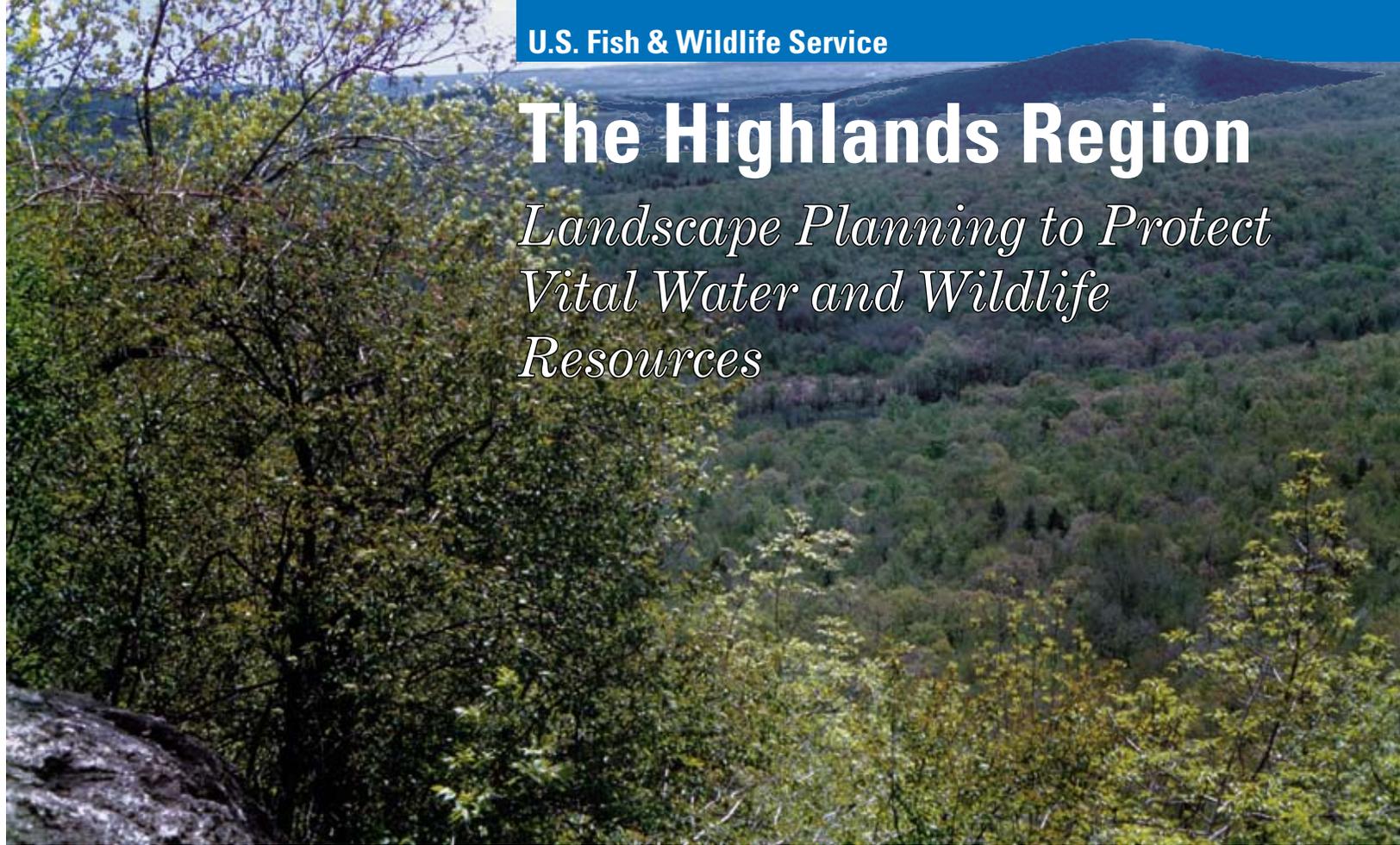


# The Highlands Region

## *Landscape Planning to Protect Vital Water and Wildlife Resources*



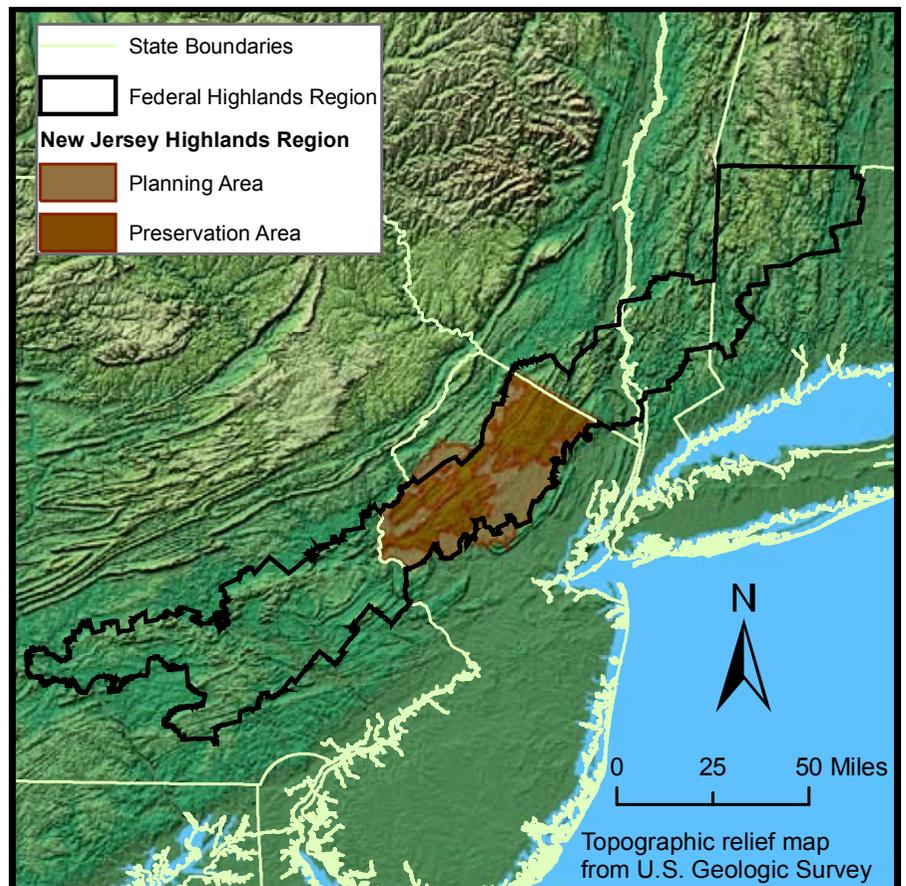
Panoramic view looking south from Wildcat Ridge, Rockaway Township, Morris County, New Jersey

Photo: Clifford G. Day / USFWS

### What is the Highlands Region?

Approximately 5,500 square miles in size, the four-state (Connecticut, New York, New Jersey, and Pennsylvania) Highlands Region is a rugged corridor of forested ridges and valleys, wetlands, and grasslands located on the western edge of a coastal metropolis that extends from Hartford, Connecticut through New York City to Philadelphia. This publication emphasizes the New Jersey portion of the Highlands Region, which is about 1,250 square miles and covers parts of 88 municipalities in 7 counties.

The Highlands Region is distinguished by ancient and complex geology that includes the oldest rocks in New Jersey, formed by volcanic activity as much as 1.3 billion years ago. These hard, crystalline rocks are resistant to erosion and form a hilly, northeast-southwest-trending upland rising above the surrounding terrain to elevations of 600 to 1,200 feet. Within interspersed belts of softer, sedimentary rock, major streams—including headwaters of the Passaic, Raritan, Wallkill, and Hudson Rivers—have formed long, steep-sided, parallel valleys. The Highlands Region is bisected from east to west by the southern limit of the most recent (Wisconsin) glacial advance, along a line roughly followed by Interstate Route 80. The northern half of the Highlands is overlain by glacial deposits left when the ice retreated approximately 10,000 years ago.



## Highlands Resources

New Jersey's Highlands provide an essential source of clean and plentiful drinking water for one-half of the State's population from only 13 percent of the State's land area. Over 10 percent of the New Jersey Highlands, about 110,000 acres, is in agriculture, with some of the most productive soils in the world. The New York and New Jersey portions of the Highlands contain more than 311,000 acres of public park lands with over 14 million visitor days per year. One in nine Americans lives within a 2-hour drive of the outstanding outdoor recreational opportunities provided by the Highlands.

