



# SAVING NEW HAMPSHIRE'S PINE BARRENS

*Above: The largest intact pine barren left in New Hampshire is the Ossipee Pine Barrens, found on glacial outwash deposits around Ossipee and Silver Lakes to the south of the Mount Washington Valley. Photo by Jeff Lougee.*

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By Jeffrey Lougee

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Pine barrens were once common across New Hampshire, stretching thousands of acres across the northeastern part of the Lakes Region and the lower Merrimack River Valley. Found on dry, sandy soils that were deposited during the retreat of the last continental ice sheets, this unique natural community is characterized by pitch pine (*Pinus rigida*), scrub oak (*Quercus illicifolia*), low sweet blueberry (*Vaccinium angustifolium*), and other hardy plants.

Today, this ecosystem is one of New Hampshire's rarest natural communities, making up less than half of one percent of the state's landcover (New Hampshire Fish and Game Department, 2010). Its scarcity is due to a number of reasons, foremost being the suitability of its flat and sandy soils for residential and commercial devel-

opment. Sand and gravel mining has also eliminated pine barrens, and some areas have been converted to more commercially valuable forest types like white pine.

The largest intact pine barrens ecosystem left in New Hampshire is the Ossipee Pine Barrens, which is found on glacial outwash deposits around Ossipee and Silver Lakes to the south of the Mount Washington Valley. Over 1,500 acres of the Ossipee Pine Barrens have been protected by numerous conservation organizations, and the area is being managed to maintain the pine barrens ecosystem. Smaller pine barrens are found in southern New Hampshire, such as the Concord Pine Barrens, which include the state's only population of the endangered karner blue butterfly (*Lycaeides melissa samuelis*).



*Right: This unique ecosystem is home to many uncommon species, including the state butterfly, the rare karner blue. Pitch pine communities foster wild lupine, on which the adult butterfly lays its eggs. Dense stands of lupine are necessary to ensure that enough butterflies are produced to maintain the population over time. Photo by Eric Aldrich.*

### **A Natural Community of Distinction**

This unique ecosystem is home to many uncommon species, some of which can't be found elsewhere in New Hampshire, and a few that are only found in the pitch pine barrens areas of the northeastern United States. The New Hampshire Natural Heritage Bureau documents more than 50 species of rare plants and animals occurring in pine barrens, including a variety of ground and shrub nesting bird species, dozens of insect species, and several rare plants. Whippoorwill (*Caprimulgus vociferus*), eastern towhee (*Pipilo erythrophthalmus*), and the state butterfly, the rare karner blue, are just a few of the well known yet uncommon wildlife species that depend upon pine barrens for their habitat.

These wildlife depend upon the plant species and unique forest structure associated with pine barrens for various parts of their life histories. Many of the rare invertebrates depend upon just one or two plant species to serve as their host. For example, the caterpillar of the highly uncommon pine pinion moth (*Lithophane lepidalepida*) feeds exclusively on pitch pine needles. Similarly, the ground and shrub nesting birds found in pine barrens depend upon the unique habitat niches available; in this case the patches of bare mineral soil and dense shrubby thickets for nesting that are created and maintained by fire.

Whippoorwills were once widespread across the northeast but have declined substantially over the past 50 years. Their decline is believed to be the result of a number of factors. Habitat fragmen-



*The plant and animal species native to the pine barrens are uniquely adapted to disturbance from fire. These forests thrive with disturbance, which has historically come from repeated naturally-occurring fires that burned in these droughty areas. Photo by Jeff Lougee.*

tation and residential development has made their nests, which are on the ground, more susceptible to depredation from domestic cats. Their decline is also partly attributed to a drastic reduction in a key food source, specifically the large saturniid (silk) moths that were substantially killed off by the biocontrol released for gypsy moths. Whippoorwills still thrive in large, intact areas of pine barrens because of the abundance of moths that remain there, as well as the flat and dry sandy areas that provide suitable nesting locations. The largest concentrations of these birds across the northeast are all associated with remnant pine barrens.

Like the whippoorwill, the karner blue's habitat needs are very specific: the pitch pine communities they depend upon foster wild blue lupine (*Lupinus perennis*). The adult butterfly lays its eggs on this blue flower, and when the eggs hatch, the larvae feed exclusively upon the plant's leaves. Dense stands of lupine are necessary to ensure that enough butterflies are produced to maintain the population over time, and lupine is known to proliferate after hot fires burn through the leaf litter and other organic matter on the ground to reveal the mineral soil below.

### Thriving Through Upheaval

Ecologically, pine barrens require disturbance to regenerate pitch pine and other species unique to this natural community, to remove competing vegetation, and to maintain structural diversity. Historically, such disturbances have come from repeated and prolonged fires that burned in these droughty areas. Now vast areas of pine barrens have been lost through human activity to suppress wildfire, cultivate commercial forests, and industrial, commercial and residential development. Today, a combination of mechanical treatments and prescribed burning is commonly used to provide disturbance. This includes a mix of timber harvesting, mowing of dense shrubby vegetation, and prescribed burning.

Timber harvests focus on removing fire-intolerant species to favor hard pines (pitch pine and red pine (*Pinus resinosa*) and other pine barrens species. Often, the target species to be removed with timber harvests include white pine (*Pinus alba*), red maple (*Acer rubrum*), American beech (*Fagus grandifolia*), and red oak (*Quercus rubra*). These are the tree species most likely to become established in pine barrens in the absence of fire. Timber harvests are also used to create

openings in the canopy even when the forest is already dominated by pitch pine; this is needed to promote the shrub layers in the forest understory. Additionally, the soil scarification created during a harvest may help to promote the regeneration of pitch pine and other pine barren species. Harvests are sometimes planned and timed to coincide with good seed years for pitch pine.

