

Conservation Plan for the Kittatinny Ridge In Pennsylvania



Prepared by



December 2006

Contents

<u>INTRODUCTION</u>	4
<u>DESCRIPTION OF STUDY AREA</u>	4
Kittatinny Ridge Conservation Corridor	
<u>ECOLOGICAL AND CULTURAL VALUES</u>	6
<u>Important Place for Birds</u>	
Fall Migration	
Nesting	
<u>Valuable Wildlife Habitat</u>	
<u>Recreation</u>	
Hiking	
Watching Birds	
Hunting	
<u>Water Resources</u>	
Watersheds and Rivers	
Drinking Water	
<u>Protected Lands</u>	
Public Lands	
Private Lands	
<u>Cultural History</u>	
<u>SPECIAL DESIGNATIONS</u>	12
<u>THREATS</u>	13
Loss of Habitat	
Problematic or Invasive Species	
Pollution	
Loss of Wild Experiences and Scenic Beauty	
<u>OBSTACLES TO CONSERVATION</u>	15
<u>CURRENT CONSERVATION INITIATIVES</u>	16
The Kittatinny Coalition	
State Agency Initiatives and Activities	
Non-profit Initiatives and Activities	
<u>CONSERVATION ACTIONS RECOMMENDED</u>	23
Science	
Land Planning, Management and Conservation	
Public Policy	
Education and Outreach	

APPENDICES

27

[National Audubon Society Bird Conservation Goals](#)
[Rivers, Creeks and Runs of the Kittatinny Ridge](#)
[PA Municipalities in the Kittatinny Ridge Conservation Corridor](#)
[Maps of the Conservation Planning Corridor for the Kittatinny Ridge](#)
[Threats to the Kittatinny Ridge](#)
[Hawk Watching Sites Along the Kittatinny Ridge](#)
[Sample Stream Map](#)
[Sample Parcel Map](#)
[Environmental Advisory Councils in Eastern Half of the Corridor](#)
[Maps of Unprotected Areas with High Ecological Value](#)

INTRODUCTION

The Kittatinny Ridge has long been an important landscape feature in Pennsylvania. Boulder fields and rock outcroppings that are thought to have been used by Native Americans for spiritual purposes are used today by people from throughout Pennsylvania and the world as quiet locations for watching hawks, hiking rest stops to enjoy the pastoral vistas, or personal spiritual renewal. This ridge has been one of Pennsylvania's most important greenways since the 1930s when the Appalachian National Scenic Trail was created along its spine, and when the world's first conservation area for birds of prey, Hawk Mountain Sanctuary, was established on the ridge with a mission to protect the migration of tens of thousands of raptors and other birds along the Kittatinny Flyway.

Traveling north and west from the more populous urban and suburban regions of southeast Pennsylvania, the first major landform encountered is the Kittatinny Ridge. Nearly 326,000 people live in the numerous boroughs and townships along the ridge; and another 1.5 million people live within 20 miles of the Ridge and see it regularly as a part of their landscape. A growing number of Pennsylvanians depend on the natural resources of the ridge for their business, their recreation, their drinking water, or their home.

Over the past century, the ridge has been a popular place for people to recreate, and this interest has resulted in a third of the forested slopes currently protected as state or federal public land. State game lands make up the majority, with the rest a patchwork of state forests, state parks, national park and recreation areas. Despite many areas being protected, two thirds, or more than 300,000 square miles of the ridge are privately owned and vulnerable to degradation.

Numerous local, regional, state and national conservation organizations have each worked to protect a piece or aspect of the ridge of concern to their respective mission. Due to increasing fragmentation due to new housing and commercial development, a coalition of these groups was formed in 2000 as the Kittatinny Coalition to coordinate and multiply efforts to better conserve the approximately 500 square miles of sloped ridge through Pennsylvania. The coalition elected the National Audubon Society to be the lead organization for the effort, and obtained a planning grant from the Pennsylvania Department of Conservation and Natural Resources to begin a regional planning and conservation effort for the ridge and adjacent forested and agricultural lands.

This conservation plan is an overview of what is currently known about the cultural and natural resources of the Kittatinny Ridge through Pennsylvania, and recommends strategies and priorities for protecting the ridge corridor for people and for ecological integrity.

DESCRIPTION OF STUDY AREA

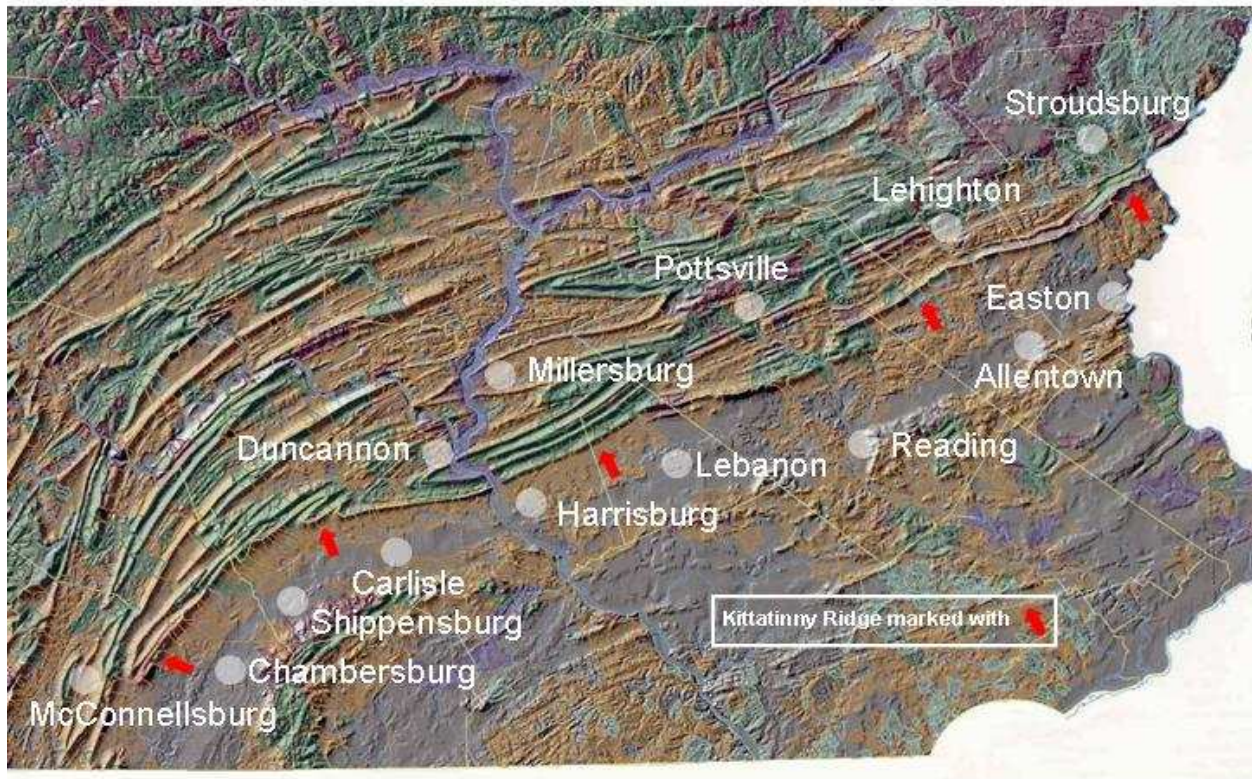
Kittatinny Ridge is the overall name for a long mountain ridge that runs over 250 miles from southern New York State, through northern New Jersey and south-central Pennsylvania, to Maryland. In Pennsylvania, it crosses 11 counties, where it is known locally in eastern Pennsylvania as Kittatinny Mountain, in central Pennsylvania as Blue, First or North Mountain, and in Franklin County as Front Mountain or "The Tuscaroras."

However the ridge is known locally, it is one of Pennsylvania’s most prominent natural features, forming the eastern-most edge of the Appalachian Mountains and the “ridge and valley” region — a forested series of folds in the earth’s crust that uniquely defines the landscape of the southeast quadrant of the state.

Satellite photo of Pennsylvania with the Kittatinny Ridge highlighted in green



Map of southeast quadrant of Pennsylvania with Kittatinny Ridge identified with arrows



ECOLOGICAL AND CULTURAL VALUES

Overview

Millions of Pennsylvanians and hundreds of communities value the ridge for scenic beauty, recreational opportunities, water supplies, and wildlife habitat. The ridge has national importance as a critical habitat link in the magnificent Appalachian Forest that stretches the length of the East, and as a corridor for the world-famous Appalachian National Scenic Trail.

The ridge was named “Kittatinny” meaning ‘the endless mountain’ by the Leni-Lenape tribe of Native Americans that inhabited this region. The name is appropriate as the mountain extends nearly uninterrupted through New Jersey and Pennsylvania. It forms one of the largest continuous forest blocks remaining in southeastern Pennsylvania; and as such, it harbors unique plants and wildlife species that are rarely encountered elsewhere. The clear mountain streams spilling off its slopes feed thousands of drinking water wells, and form the headwaters for many creeks, reservoirs and lakes.

The corridor of the Kittatinny Ridge is where people hike, watch soaring hawks, hunt deer, fish for trout, ride bicycles, canoe, and enjoy beautiful fall colors. It is the background of virtually every vista in the region, enhancing the attractiveness of neighboring communities for residents and businesses. It provides water and forest resources for tens of thousands of people; and for many, Pennsylvanians it is where they live, work, and raise their children.

An Important Place for Birds

Fall Migration

The Kittatinny Ridge is recognized as a “globally significant” migration flyway in spring and fall. This 150 mile-long ridge concentrates 14,000 to 20,000 migrating raptors from August through December each year along its entire length. Impressive flights of both Golden and Bald Eagles have also been recorded (200 -300 eagles per season are regularly counted at a number of sites along the ridge).

The longest running annual raptor migration count in the world, at Hawk Mountain Sanctuary, was initiated along the Kittatinny Ridge top in 1934. Other annual migration counts along the Kittatinny were begun in the 1950s at Bake Oven Knob, approximately 20 miles east of Hawk Mountain, and at Waggoner’s Gap, north of Carlisle. More recent sites in Pennsylvania where volunteers currently record annual flight numbers include (from east to west): Little Gap north of Allentown; Lehigh River Gap; Second Mountain HawkWatch at Fort Indiantown Gap; and Tuscarora Summit at the Franklin/Fulton County line and Route 30. These databases help to set priorities for raptor conservation among 16 species inhabiting the mid-Atlantic and northeast United States and Canada. Counts along the Kittatinny also serve as barometers of overall ecosystem health – with raptors (as top-level predators) being outstanding indicators of environmental change.

Conservation of the entire forested ridge corridor is important for the migrating raptors. Depending on weather conditions, it may take several days to several weeks for birds to complete their migration through Pennsylvania, and they must stop to feed and rest along the

way. Any compromise to the quality or quantity of forest habitat could adversely affect the birds' health and survival during this critical period of their life cycle.

In addition to the tens of thousands of raptors, millions of songbirds (orioles, tanagers, warblers, etc.) also use the ridge's forests as stopover habitat during their migration through Pennsylvania. As these birds migrate at night, they are particularly susceptible to collisions with tall towers and guy wires, especially during low-visibility weather conditions. It is thought that migrant birds pack into the Kittatinny at much higher densities than other places in both spring and fall because it is the last ridge for southbound migrants, and the first ridge for northbound migrants. Ridge-tops tend to concentrate migrants at much higher densities than lowland sites — when the birds come down, they tend to be attracted to the highest topography for resting and refueling.

Bird Nesting

The large blocks of unfragmented forest throughout the ridge also serve as key breeding sites for many “interior-forest” birds, including Ruffed Grouse, Wood Thrush, Ovenbird, Scarlet Tanager, Cerulean Warbler, Worm-eating Warbler, Louisiana Waterthrush, Acadian Flycatcher, and many others. Some of these are species of conservation concern that are on the brink of being threatened or endangered, or on the national bird conservation WatchList.

Of major concern to these nesting species is any further fragmentation of the forests due to new housing or commercial developments, roads, or utility lines.

In addition to interior forest songbirds, other species that use the Ridge Corridor for nesting that are on Audubon PA's list of “Birds of Concern” include: American Woodcock, Great Egret, Bald Eagle, Red-headed Woodpecker, and Peregrine Falcon. See appendices for a complete list of Audubon's “Birds of Conservation Concern” for the Kittatinny Ridge.

