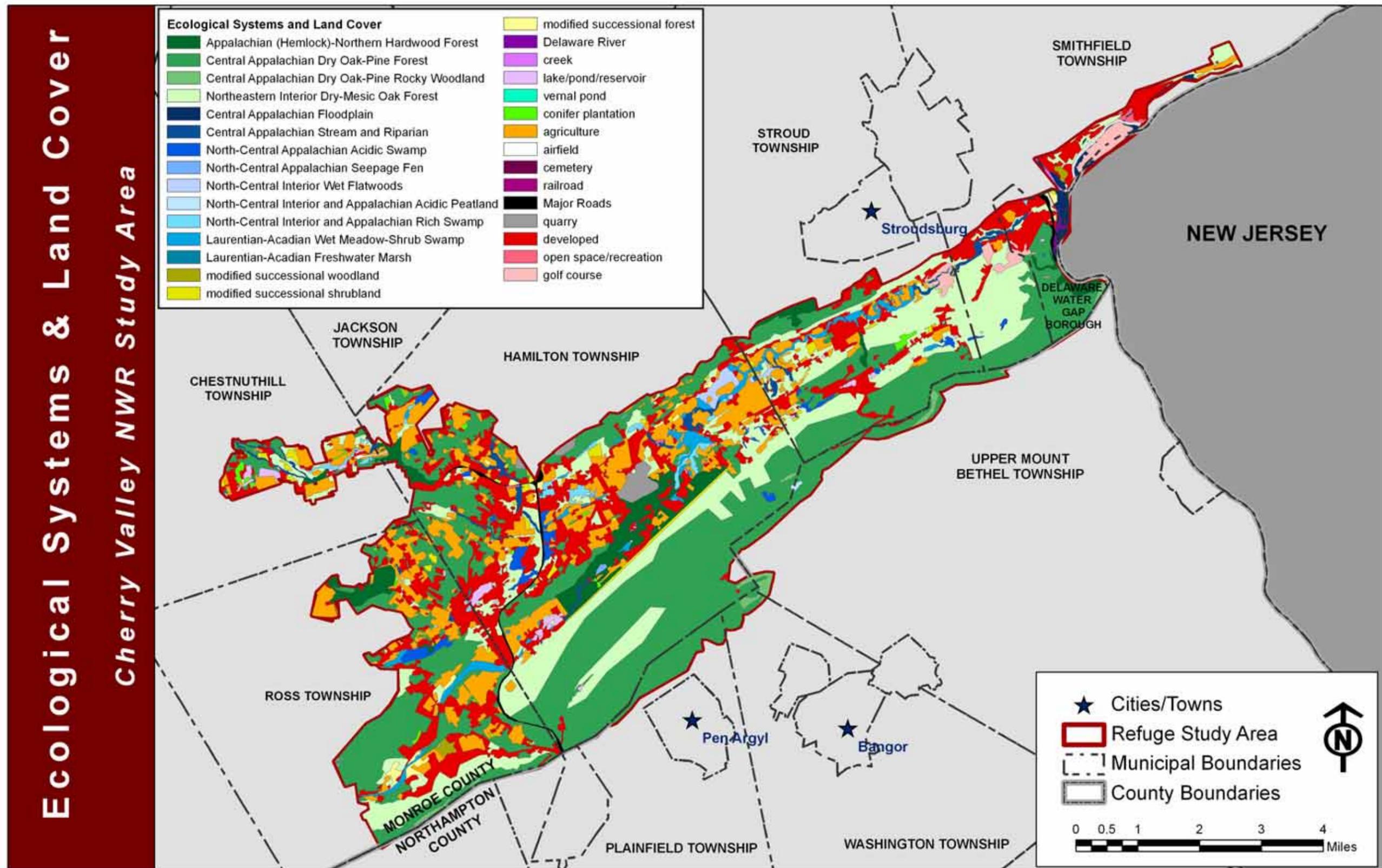


Figure 2-4. Ecological Systems in the Cherry Valley National Wildlife Refuge Study Area, Pennsylvania.

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 ESA¹).

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

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



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, redbfin 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		34,869¹	

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.