Mowing is used to manage tall shrubs, with specific emphasis on treating dense thickets of scrub oak, especially those with many dead branches. Older areas of scrub oak with average heights in excess of six feet are often senescent, with many dead branches, and have formed impenetrable thickets. These areas have reduced value for the rare invertebrate species, contribute to a localized loss of plant diversity as they completely shade the forest floor, and represent fire hazards. Scrub oak is typically managed to maintain average height of less than six feet, with adequate spacing for other low stature shrubs and vegetation to colonize the spaces in between.

### Growth Fueled by Fire

Following timber harvesting or mowing, prescribed burning is used to remove the smaller fuels left after these mechanical treatments. This includes leaf litter, twigs, small branches, and the slash remaining from harvesting or mowing. The fires are also set when conditions are dry enough to allow the fire to burn through both the leaf litter and organic material below to expose the mineral soil. These areas of exposed mineral soil are the seed beds required by pitch pine and other pine barren species to regenerate. These soils can be suitable locations for ground nesting birds, especially common nighthawks and whippoorwills. The prescribed fires also remove the fire-intolerant species that may not have been captured by the timber harvest, like small diameter white pine and hardwoods.

The plant and animal species native to the pine barrens are uniquely adapted to disturbance from fire. For example, pitch pine has extremely thick bark that provides a protective blanket around the cambium layer to prevent the tree from being girdled when exposed to fire. Pitch pines are also one of the few coniferous species capable of stump sprouting, or sprouting from the trunk. An entire tree can burn, yet survive the fire through its ability to sprout. Blueberry species also become highly reproductive after burning because the new growth is able to produce significantly more flow-

ers and, therefore, fruit. This is why commercial blueberry fields are often burned to maintain the highest levels of productivity.

### Giving Nature a Helping Hand

A lack of fire in pine barrens leads to a number of management challenges, including the accumulation of fuel loads – leaves, twigs, and any other vegetation that can burn – which can generate wildfires that are difficult to control. The absence of fire also leads to the encroachment of fire-intolerant species, which eventually displace the unique species that make up this natural community. That in turn leads to the loss of habitat for rare species populations, particularly the loss of structural diversity, and the decreased amount of open-canopied habitat niches.

Pine barrens are comprised of highly flammable vegetation. Many of the plant species have flammable oils that enable them to burn with high intensity even during the growing season, when water is moving through the live vegetation. Without periodic fires, the amount of material available to burn in a pine barrens can accumulate to dangerous levels, and the wildfires that can result may not only cause significant ecological damage, but also threaten life and property.

Due to fire suppression throughout the state, many pine bar-

rens now have high fuel loads and represent considerable fire hazards during periods of drought. This issue is further amplified by the extent of residential and commercial development intertwined amongst New Hampshire's pine barrens.

Because of fire suppression over the past 50-100 years, fuel loads have reached very high levels in the pitch pine-scrub oak habitats in Ossipee, Madison, Freedom, and Tamworth. The last large-scale wildfire in the area was in 1957, when several hundred acres burned north of Ossipee Lake Road in Madison and Freedom. The lack of fire since then has enabled fire-intolerant species, like white pine and some hardwoods, to gain a foothold, while pitch pine and scrub oak have declined.

After thorough research, The Nature Conservancy launched a comprehensive project to maintain the Ossipee Pine Barrens using a combination of mechanical vegetation management and controlled (“prescribed”) burning. This effort will both restore and maintain the critical habitat found in the Ossipee Pine Barrens while helping to reduce the current wildfire hazard. ♪

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## RESTORING PITCH PINE HABITAT AT THE HARMON PRESERVE

By Wendy Weisiger

The Forest Society has an on-going effort to restore the portion of the pine barrens occurring on its property in the Town of Freedom. The Harmon Preserve, containing nearly 200 acres of pitch pine-scrub oak habitat, was purchased in 1999 with pine barrens habitat restoration in mind. Several years of planning went into the development of a management schedule that includes removal of the competing tree species that have invaded the site since the last time the property burned. Several monitoring sites have been established on the property to track the occurrence and abundance of bird and moth species utilizing the property before and after the restoration.



The first harvest of competing trees took place in the spring of 2011 and will be followed by at least one more harvest planned for the spring of 2012. The habitat area will then be assessed and prepared for a prescribed burn in the following few years.

The Forest Society has the opportunity to add to the knowledge base for management of this rare natural community by following several different restoration paths. Cutting prescriptions will be varied, and the use of site preparation through mechanical scarification and planting or seeding of pitch pine will replace fire in at least one area.

The restoration of this habitat is a project that will take decades. Progress will be monitored over the years to assess how well our methods are working and what adjustments to our management we might make.

“We are fortunate to have the expertise and experience of other natural resource professionals to collaborate with,” said George Frame, senior director of forestry at the Forest Society. “The State of New Hampshire and The Nature Conservancy both also have pitch pine barrens they are each using different methods to restore. We hope that through all of our work and through sharing ideas and methods, we’ll all be successful in restoring this unique habitat to New Hampshire.”

*About 150 acres of the 300-acre Harmon Preserve will be actively managed for pine barrens. The remaining 150 acres, like this seasonally flooded natural community along the Ossipee River, will remain uncut and managed as an ecoreserve. Photo by Peter Ellis.*