National Audubon Society Important Bird Area

Due to the ridge's extreme value for migration, nesting, and science, it has been officially designated by Audubon Pennsylvania as the state's largest “Important Bird Area.” A site qualifies as an Important Bird Area (IBA) if it meets one or more of five categories of criteria. The Kittatinny Ridge meets four of the criteria:

Exceptional concentration or diversity -- The IBA represents a high concentration migratory corridor for raptors during the spring and fall migration. The IBA is recognized as a globally significant raptor migration corridor. Approximately 23,000 raptors have been recorded during fall migration. The IBA also has an exceptional concentration and diversity of bird life during migratory and breeding season. Records indicate that a total number of 251 species of birds have been recorded migrating and 86 species of birds have been recorded nesting within the IBA.

Significant population of endangered or threatened species -- The IBA is an important migratory corridor for state and federal threatened and endangered species. Approximately 136 Bald Eagles (PA endangered and federally threatened), 55 Peregrine Falcons (PA endangered) and 625 Ospreys (PA threatened) have been recorded as maximum counts during fall and spring migration.

Significant population of PA Species of Special Concern -- Several species of special concern have been observed using the IBA during the migration and breeding seasons. The Northern Goshawk (PA *Candidate-Rare*) and the Northern Harrier (PA *Candidate-At Risk*) have been observed during the spring migration and the Northern Saw-whet Owl (*Condition Undetermined*) has been observed during fall migration and the breeding season.

Long-term research or monitoring ongoing -- The site is part of a long-term environmental monitoring, education and applied research. The Hawk Mountain Sanctuary has contributed to over 140 scientific publications and manages the oldest continually operating hawk watch in the world. Hawk Mountain Sanctuary has completed a comprehensive biological survey. The Sanctuary also has the two of the longest running Breeding Bird Censuses in Pennsylvania. Nineteen Hawk Watching Sites are established along the Kittatinny Ridge IBA.

Valuable Wildlife Habitat

The intact forests of the Kittatinny Ridge provide critical habitat for many species of wildlife that cannot survive in the valleys below. The surface-rock areas and outcroppings, older growth areas, scrub/shrub openings, herbaceous fields, and pockets of wet woods all form patches of diverse habitat within large blocks of unfragmented forest.

This habitat matrix supports a variety of species of special concern, including the Pennsylvania threatened Allegheny woodrat and Eastern small-footed myotis (bat). Black bear, bobcat, wild turkey, and ruffed grouse are found in healthy numbers, not to mention an abundance of white-tailed deer. Also present are porcupine, beaver, (red-backed vole?)

Streams of the Kittatinny flow off the ridge to the north and south are home to more than 34 species of freshwater fish.

Hundreds of seasonal ponds, temporary pools of water that form in the spring or fall when runoff or precipitation is high, provide habitat for many species of amphibians and crustaceans that cannot survive in year-round bodies of water where fish would eat them. These ponds are home to numerous species of salamanders, frogs, toads, and crustaceans like fairy shrimp.

Recreation

Hiking

The Appalachian Trail (AT), the most famous hiking trail in North America and perhaps the world, extends 2,160 miles from Georgia to Maine. A National Scenic Trail administered by the National Park Service, the AT follows the Kittatinny corridor for 160 miles from the Delaware Water Gap into Cumberland County. Although nearly all of the AT traverses public property in Pennsylvania, the protected corridor is narrow in many areas, leaving the trail vulnerable to new developments that would degrade scenic views from the trail or would allow urban noise to penetrate areas that currently provide a quiet, wild hiking experience.

Where the Appalachian Trail turns south off the ridge in eastern Cumberland County, the Tuscarora Trail begins and follows the Kittatinny Corridor west and south for 60 miles into Maryland, eventually rejoining the Appalachian Trail in Virginia. This trail exists primarily through agreements with private landowners, and is much more vulnerable to intrusions than the

AT. The Tuscarora Trail could even result in a loss of continuity if certain parcels were sold for development that now allow hikers to pass through.

Bird Watching

As Pennsylvania's most famous migration route for raptors, it has more than a dozen hawk-watching sites at rocky outcrops and openings all along the corridor. The most well-known and popular sites – Hawk Mountain Sanctuary (straddling Schuylkill and Berks Counties), Bake Oven Knob (Carbon and Lehigh Counties), and Waggoner's Gap (Perry and Cumberland Counties) – have the highest counts of birds. See map of all sites in appendices.

Bird watching can also be a boon to local economies if a lot of people can be attracted to a specific site. A study conducted by Hawk Mountain Sanctuary in 1995 showed economic impacts on the communities adjacent to the sanctuary in the amount of over \$5 million annually in today's dollars.

In addition to the hawk-watch sites used during fall migration, the extensive system of trails and parking areas enable birdwatchers easy access to watch and count songbirds in the forests during spring migration or summer nesting.

The ridge is a primary destination for many hunters who live in southeast Pennsylvania, as it is an accessible large block of public forestland. The forests on the ridge are home to many "big woods" species favored by hunters, including wild turkeys and black bears.

The numerous roads that traverse the ridge as well as the many parking areas for game lands and the Appalachian Trail make it an extremely accessible recreation area.

Protected Lands

Protected Public Lands

Approximately one-third of the ridge's land area is public land. The National Park Service administers a narrow strip down the spine of the ridge on either side of the Appalachian Trail from the Delaware River to eastern Cumberland County. Other federal lands include the Delaware Water Gap National Recreation Area, Fort Indiantown Gap National Guard Training Site, and Letterkenny Army Depot. State lands include eleven State Game lands: 124, 235, 76, 230, 170, 211, 80, 110, 106, 217 and 168; parts of three State Forests: Weiser, Tuscarora and Buchanan; and five State Park areas: Big Spring, Fowlers Hollow, Colonel Denning, Swatara, and Boyd Big Tree Conservation Area.

Other sizable conservation areas within the corridor include: Hawk Mountain Sanctuary (Berks and Schuylkill counties), Lehigh Gap Wildlife Refuge (Carbon County), and Reineman Sanctuary (Perry County). A total of (41,655 hectares) of public land are within the IBA.

Additionally other state and federal public lands are adjacent to the ridge and fall within the wider "planning corridor." These lands include State Game Lands 256, 290, 210, 229, 286, 222, 257 and 141, other state park and forest land (parcels of Weiser State Forest, Beltzville State Park, Jacobsburg State Park, and Penn Forest) and other parks (Bear Swamp Park). These public

lands serve as important nodes in linking other publicly protected lands within the ridge corridor for conservation and habitat protection purposes.

Water Resources

Watersheds and Rivers

Rain and snow falling on the forested ridge fills hundreds of creeks, wetlands and seasonal ponds, and supplies the water for 13 lakes and reservoirs.

Several of the rivers that run through or parallel the base of the ridge have planning and protection initiatives underway (from east to west):

Delaware River – National Scenic River Corridor, Delaware and Lehigh River Canal Heritage Corridor.

Lehigh River – Designated Pennsylvania Scenic River. Delaware and Lehigh Canal Heritage River Corridor.

Maiden Creek / Tulpehocken – The Maiden Creek originates in the fold of the Kittatinny at Hawk Mountain Sanctuary.

Schuylkill River – Pennsylvania’s first scenic river, it has also been named as a National Heritage River Corridor.

Swatara Creek – SRBC and DCNR Chesapeake Bay source water protection initiatives. Recommendations of the Chesapeake Bay Forest Workgroup include maintaining or gaining on the amount of forest cover in the Bay watershed.

Susquehanna River – The Susquehanna River Greenway project. The segment of the Susquehanna that passes through the Kittatinny is the site of the Pennsylvania’s first water trail.

Conodoguinet Creek – The middle section of the Conodoguinet Creek is the focus of a DCNR-funded rivers conservation plan.

Drinking Water

This water is critical to the hundreds of thousands of people living below who depend on the underground drinking water that comes from the ridge. Through surface and groundwater, the ridge corridor includes 47 permitted surface water sources (streams and rivers used for public drinking water), 1500 permitted wells, and more than 20,000 private wells.

To illustrate the importance of the ridge for recharging human water supplies, the table below is an assessment of the number of people serviced with public water supplies (surface and ground sources combined) that withdraw water within only one mile of the ridge:

County of Water Suppliers	Population Served
Berks	117,011
Carbon	7,554
Cumberland	137,320
Dauphin	191,090
Franklin	16,397
Fulton	2,000
Lebanon	57,097
Lehigh	4,423
Monroe	910
Northampton	36,511
Perry	46
Schuylkill	1,273
TOTAL	571,632

* Data compiled in May 2006.

Cultural History of Kittatinny Ridge

Pre-European Settlement

Native Americans were Lenape Indians of the Delaware Nation. “Kittatinny” comes from the Lenape word for “Endless Mountain.” Some of the high, exposed boulder fields and outcroppings are thought to have been used for religious purposes, and as lookout areas. Areas of the ridge were known to be burned regularly to promote huckleberries and blueberries and to attract game animals to open areas. Local residents continued this practice in some places through the early 1900s, such as in Carbon County.

1700s

European settlers, particularly German immigrants, came to the region in the early 18th century, but the Kittatinny formed a potent barrier to northward expansion. The ridge marked the southern edge of what was known for many years as St. Anthony's Wilderness (a name now applied to the Stony Creek Valley just to the ridge's north in Dauphin and Lebanon Counties). Water gap passes along the Lehigh River, Schuylkill River, Swatara Creek and Susquehanna River provided access to the north, but even during the French and Indian War the region was sparsely settled, and subject to Indian attack. A string of blockade forts, their construction overseen by Benjamin Franklin and manned by local militias, stretched along and near the ridge from Lehigh to Dauphin Counties and eventually through Cumberland and Franklin Counties. Some of the larger forts became communities or historic sites that are still referenced today, for example: Fort Henry in Berks County, Fort Hunter in Dauphin County, and Fort Loudon in Franklin County.

On the south side of the ridge, valley farmers owned tracts of land up the slope for firewood. Family-owned tanneries in the Cumberland Valley also owned ridge slope parcels as a source for tree bark. The north side had some farms adjacent if the valley was accessible; otherwise the forests were uncut until the 1800s. Where there was limestone and iron on the south side of the ridge, coke iron furnaces were established that utilized some of the forests for charcoal in Berks, Schuylkill and Cumberland Counties.

1800s

The more remote forested areas of the Kittatinny Ridge, especially on the north side west of Schuylkill County, were left uncut until late 1800s to early 1900s when mine and railroad timbers were in great demand. Starting in 1885, the small and more powerful logging railroad was invented which enabled access to non-river areas of Pennsylvania's ridge and valley province. Trees near top of ridge grew slowly due to thin soils and dry conditions, making the trunks small in diameter and very dense due to the narrow growth rings. These trees were highly prized as props for mine shafts due to their compact size and strength. Communities north of the Kittatinny Ridge grew during this time due to greater access and jobs.

1900s

By early 1900s, all the forests along the Kittatinny Ridge were cut at least once, some two and three times. Due to the severe erosion and siltation that occurring, the Pennsylvania Department of Forests and Waters was established to re-vegetate the ridges and protect drinking water. The annual fall shooting of hawks, eagles and vultures took place from the late 1800s until 1960s and even more recently. Hawk Mountain Sanctuary was created in 1934 as the world's first sanctuary for birds of prey.

The tree species mix of the ridge's forests were quite different in the 1800s than they are today. Prior to European settlement, it is estimated that approximately forty percent of the trees were chestnut, with a greater percentage of hemlock and white pine than presently exists. Oaks, poplar, and sweet gum were all minor species. Fires that followed the forest clearing in the early 1900s suppressed the hemlock and white pine re-growth, and in 1901 the chestnut blight hit. As a result, the ridge's forests now consist primarily of oaks, with popular, gum, birch, and pitch pine.*

* Forest history and historic tree composition estimates from conversation with James Nelson, former state forester

SPECIAL DESIGNATIONS

In 1984, President Ronald Reagan proclaimed October 7 through October 13, 1984 as "National Birds of Prey Conservation Week." Senate Joint Resolution 230 authorized and requested the President to issue a proclamation for this observance. The proclamation encouraged "all Americans to observe this week by participating in appropriate ceremonies and activities planned by government agencies, individuals, and private associations and institutions throughout the country to promote the appreciation and conservation of birds of prey."

In 1978, the Pennsylvania Game Commission designated the entire length of the of the Kittatinny Ridge in Pennsylvania as the "Kittatinny Ridge Birds of Prey Natural Area."

Also in 1978, Lehigh County adopted an executive resolution designating the Lehigh County section of the ridge as the "Lehigh County Raptor Migration Area."

Note that these three above designations resulted from work by Don Heintzelman to raise awareness about the importance of the ridge as a globally important raptor migration corridor. In 1998 the National Audubon Society designated the ridge as an "Important Bird Areas."

