

Pinelands Home

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VEGETATION OF THE PINE BARRENS by Jack McCormick

Water, fire, and man have shaped the modern vegetation of the Pine Barrens. The effects of water are illustrated most dramatically by the growing conditions it creates - soils flooded or saturated for days, weeks or months during the year. These conditions limit the kinds of plants that can grow on these soils.

Frequent and severe fires and man's repeated cutting are also of outstanding importance to the vegetation's composition and distribution. No large area in the region has escaped burning and/or cutting within the past century. At least until the early 1900's, most forests in the Pine Barrens were clear-cut every 25 to 50 years for firewood, charcoal production, poles and lumber. Most of the forests were burned repeatedly, at intervals of 10 years or less to 30 years or more. These frequent fires apparently screened out many plants which grow along the margins, being predominant in surrounding regions. The absence of these potential competitors and/or the stimulation afforded by the fires may have favored many existing Pine Barrens plants that are absent or rare elsewhere.

Pitch pine, blackjack oak, and southern whitecedar are most characteristic of the twenty or more trees forming the forests. Pitch pine grows on sites ranging from the driest to the wettest. Most of the trees, shrubs, herbs, mosses and lichens, however, occur either on relatively dry sites (the uplands) or on sites with soils saturated part of the year (the wetlands). The abundant moisture in the wetland sites supports dense vegetation. The wetland plants' moist condition reduces their flammability -- fires occur less frequently here than in nearby uplands.

LOCAL & STATE RESOURCES

- Batsto Village
- Cranberry Recipes
- Jersey Devil of the Pine Barrens
- New Jersey Pinelands Comprehensive Management Plan Summary
- Photos of the Pinelands
- Pinelands Commission
- Pinelands Preservation Alliance
- Pineylore
- Piney power
- Plants of the Pinelands
- Wharton State Park
- Whitesbog Village

Upland agriculture and urban uses occupy about 15 percent of the Pine Barrens area. Wetland communities, on sites with high water tables (at least seasonally) occupy, approximately 20 percent of the region and upland forests, on sites where the water table seldom is less than 2 to 3 feet below tile surface, cover the remaining 65 percent.

In some parts of tile region, upland and wetland vegetation types are connected by a transition area. In these transitional areas, plants of the two complexes grow side by side. However, in most places, tile boundaries between the two complexes are sharp. These abrupt changes occur where stream channels are flanked by banks at least 2 to 3 feet high and where fires have consumed peat and muck accumulations on which transition vegetation formerly grew.

UPLAND VEGETATION

Except for areas where human activities have destroyed the cover, the Pine Barrens uplands are continuously forested. Truck farms utilize several thousand acres, particularly along the western boundary and near Hammonton and Vineland. Fallow fields scattered through the region are revegetated rapidly by pitch pine and, less commonly, shortleaf pine. Along the western margin, Virginia pine and redcedar are important oldfield trees. Redcedar also is abundant in oldfields near the coast. The common Pine Barrens shrubs, especially lowbush blueberry and hog huckleberry, seem not to reproduce from seeds on these disturbed sites and the ground beneath the pines is covered by firesedge or, less frequently, orange broomsedge, switchgrass or other grasse

Shortleaf pine, black oak, white oak, chestnut oak, post oak and blackjack oak are prominent in the canopies of the upland forests throughout the region. Scarlet oak is common in the northeastern section, southern red oak is common in the southern section of the Pine Barrens, and these trees also appear in lowland forests near the region's perimeter

Most oak trees in the modern forest originated as sprouts after fires or cutting, and many have two or more trunks that developed from a single stool. The trunks of these trees is very susceptible to heart rot. The rot fungi, and the excavations of carpenter ants, mechanically weaken the trunks. The uppermost sections of many large oaks' crowns have been snapped off by strong winds and the lower branches developed a new peculiarly foreshortened crown. These trees are said to be stageheaded