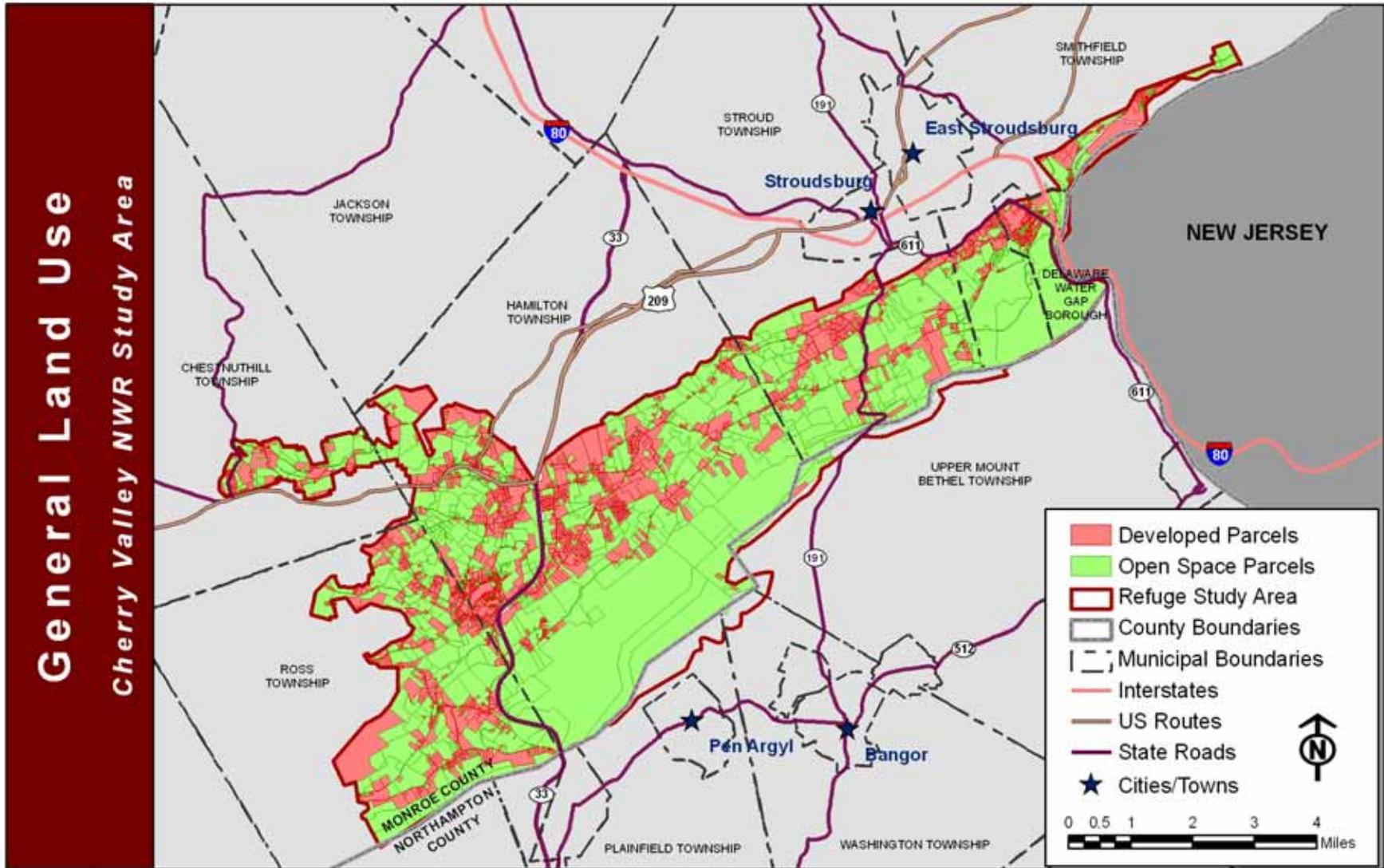


Figure 2-5. Location of developed and open space parcels in the Cherry Valley National Wildlife Refuge Study Area. Source: Monroe County Land Use data. Analysis conducted by Division of Economics, U.S. Fish and Wildlife Service, September 2008.

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 Saylor's 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.