THREATS

The Kittatinny Ridge's quiet, natural beauty and undisturbed wildlife habitat is being threatened and degraded in many places along the entire corridor. The known threats are listed below.

Loss of Habitat

Housing Development

The large blocks of interior forest that make the ridge an important landscape for many forms of wildlife is shrinking each year as housing and commercial development increase around its perimeter, and from within its core. New residential housing is currently having the biggest impact in the Kittatinny municipalities of Monroe County and the greater Harrisburg area. Due to the growing demand for luxury housing on wooded hillsides, nearly every other part of the ridge corridor has municipalities that are vulnerable to future housing development.

Even municipalities with restrictive ordinances are not immune to this threat, as township supervisors statewide regularly approve variances requested by developers. A new housing development, or even just one, large visible house, can be a surprise to township residents who thought the forested ridge was protected. A good example of this is a luxury home development in East Pennsboro Township, Cumberland County where the developer logged the side of the ridge, then built numerous large, visible homes from the base of the ridge to the top. What was formerly a view of forest beauty framing the west side of the Susquehanna River Gap is now a glaring example of what area residents fear most.

Commercial Development

Every municipality without natural resource protection ordinances is vulnerable to large-scale commercial development. Residents in Monroe County's Eldred Township have been opposed to a racetrack being developed near the Appalachian Trail. This township was chosen by the developer due to its location and the lack of municipal ordinances.

Other areas of major concern for commercial development are all of the highway passes through gaps in the ridge, as is evident from the explosion of new commercial development adjacent to the ridge along Route 61 in northern Berks County following the construction of Cabella's in 2004.

An area of growing concern is the Interstate 81 corridor in Cumberland and Franklin counties. Several very large trucking terminals are being proposed for the area from Carlisle south to Maryland, where numerous terminals already exist. The additional commercial and residential development that this type of growth brings is worrying county planners and conservationists alike.

Energy and Mining

Wind energy turbines are a growing threat to the forest ecology of ridges, particularly since the turbine construction results in dramatic fragmentation of habitat. Many acres of forest are cleared for road access and to reduce wind interference around each turbine. Disruption of bird and bat migration is also a major concern for any of Pennsylvania's ridges, but especially along the Kittatinny Flyway.

In addition, new high voltage power lines are being proposed to move coal-produced electricity from West Virginia to the northeast, threatening to create new, wide swaths across the ridges of central Pennsylvania.

The very hard sandstone that underlies the ridge's forests has been used as a building material since the first European settlers arrived in the region. One large sandstone quarry already exists on South Mountain in Cumberland County, just southeast of Carlisle. This quarry is removing the top of ridge, and is evident from across the Cumberland Valley. Though not on the Kittatinny Ridge, it is an example of another threat that the Kittatinny could experience in communities without zoning to protect the natural resources.

Any new commercial development on or adjacent to the Kittatinny Ridge not only has a potential impact on the aesthetic view and habitat fragmentation, but also on drinking water. The tens of thousands of wells in the valleys below the ridge slope are recharged by precipitation falling on the forests above. Any new development increases demand on the limited water supply, and the loss of forest habitat further compounds the problem by decreasing the recharge of groundwater.

Problematic or Invasive Species

Overabundant White-tailed Deer -- Many years of an overabundant white-tailed deer population have resulted in a severely degraded under-story in most areas of the ridge corridor. Some areas that were over-browsed following timber cuts currently have a floor cover of hay-scented ferns, with very few shrubs and saplings. The exception to this are areas where enclosure fencing has been erected in state forests following timber cuts to permit sapling re-growth.

Invasive Species -- Two non-native species are causing particular damage throughout the Kittatinny Ridge. One is an insect, the Hemlock Woolly Adelgid (*Adelges tsugae*), that is causing a severe decline in hemlock trees. The other is the Tree of Heaven (*Ailanthus altissima*) that is not as favored by browsing deer as native species. The Tree of Heaven and the native Striped Maple (*Acer pensylvanicum*) both thrive in sunny openings in the forest where deer are present in abundance. Due to little competition from other trees that are browsed heavily, these two species often occur in high numbers following a timber cut where deer fencing is not installed.

Introduced Nest Predators -- Roads, utility line cuts, and any development that fragments an interior-forest brings with it animal species that thrive in a "forest-edge" environment – two in particular that can cause severe harm to bird populations in certain areas. Raccoons are a major predator of eggs from birds that nest on or near the ground, and many of the affected birds are birds of conservation concern. Cowbirds lay their eggs in other bird's nests near edges; and cowbird young often kill the other birds' eggs or out-compete other nestlings for food.

Pollution

Illegal dumpsites are an ongoing problem in remote areas accessible by gravel roads. State forests are a common target; with dumped material consisting of furniture, tires, appliances, construction debris, and general refuse. These dumps are often within sight of hiking trails and diminish the experience of people enjoying the woodland beauty and wildness. Leaking appliances and junked automobiles also pose a threat to groundwater.

Loss of Wild Experiences and Scenic Beauty

Due to the high importance of recreation along the ridge, many of the threats listed above also have the potential for impacting the experience of being in a wild place or enjoying a scenic vista that make the Kittatinny a special place for many people. When a hiker climbs onto a rocky ledge for a vista of wild or rural Pennsylvania, that experience can be ruined by the sight of a nearby housing development, the sound of a noisy commercial facility, or even the sight and sound of wind power generators. Untold thousands of people use sections of the Appalachian Trail for local hikes each year, and they do so to enjoy a natural, wild experience. Hunters, anglers, birdwatchers, and people enjoying picnics or fall colors escape to the Kittatinny Corridor to experience nature in its unspoiled form. Many more value the scenic beauty of the ridge on a daily basis looking up from the valleys below or driving through the river gaps. Once destroyed, this beauty and the wild experiences that the ridge provides will be nearly impossible to restore.

OBSTACLES TO CONSERVATION

The values of Kittatinny Ridge are unrecognized. Most people that live within the Kittatinny planning corridor do not value the ridge for its many natural resources. Some may enjoy the beauty of the forested backdrop to their community, or use a local section for family walks, but the enormous value for birds and other wildlife, birdwatchers, hikers, and water resources is relatively unknown to the vast majority. This includes elected officials and decision-makers, as well as the general public.

The ridge doesn't look threatened. Most large areas of forest in southeast Pennsylvania that are still intact are in public ownership, so a common misconception is that the ridge is primarily state land that is protected from development. In addition, the public does not know what an impaired forest under-story looks like, and may even prefer the look of an over-browsed forest due to its park-like appearance.

Many municipalities do not have the resources to develop conservation ordinances. Even if the interest exists, many townships of the second class do not have the funds or personnel to develop a comprehensive set of natural resource protection ordinances.

Some communities and landowners are reluctant to support land use controls. There will always be certain individuals or elected officials in some municipalities who are not interested in supporting efforts to restrict development or protect natural areas, particularly in the more rural areas on the north or west side of the ridge.

Thousands of landowners. Two-thirds of the ridge's 500 square miles is privately owned with several thousand of individual landowners. Contacting all landowners about the project is difficult enough; let alone attempting to engage a meaningful number of them in conservation activities. (See appendices for sample map of landowners/parcels in Cumberland County.)

The ridge-groundwater connection is unknown. The connection between valley groundwater resources and the ridge's forests is unknown to most of the public. Keeping the forested slopes intact for groundwater (and thus drinking water well) recharge and for stormwater control is a concept that is new to too many elected officials and the public at large.

CURRENT CONSERVATION INITIATIVES

The Kittatinny Coalition

The Kittatinny Coalition was formed in 2000 to bring together all the organizations and agencies that have been involved in ridge conservation activities at the local, regional, state or federal level. The National Audubon Society was elected to serve as the administrative coordinator for the coalition, and was awarded a grant from the Pennsylvania Department of Conservation and Natural Resources in 2001 to begin the coalition's planning process. This funding, matched with private funds, launched the "Kittatinny Ridge Conservation Project" with the following goals:

- Conduct an inventory and assessment of biological (with an emphasis on birds), historical, water resource and land-based resources on the Kittatinny Ridge including existing information and data, along with new data.
- Identify issues and concerns most important to local communities, governing agencies, conservation organizations and landowners and provide a framework for the understanding of the entire ridge that recognizes the importance and interdependency of multiple issues and interests.
- Complete an institutional gap analysis to determine potential issues in land use management of ridge lands, and make recommendations regarding the coordination of the management of the ridge.
- Define a Kittatinny Ridge conservation agenda, formulate priorities, and develop recommendations.
- Build momentum for the conservation of the Ridge by local governments, landowners, private non-profits and businesses, and provide a forum for sharing ideas and tools.
- Educate and engage landowners in conservation activities.

To date, the Kittatinny Conservation Project has completed the following activities:

- A comprehensive Geographic Information System (GIS) was constructed to help identify, analyze, and manage the many natural resources of the ridge.
- Communication materials have been developed, including a brochure and PowerPoint programs to introduce why people value the ridge, concerns about its future, and conservation vision.
- Aerial video and photographs have been taken to provide a baseline documentation of land use of the south side of the ridge, as well as to obtain a "hawk's eye" perspective for education purposes.
- Presentations have been made to thousands of people throughout the corridor, and public exhibits have reached thousands more to raise awareness and build support for its protection.

- A summary of all land protection tools available has been assembled into a “Conservation Toolbox” to help municipalities understand the options available to reduce sprawl.
- Many municipalities within the conservation corridor have received a presentation on Environmental Advisory Councils and their value to assist elected officials in local conservation and land planning activities. Extra effort was made to help interested municipalities in the eastern half of the corridor create EACs. See appendices for map.
- This conservation plan will serve as a valuable reference for the history of the ridge and the conservation project, and provide recommendations on activities to begin the work of protecting the ridge’s forests for wildlife and for people.
- A website has been developed, hosted by the National Audubon Society, to make the GIS and informational materials available to the public: <http://pa.audubon.org/kittatinny>. A separate URL has also been secured to use for general publicity for the site: www.kittatinnyridge.org. This site contains information, photos, slide show, maps, an interactive mapping site (using ArcIMS), aerial videos, and description and links to all Kittatinny Coalition member organizations and agencies.

State Agency Initiatives and Activities

Fort Indiantown Gap National Guard Training Site

Mission: Committed to protecting the environment and working with surrounding communities to provide recreational opportunities, such as hunting and fishing to the public. The FIG Training Site encompasses more than 17,000 acres within the Kittatinny Ridge Corridor in Lebanon and Dauphin counties, and includes diverse habitat areas including early-successional (old fields and young forest), wetlands and riparian. A high diversity of plant and animal species are found here, including numerous animal species of state and global concern, resulting in a partnership with The Nature Conservancy for research and conservation management. Within the site on Second Mountain is located a hawk watch site, administered (in partnership agreement with FIG) by the all-volunteer Second Mountain Hawk Watch Association. The public can obtain permits to hunt, fish, and collect firewood. Website: ftig.state.pa.us; 717-861-2806

PA Department of Conservation and Natural Resources

DCNR is a major manager of public land on the ridge, with tens of thousands of acres of state forestland and several state parks. Through various grant programs, DCNR has been a major supporter of planning, greenways protection, and conservation work throughout the Kittatinny Corridor. DCNR’s Bureau of Forestry administers the Forest Stewardship program in Pennsylvania, which gives forestry guidance (as well as wildlife and aquatic resource guidance) in the form of technical and/or cost assistance to private forest landowners. Additionally, public forest and park lands managed by DCNR participate in the DMAP program to manage white-tailed deer populations. Website: dcnr.state.pa.us; 717-783-2659

PA Fish and Boat Commission

Mission: The protection and management of aquatic resources in order to provide fishing and boating opportunities to the public. PFBC stocks trout in numerous runs and streams along the Kittatinny corridor, and manages several fishing and boating lakes in the corridor including

Leaser Lake in Lehigh County, Minsi Lake in Northampton County, and Opossum Lake in Cumberland County. Website: fish.state.pa.us; 717-705-7807

PA Game Commission

State Game Lands encompass more than 115,000 acres within the Kittatinny corridor, more than 58 percent of all public land within the corridor. These lands include some of the largest blocks of interior forest habitat, rock outcroppings and boulder fields through the corridor, and are located in the southeast and southcentral PGC regions. The Commission's Division of Wildlife administers Pennsylvania's bird and mammal component of the federal State Wildlife Grant program, which has supported important biological research and education activities for the ridge. In addition, numerous PGC parking areas along the ridge provide public access for recreation year-round. Website: pgc.state.pa.us; 717-787-4250

Non-profit Conservation Initiatives and Activities

All of the organizations that are members of the Kittatinny Coalition as well as many other local and regional organizations are currently working to protect a particular geographic area of the ridge or improve the protection of one or more natural resources through regional or statewide efforts. The following are categories of activities with a few generalized examples to show the breadth of effort taking place:

Science – monitoring bird migration or nesting; biological research

Policy – working with local government officials to strengthen municipal ordinances; efforts to change statewide deer hunting regulations

Direct land protection – purchasing land or easements; managing owned land for biodiversity health and ecological integrity

Experiential activities – leading groups on hikes; bird watching; wildflower walks

Environmental education – student or teacher training about the ridge's values; citizen action activities to monitor water quality or remove invasive plants

Technical training – workshops for local governments or consultants on best practice storm water control practices; training for landowners in good forestry practices and wildlife land management

Kittatinny Ridge Coalition Member Efforts

Due to the size of the Kittatinny Ridge planning corridor (137 municipalities in 12 counties) it would be impossible to list all of the specific activities taking place along the ridge. Instead, the non-profit members of the Kittatinny Coalition are listed below with a description of their individual activities as they relate to the ridge. These are only the non-profit members that launched the Kittatinny Conservation Project in 2000. Note that there are many other organizations conducting local conservation efforts that are not listed here.