Two hearths, the hog huckleberry and the lowbush blueberry, form the bulk of the uplands forests' shrub layer. These plants reach 1 to 2 feet in height and are a uniform cover over a thousand acres, regarding less of the overshadowing tree canopy. In many places, scrub oak (a shrub from 3 to 15 feet tall) stands above the hearths, but appears not to significantly effect the lower shrubs. Thus, two shrub communities can be recognized in the upland forests: a heath type and a scrub oak type. In the scrub oak type, scrub oak covers 20 percent or more of the ground. The lower cover formed by huckleberry and blueberry, however, it is essentially the same as in heath undergrowth type

Herbaceous plants are sparse in the upland forests. Bracken fern and wintergreen are the most common herbs with cowwheat, goatsrue and several other species occurring here and there. The cover of mosses and lichens is related closely, but inversely to the proportion of ground blanketed by litter. The litter usually is continuous cover; lichens and mosses grow only on exposed spots of soil.

Both the heath type and the scrub oak type of shrub layer occur in association with the two principal upland forest types: the pine-oak forest and the oak-pine forest. (When botanists refer to vegetation on a particular area, they usually do not include the word "heath" in the name, but it is implied.) Thus, there are four principal types of upland forest communities in the Pine Barrens: the pine-oak, the pine-oak-scrub oak, the oak-pine, and the oak-pine-scrub oak. Because the heaths are included in the scrub oak type of shrub layer, these combinations reflect the almost uniform occurrence of heaths throughout the uplands. In contrast, scrub oak and the other various species of trees are distributed more or less irregularly.

The Pine-Oak Forests

Pine forests give the Pine Barrens its typical aspect. In these forests, pitch pine covers 30 percent or more of the ground and contributes 50 percent or more of the tree stems 1 inch or more in diameter. Large broadleaf trees, including black oak, chestnut oak, scarlet oak, and white oak, cover no more than 25 percent of the ground and contribute no more than 25 percent of the stems.

Pine-Blackjack Oak Forest

Much of the central Pine Barrens is covered by open forests of pitch pines, averaging about 25 feet high, and blackjack oaks, most averaging less than 20 feet. These forests are almost pure pitch pine, the blackjack oak representing a small percentage. Post oaks, also less than 20 feet tall, may be widely scattered to relatively abundant in these stands. Black oaks and scarlet oaks are scattered through the pine-blackjack oak forests, but seldom exceed five trees per acre.

The pine-blackjack oak type is a product of frequent, severe fires' selective action. Shortleaf pines and most treeform oaks are rare or absent from these forests--they probably were eliminated by fires hundreds, or even thousands, of years ago. The pygmy forests of the East and West Plains are the extreme expression of this type. They consist of dense stands of 4 to 6 feet tall pitch pines, blackjack oaks and, in place scrub oaks. There are about 3,000 to 6,500 individuals (clones) per acre in the West Plains vegetation. Of these, from 20 to 70 percent are pitch pines and virtually all others are blackjack oaks and, less commonly, scrub oaks. In one study, some 34,000 stems were found per acre in a stand burned 7 years previously. In another study, approximately 16,000 stems were found per acre in a stand unburned

for 27 years. This difference in densities may reflect natural thinning during the fire-free period and the presence of a substantially greater proportion of oaks in the second area. Pine roots in the Plains forecasts were found to support about seven stems each; there were only two stems from each oak root.

Both heart and scrub oak undergrowth types occur beneath the pine-blackjack oak forest type. In the Plains and several nearby areas, mountain laurel, sheep laurel, sweetfern, broom-crowberry and bearberry are abundant from place to place in the shrub layer. Pyxiemoss and falseheather are abundant Herbs throughout the pygmy forests.

Pine-Black Oak Forests

Pitch Pine is the principal tree in these forests, but 10 to 20 percent of the trees are black oaks, scarlet oaks or southern red oaks. White oak or chestnut oak occur in a few limited areas. The smaller blackjack oak may be absent, infrequent, or nearly as abundant as in the pine-blackjack oak forest type. The average height of these forests' canopy is 35 feet.

The Oak-Pine Forests

Black oak, chestnut oak, scarlet oak, and white oak cover 40 percent or more of the ground and contribute 50 percent or more of the tree stems in oak-pine forests. Pitch pine grows in nearly all these stands, but it is subordinate to the broadleaf trees and, in many areas, shortleaf pines are more abundant than pitch pines.

