



Appalachian Oak-Pine Forests

Habitat Stewardship Series

NEW HAMPSHIRE WILDLIFE ACTION PLAN

Recognizing

Appalachian oak-pine forests

Appalachian oak-pine forests occur in southern and central New Hampshire below 900 feet of elevation, or on dry, rocky ridges at higher elevations. Here, the warmer and drier climate promotes tree species adapted to drier soils. White pine and oak trees dominate the tree canopy.



Chestnut oak forest

The presence of tree species typical of southern (Appalachian) states sets this habitat apart from the more common oak-pine forest type (also called Hemlock-Hardwood-Pine). Look for black, scarlet, chestnut and white oaks, and shagbark and pignut hickories. Black birch, aspen, pitch pine, sassafras, and yellow birch may also be present. Blueberry, black huckleberry, sheep laurel, and Pennsylvania sedge are typical understory plants. In southwest New Hampshire, mountain laurel shrubs

can dominate the understory, while along the Connecticut River and in the Seacoast, Appalachian oaks and hickories mix with sugar maple and white ash on richer soils.

Squirrels may play a key role in re-growing (regenerating) oak stands by burying acorns, often under stands of white pine. They also bury pine cones under oak trees. As a result, it is common to find oak in the understory of white pines, and white pine regenerating under oak.



White oak leaves



Where are New Hampshire's Appalachian oak-pine forests?

Appalachian oak-pine forests cover less than 10% of the state, mostly in the southeastern portions, especially Rockingham County, where the largest blocks of this habitat are found. A narrow band also follows the Connecticut River north from Cheshire into Sullivan and Grafton Counties. Examples of high-quality Appalachian oak-pine forests are in Pawtuckaway State Park in Nottingham, around Great Bay in Durham (Crommet Creek), and at Beaver Brook Association lands in Hollis.

Why are Appalachian oak-pine forests important?

Appalachian oak-pine forests, with their abundance of nut-bearing oaks and hickories, provide a rich food source for wildlife such as ruffed grouse, turkey, black bear, squirrels, mice and chipmunks. In turn, raptors such as northern goshawk feed on small mammals and find nesting and perching sites in white pines in the tree canopy. Near water, white pines provide key nest and perch sites for bald eagles, great blue herons, and osprey.



Threats to Appalachian oak-pine forests

Habitat loss to development

Most Appalachian oak-pine forests are in southeastern New Hampshire, coinciding with the highest densities of people. The dry soils in these forests are easily developed for homes, buildings, and septic systems. Much of New Hampshire's historical Appalachian oak-pine forest is already permanently lost to human development. Large, intact blocks of this forest type are relatively rare, and only 12% of existing forests are permanently conserved.

Land use history

Many stands of Appalachian oak-pine forest are of the same age, roughly 80-100 years old. They re-grew after farms were abandoned throughout the last century. Many wildlife species of conservation concern found in Appalachian oak-pine forests are attracted to patches of old or young trees within the larger forested landscape. Without a diverse range of ages and sizes of trees, today's Appalachian oak-pine forests are less diverse and do not support as many of these rare species.

Fewer beaver dams, less diversity

Prior to human settlement, large complexes of beaver wetlands occurred on the landscape in varying stages of abandonment – from newly flooded sites, to ponds, open meadows and forests. Beaver activity contributed to the patchwork of different tree sizes, types, and ages in pre-settlement Appalachian oak-pine forests. The flat landscape in southern New Hampshire meant that beaver flooding covered more of the landscape than in other hillier parts of the state. Over time, human development encroached on beaver habitats, reducing the ability of beavers to influence the forested landscape, making our forests more uniform and less diverse.

Less fire, less diversity

Historically, the dry soils and warm temperatures in southern New Hampshire allowed occasional low-intensity fires to burn in the forest. These fires were caused by both lightning and burning by Native Americans. Oak trees are relatively resistant to fire and are able to sprout from stumps after a burn, so fire helped maintain a large component of oak in the forest. Without fire, today's forests likely have a higher proportion of white pine, hemlock, sugar maple and birch, trees less tolerant of fire which don't provide as rich a supply of nuts for wildlife.