Appalachian Mountain Club (Delaware Valley Chapter)

Mission: America's oldest conservation and recreation organization whose members actively enjoy, appreciate and protect the mountains, rivers, and trails of America's Northeast. Public activities include hiking, backpacking, kayaking, biking, cross-country skiing, snowshoeing, educational workshops, and trail maintenance. The organization plays an active role in

protecting the ridge by maintaining a section of the Appalachian Trail that lies on the Ridge. Lehigh Valley Group is in Allentown, Bethlehem, & Easton area. Website: amcdv.org

Appalachian Trail Conservancy

Mission: A volunteer-based, non-profit organization covering from Maine to Georgia, dedicated to the preservation and management of over 232 miles of Appalachian Trail in Pennsylvania. In addition the organization promotes the Appalachian Trail as a primitive setting for outdoor recreation (on foot) and for learning.

The ATC changed its name in 2005 from “Conference” to “Conservancy” to reflect the next phase of work for the organization. The on-going work of the organization has shifted from obtaining agreements and land for hiking along the narrow Appalachian National Scenic Trail, to conserving a much wider corridor. The goal is to better protect the ecological integrity of the corridor and to reduce the impacts of housing and commercial development occurring along the edges of the trail. As a result of this change, ATC’s work in Pennsylvania will have an increased emphasis on work with municipalities to improve local land protection measures, and partnering with conservation groups to identify and protect areas most threatened with development. Website: appalachiantrail.org; 717-258-5771

Audubon Pennsylvania

Mission: To conserve and restore natural ecosystems in Pennsylvania, focusing on birds, other wildlife, and their habitats through science, education and advocacy, for the benefit of humanity and the earth's biological diversity. Members and general public are involved in programs related to conservation, education and policy initiatives to protect areas that are important for birds. Audubon has identified the Kittatinny Ridge as its largest Important Bird Area. Conservation activities will be developed to address habitat needs of bird species in two categories: 1) at-risk species that are on the Audubon WatchList; and 2) common species that are vulnerable due to a variety of factors. Audubon also owns and operates a public hawk-watching site on the ridge north of Carlisle, Waggoner’s Gap HawkWatch. A parking lot on the Perry County side of the site off of route 74 is open from August through December when volunteer migration counters are present. Guided group field trips and teacher training can also be arranged. Website: <http://pa.audubon.org>; 717-213-6880

Berks County Conservancy

Mission: To preserve Berks County’s cultural and environmental heritage for the benefit of future generations through preserving agricultural land, open space; protecting the quality of Pennsylvania’s streams and groundwater; and preserving historic landmarks and scenic landscapes. Activities include hikes, guest speakers, conferences, Earth Day celebration, tours. Website: berks-conservancy.org; 610-372-4992

Central Pennsylvania Conservancy

Mission: To conserve natural resources and open space for the benefit of current and future generations through the acquisition and protection of land in the Central Pennsylvania Region. Activities include the promotion of natural resource conservation through development of public awareness, education, and scientific research with the cooperation of state and local governments. CPC has protected several large ridge-top parcels from development on both sides of the Susquehanna River. Website: centralpaconservancy.org; 717-763-9276

Delaware and Lehigh National Heritage Corridor

Mission: Invite the public to explore the diversified heritage of Lehigh Valley, Delaware Valley, and Anthracite regions of Pennsylvania. Activities include recreational opportunities include ethnic and musical celebrations, walking tours, and a wide variety of museums.

Website: nps.gov/dele/Recreation.htm; 610-923-3548

Eastern Forest Partnership

Mission: Collaborative of organizations working to conserve the forestlands of the entire Seaboard from Maine to Georgia. Work to deliver a common message on the need for expanded conservation of eastern forestland and educating federal officials on the need for increased land conservation funding. Member groups include three coalitions – the Northern Forest Alliance, Highlands Coalition, and Southern Appalachian Forest Coalition – alongside the Appalachian Mountain Club, The Wilderness Society, and the Southern Environmental Law Center. Website: protecteasternforests.com; 802-253-8227

Hawk Mountain Sanctuary Association

Mission: To foster the conservation of birds of prey worldwide and to create a better understanding of and further the conservation of the natural environment, particularly the Central Appalachian region. Activities include hiking, bird watching, and weekend educational programs. The Sanctuary includes several lookouts with 70-mile panoramic views, eight miles of trails, and a native plant garden. Visitor center is open year round, with a bookstore and Wings for Wonder gallery. Members receive free admission; daily fee for non-members.

Recent research includes the use of radio telemetry to study the movement of sharp-shinned and cooper's hawks along the ridge to help guide future conservation initiatives. Location: Southeastern PA (Kempton). Website: hawkmountain.org; 610-756-6000

Natural Lands Trust

Mission: Primary focus is the permanent protection of significant open space in the greater Philadelphia region. This is accomplished through acquisition and conservation of land in addition to conservation easements and land planning. Location: Delaware Valley headquarters conducts preservation activities in the counties of Chester, Delaware, Lackawanna, Montgomery, Northampton, and Philadelphia. NLT also manages the Reineman Sanctuary, a wildlife refuge on the Ridge in Perry County. Website: natlands.org; 610-353-5587

Kittatinny & Pinnacle Association

Mission: The preservation of the Kittatinny Ridge, particularly in Berks Country. Working to protect the Ridge from development and logging due to its global importance for the migration of birds.

National Wild Turkey Federation (PA Chapter)

Mission: Work for the restoration and wise management of the American wild turkey through improving wildlife habitat and the preservation of turkey hunting traditions. Activities include various types of habitat work such as planting seedlings and bushes to produce future mast and berry crops, seeding and liming old roads close to all vehicular traffic, and working on spring seeps. Website: panwtf.com; 717-761-5925

Pennsylvania Deer Association

Mission: Actively engaged to the wise management of Pennsylvania's deer herd. Activities: outdoor shows, annual PA Deer Classic and Outdoor Expo, bull and pig roast.

Website: padeer.net; 717-776-7248

PA Federation of Sportsmen's Clubs

Mission: To provide a statewide, united voice for the concerns of all sportsmen and conservationists; to ensure their rights and interests are protected, and to protect and enhance the environment and natural resources. Public activities include meetings, fishing activities, and youth programs. Website: pfsc.org; 717-231-3521

PA Institute for Conservation Education

Mission: Founded in 2002, it is a non-profit educational organization dedicated to advancing awareness, knowledge and skills in natural history and conservation of natural resources by building an ecologically literate and engaged public. The Kittatinny Ridge region serves as an outdoor classroom providing ideal locations for natural history and conservation field-based learning opportunities for the public. The Institute serves students of all regions providing natural history seminars, teacher workshops, conservation internships, and youth programs. Website: picweb.org; 570-458-5227

Pennsylvania Environmental Council

Mission: To protect and enhance the environmental quality of the Commonwealth by working on such issues as air quality, water resource protection, land use and growth management, and the re-use of contaminated industrial sites. PEC supports the Environmental Advisory Council (EAC) Network by promoting the establishment of new EACs and assisting existing ones. In 2005, PEC began meeting with municipalities in several Kittatinny Project counties to promote EACs on behalf of the Kittatinny Coalition, and will continue that work as funding allows: eacnetwork.org. Website: pecpa.org; 717-230-8044; Phila/EAC Office: 215-563-0250

PA Land Trust Association

Mission: Promotes voluntary land conservation by supporting the missions of land trusts and building a positive climate for conservation in Pennsylvania. Website: conserveland.org; 717-230-8560

Schuylkill Headwaters Association

Mission: Committed to the protection of the Schuylkill River through working closely with 17 school districts to educate children and the public about the river. Website: phillywater.org/Schuylkill/Projects; 570-385-2122

Schuylkill River Greenway Association

Mission: To inform, coordinate, lead and assist communities, organizations, and citizens in envisioning the Schuylkill River region fully revitalized and restored. Activities include conferences and workshops to members. Website: schuylkillrivergreenway.org; 484-945-0200

Sierra Club Berks County

Mission: Promotes conservation by influencing public policy through activism, education, lobbying, and litigation. Website: pennsylvania.sierraclub.org.

The Conservation Fund

Mission: Forges partnerships to preserve outdoor heritage-America's legacy of wildlife habitat, working landscapes, and community open space. Uses a unique brand of conservation driven by effectiveness, efficiency, and environmental and economic balance.

Website: conservationfund.org; 717-230-8163

The Nature Conservancy of PA

Mission: To preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. TNC's work along the Kittatinny Ridge has and will continue to focus on two primary areas: 1) Cherry Valley region of Monroe County, which has a matrix of wetlands, rare plants, animals and natural communities; and 2) Fort Indiantown Gap National Guard Training Site in Lebanon County that has grassland habitat supporting the only population of the Regal Fritillary butterfly in the northeastern United States. Website: nature.org; Ft. Indiantown Gap: 717-861-2949; Cherry Creek Valley: 570-643-7922

Wildlife Information Center

Mission: To preserve wildlife and habitat through education, conservation, and research for the benefit of the earth and all of its inhabitants. Activities include the Kittatinny Raptor Corridor Project to preserve biological diversity through protection and preservation of wildlife habitat along the Kittatinny Ridge. The center monitors ecological vital signs of the mountain, assists where needed, develops eco-tourism information, and releases educational material to the public.

In 2002, WIC purchased over 750 acres of the Ridge along the Lehigh River and in Lehigh Gap (primarily eastern Carbon County). The Lehigh Gap Wildlife Refuge includes a severely degraded section of the ridge's slope (from local industrial emissions in the 1900s) that is being restored by experimental planting of native warm-season grasses and the removal of invasive species plant species. The refuge also serves as an outdoor classroom and public education center. Location: Slatington; Website: wildlifeinfo.org; 610-760-8889

Wildlands Conservancy

Mission: Non-profit organization dedicated to the preserving land, keeping waterways healthy, and educating the community about nature. Work includes conservation efforts in the Schuylkill River watershed, and with landowners along the ridge. Public activities include: film festival, plant sale, and Lehigh River sojourn. Location: Emmaus; Website: wildlandspa.org; 610-966-6437

CONSERVATION ACTIONS RECOMMENDED

The recommendations listed below are grouped into four categories to help track future progress and align activities with the mission of partners. This list will serve as a framework that the Kittatinny Coalition can convert into a work plan with member organizations identifying specific roles and responsibilities for implementation.

Science

Develop breeding bird volunteer monitoring program to collect data along entirety of ridge.

Conduct nesting transect studies by professional scientists to locate key nesting areas for Audubon species of concern.

Conduct additional raptor telemetry studies to track migration & roosting patterns.

Pursue designation of the ridge as a continentally-important or globally-important bird area.

Pursue municipal or county designations of the ridge as locally important for birds, migration, groundwater recharge, or other ecological factors.

Support and pursue research and monitoring efforts for PA Species of Special Concern.

Conduct habitat and bird population monitoring at deer exclosures along ridge.

Compile research on reptiles, amphibians, and vernal pools. Identify needs for further research.

Add to GIS the recent natural heritage data compiled for Franklin and Dauphin counties.

Land Planning, Management and Conservation

Identify parcels to connect and extend public land holdings along high ecological value corridors. Natural Lands Trust's Smart Conservation program can help identify suggested corridors of connectivity, as well as priority parcels for biodiversity protection.