### Birds of Conservation Concern that Breed in New Jersey's Highlands

Acadian flycatcher (*Empidonax vireescens*)  
 black rail (*Laterallus jamaicensis*)  
 black-billed cuckoo (*Coccyzus erythrophthalmus*)  
 Canada warbler (*Wilsonia canadensis*)  
 cerulean warbler (*Dendroica cerulea*)  
 golden-winged warbler (*Vermivora chrysoptera*)  
 Henslow's sparrow (*Ammodramus henslowii*)  
 Kentucky warbler (*Oporornis formosus*)  
 Louisiana waterthrush (*Seiurus motacilla*)  
 northern saw-whet owl (*Aegolius acadicus*)  
 peregrine falcon (*Falco peregrinus*)  
 prothonotary warbler (*Protonotaria citrea*)  
 red-headed woodpecker (*Melanerpes erythrocephalus*)  
 sedge wren (*Cistothorus platensis*)  
 upland sandpiper (*Bartramia longicauda*)  
 whip-poor-will (*Caprimulgus vociferus*)  
 wood thrush (*Hylocichla mustelina*)  
 worm-eating warbler (*Helminthos vermivorum*)  
 yellow-bellied sapsucker (*Sphyrapicus varius*)

The New York and New Jersey portions of the Highlands support at least 150 species of breeding birds, 45 species (a high diversity) of reptiles and amphibians, and 40 species of mammals. The Highlands harbor important populations of bats and regional strongholds for several rare reptiles and amphibians.

One quarter of the Nation's neotropical bird species are found in the Highlands. Of the 460 species of avifauna reported in New Jersey, 273 species have been documented in the Highlands, including about 150 of the State's 210 species of breeding birds. Nearly half of the bird species of regional conservation concern are known to breed in the New Jersey Highlands (see box). Nineteen species of raptors follow Highlands ridges during migration, including 10 that breed in the area.

Over half of New Jersey's Highlands are forested. Forests of the Highlands Region are dominated by upland mixed oak (*Quercus* spp.) and hickory (*Quercus* spp.) hardwoods on the ridges and valley slopes, and red maple (*Acer rubrum*) swamps in the valleys. Numerous rare vegetational communities contribute to the region's biodiversity (see box), which also includes six federally listed species in New Jersey alone (see box). The Highlands' biodiversity is bolstered by the southernmost occurrences

of several northern species and plant communities, such as northern bogs. The New Jersey *Natural Heritage* program has designated over 70 Highlands locations as priority sites because of the significant levels of biodiversity they sustain.



Prothonotary warbler (*Protonotaria citrea*)

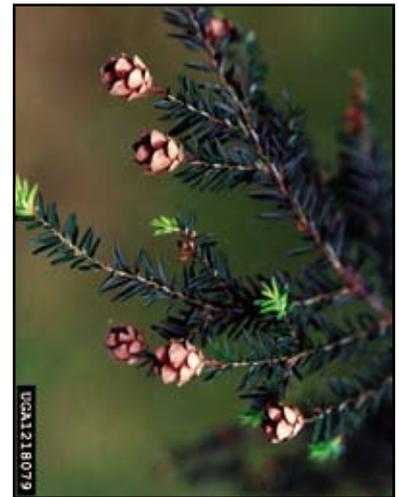
### Federally Listed Species in New Jersey's Highlands

#### Endangered

Indiana bat (*Myotis sodalis*)  
 dwarf wedgemussel (*Alasmidonta heterodon*)

#### Threatened

bald eagle (*Haliaeetus leucocephalus*)  
 bog turtle (*Clemmys muhlenbergii*)  
 swamp pink (*Helonias bullata*)  
 small-whorled pogonia (*Isotria medeoloides*)



Eastern hemlock (*Tsuga canadensis*)

Bill Cook, Michigan State University,  
 www.forestryimages.org

### Rare Highlands Communities

rocky summit grasslands

pitch pine (*Pinus rigida*)-oak-heath (*Ericaceae* spp.) rocky summit communities

rocky slope (talus) communities dominated by chestnut oak (*Quercus michauxii*), scrub oak (*Quercus ilicifolia*), Eastern white pine (*Pinus strobus*), and sweet birch (*Betula lenta*)

Atlantic white-cedar (*Chamaecyparis thyoides*) swamps

dwarf shrub (heath) peat bogs

black spruce (*Picea mariana*)-tamarack (*Larix laricina*) bogs

Eastern hemlock (*Tsuga canadensis*) ravines

The Highlands are regionally important for biodiversity, particularly breeding and migratory birds, resident amphibians and reptiles, and rare plants and communities. The area's ecological significance stems from its large, unfragmented forests and wetlands that support disturbance-sensitive species, as well as a diversity of plants, communities, and animals unique to this region. Species in the Highlands indicative of undisturbed forest and wetland habitats include wood turtle (*Clemmys insculpta*), timber rattlesnake (*Crotalus horridus*), red-shouldered hawk (*Buteo lineatus*), barred owl (*Strix varia*), warblers and thrushes, black bear (*Ursus americanus*), bobcat (*Lynx rufus*), and native Eastern brook trout (*Salvelinus fontinalis*).

