



FOREST: FOREST LAND OWNERSHIP AND MANAGEMENT

FOREST

While the Highlands contain a diversity of land uses, more than half of the study area is forest land. Most of the Highlands forest land is dominated by oak-hickory forest with northern hardwoods, hemlock, and swamp hardwoods being of secondary importance. The most recent USDA Forest Service Inventory and Assessment reports suggest that the amount of forest land classified as timberland is holding steady and that the total net volume of timber stock is growing as Highlands forests continue to mature (Alerich and Drake 1995, Griffith and Widmann 2001).

FOREST LAND OWNERSHIP AND MANAGEMENT

The most current data on forest land ownership in the Highlands region comes from surveys conducted by the USDA Forest Service in New York and New Jersey in the early 1990s. There were between 50,000 and 75,000 private forest land ownerships in the counties of the Highlands region in 1991. A majority of Highlands forest land is owned by private individuals and organizations, with the remainder owned by public agencies. The diversity of reasons for owning forest land in the Highlands matches the diversity of people that own it. While many owners have forest land simply because it is a part of their residence, a significant proportion of forest land is owned as a real estate investment. These individuals and other owners in the Highlands region will determine how the land will be used and what the rest of society may expect from these lands: whether they will remain forested and replenish and purify ground water, or will be subdivided and developed into house lots with increased impervious surface cover. Decisions to change land use will depend on landowners' goals and whether they can afford these goals, given their property taxes and ability to generate income from the land.

Surveys found that these landowners value the forest land more for its green space than for its ability to produce timber products (Birch 1996). Most forest land ownerships are quite small with more than 50 percent of them smaller than 10 acres, and more than 90 percent smaller than 50 acres in size. Nearly a third of the owners have harvested some type of forest product from their land—predominately firewood—for their own use, and an even larger portion plan to harvest in the future. Approximately 10,900 acres in New York and 5,600 acres in New Jersey are enrolled in the USDA Forest Service's Forest Stewardship Program that provides forest management plans for multiple forest resources (Appendix I). Forest tax laws in New York and New Jersey require that a forest management plan be prepared by a professional forester and that the plan be followed. New Jersey requires that at least \$500 of income must be generated from the forest per year.



Most of the public lands are owned by State agencies, but a significant area is also owned by various local and Federal agencies. The authority and regulations used to purchase and manage the public lands makes the fate of these lands more predictable than that of the lands owned by private individuals and organizations. The publicly owned forest lands are predominately owned to provide the general public with clean drinking water and recreational opportunities and to provide habitat for wildlife and rare species, and are unlikely to be converted to other land uses.

FOREST HEALTH

The Highlands forests are negatively impacted by a number of forest pests and diseases. One of the more critical biological threats to the forest resources of the Highlands is the presence of the introduced pest, the hemlock woolly adelgid. A significant percentage of the Highlands eastern hemlock forest stands have been infested and have died. As the primary evergreen tree in the Highlands, hemlock represents an irreplaceable component of Highlands forests. Defoliation caused by the gypsy moth has been impacting Highlands forests for many years, with oak forest types being the most affected. Several years of repeated defoliation leave the trees vulnerable to other insects and diseases that can eventually lead to tree mortality. This may ultimately lead to the reduction of the larger mature oak species in a particular area.

The incidence of many forest pests is monitored and updated on an annual basis through the USDA Forest Service's Cooperative Forest Health Program and the Forest Health Monitoring Program in each State. Efforts are underway on a variety of fronts to understand and mitigate the impacts of forest pests. Considerable effort is being focused on the use of biological agents to control some of the pest species including hemlock woolly adelgid and the gypsy moth. Other possible avenues include spray programs to abate the impacts of several of the pests including the gypsy moth.

Deer also pose a serious threat to forest health and regeneration as well as to the future vegetation composition of the Highlands forests. Deer actively browse tree seedlings and saplings and understory shrubs and herbs. Deer overpopulation and lack of adequate forage have resulted in low regeneration for native trees and herbaceous plants throughout the region. In many instances, preferential browsing on native species has given invasive plant species the competitive advantage to reproduce and spread unabated throughout the area.

The individual impact from various forest stressors is partially dependent on additional contributing factors. One of the more recent significant factors is drought, especially since the early 1990's. Drought-stressed trees are more vulnerable to pests and diseases, and multiple stressors increase the probability of tree mortality. For example, the coincidence of drought and gypsy moth



FOREST: KEY FINDINGS

outbreaks could significantly affect the oaks that make up a majority of the Highlands forests.

For more information on timberland, forest land ownership, and forest health, refer to the New York – New Jersey Highlands Technical Report.