Promote and support the purchase of conservation easements by land trusts and agencies (especially identified target or priority areas), using conservation easement programs to expand the protected habitat range, link protected lands and buffer the larger public holdings. Regional offices of US Forest Service and US Environmental Protection Agency may be helpful in efforts to secure federal funding for easements.

Develop a comprehensive breeding and migratory bird management plan for entire ridge. Since large, unfragmented forest blocks are required for many migrating species, the primary conservation strategy for migrating raptors and songbirds is to prevent as much fragmentation as possible along the entire corridor. Data collected from breeding bird surveys (see science above) will help guide more local or regional protection strategies for species of concern that use the forested ridge for nesting.

Partner with public land management agencies to develop bird habitat management plans as part of their natural resource management plans within the IBA.

Identify public water authority watersheds and work for their permanent protection. Examples include the Hamburg Water Authority's property in Berks County that includes the Pinnacle, and Lebanon Water Authority's Seigrist Reservoir in Schuylkill County.

Partner with the agricultural community to help protect valley farmland adjacent to the forested slopes. Agricultural land at the base of the ridge is important groundwater recharge areas and provides a buffer to the forests.

Identify historic features along the Kittatinny Conservation Corridor.

Obtain parcel data from Lebanon County Planning Office.

Partner with intersecting greenway groups for municipality and landowner work:

Intersecting Trails & Greenways:

- Susquehanna Greenway
- Schuylkill River Heritage Corridor
- Delaware and Lehigh Trail
- Delaware & Lehigh Heritage Corridor
- Appalachian Trail
- Tuscarora Trail

Develop regional or interest area committees for local conservation work. The Susquehanna and Delaware basins divide the ridge into two regional groups. Smaller watersheds can be an effective organizing unit for much of the work. Grouping counties together that straddle the ridge may also be a useful implementation unit (e.g. Franklin and Fulton; Cumberland and Perry; Dauphin and Lebanon; Schuylkill and Berks; Northampton, Lehigh, Carbon and Monroe; etc. Committees can also include interest areas such as: birds, mammals, herps, hiking trails, etc.

Develop a list of important initiatives for each committee's geographic region, and the partner(s) taking the lead for each initiative.

Public Policy

Continue work to promote Environmental Advisory Councils and build interest in local natural resource protection policies and practices. Explore partnership opportunities to fund EAC efforts and support.

Develop and implement a local government assistance program for the ridge to help municipalities build the infrastructure of policies and programs needed to achieve a basic level of protection for the entire ridge. Some municipalities need help writing and enacting basic natural resource protection ordinances, while others are ready to make updates and improvements to strengthen existing ordinances, including steep slopes, wetlands, riparian buffers, and forests/tree cover. Encourage developers to require natural wood or stone exterior on homes, and plant native vegetation. Cumberland and Monroe counties currently have matching grant programs to help municipalities pay for these costs.

Public Policy, continued

Obtain funding to assist municipalities with costs to enact or improve ordinances to better protect the ridge's natural resources.

Where development is unavoidable, encourage municipalities to require developers to use open space protection planning tools such as the Natural Lands Trust's "Conservation by Design" model.

Identify municipalities within the conservation corridor that do not have any natural resources zoning, and assess public interest for zoning in these communities.

Support state-level work to better manage white-tailed deer population to help protect forest health; and work with regional and local land managers to help implement local deer management initiatives.

Work with municipalities and county commissions at a regional management perspective to implement land use planning practices that are in conformance with Ridge habitat conservation and protection goals.

Develop a list of elements to include in ordinances for forest slope protection. (Berks County has a list they recommend.) Work with the Bureau of Forestry's Division of Rural and Community Forestry to develop complete list, then send list to each county to review and approve.

Extend the Kittatinny Conservation Project beyond Pennsylvania's borders. Develop Kittatinny conservation partners in additional states to extend Kittatinny planning corridor to a multi-state project. Definitely include New Jersey and New York; explore feasibility of Maryland and West Virginia. Then, seek national legislation to obtain federal funding for easements.

Education and Outreach

Develop materials and strategies to increase public awareness of ridge values and threats throughout the twelve-county region. Implement strategies and disseminate materials on an on-going basis.

Develop and promote public action opportunities by all partners to improve ridge habitat.

Develop landowner habitat enhancement & protection initiatives to help private landowners with stewardship and conservation options

Work closely with DCNR's Forest Stewardship program and district foresters to consider Kittatinny conservation strategies and activities in landowner forest management plans.

Develop school programs & teacher-training workshops to help students better understand, connect with, and protect the ridge locally, with an understanding of the larger Kittatinny Ridge conservation effort.

Explore ways to involve more youth in ecological ridge studies and activities (youth camps, school or youth groups adopting their piece of the ridge, etc.)

Enhance the Kittatinny website with more youth and educator materials.

Education and Outreach, continued

Support DCNR, PGC and other agencies and organizations in their efforts to conduct education outreach programs along the ridge.

Develop informational signs or kiosks for partner facilities or parking areas, and have partner facilities distribute materials and conduct activities with a Kittatinny Ridge component.

Enhance awareness of the ridge as an IBA and the need for bird conservation by placing IBA signs at public access points and on private land that is highly visible to the public.

Establish a formal network of official “Kittatinny Ridge Education Centers” that serve as education and citizen engagement centers along the ridge. Current facilities already acting in this capacity in varying degrees are listed below (from east to west), along with the county in which it is located.

Jacobsburg State Park EE Center, Northampton County
Wildlife Information Center’s Lehigh Gap Education Center, Carbon and Lehigh counties
Hawk Mountain Sanctuary Association, Berks and Schuylkill counties
Kernsville Dam recreation area, Hamburg
Nolde State Park EE Center, Berks County
Olewine III Nature Center at Wildwood Lake, Dauphin County Park and Recreation Dept.
Waggoner’s Gap HawkWatch and Reineman Sanctuary, Perry County
Charles C. Brightbill Environmental Center, Franklin County

Additional facilities with potential to serve in this capacity include:

Monroe County Conservation District’s Environmental Education Center at the Kettle Creek Wildlife Sanctuary
Schuylkill Conservation District’s Dr. James S. Shadle Nature Center in the Bear Creek Environmental Area
Memorial Lake State Park, Lebanon County
Colonel Denning State Park, Cumberland County
Cowan’s Gap State Park, Fulton County

County Priorities

Some county planning offices have identified priority work for the Kittatinny Ridge:

Lehigh Valley Planning Office’s priority is the eastern third of the ridge in Northampton County. This region has a high ecological value, yet is primarily privately owned and vulnerable to development.

Berks County Planning Office is working to help municipalities enact conservation ordinances.

Berks County Conservancy is focused on a corridor from Bethel to Tilden townships due to the increasing development pressure in the northwest part of the county.

A priority area for Carbon County is the Lehigh Gap and the Delaware & Lehigh Corridor.

Schuylkill County needs help reaching out to municipalities to enact conservation ordinances.

APPENDICES

National Audubon Society Bird Conservation Goals
With species of concern listed for the Kittatinny Ridge in Pennsylvania

**GOAL: Stabilize & increase populations
of at-risk species of birds**

WatchList - Red (highest concern)

Cerulean Warbler
Golden-winged Warbler

WatchList – Yellow (high concern)

American Woodcock
Red-headed Woodpecker *
Olive-sided Flycatcher *
Willow Flycatcher *
Wood Thrush
Bay-breasted Warbler *
Blue-winged Warbler
Prairie Warbler
Worm-eating Warbler
Kentucky Warbler
Canada Warbler

State-listed Species of Concern

Great Egret
Bald Eagle
Peregrine Falcon *

* denotes use of ridge for migrating or
seasonal only, not for nesting

**GOAL: Prevent persistent declines or
range contractions in populations of
common native birds**

Vulnerable Common Species

Black Vulture
Turkey Vulture
Red-shouldered Hawk
Broad-winged Hawk
Northern Goshawk *
Ruffed Grouse
Whip-poor-will
Chimney Swift
Yellow-bellied Flycatcher *
Least Flycatcher *
Swainson's Thrush *
White-eyed Vireo
Yellow Warbler
Chestnut-sided Warbler
Rose-breasted Grosbeak
Black-throated Blue Warbler
Blackpoll Warbler *
Ovenbird
Louisiana Waterthrush
Hooded Warbler
Yellow-breasted Chat
Scarlet Tanager
Eastern Towhee

Rivers, Creeks and Runs of the Kittatinny Ridge

Rivers running through the Kittatinny Ridge

Delaware River
Schuylkill River
Susquehanna River

Smaller water bodies originating on or running through the Kittatinny Ridge

Northampton County

Minsi Lake
Slateford Creek
Martin's Creek
Little Bushkill Creek
Bushkill Creek
Hokendauqua Creek
Indian Creek
Bertsch Creek

Monroe County

Chicola Lake
Nazareth Reservoir
Cherry Creek
Rose Common Creek
Aquashicola Creek

Carbon County

Aquashicola Creek
Lizard Creek

Lehigh County

Leaser Lake
Trout Creek
Jordon Creek
Ontelaunee Creek
School Creek

Berks County

Lake Ontelaunee
Pine Creek
Furnace Creek

Maiden Creek
Birch Creek
Mill Creek
Little Swatara Creek
Swatara Creek
Northkill Creek
Rattling Run
Stony Run
Hassler Run

Schuylkill County

Fawn Lake
Lake Wynonu
Lizard Creek
Swatara Creek
Bear Creek
Bear Hole Run
Indian Run
Swope Valley Run

Lebanon County

Marquette Lake
Memorial Lake
Shuey Lake
Lake Strause
Lake Weiss
Forge Creek
Monroe Creek
Reed's Creek
Bear Hole Run
Trout Run
Qureg Run
Aires Run

Dauphin County

Manada Creek
Fishing Creek
Beaver Creek
Bow Creek
Paxton Creek
Walnut Run
Indiantown Run

Cumberland County

Simmons Creek
Opossum Creek

Locust Creek
Bloser Creek
Doubling Gap Creek
Center Creek
Holtz Run
Spring Run
Wertz Run
Meetinghouse Run
Rock Run
Whisky Run
Brandy Run
Three Square Hollow Run
Bore Mill Run
Pebbles Run
Newberg Run
Laughlin Run

Perry County

Sherman Creek
Fishing Creek
Bryson Hollow Run
Trout Run
Fishing Run
Pisgah Run
Green Valley Run
Trout Run
Laurel Run

Franklin County

Letterkenny Reservoir
Cedar Lake
Conodoguinet Creek
Conococheague Creek
Dennis Creek
Chippinger's Run
Paxton Run
Trout Run
Spring Run
Lehman Run
Kesey Run
Muddy Run
Wilson Run
Campbell Run
Broad Run

PA Municipalities in the Kittatinny Ridge Conservation Corridor

Berks County

Albany Township
Bethel Township
Greenwich Township
Hamburg Borough
Lenhartsville Borough
Strausstown Borough
Tilden Township
Upper Bern Township
Upper Tulpehocken Twnship
Windsor Township

Carbon County

Bowmanstown Borough
East Penn Township
Franklin Township
Lehighton Borough
Lower Towamensing Twp
Mahoning Township
Parryville Borough
Palmerton Borough
Towamensing Township
Weissport Borough

Cumberland County

Camp Hill Borough
Carlisle Borough
East Pennsboro Township
Hampden Township
Hopewell Township
Lemoyne Borough
Lower Frankford Township
Lower Mifflin Township
Mechanicsburg Borough
Middlesex Township
New Cumberland Borough
Newburg Borough
Newville Borough
North Middleton Township
North Newton Twp (N. 1/3)
Shiremanstown Borough
Silver Spring Township
Upper Frankford Township
Upper Mifflin Township
West Pennsboro Twp (N. 1/3)
Wormleysburg Borough

Dauphin County

Dauphin Borough
East Hanover Township
Halifax Township (S. 1/3)
Harrisburg City
Jefferson Township
Lower Paxton Township

Middle Paxton Township
Paxtang Borough
Penbrook Borough
Reed Township
Rush Township
Susquehanna Township
Wayne Township
West Hanover Township

Franklin County

Fannett Township
Hamilton Township
Letterkenny Township
Lurgan Township
Mercersburg Borough
Metal Township
Montgomery Township
Peters Township
St. Thomas Township
Warren Township

Fulton County

Ayr Township
Dublin Township
McConnellsburg Borough
Todd Township
Thompson Township

Lebanon County

Bethel Township
Cold Spring Township
East Hanover Township
Jonestown Borough
Swatara Township
Union Township

