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The Natural Vegetation of North Carolina

Explanation of map

by

Arthur W. COOPER

The map (Fig. 1) shows the distribution of the major natural vegetation types of North Carolina. Each of the vegetation types shown occurs over a large area, is characterized by a general similarity in structure and species composition, and occupies a similar habitat throughout its range. Where vegetation types occur that are too small to be displayed at the scale of the map, they are described in the narrative. Each vegetation type, unless otherwise indicated, is a climax type; it would continue to occupy its present habitat under the prevailing conditions of climate and geology. The map does not show, however, that large areas in each vegetation type are now converted to cropland, pasture, managed forest, or are urbanized.

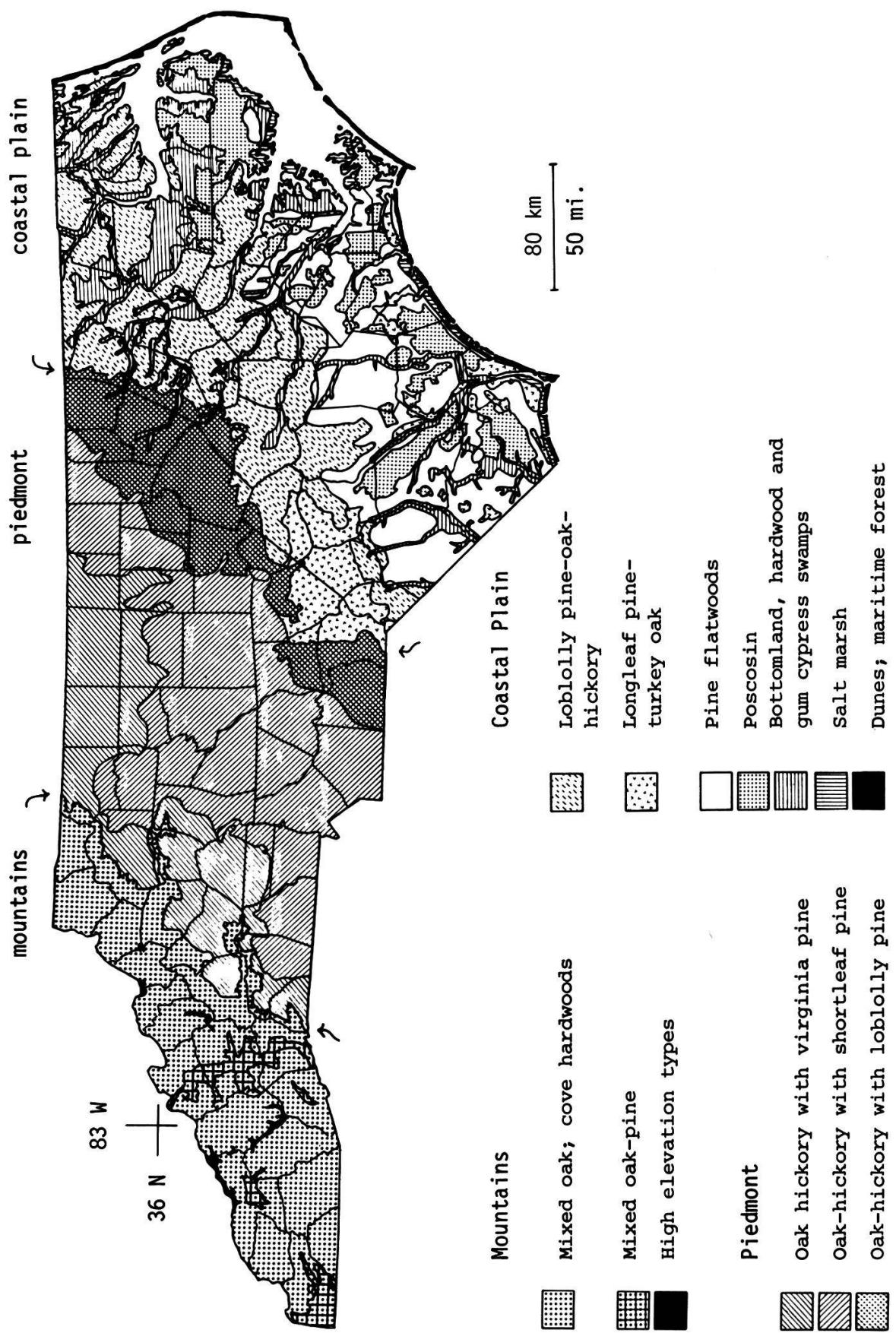
Species nomenclature in the following descriptions follows RADFORD et al. (1968).

1. Mountains

Three map units, comprising eight major vegetation types, occur in the mountains:

1.1. *Mixed oak and cove hardwoods*

a) *Mixed oak forests.* Forests of mixed oak are found on the open,



A.W. Cooper, May 1979

Figure 1. Natural vegetation of North Carolina

exposed slopes of the mountains from the lowest elevations up to 4,500-5,000 feet. The major species now are *Quercus prinus*, *Q. coccinea*, *Q. velutina*, *Q. alba*, *Acer rubrum*, *Oxydendrum arboreum* and on moister sites and at higher elevations, *Q. rubra*. *Castanea dentata*, now virtually eliminated by chestnut-blight, was once a dominant. An ericaceous shrub layer, with *Kalmia latifolia* the major species, is well developed. b) Pine forests. Stands of pine occur on dry, open ridges ("leads") and on steep south- and southwest facing slopes. *Pinus virginiana* and *P. rigida* dominate at low elevations. Between 2,500-3,500 feet *P. rigida* is the major species and above 3,500 feet pure stands of *P. pungens* occur. c) Cove hardwoods. Cove hardwood (often called mixed mesophytic) forest occupies the sheltered mountain valleys, protected lower slopes, and more open east- and north-facing slopes from 1,500-4,500 feet. Although 25-30 tree species may occur in any stand, six are typical: *Halesia carolina*, *Aesculus octandra*, *Tilia heterophylla*, *Acer saccharum*, *Betula lutea*, and *Tsuga canadensis*. Huge *Liriodendron tulipifera* and *Fagus grandifolia* are present in most stands. Although there is no well-developed shrub layer, numerous species occur. A luxuriant herb layer is present, however, and the variety of species present is unequalled in eastern North America.