KEY FINDINGS:

- **Of the forest land in the New York – New Jersey Highlands counties, 84 percent is privately owned**, half of it in small lots (10 acres or less). Nearly 90 percent of owners live on or near their forest land; however, the larger the tract, the more likely it was that the owner lived farther away from their land.
- The overwhelming majority of Highlands landowners mentioned **aesthetics, enjoyment, or increased property value as the primary reason for owning forest land**. Although timber harvesting was not the primary reason for ownership, more than one-third of the owners have harvested timber products from their land. Approximately 50 percent plan harvests in the future.
- **Approximately 16,500 acres** (10,867 acres in New York and 5,627 acres in New Jersey) **is managed under the USDA Forest Service’s Forest Stewardship Program**.
- The amount of forest land classified as **timberland** by the USDA Forest Service **is holding steady in the New York – New Jersey Highlands**. In New York Highlands counties, the amount of timberland decreased by approximately 7.5 percent from 1980 to 1993. In New Jersey Highlands counties, the amount of timberland increased by more than 6 percent during the 1987 to 1999 time period. This is due primarily to the gradual and increased conversion of farm and grassland to forest land over the period.
- **Of the timberland, 53 percent is in the oak-hickory forest type**, followed by 25 percent in northern hardwoods.
- **The net timber volume grew by more than 24 percent** during the 1980’s and 1990’s. **The annual removal is less than half of the net growth** of sawtimber and growing stock.
- As of 1998, about **30 percent of the approximately 20,000 acres of hemlock stands in New Jersey showed evidence of hemlock woolly adelgid infestation**, with approximately 5,000 acres showing severe to complete defoliation (Royle 2002).
- In 2001, more than **100,000 acres of forest land (12 percent) were defoliated by gypsy moths**, primarily in the New Jersey portion of the Highlands with less damage in New York.



BIODIVERSITY: FISH AND WILDLIFE; ENDANGERED, THREATENED SPECIES

BIODIVERSITY

Biological diversity, or biodiversity, is the variety as well as variation of all living organisms in the context of their habitats and ecological systems. Components of biodiversity include individual species and the genetic variation within and between species, ecological diversity and the variety of different systems, and the linkages at the regional scale. The Highlands are rich in the variety of biological systems that support high local biodiversity including freshwater wetlands, swamps and bogs, glades, ravines and ridges, large contiguous forest tracts, and grasslands. The rich diversity of different community types as well as variability within the community types allows the Highlands region to support high levels of biodiversity.

FISH AND WILDLIFE

The Highlands represent a rich habitat resource for fish and wildlife. The combination of relatively large tracts of forest and the variety of habitat types in the Highlands support a wide diversity of fish and wildlife. There are more than 100 species of nesting birds, large mammals including bobcat, black bear, and river otter, and wild trout fisheries in the Highlands. The Highlands is also part of a major east coast migratory flyway for many bird species.

About 874,000 acres or 62 percent of the Highlands is considered to be important wildlife habitat (Figure 2-12). Large forest tracts are one of the critical habitat types for Highlands wildlife. Just as important as the sheer size of this habitat are its location and contiguity (Figure 2-13). Large, unbroken tracts of forest (larger than 500 acres), which comprise about 350,000 acres or nearly 25 percent of the Highlands, support habitat requirements of far-ranging mammals such as bear and bobcat, and provide interior forest habitat critical to the survival of many nesting neotropical songbirds. In addition, protected open space areas in key locations provide feeding and migration corridors that are critical to the survival of large animals with extensive range requirements. Streams provide a critical resource base for trout fisheries. There are 1,861 miles (or 45 percent) of streams in the Highlands that provide the necessary habitat requirements to support trout.

ENDANGERED AND THREATENED SPECIES

The Highlands region harbors over 200 species of plants and almost 50 species of vertebrate animals that are listed on Federal or State inventories for species that are endangered, threatened, or of concern. Over 50 percent of the land within the Highlands provides habitat for wildlife species that have special status at the State or Federal level, while another 10 percent of the Highlands provides