Lehigh County

Heidelberg Township
Lynn Township
Slatington Borough
Washington Township

Monroe County

Delaware Water Gap Borough
East Stroudsburg Borough
Eldred Township
Hamilton Township
Middle Smithfield Township
Ross Township
Smithfield Township
Stroud Township
Stroudsburg Borough

Northampton County

Bangor Borough
Bushkill Township
Chapman Borough
East Bangor Borough
Lehigh Township
Moore Township
Pen Argyle Borough
Plainfield Township
Portland Borough
Roseto Borough
Upper Mount Bethel Township
Walnutport Borough
Washington Township
Wind Gap Borough

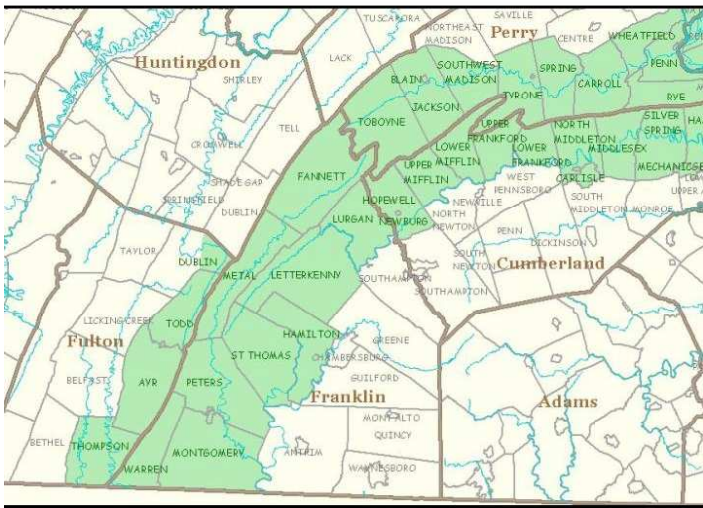
Perry County

Blain Borough
Carroll Township
Duncannon Borough
Jackson Township
Landisburg Borough
Marysville Borough
Penn Township
Rye Township
Southwest Madison Township
Spring Township
Tyrone Township
Toboyne Township
Watts Township (south 1/3)
Wheatfield Township

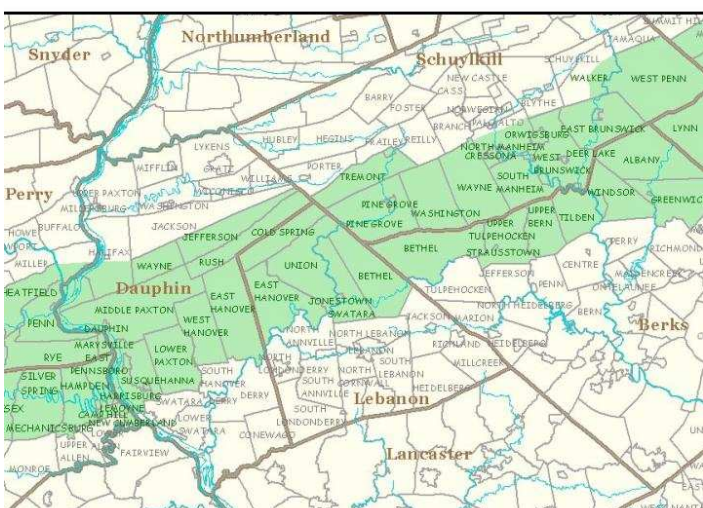
Schuylkill County

Auburn Borough
Cressona Borough
Deer Lake Borough
East Brunswick Township
Landingville Borough
New Ringgold Borough
North Manheim Township
Orwigsburg Borough
Pine Grove Borough
Pine Grove Township
Port Clinton Borough
Schuylkill Haven Borough
South Manheim Township
Tremont Borough
Tremont Township
Walker Township (S.E. 1/3)
Washington Township
Wayne Township
West Brunswick Township
West Penn Township

Maps of the Conservation Planning Corridor for the Kittatinny Ridge



Western Third

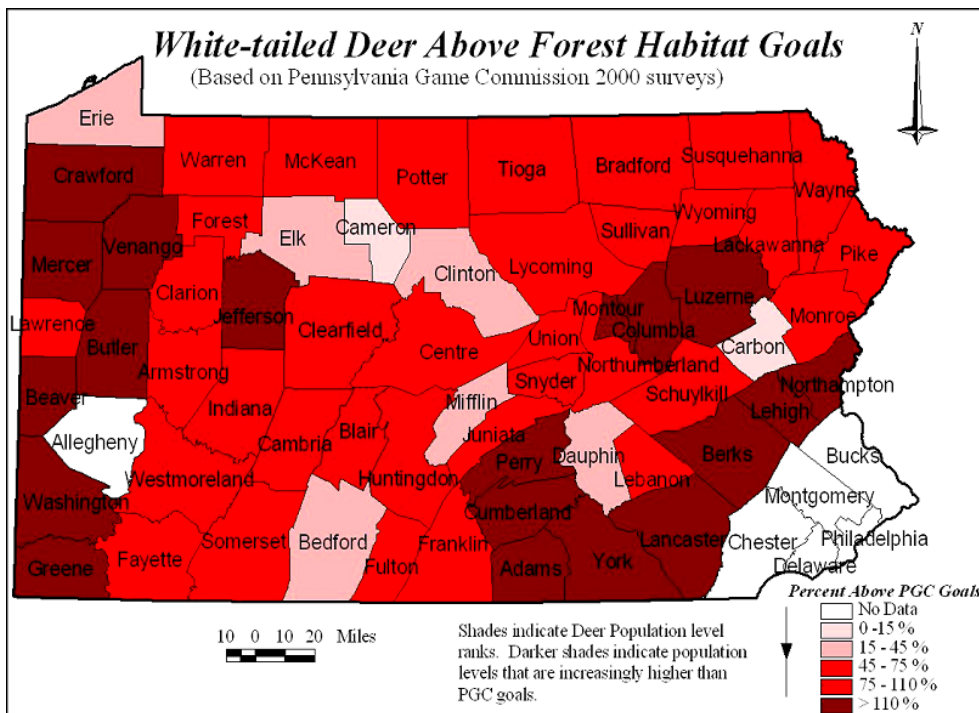
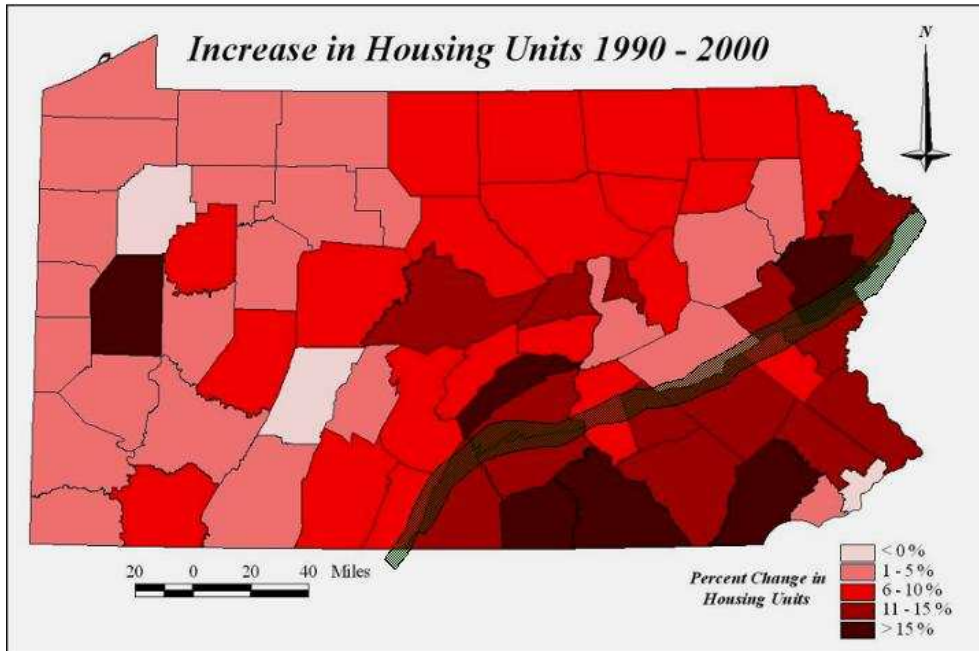


Central Third

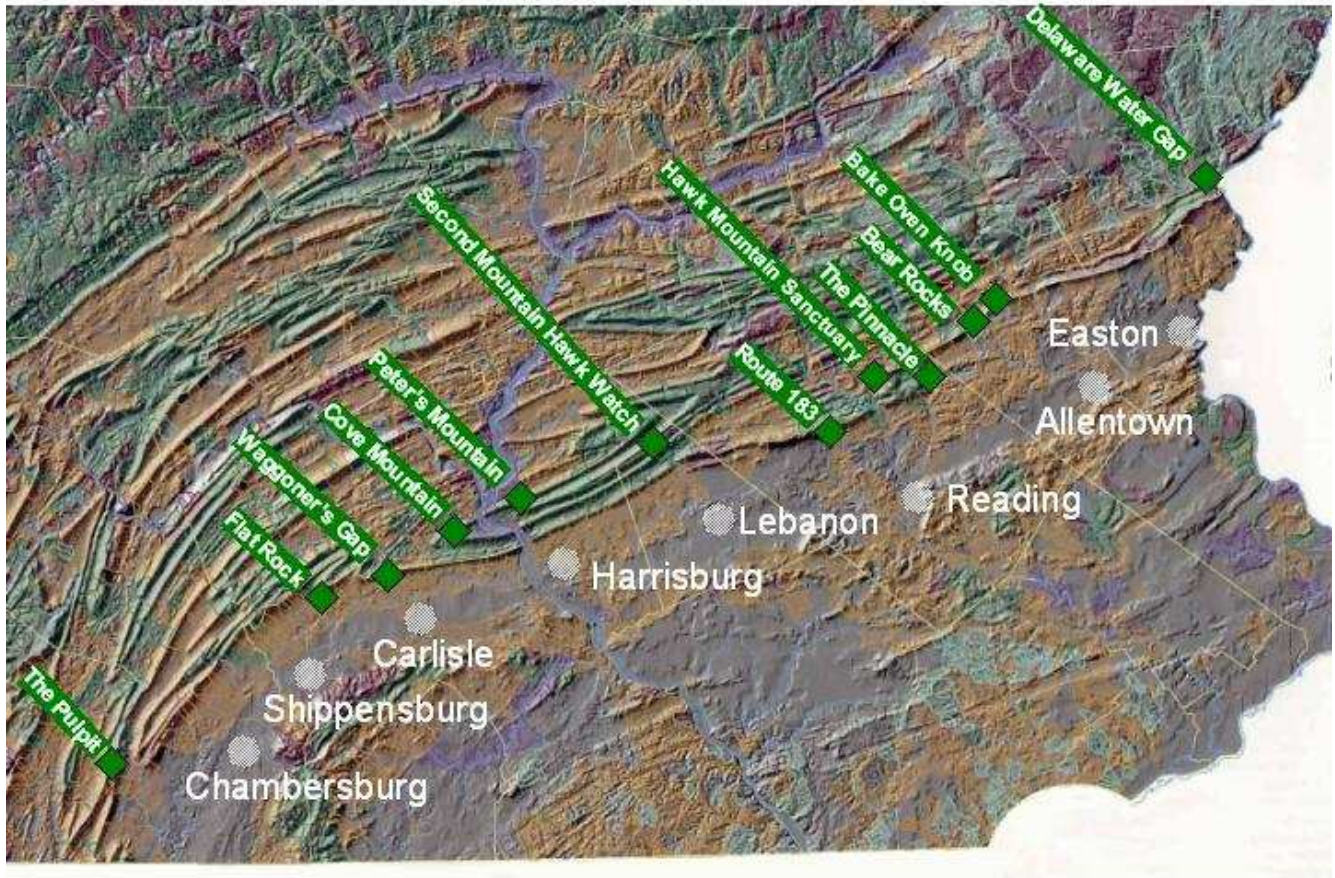


Eastern Third

Threats to the Kittatinny Ridge



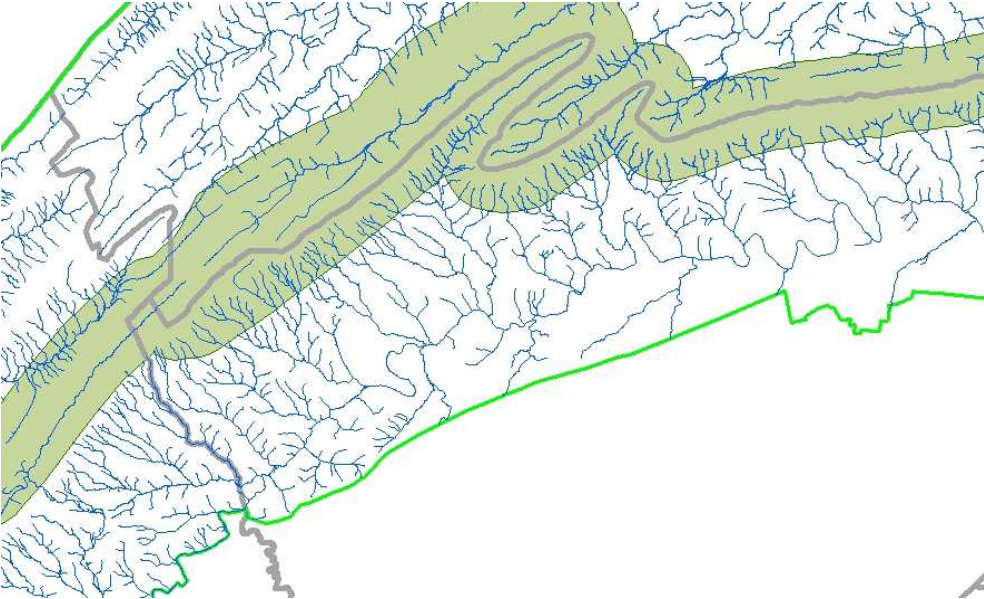
Hawk-watching Sites Along the Kittatinny Ridge