Photo: Hollingsworth / USFWS

### Threats to the Highlands

The vital resources of the Highlands are at risk. The crystalline rocks that transmit drinking water are poor filters of pollution, making both ground and surface water supplies vulnerable to degradation. As watersheds become developed, water quality inevitably suffers. As forests and wetlands are fragmented, sensitive and area-dependent elements of biodiversity are lost (e.g., grassland and forest birds, large mammals, rare communities).

Suburban sprawl is also accompanied by invasions of non-native species, which already threaten the integrity of Highlands ecosystems. An estimated 62 percent of New Jersey's plant species are nonindigenous, threatening our rich and diverse native flora. Purple loosestrife (*Lythrum salicaria*) is a major threat to wetlands, forming dense monocultures. Purple loosestrife is particularly invasive in the Highlands, first documented in the region over 100 years ago. Pervasive upland invaders in the Highlands include Japanese barberry (*Berberis thunbergii*) and Japanese stilt grass (*Microstegium vimineum*). Animal invaders include brown-headed cowbirds (*Molothrus ater*), exotic earthworms, and the insect woolly adelgid (*Adelges tsugae*), a major threat to hemlock forests.

A majority of Highlands forest land is owned by private individuals and organizations, and therefore subject to land use changes. Of the forest land in the New York and New Jersey Highlands counties, 84 percent is privately owned, half in small lots of 10 acres or less. Since 1984, 65,000 acres (over 100 square miles) of New Jersey's Highlands have been lost to development, and the rate of loss of forested lands and wetlands more than doubled since 1995. From 1995 to 2000, the New Jersey Highlands lost 17,000 acres of forests and 8,000 acres of farmland to development. Prior to the passage of recent legislation, development continued to consume land in New Jersey's Highlands at a rate of approximately 3,000 acres every year.

**Wild columbine**  
(*Aquilegia canadensis*)

### Laws Protecting the Highlands

The Highlands Region received federal recognition with the issuance of major studies by the U.S. Forest Service in 1992 and 2002. In 2004, Congress passed the Highlands Conservation Act (P.L. 108-241), "to recognize the importance of the water, forest, agricultural, wildlife, recreational, and cultural resources of the Highlands region, and the national significance of the Highlands region to the United States." The law establishes a federal Highlands Region in parts of Connecticut, New York, New Jersey, and Pennsylvania, and authorizes up to \$10 million per year to preserve lands of high conservation value, with the funds to be matched by the States. Funds are distributed by the Secretary of Interior among land acquisition projects that have been deemed eligible and ranked by a committee comprised of State, U.S. Fish and Wildlife Service, U.S. Forest Service, and National Park Service representatives. The Highlands Conservation Act also directs the U.S. Forest Service to continue and expand its study and technical assistance efforts.

The New Jersey State Plan, which guides development, first recognized the importance and vulnerability of the Highlands in 2001. In March 2004, a New Jersey Highlands Task Force recommended establishing a Highlands Council, initiating regional planning, and strengthening environmental regulations to protect the Highlands' critical water and forest resources. The State acted on these recommendations, passing the New Jersey Highlands Water Protection and Planning Act (N.J.S.A. 13:20-1 *et seq.*) in June 2004.

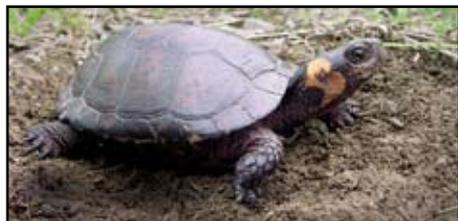
The State law delineates New Jersey's Highlands Region into Preservation and Planning Areas. Stricter environmental regulations were adopted for the Preservation Area in June 2005, including requirements for 300-foot buffers along open waters and limits on impervious surface, upland forest clearing, and development on steep slopes. The New Jersey Highlands Council is preparing a Master Plan to manage growth in both the Planning and Preservation Areas, as directed by the State law.

A second element of New Jersey's strategy to conserve the Highlands is a substantial State commitment to land acquisition. Through the Garden State Preservation Trust Act (P.L. 1999 c. 152), New Jersey has committed nearly \$2 billion for land preservation and park development over 10 years—the second largest land preservation program in the Nation. These funds are allocated through two State programs. The *Green Acres* program acquires open lands, watersheds, and wildlife habitats, and creates and improves recreational parks. The *Farmland Preservation* program acquires the development rights on privately owned farmland. In New Jersey's Highlands Region to date, the *Green Acres* program has acquired 108,699 acres of open space, and the *Farmland Preservation* program has preserved 24,648 acres of agricultural lands on 267 farms. The *Green Acres* program also serves as an important source of matching funds under the federal Highlands Conservation Act.