BIODIVERSITY

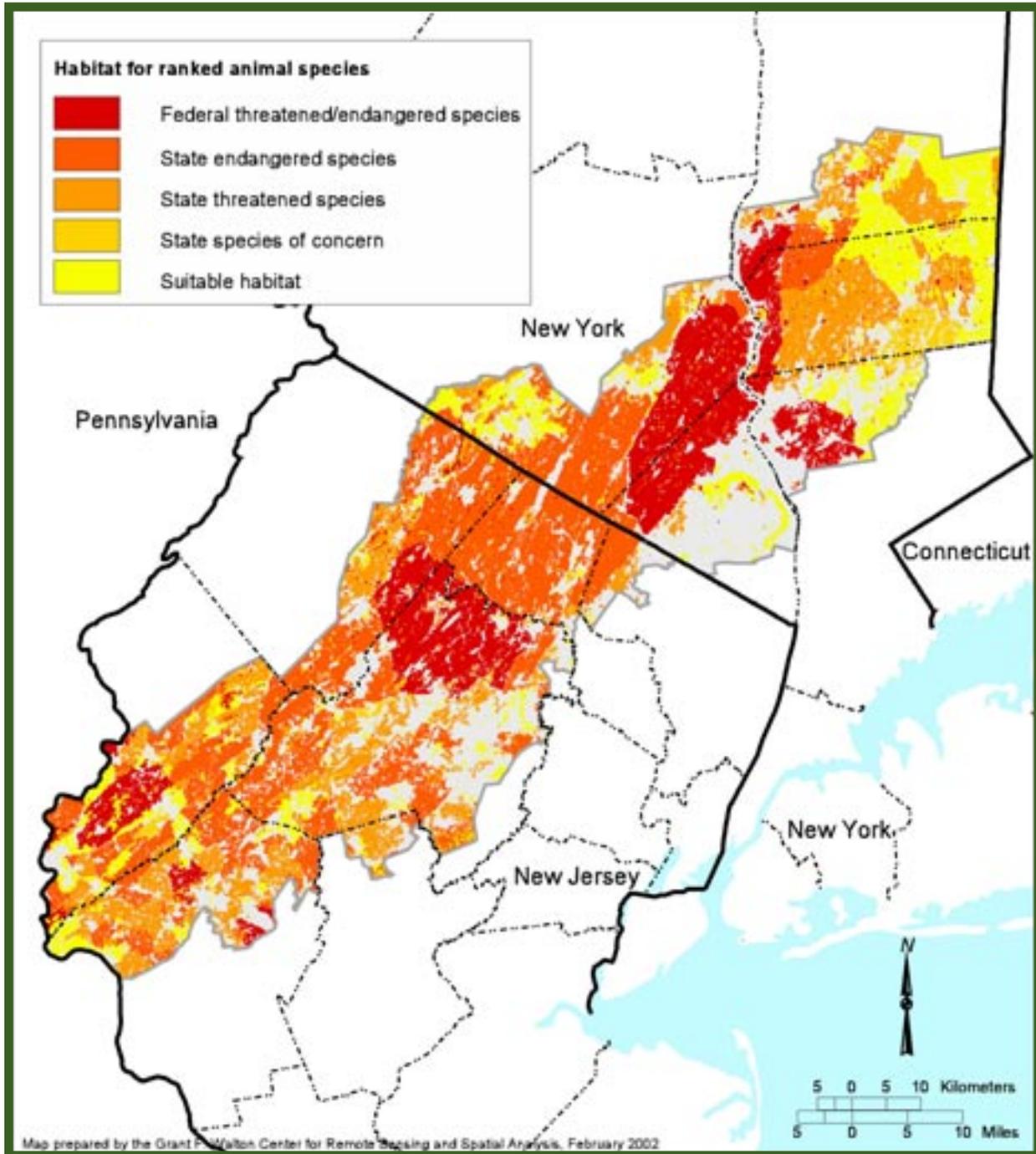


Figure 2-12. Threatened and endangered wildlife habitat. Critical areas shown on the map provide habitat for wildlife species that have special status at the Federal or State level. Over 60 percent of the Highlands is considered important wildlife habitat.