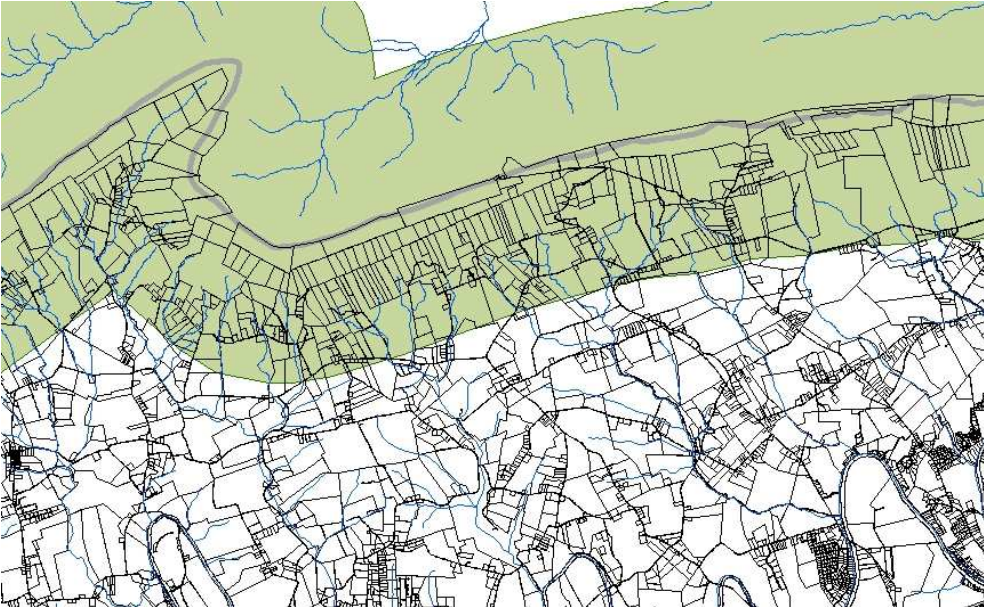
Hawk Watching Sites. The sites identified in the map above represent all the locations along the Kittatinny Ridge flyway in Pennsylvania that are accessible by the public for watching raptor migration. The sites that currently submit their counts to the national raptor migration database administered by the Hawk Migration Association of North America are: Bake Oven Knob, Hawk Mountain Sanctuary, Lehigh Gap, Little Gap, Second Mountain, Tuscarora Summit, and Waggoner's Gap. Data can be viewed online at hawkcount.org.

Visit <http://pa.audubon.org/maps> for an interactive mapping site where custom maps can be created from dozens of data layers.

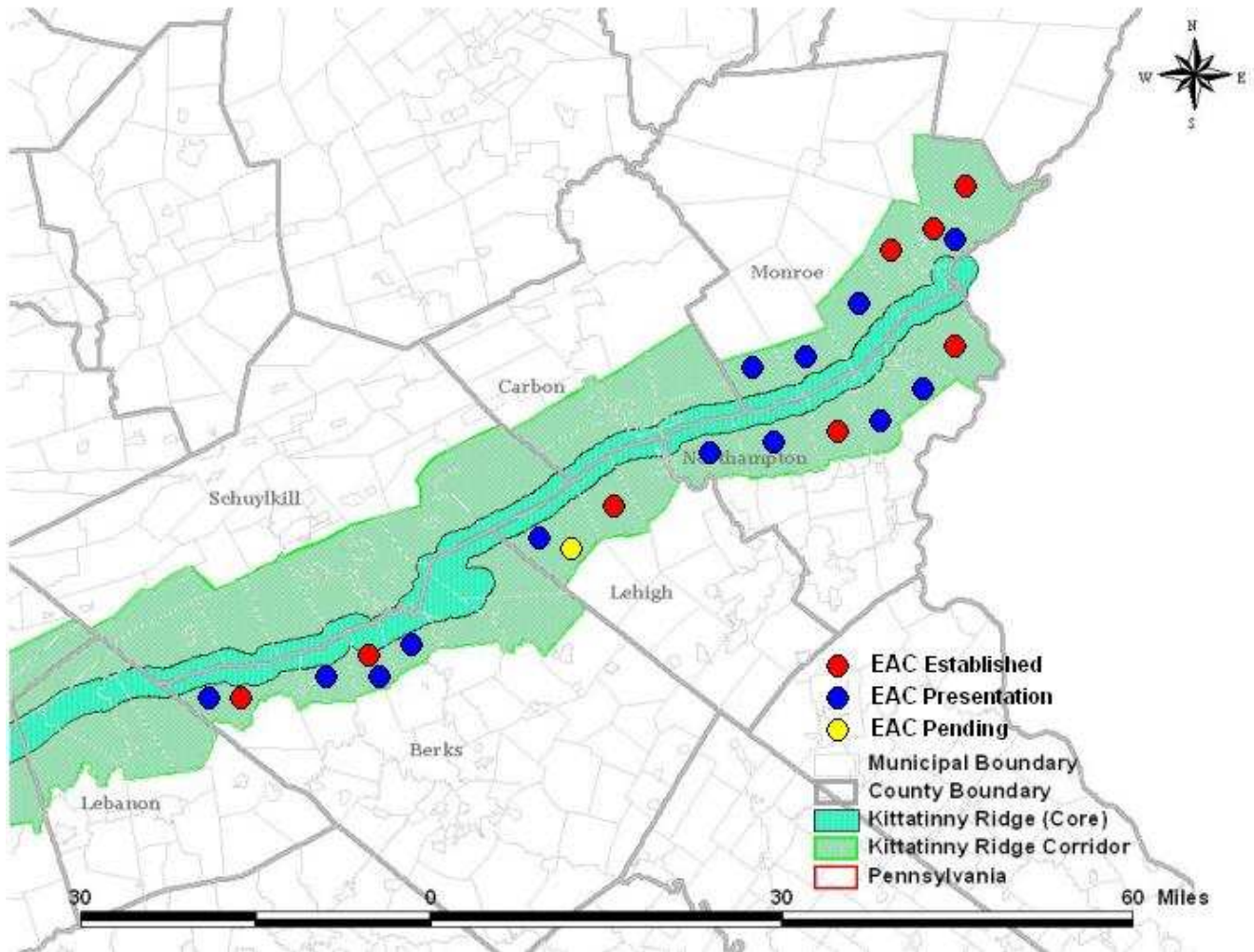
Sample Stream Map from Cumberland County



Sample Parcel Map from Cumberland County



Environmental Advisory Councils in Eastern Half of the Corridor (as of November 2006)



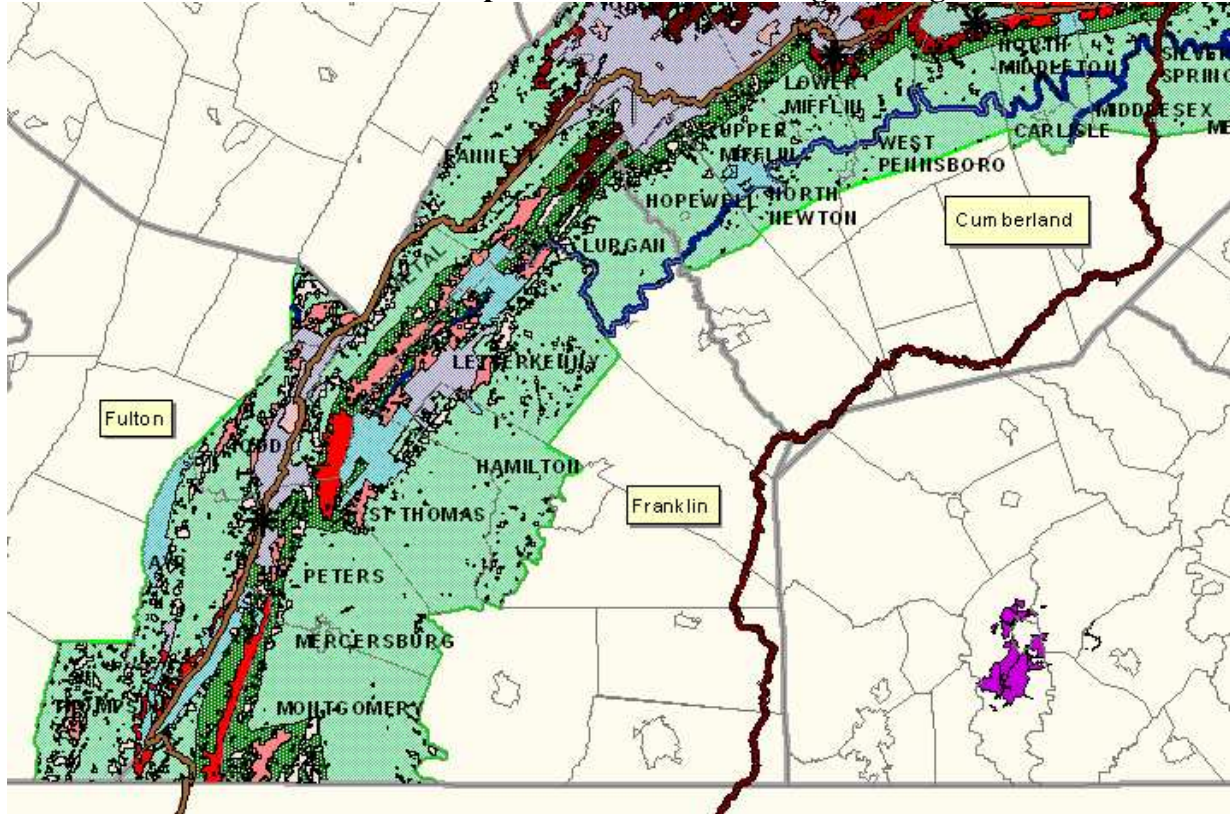
Maps of Unprotected Areas with High Ecological Value

The following six maps are a sample of what can be produced from the Kittatinny Mapping website: <http://pa.audubon.org/kittatinny/maps.html>.