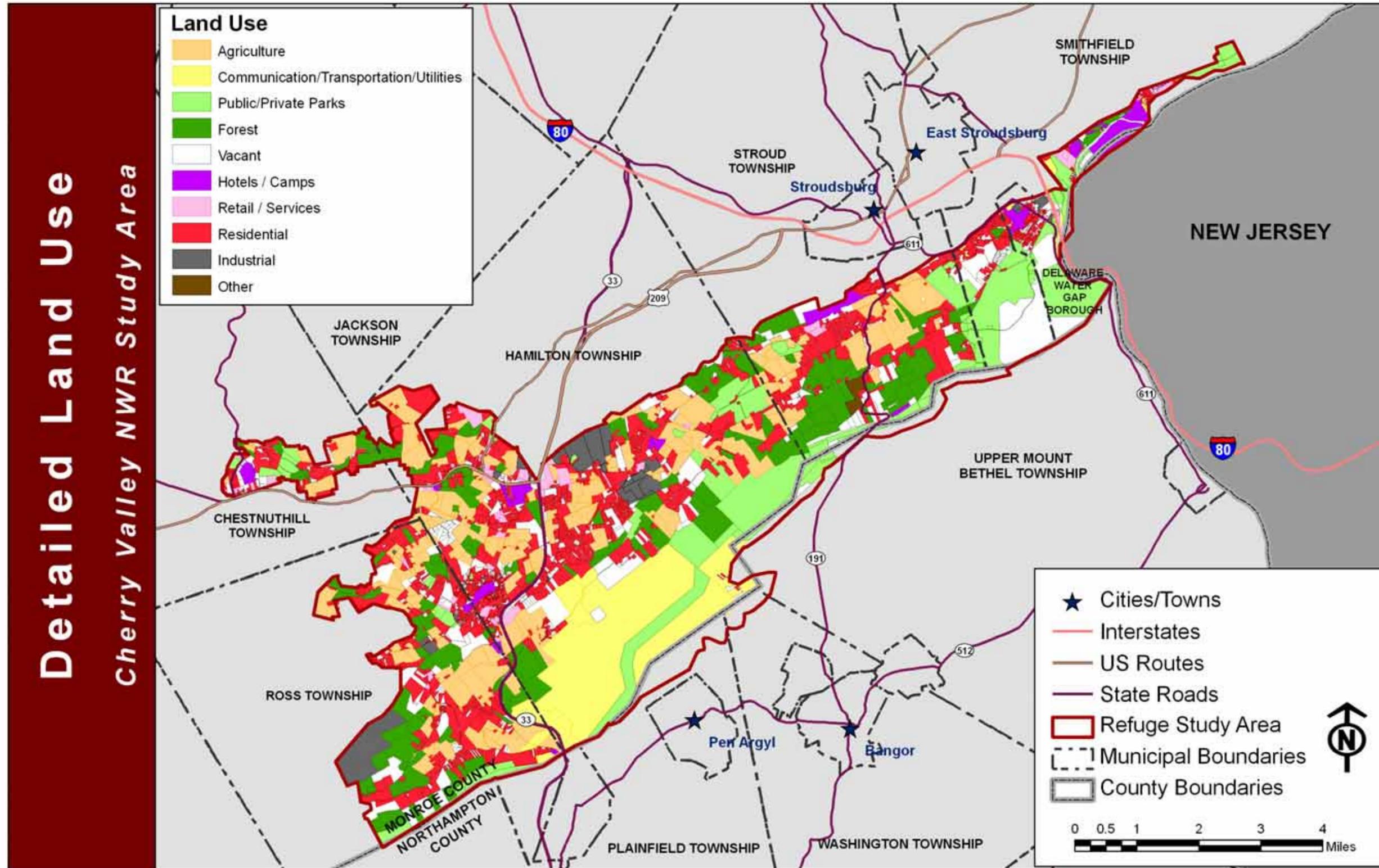


Figure 2-6. Detailed land-use in the Cherry Valley National Wildlife Refuge Study Area, Monroe County, Pennsylvania.

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 are 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 value⁵.

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 Value¹	2008 Millage Rate²	Estimated Tax Receipts³
Chestnuthill	\$5,661,630	\$44,217,330	0.153	\$3,464,918
Delaware Water Gap	\$7,577,090	\$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.

³ 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 Value¹	Estimated Tax Receipts²
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
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
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	Delaware						Total
	Chestnuthill	Water Gap	Hamilton	Ross	Smithfield	Stroud	
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	Agriculture 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 Marz 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

Municipality	Total Population			Study Area Population ¹		
	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.