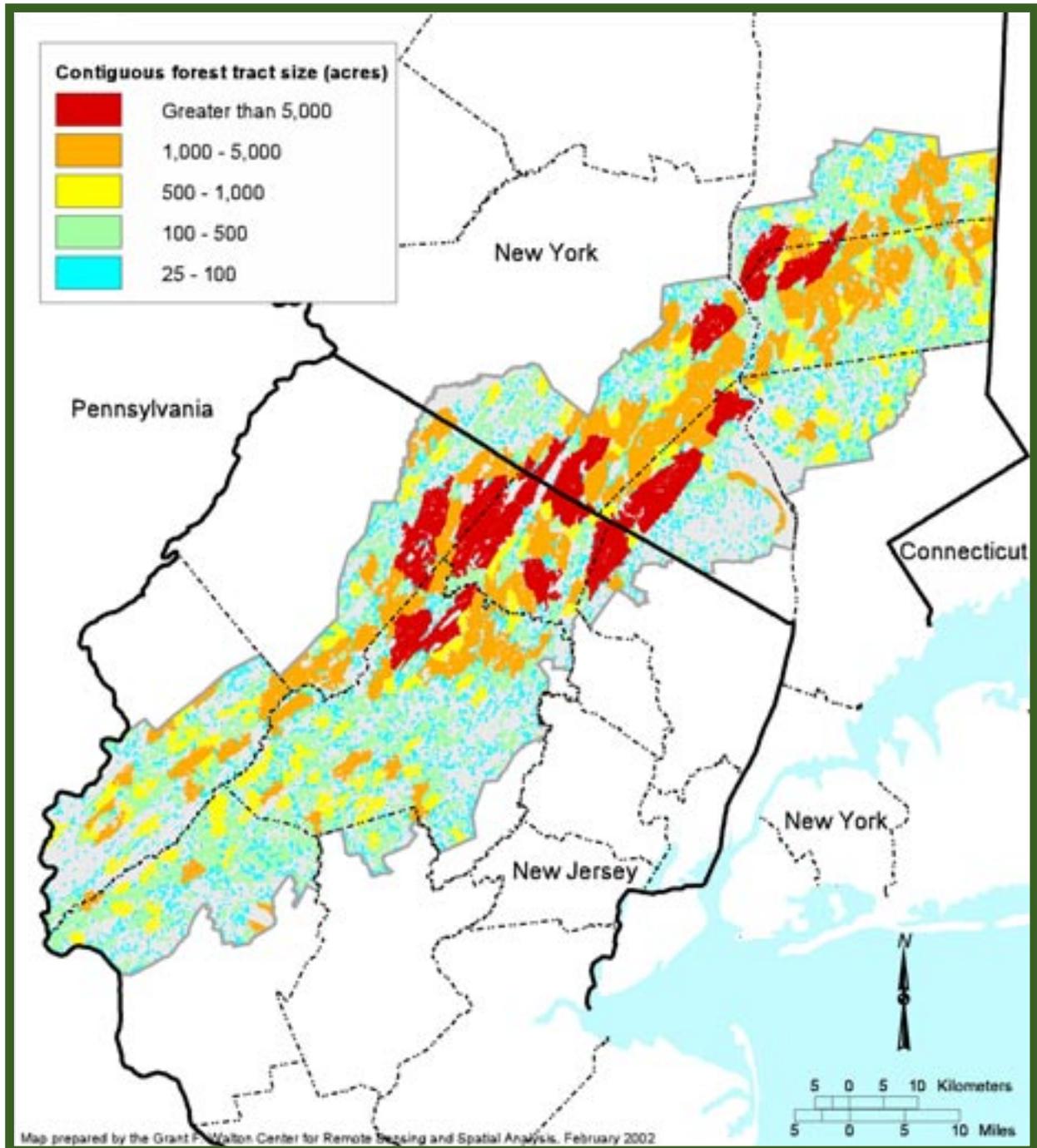


Figure 2-13. Contiguous forest tracts. These large contiguous forest tracts provide habitat for species that are area sensitive and require large tracts of land. Almost 25 percent of the Highlands is in forested tracts of 500 acres or more.



BIODIVERSITY: NATURAL COMMUNITIES

important wildlife habitat (Table 2-3). In addition, over 100,000 acres or 7.5 percent of the Highlands provides habitat for plant species that are listed as imperiled at the State or Federal level (Figure 2-14, Table 2-4).

Endangered species are in immediate peril due to low population numbers as a result of one or several reasons including habitat loss, over-exploitation, predation, competition, disease, disturbance, or contamination. Federally listed endangered species represent those species that are in peril at the national level. State listed endangered species are those that are not nationally at risk but are rare within the State. Species listed as threatened are those at risk of becoming endangered if trends continue and management efforts are not successful in increasing population numbers. Species of concern are of interest at the State level and represent those species whose population trends suggest that if they continue, they will become threatened and potentially endangered.

Endangered or threatened species within the Highlands region include Federally listed species such as the bog turtle, bald eagle, Indiana bat, and swamp pink. State listed endangered and threatened species in the Highlands include the timber rattlesnake, wood turtle, red-shouldered hawk, barred owl, great blue heron (breeding), and eastern wood rat. There are also several globally rare species in the Highlands including Torrey's mountain mint, New England bluet, and the triangle floater. For detailed methodology on mapping of biodiversity in the Highlands, see the New York – New Jersey Highlands Technical Report.

NATURAL COMMUNITIES

There are a number of unique and exemplary natural communities in the Highlands region (Table 2-5). Analyses show that approximately 282,350 acres (19 percent) of the Highlands have State and Federal status recognition as priority sites for preservation or role-model examples of relatively intact vegetation community types that are in good condition, relatively undisturbed, and generally lack invasive species (Table 2-5, Figure 2-15). These communities are important biodiversity components of the Highlands, as in many cases they are habitat to sensitive or rare species found in only a few locations throughout the region. Special community types include calcareous fens, glacial bogs, rocky summit or outcrop plant communities, talus slope woodlands, swamps including Atlantic white cedar and spruce-fir, and prime examples of chestnut oak forests and hemlock-northern hardwood forest.

Large contiguous tracts of relatively natural habitat provide critical habitat and movement corridors for wide-ranging species (Figure 2-13). In 2001, The Nature Conservancy identified seven of these tracts of contiguous forest as their regional priority for conservation.¹ These so-called matrix sites of exceptional biodiversity and integrity comprise 200,000 acres.

¹Unpublished GIS data on file, The Nature Conservancy, Newton, New Jersey.



Table 2-3. Habitat area for imperiled wildlife species in the Highlands, by conservation status

Status	Acres*	Percent of study area
Federal Threatened and Endangered Species	195,488.3	13.78
State Endangered	310,262.7	21.87
State Threatened	198,440.3	13.99
Unprotected Species of Concern	15,425.9	1.09
Potential habitat	153,003.7	10.78
Total NY/NJ Region	1,418,825.0	--

*Section 3, Resources at Risk, identifies how many acres of land ranked highest for biodiversity values are protected and unprotected.

Table 2-4. Habitat area for imperiled plant species in the Highlands, by conservation status

Status	Acres*	Percent of study area
Federal Threatened and Endangered Species	2,878.7	0.20
State Endangered	72,345.0	5.10
State Threatened	29,902.2	2.11
Unprotected Species of Concern	6,827.0	0.48

*Section 3, Resources at Risk, identifies how many acres of land ranked highest for biodiversity values are protected and unprotected.