Today's mature Appalachian oak-pine forests may also be denser, as historical low ground fires would have created a more open understory in the forest, important for such species as whip-poor-wills and northern goshawks.



Stewardship Guidelines

for Appalachian oak-pine forests

- In the face of intense development pressure, land conservation is critical to protect **large forest blocks** (>500 acres) of Appalachian oak-pine habitat. These large forest blocks are rare, and are critical to protect wide-ranging species such as bobcat, black bear, and moose.
- For both conservation and land stewardship efforts, focus on conserving oak-pine habitat characterized by:
 - **Areas with large trees** (>18" diameter) which are important as nut-producers, especially oaks and hickories, and as future snags and den trees used by bats, black bear, and other species;
 - Areas with particularly dry soils — look for an **open understory** and less common trees such as red pine, pitch pine, white oak, chestnut oak, scarlet oak, hickories, and sassafras;
 - Areas with a **diversity of tree sizes and ages**, including patches of young forest, used by New England cottontail, Canada warbler, American woodcock.
- Work to regenerate a mosaic of tree age classes and a mix of tree species to create a **"patchy" forest canopy**. A full-range of age classes, well-distributed across the landscape, is important to support the great diversity of wildlife dependent on Appalachian oak-pine habitats.
- Provide continual patches of young, regenerating forest habitat to enhance: cover for wildlife, berry-producing shrubs, hardwood stump sprouts, and other key features of **"early-successional"** habitat (refer to *Shrublands* brochure in this series).
- Maintain **downed woody material** (fallen logs, branches, and leaves) on the forest floor as cover for small mammals, amphibians, and ground-nesting birds. Large downed logs (>18" diameter) provide "drumming sites" used by male ruffed grouse to attract females.
- When conducting forest management activities, maintain some overstory pine to **provide additional wildlife cover, perches, seed sources** and large **future cavity trees**. "Wolf pines" (large, branchy pines with low timber value) can be a good source for these wildlife habitat features.
- Maintain **existing cavity trees and snags** whenever possible. Cavity trees and snags at least 18" in diameter support the greatest diversity of wildlife species.
- Re-growing oak and white pine after a timber harvest can be tricky. Use carefully planned **harvest techniques to regenerate Appalachian oak-pine species**. Techniques may include partial "shelterwood" harvests and "group selection" harvests, combined with attention to oak-pine seed sources, seasonal timing of harvest, and planned disturbance of the forest floor to create a favorable seedbed.
- Always **consult a licensed New Hampshire forester** before conducting a timber harvest on your property. Foresters can employ harvest ("silvicultural") techniques to regenerate Appalachian oak-pine forest. Understand and follow all laws pertaining to the harvesting of trees near wetlands and waterbodies. Follow established Best Management Practices, and harvest timber near wetlands only when the soils are either frozen (winter) or very dry (summer).



A hickory tree may provide habitat values, including a cavity for nesting, nuts for food, and flaky bark used by roosting bats.

Species Focus

of conservation concern

Whip-poor-will

Whip-poor-wills are nocturnal birds that make an unmistakable “*whip-poor-will*” call. Found in dry, open oak forests with sparse understory vegetation, whip-poor-wills lay eggs in leaf litter on the forest floor. Whip-poor-wills are still found in the Ossipee pine barrens and in parts of Belknap, Coos, Merrimack and Hillsborough counties. Whip-poor-wills also use open fields and shrublands for foraging on flying insects. If open habitats are lost to development or grow into mature forest, even if suitable dry forests exist for nesting, whip-poor-wills will not occupy the area.