Oak-pitch forests (600 to 900 trees per acre) generally are less dense than pine-oak forests (1,100 to 1,200 trees per acre). The oak-pine forest canopy ranges from 35 to 50 feet high but in stands left unburned for 1 century or more, the trees may be 75 to 100 feet tall.

Several kinds of treeform oaks are prominent in oak-pine forests. Black oak is the most common tree in the stands of the north Mullica River; southern red oak becomes prominent to the south. The abundance of chestnut oak, scarlet oak and white oak vary from stand to stand. Of the two smaller treeform oaks, post oak generally is more abundant than blackjack oak. In a few places, the post oaks are relatively large and form part of the canopy.

In oak-pine forests, tree crowns spread over 70 percent of the ground and 60 percent of the cover is treeform oaks. Half or more of the wood in the tree trunks, however, is represented by pines. This is because pines commonly sprout out from their branches after a fire and a new crown develops on the old trunk. Oaks, in contrast, seldom develop new crowns from the old trunk after a fire—the old trunk dies, and new stems sprout from the root crown. In oak-pine forests, therefore, the root systems of the pines and oaks may be of the same age. The trunks of the pine trees, however, are usually many years older and larger in diameter.

VEGETATION OF THE WETLANDS

Wetland vegetation occupies sites which may be inundated continuously or where the soil is saturated for only a few weeks per year. Both the floristic and the physiognomic diversities of wetland vegetation greatly exceed those of upland vegetation. By virtue of regulations promulgated under Section 404 of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), most of these areas are under the jurisdiction of the United States Army Corps of Engineers and the United States Environmental Protection Agency. Only by stringent regulation, continuous scrutiny, minimal alteration, and informed husbandry will these immensely valuable, but terribly fragile, habitats persist into the twenty-first century and beyond.

Wetland Herb Communities

Several kinds of treeless communities occur in ponds and streams, in concentric bands around isolated depressions and in linear bands along streams. Deeper sections of ponds may be colonized by algae. Near the margins of ponds and in stream coves, white waterlilies, spatterdocks, bladderworts, and other submerged or floating leaf plants may cover both the bottom and the surface. Sphagnum mosses, sedges, rushes, pipeworts, chain ferns and other emergent plants occur in water no deeper than a few inches and along the shore.

At scattered places such as the channels of intermittent streams, lowland broomsedge, bullsedge and other grasses and grasslike plants form marshes. Locally, these are called savannas. About 1900, savannas covered several thousand acres in the Pine Barrens. Today, individual savannas are small and, collectively, probably cover no more than a thousand acres. Thickets of leatherleaf, or highbush blueberry and swamp forests of red maple, blackgum, sweetbay and southern whitecedar have replaced most of the former savannas.

Wetland Shrub Communities

Leatherleaf grows in the channels of intermittent streams, on the margins of ponds and over the central sections of many nearly isolated depressions. These thickets are known locally as spungs (rhymes with rungs-the term is also applied to broadleaf swamp forests). The ground in spungs is covered by sphagnum moss with scattered chain ferns projecting from it. Sheep Laurel and Staggerbush occur here and there in highbush blueberry edging many streambanks. In stands of leatherleaf, highbush blueberry and small trees of pitch pine and red maple occur as scattered individual.

Wetland Forests

Southern whitecedar, trident red maple, blackgum, sweetbay, and pitch pine are the principle trees of the wetlands forest. A few stems of gray birch and sassafras are present in many stands - the sassafras trees may be relatively large. The lowland forests, particularly the broadleaf swamp type, extend well beyond the Pine Barrens limits.

In lowland forests within the region, but principally near its margins, sweetgum, pin oak, willow oak, basket oak, water oak, and various other trees are found.