Table 2-5. Important natural community areas in the Highlands, by ranked biodiversity status

Biodiversity Rank*	Acres**	Percent of study area
2	50,973.8	3.6
3	30,250.0	2.1
4	63,398.7	4.5
5	138,527.0	9.8

*Biodiversity rank of 1 is highest value and rank of 5 is lowest value. In the study area, no community was ranked 1.

**Section 3, Resources at Risk, identifies how many acres of land ranked highest for biodiversity values are protected and unprotected.



BIODIVERSITY

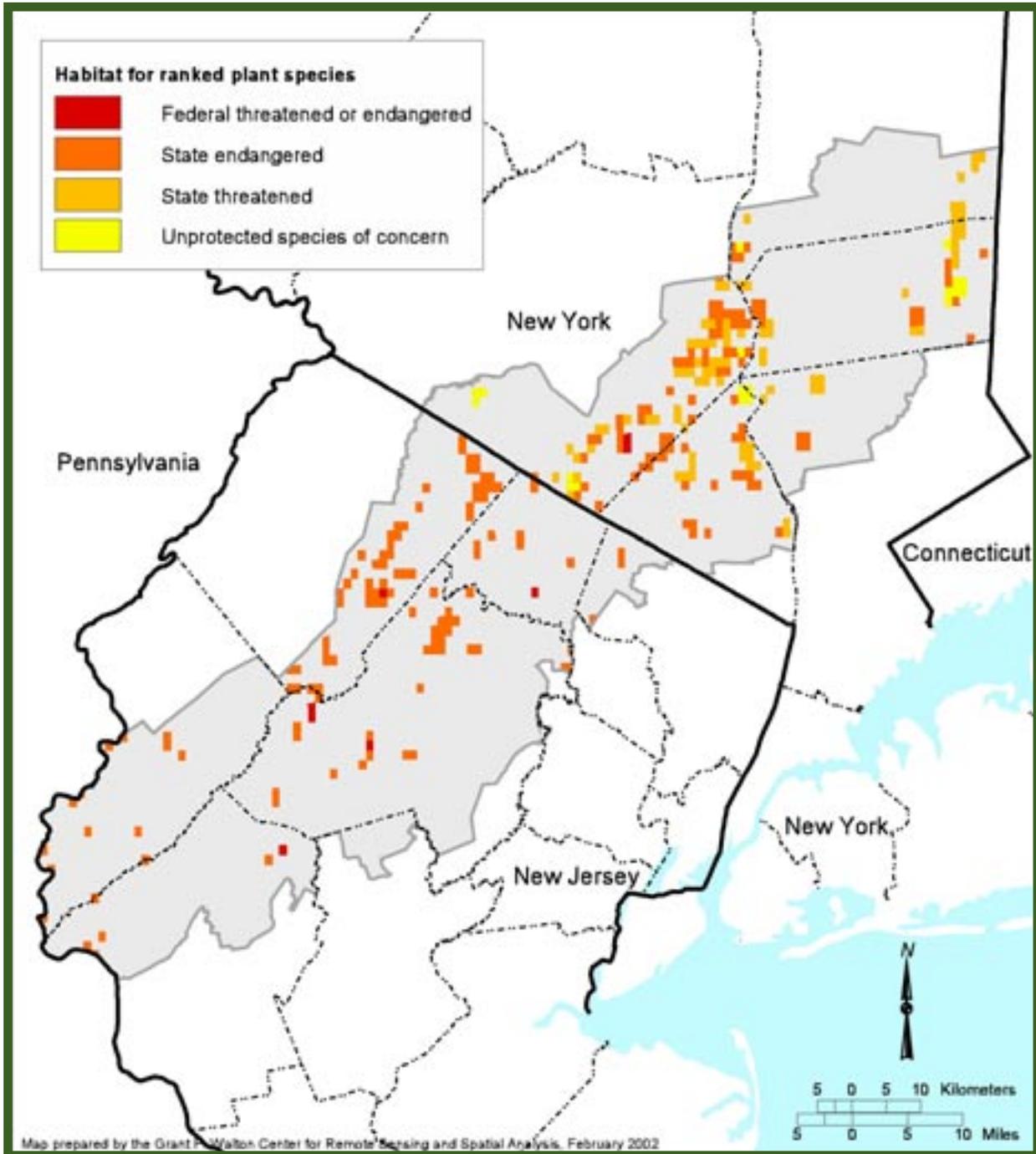


Figure 2-14. Threatened and endangered plant habitat. More than 7 percent of the Highlands provides habitat for threatened and endangered plant species.