**The Service's Role in the Highlands**

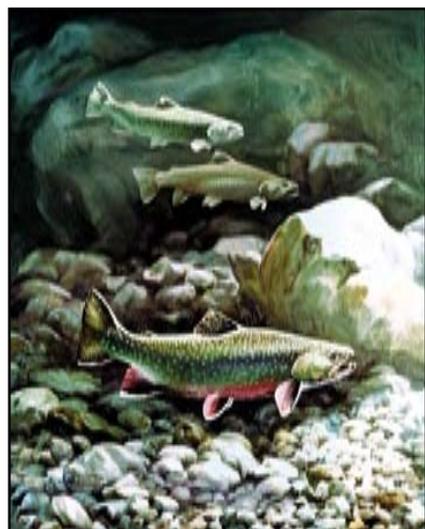
The Highlands support extensive federal trust resources under U.S. Fish and Wildlife Service (Service) jurisdiction, including migratory birds, two National Wildlife Refuges, and six federally listed species in New Jersey alone. Service involvement in the Highlands is also consistent with regional and national priorities including water supply and delivery, restoration, landscape-level planning, and partnerships.



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**Bog turtle (*Clemmys muhlenbergii*)**

In the 1990s, the Service's New Jersey Field Office provided support for conservation initiatives at localized areas of the Highlands including Beaver Brook, Mount Hope Bog, Farney Highlands, and Sterling Forest. Since 1994, the Service's *Partners for Fish and Wildlife (Partners)* program and its partners have carried out 46 projects in New Jersey's Highlands to restore 575 acres of uplands, 215 acres of wetlands, and 16 miles of riparian habitat. In one *Partners* project, through the *Bring Back the Natives* initiative, portions of Beaver Brook were restored in Morris County. Since 1997, the Service has reviewed over 1,200 project proposals in the New Jersey Highlands and made recommendations to protect fish and wildlife resources.



Robert W. Hines / USFWS

**Brook trout (*Salvelinus fontinalis*)**

In 1993, the New Jersey Field Office and the New Jersey *Endangered and Nongame Species* program documented the endangered Indiana bat in New Jersey's Highlands at a time when the species was believed to be extirpated from the State. Subsequently, the Service has worked with the *Endangered and Nongame Species* program and other partners to install a conservation gate at one of the Indiana bat's winter hibernation sites, and to identify the bat's maternity habitat. To date at least seven maternity colonies have been documented, all located at least partially in the Highlands. Additionally, the New Jersey Field Office's *Adopt-a-Swamp-Pink Population* program includes sites in the Highlands where volunteers are monitoring this threatened plant.



Photo Dr. J. Scott Altenbach

**Indiana bat (*Myotis sodalis*)**

**U.S. Fish & Wildlife Service**  
**Bring Back The Natives**  
*Spawning Partnerships in New Jersey*

**Goals**  
 The goals of the BBN program are to:  
 (1) restore aquatic species to their historic range;  
 (2) improve and enhance aquatic and riparian habitats to support native fish species;  
 (3) restore the health of aquatic systems to benefit native species in the Nation's waters and watersheds; and  
 (4) develop conservation partnerships between federal and non-federal entities for restoration of aquatic systems.

**How to Establish a Project**  
 Proposed projects restoration:

**Partners for Fish and Wildlife**

**On the internet at**  
<http://www.fws.gov/northeast/njfieldoffice/Partners/Partners.htm>

In 1997, the Service's *Coastal Program* produced a landmark report entitled *Significant Habitat Complexes of the New York Bight Watershed* that includes a detailed description of the wildlife resources of the Highlands Region. The Service's Division of Migratory Birds participates in several bird conservation initiatives that have identified unfragmented forests such as those of the Highlands as essential to the conservation of long-distance migratory songbirds in the Northeast.

The Service is building on past conservation work in the Highlands through: administration of the federal Highlands Conservation Act; review of the State Highlands Master Plan; technical assistance to the State Highlands Council; implementation of conservation tasks for federally listed species, species of concern, and migratory birds; and continued habitat restoration projects through the *Partners* program. The Service is also building and strengthening partnerships for conservation of the Highlands.



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**Bald eagle (*Haliaeetus leucocephalus*)**



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