Whip-poor-will

Silver-haired bat

Silver-haired bats are summer residents in New Hampshire. They roost in large trees during the day, often in tree cavities or under loose bark like that on shagbark hickory. They forage at night for insects in forest openings, along rivers or over ponds. Little is known about many of New Hampshire’s bats, but human development, fewer abandoned buildings (such as old barns), and outright extermination are all threats to bat populations. Large-scale wind-turbines may also pose a threat to migrating bats (silver-haired, eastern red and hoary bats). Conserving large cavity trees, standing dead trees (“snags”), and mature forests with patchy openings near waterways will help protect these nocturnal mammals.



Silver-haired bat

Ruffed grouse

Ruffed grouse are found in other forest types, but their varied life histories highlight the importance of Appalachian oak-pine forests to ruffed grouse. They require four different habitat components in close proximity: 1) thick, dense, young forests for cover and raising young; 2) mature forests for nesting and feeding on acorns, nuts and tree buds; 3) sunny openings for foraging on insects with their young; and 4) large fallen logs, from which males make their mating calls (rapidly beating their wings to produce a drumming sound). The patchy canopy of Appalachian oak-pine forests can be well-suited to these varied habitat requirements. However, human development, forest fragmentation, and lack of young early-successional forest are all threats to ruffed grouse habitat.



Ruffed grouse

Wildlife found in Appalachian oak-pine habitats

A great many wildlife species use Appalachian oak-pine forests, including those listed below. Be on the lookout for these species, and follow stewardship guidelines to help maintain and enhance these forests. Species of conservation concern, those wildlife species identified in the Wildlife Action Plan as having the greatest need of conservation, appear in **bold** typeface.

- **American woodcock**
- **Bald eagle***
- Black bear
- **Black racer***
- **Blanding's turtle****
- **Bobcat**
- Canada warbler
- **Cerulean warbler**
- **Common nighthawk****
- **Cooper's hawk**
- **Eastern pipistrelle**
- **Eastern red bat**
- **Hognose snake****
- Moose
- **New England cottontail****
- **Northern goshawk**
- **Northern myotis**
- **Ribbon snake**
- **Ruffed grouse**
- **Silver-haired bat**
- **Smooth green snake**
- **Timber rattlesnake****
- **Veery**
- **Whip-poor-will**
- White-tailed deer
- Wild turkey
- **Wood thrush**

* state-threatened species

** state-endangered species

Where to get help

If you have information about a wildlife species of conservation concern, contact NH Fish & Game's Wildlife Division at 603-271-2461. Contact the UNH Cooperative Extension Wildlife Specialist at 603-862-3594 for technical assistance for landowners or your community.

Publications and assistance on forestry and wildlife topics are available through the UNH Extension Educators in Forest Resources in each county. Contact information for each UNH Cooperative Extension office is provided below. Additional publications, contact information, resources, and web versions of all brochures in the Habitat Stewardship Series are available on the UNH Cooperative Extension website at: nhwoods.org.

Belknap County	603-527-5475	Grafton County	603-787-6944	Rockingham County	603-679-5616
Carroll County	603-447-3834	Hillsborough County	603-641-6060	Strafford County	603-749-4445
Cheshire County	603-352-4550	Merrimack County	603-225-5505	Sullivan County	603-863-9200
Coos County	603-788-4961				

Authorship

The Habitat Stewardship brochures are produced by UNH Cooperative Extension, an equal opportunity educator and employer. University of New Hampshire, U.S. Department of Agriculture and N.H. Counties cooperating. Partial funding for this publication was provided by The Sustainable Forestry Initiative. Additional support came from the New Hampshire Fish & Game Department. Written by Malin Ely Clyde.

About the Habitat Stewardship Series

Much of the land in New Hampshire is privately owned. These individuals are the primary stewards of our wildlife and forests, and also our clean water, scenic views, fresh air, natural and cultural heritage, and recreational resources. The Habitat Stewardship Series has been created to help landowners and land managers recognize the habitats critical for wildlife species at risk, and to illustrate the role private landowners can play in sustaining those species through conservation, management, and sound land stewardship.

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