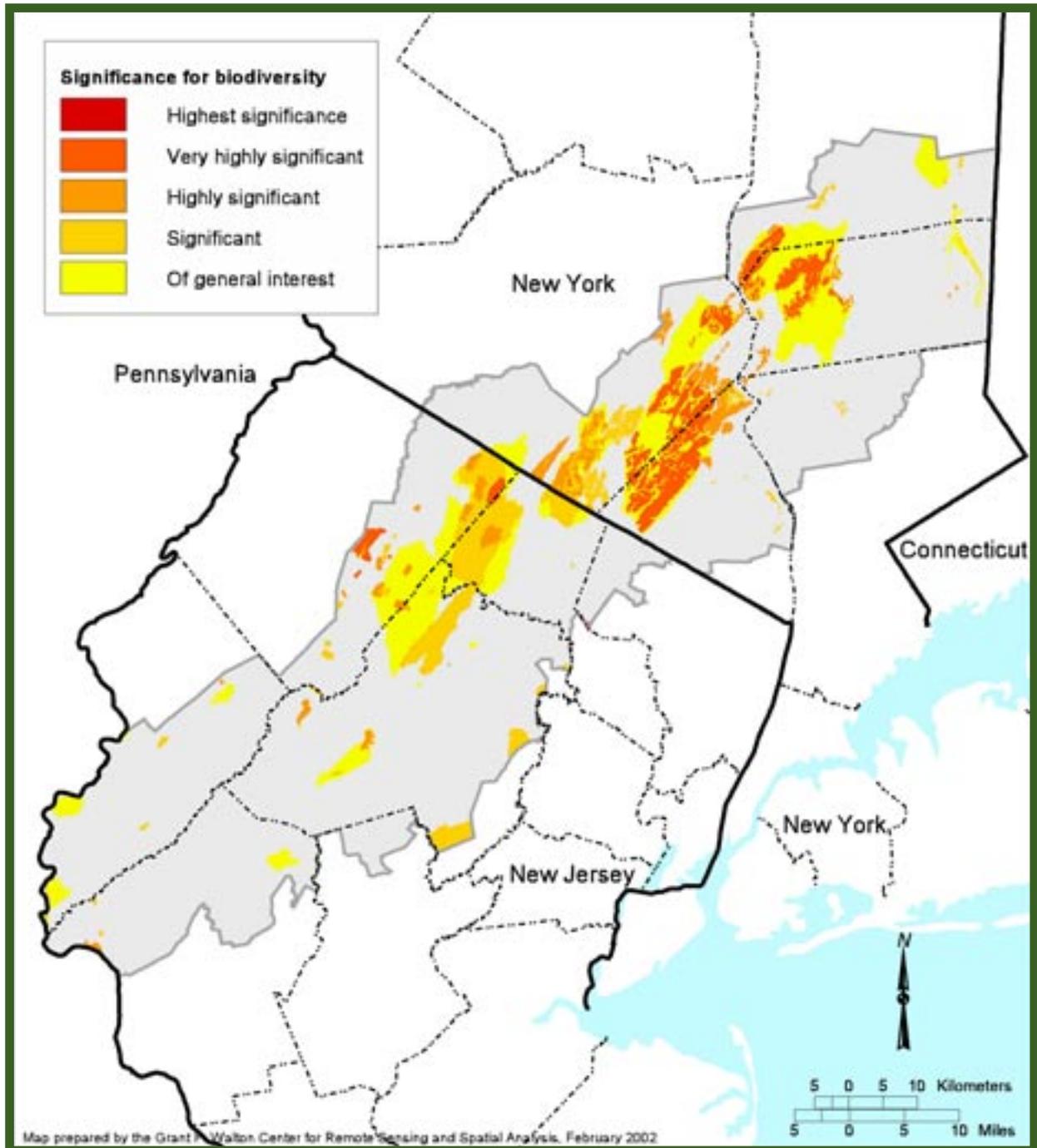


Figure 2-15. Important natural communities. Natural communities that are important to the biodiversity of the Highlands may represent unique assemblages of plants and animals, be rich in biodiversity, or be large tracts of representative habitat types that are relatively undisturbed.



BIODIVERSITY: MIGRATORY FLYWAY; INVASIVE SPECIES

MIGRATORY FLYWAY

The Highlands represent a vital link in a major bird migratory flyway connecting wintering habitat in Central and South America with breeding grounds in northern latitudes. One-quarter of all neotropical bird species found in the United States are found in the Highlands, and half of the total number of species that breed in the Highlands are neotropical migrants. Many of these species are forest-interior breeding species, and the 416,182 acres of interior forests in the Highlands provide critical habitat for species including the red-eyed vireo, American redstart, and eastern pewee.

Two-thirds of the migrant birds that use the eastern migratory flyways are believed to be in serious decline. Several species including the wood thrush, Kentucky warbler, black-throated blue warbler, and cerulean warbler are on the Audubon Watch List for species in rapid decline (National Audubon Society 2001). Population declines have been primarily attributed to the loss of habitat through forest fragmentation and development pressure. Additional causes of bird population declines in the Highlands include exposure to human-derived contaminants, increased competition with nonnative bird species, increased predation from domesticated animals, and collision with structures.