Southern Whitecedar Swamp Forests

At maturity, southern whitecedar trees have straight stems devoid of branches or foliage beneath their topmost sections. The trees usually begin to grow after a forest has been destroyed by fire or cutting. As many as 200,000 seedlings per acre may germinate during the first year. As this generation of trees ages, their density is naturally thinned. By the twentieth year, 95 percent of the stems may have died and the forest has about 11,000 trees per acre. The thinning continues, but the mortality rate is reduced. During the 35th through 50th years, the density averages about 3,000 stems per acre. Surveys in New Jersey indicate that whitecedar forests, 70 to 80 years old are composed of around 1,000 mature trees per acre. However, the densities of trees may vary considerably in different stands of the same age and in different parts of a single stand. Nevertheless, in fewer than 100 years, more than 95.5 percent of the initial number of seedlings succumb to disease, predation, starvation and other agents of natural thinning.

Many of the Pine Barrens streams flow through whitecedar swamp forests. The forests range from a few yards to a mile or more in width, with few exceeding 1,000 feet. The mature trees generally are 50 to 60 feet tall. Pitch pines may be scattered among the whitecedars with red maple, blackgum and sweetbay forming a more or less continuous understory. Crowns of highbush blueberry, dangleberry, clammy azalea, sweetpepperbush, fetterbush, bayberry and several other shrubs merge with branches of broad-leaf trees. The herbaceous vegetation is rather sparse in most stands, but it is composed of many beautiful and often rare plants. Chain ferns, bladderworts, stundews, pitcherplants, swamppink and partridgeberry are common. Curlygrass, a grasslike boreal fern at the southern limit of its range in the Pine Barrens, is rare, but widely distributed in the whitecedar forests. Sphagnum mosses blanket hummocks around the bases of trees and much of the surface between trees.

Broadleaf Swamp Forests

Trident red maple is the most abundant tree in the broadleaf forests. Blackgum and sweetbay are the most frequent associates with wetland's gray birch and sassafras abundant in places. Pitch pines are scattered through most stands and may be as abundant as broadleaf trees in some spots. Southern whitecedars occur in many stands.

In most places, the broadleaf trees are 30 to 40 feet tall. The tops of taller shrubs (5 to 10 feet high) extend amid the trees' lower limbs. Highbush blueberry and sweetpepperbush are the most common shrubs. Clammy azalea, leatherleaf,

fetterbush, hog huckleberry, dangleberry and sheep laurel are less common, but occur throughout most stands. Most herbaceous plants, mosses and lichens in the broadleaf swamp forests are of the same species as those in the cedar swamp forests. Shrubs, generally, are more abundant and form a more continuous undergrowth in broadleaf swamp forests than in cedar swamp forests. Herbaceous plants, in contrast, seem to be more abundant in cedar swamp forests than in broadleaf swamp forests.

Pitch Pine Lowland Forests BR> Pitch pine forms 90 percent or more of this forest's canopy. Small clumps of red maple and blackgum are scattered throughout and gray birch may be a minor component. The stands are dense; few of the crooked trees, many with two or more stems from a single root crown, are taller than 15 to 25 feet. These forests cover many isolated depressions within the Pine Barrens, grow on level sites adjacent to swamp forests or occupy hundreds of acres of other poorly drained soils.

More than twenty kinds of shrubs and woody vines occur in the undergrowth of pitch pine lowlands forest. Over half of the shrub layer cover, however, is hog huckleberry, sheep laurel and dangleberry. Nearly 30 percent of the ground is covered by turkeybeard, wintergreen, bracken fern and associated herbs, including several orchids. Spogy mats of spagnum mosses cover about 10 percent of the surface.

Regardless of the inordinate cutting and largely because of the frequent fires, the vegetation of the of the New Jersey Pine Barrens is unique in the world. Owing to this vegetation and to the area's sparse settlement, the Pine Barrens is of formidable significance as a natural open space and recreation source to the people of New Jersey, of the Eastern Seaboard's megapolitan region and of the Nation.

Dr. McCormick was Curator and Chairman of the Academy's Dept. of Ecology and Land Management from 1963-71. During this time, he conducted a study for the National Park Service to determine the national significance of the Pine Barrens. Today, Jack McCormick & Assoc. does environmental consulting in Berwyn, PA and Washington, D.C. Dr. McCormick was on the Pinelands Advisory Committee that wrote the legislation to form New Jersey's Pinelands Environmental Council and recently served on the N.J. Dept. of Environmental Protection's Water Quality Task Force.

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