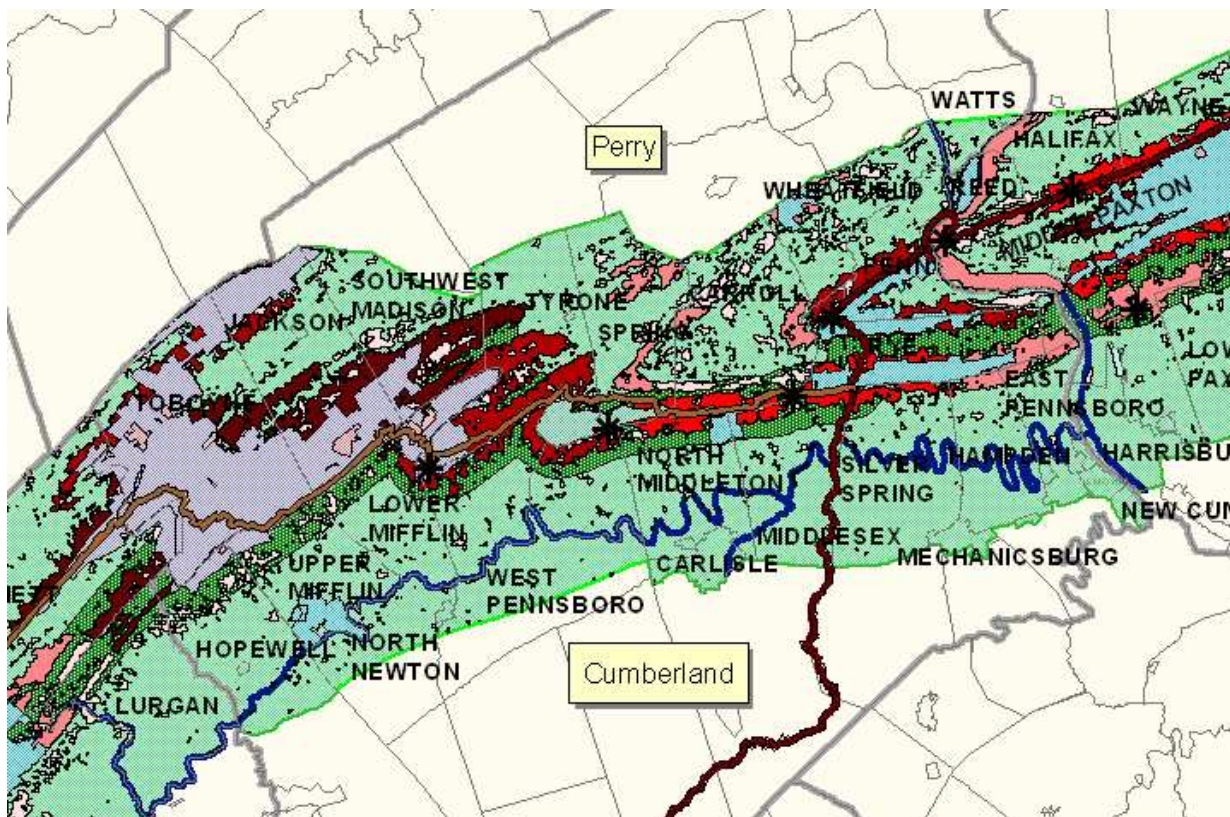
For this set of maps, particular data layers were combined to focus on areas that are of high ecological quality, yet privately owned — thus vulnerable to future development.

1. The “contiguous forest” layer is the base layer that has shades of brown, red and pink to indicate varying sizes of intact, contiguous forest (brown is largest forest blocks, red is next largest, pink is smallest). Generally, the larger the block of unfragmented forest, the higher value the block of forest will have for biodiversity, habitat, and ecological functioning.
2. Then, the public lands layer is over the top, made up of blue (state game lands), light purple (state forests), and dark purple (federal lands). Any brown, red or pink areas still visible are high quality forest areas that are currently not publicly owned. (Note that there are a few private protected lands, such as parcels with a conservation easement, which are not included on these maps.)
3. Finally, the Appalachian and Tuscarora Trails (brown) along with major streams and rivers (blue) were added over the top so they would remain visible.

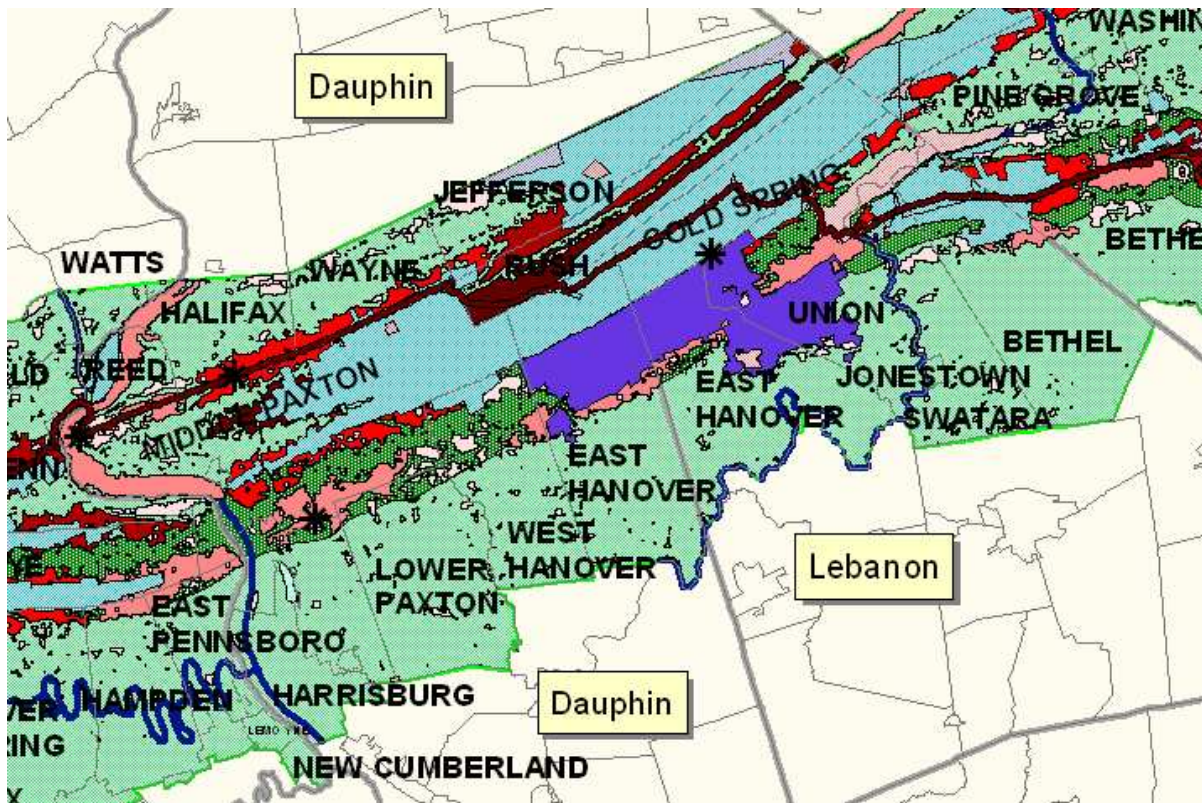
Fulton and Franklin Counties: Unprotected Areas with High Ecological Value



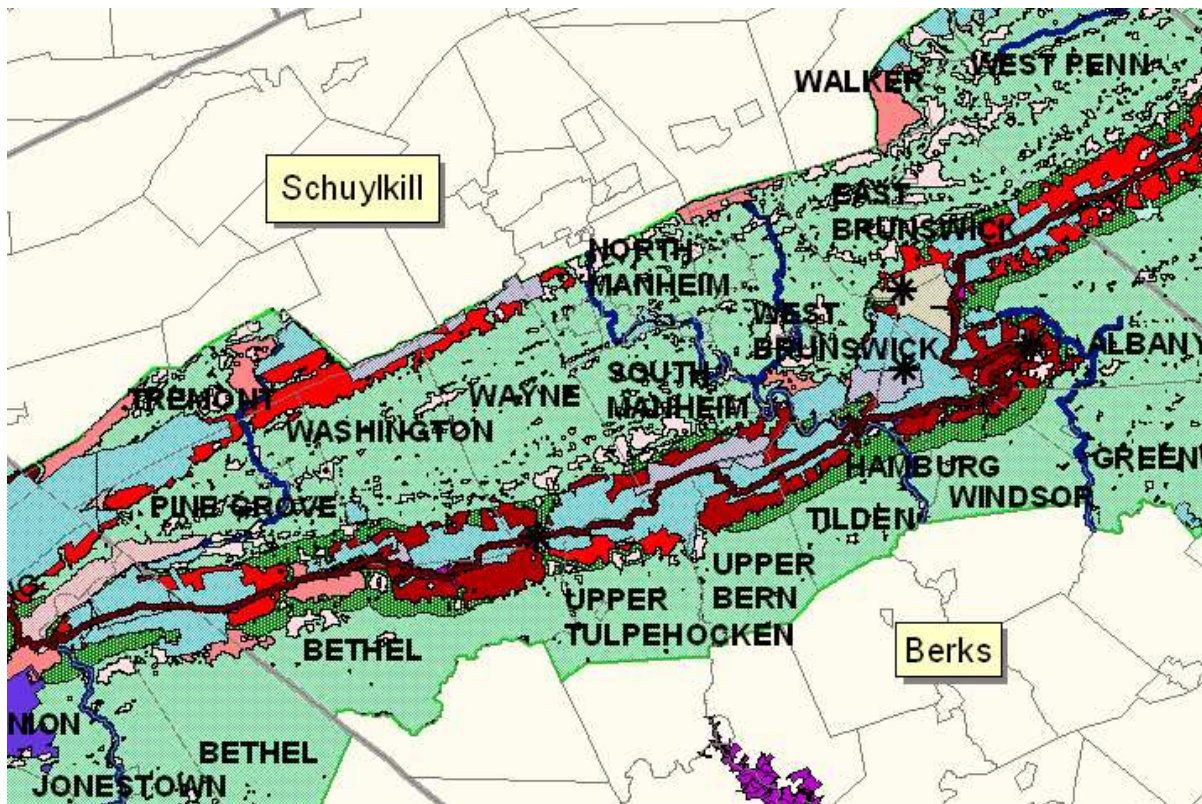
Perry and Cumberland Counties: Unprotected Areas with High Ecological Value



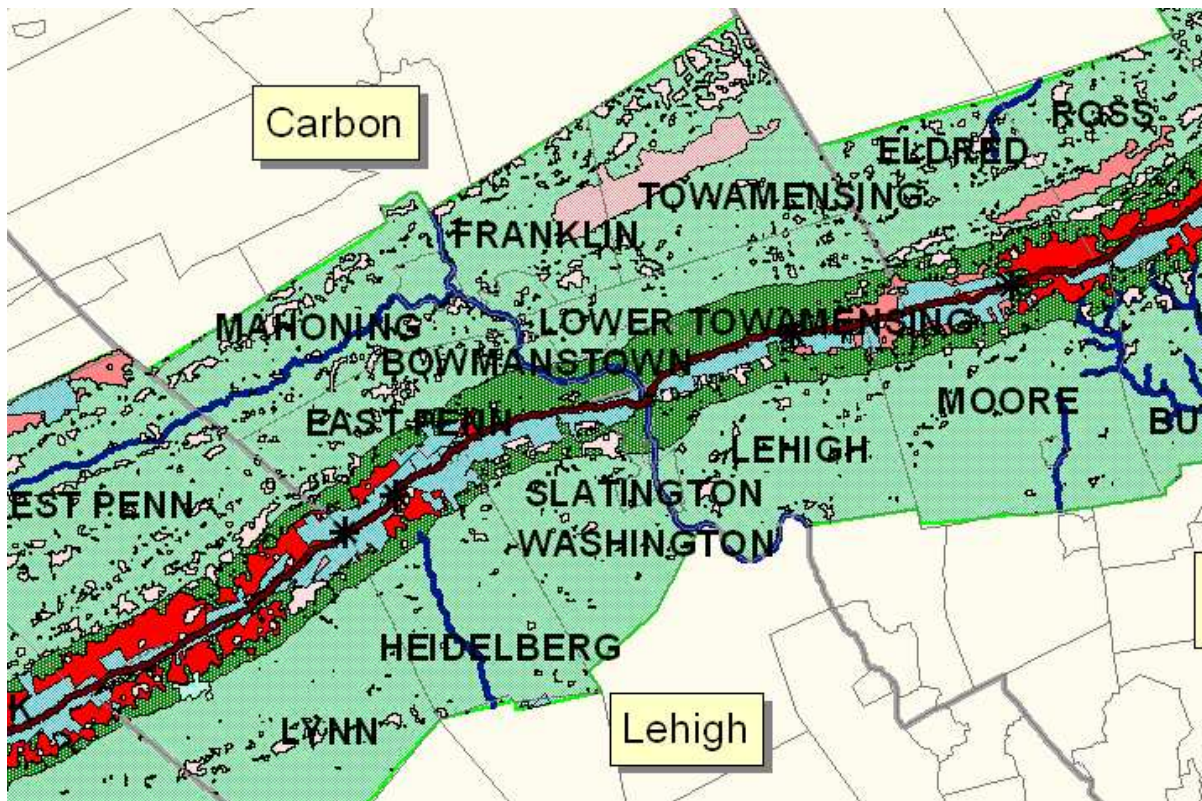
Dauphin and Lebanon Counties: Unprotected Areas with High Ecological Value



Schuylkill and Berks Counties: Unprotected Areas with High Ecological Value



Carbon and Lehigh Counties: Unprotected Areas with High Ecological Value



Monroe and Northampton Counties: Unprotected Areas with High Ecological Value