INVASIVE SPECIES

Invasive species can dramatically affect species diversity and ecosystem function. Some of the more common invasive plant species in the Highlands include Norway maple, tree-of-heaven, Japanese barberry, Japanese honeysuckle, purple loosestrife, garlic mustard, and stilt grass. In addition, the soil community has been impacted by the invasion of exotic earthworms throughout the region. Range expansion of cowbirds exacerbates the effects of forest fragmentation on forest interior breeding birds. The hemlock woolly adelgid, an insect pest that specifically targets eastern hemlocks, has spread throughout the Highlands. As the Highlands' primary evergreen tree, hemlocks represent a keystone species providing habitat diversity for nesting birds and dense shade to maintain cool stream water temperatures for trout. Little scientific evidence is available as to how many of these invasive species are altering the biodiversity of the Highlands; however, the community structure and ecosystem function will inevitably change in the presence of these invaders.



KEY FINDINGS:

- There are **over 250 species** of plants and animals in the Highlands that are **considered to be in peril** due to declining population numbers. There are 3 Federally listed endangered species in the New York – New Jersey Highlands and 118 State listed endangered species.
- The **diversity and arrangement of different habitat types** in the Highlands creates an important mosaic that **supports the high species biodiversity** of the Highlands region.
- **Large contiguous forest** tracts (greater than 500 acres) provide critical habitat resources for many species. These large forest tracts cover approximately 350,000 acres (25 percent) of the Highlands. **There are only 11 tracts of forest that are greater than 5,000 acres.** These largest tracts comprise approximately 60 percent of the New York – New Jersey Highlands core forest interior habitat. **The survival of large mammals,** such as black bear, and furbearers, such as bobcat and river otter, **depends on maintaining contiguous habitat** throughout the Highlands. Contiguous habitat provides migration corridors, and extends the feeding and breeding range of these populations.
- Over **280,000 acres of the Highlands have received special status for containing important natural community or high biodiversity areas or both.** These communities contribute significantly to the biotic integrity of the New York – New Jersey Highlands. **Protection of important natural communities** extends beyond protection at the species level and **protects multiple factors** at the community and regional level.
- **The Highlands serve as a major migratory flyway for many neotropical bird species,** many of which populations are in decline. Of particular concern to ornithologists are the 70 to 75 species of interior nesting neotropical migrants such as the red-eyed vireo, American redstart, Kentucky warbler, and eastern pewee. These species require large undisturbed forest patches.
- **Fragmentation and alteration of habitat continue to pose the greatest threat** to the biological communities in the Highlands. The rapid expansion of urbanization encroaches on and fragments habitat, destroys individuals as well as populations, and potentially threatens the continued existence of many biological communities. Degradation of habitat by direct destruction or indirectly through pollution, erosion, introduction of invasive species, or fragmentation threatens the existence of species, diminishes natural communities, and reduces genetic variability.



FARMLAND

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Although normally considered a “land use” and not a resource, agricultural land within the Highlands is essential to the area’s future. Approximately 10 percent of the Highlands is in agricultural land use such as cultivated cropland, orchards, nurseries, pasture, and hay fields (Figure 2-16). Farming has been declining in the Highlands counties of New York and New Jersey for more than half a century with a steep decline in farm acreage occurring between the 1940s and the 1970s. County level agricultural statistics show that between 1969 and 1987, agricultural land use decreased by 25 percent with almost 90,000 acres abandoned or developed. From 1987 to 1998, farmland decreased by another 39,000 acres or 15 percent. While it appears that the steep decline in acres of farmland is stabilizing, it is projected that farmland will continue to be converted to other land uses without aggressive farmland preservation programs.

Agriculture sustains the intrinsic natural character of the working rural landscape and provides jobs and a sustained quality of life for many landowners and residents of the Highlands. Farms and the agricultural production sector contribute to the region’s economy and promote a broader base of economic activity. All residents benefit from the quality and abundance of locally grown products as well as the opportunity to connect with the farming life through the growing industry of farming tourism (e.g., vegetable, fruit, and pumpkin picking; hayrides; corn mazes). To protect the Garden State’s agricultural heritage, New Jersey has a goal of preserving 500,000 acres through the Farmland Preservation Program (New Jersey Department of Environmental Protection Green Acres Program 1999b). In the New York Highlands, approximately 6,500 acres of productive farmland have been protected through the Farmland Protection Trust Fund. The maintenance of large contiguous blocks of farmland is necessary to ensure the productivity and economic health of agriculture over the long term. Preserving large contiguous blocks of farmland will help to preserve the character and quality of the region’s rural landscape. For more information on farmland, refer to the New York – New Jersey Highlands Technical Report.



FARMLAND

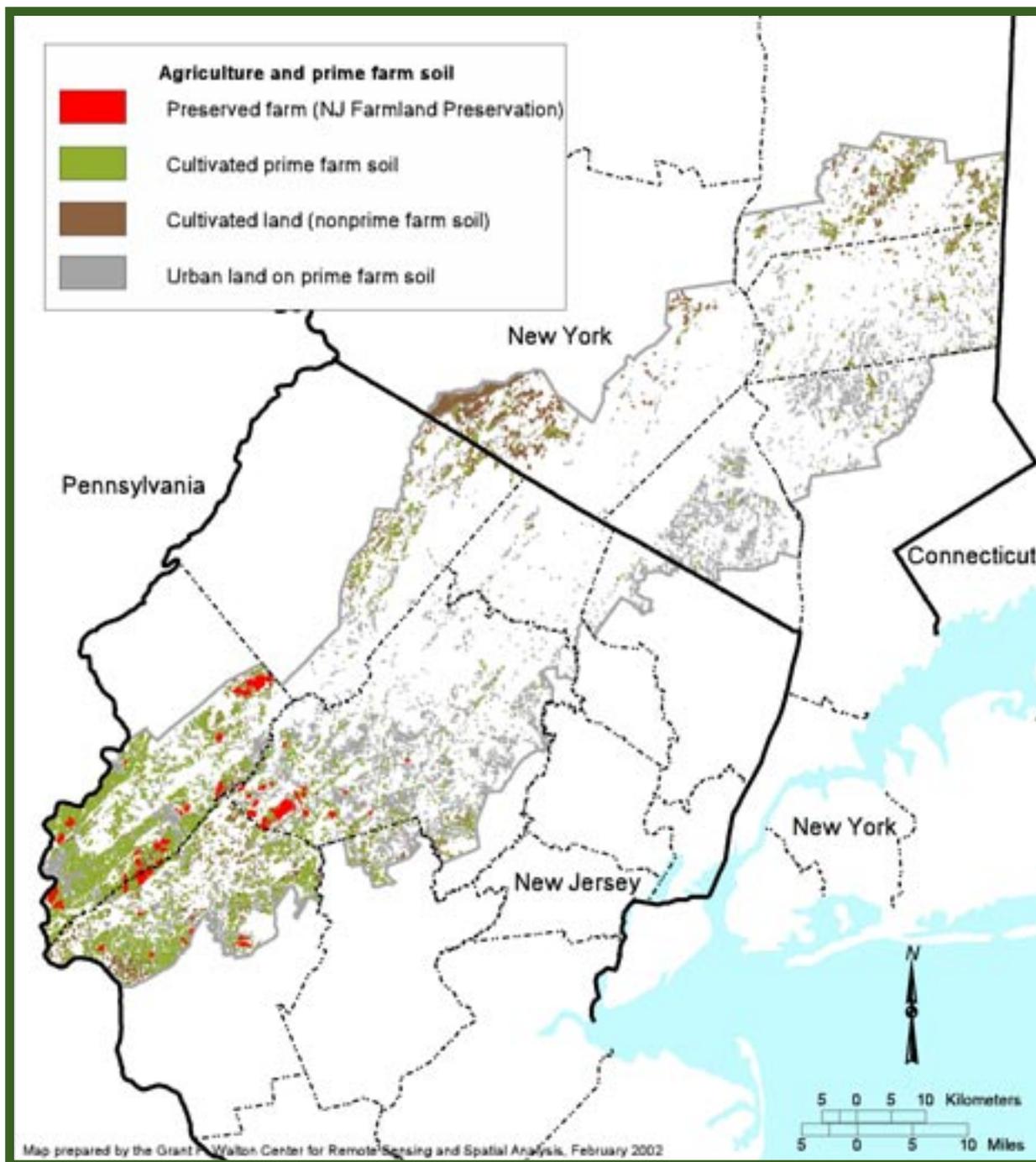


Figure 2-16. Agricultural resources. About 60 percent of cultivated land was on prime farm soil in 2000, and about 112,000 acres of prime farm soil had been lost to urban development.



FARMLAND: KEY FINDINGS

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- **Approximately 10 percent of the New York – New Jersey Highlands region or more than 143,000 acres of land is in agricultural land use.** Approximately 74 percent (over 106,000 acres) of this agricultural land was in New Jersey and 26 percent (over 37,000 acres) was in New York.
- **The size of most farms is in the 10-49 acre size class,** and they are primarily located in Warren, Hunterdon, and the very eastern part of Sussex County in New Jersey, and Orange, Dutchess and Putnam Counties in New York. Not all farmland is owned by farmers.
- **Farm production is varied** and includes these products: Livestock and poultry such as beef cows, milk cows, horses and ponies, hogs, sheep, chicken; and crops such as corn (grain, seed, and silage), soybeans, hay, vegetables, orchards, fruits, nuts, berries, nursery and greenhouse crops, mushrooms and sod (National Agricultural Statistics Service 1999; New York Agricultural Statistics Service 2001).
- **In New Jersey** the Farmland Preservation Program, which funds farmland easements on a willing seller-willing buyer basis, has been overwhelmingly supported by voters and more than **9,550 acres have been protected.** **In New York** through the Farmland Protection Trust Fund, **approximately 6,500 acres of productive farmland have been protected.** Additional farmland in both States has been protected by private nonprofit land trusts through outright purchase or through conservation easements.
- Over 60 percent (87,678 acres) of the actively cultivated land is located on mapped prime farm soils. **There has been a significant loss of prime farmland with approximately 111,600 acres of prime soils that are now in developed land uses.**