1.2. Mixed oak-pine

This type occurs in the basins within the mountains and is similar in composition and structure to forests of the Piedmont. *Quercus alba* is the dominant with *Q. velutina*, *Q. coccinea*, *Pinus echinata*, and *Pinus virginiana* the codominants. *Quercus falcata*, *Acer rubrum*, *Oxydendrum arboreum*, and *Cornus florida* are common associates. An ericaceous shrub layer is almost always present.

1.3. High elevation types

a) Spruce-fir forest. Forests of *Picea rubens* and *Abies fraseri* cover the high peaks and ridges of the mountains above 4,500-5,000 feet. The most extensive stands are in the Smoky, Black, and Balsam Mountains. Spruce-fir forest is best developed over 6,000 feet where spruce and fir

make up over 95% of the canopy. Large areas have been disturbed by lumbering and fire. In such areas *Prunus pensylvanica* and *Betula lutea* form dense stands. Herb and moss layers are well-developed in mature spruce-fir forest. b) High elevation deciduous forest. Stands of deciduous forest, ranging from true forest to scrubby stands of gnarled trees, occur within the elevational range of spruce-fir forest. The major trees are *Fagus grandifolia*, *Betula lutea*, *Acer saccharum*, and *Aesculus octandra*. The herbaceous flora of these stands is very rich. c) Heath balds. Ericaceous shrub stands, called heath balds or laurel slicks, cover exposed, rugged peaks and ridges above 4,500 feet (1350 m). *Kalmia latifolia* is the major species at lower elevations and higher *Rhododendron catawbiense* is the dominant. Heath balds may be either true climax vegetation or be formed as the result of destruction of over-topping forest by fire. d) Grass balds. These patches of *Danthonia spicata*, found at an elevation where forest otherwise clearly can persist, are North Carolina's most enigmatic vegetation type. Although they are dominated by grasses and herbs, shrubs and small trees are becoming more important in most balds. Many theories ranging from natural climatic change to direct modification by either aboriginal or white men, have been proposed for the origin of these balds. It now appears that man has played a role either in the formation or expansion of most balds and that, in the absence of disturbance, most will be replaced by open "orchards" or by true forest.

The boundary of the mixed oak and cove hardwood map unit is essentially that of the hard maple-beech-yellow birch type where it occurs in the mountains in FOREST SERVICE-USDA (1955). The mixed oak-pine areas are adapted from FOREST SERVICE-USDA (1955) and from NORTH CAROLINA WILDLIFE RESOURCES COMMISSION (1950). The distribution of high elevation types is from RAMSEUR (1960).

2. Piedmont

One map unit, oak-hickory forest, containing three zones defined by the species of pine that is found on abandoned agricultural and heavily cut over land, occurs in the Piedmont. On the rolling uplands *Quercus alba*,

Q. velutina, *Q. coccinea*, *Q. stellata*, *Q. falcata*, *Carya tomentosa*, *C. glabra*, *Nyssa sylvatica*, *Acer rubrum*, and *Pinus* spp. are the dominants. *Cornus florida* and *Oxydendrum arboreum* are the common understory trees. On moist, sheltered sites *Q. rubra*, *Fagus grandifolia*, and *Liriodendron tulipifera* are mixed with the upland species. Upland sites with soils that are very wet in winter and very dry in summer are dominated by *Q. marilandica*, *Q. stellata*, and *Carya pallida*. On dry ridges *Q. coccinea* and, particularly in the western Piedmont, *Q. prinus*, are common. Abandoned and heavily cut over land is initially invaded by grasses and forbs and these are rapidly replaced by pines. Different pines dominate in different regions of the Piedmont, with *Pinus taeda*, *P. echinata*, and *P. virginiana* characteristic of the eastern, southern and central, and northern portions respectively.

Three other vegetation types, unmapped because of their localized occurrence, also are present in the Piedmont: a) Bottomland hardwood forests generally similar in composition to those of the Coastal Plain; b) oak forests, dominated by *Quercus prinus*, on isolated monadnocks throughout and more widely in the Uwharrie and Sauratown Mountains and western Piedmont; and; c) isolated communities dominated by species disjunct from the mountains such as *Tsuga canadensis*, *Pinus strobus*, and *Rhododendron catawbiense*.

The eastern boundary of the Piedmont oak-hickory map unit is based upon the Piedmont-Coastal Plain physiographic boundary in LEE (1955) and the western boundary is based on the boundary between the virginia pine and hard maple-beech-yellow birch types in FOREST SERVICE-USDA (1955). The boundaries of the three pine regions are from FOREST SERVICE-USDA (1955).

3. Coastal plain

Seven map units, several containing more than one vegetation type, occur in the Coastal Plain:

3.1. Loblolly pine-oak-hickory

Oak-hickory forest of varying composition once occupied upland soils in the Coastal Plain that are adequately, but not excessively, drained and

are not too sandy. Such soils generally occur in the northern half of the region. Few examples of this forest remain today and its composition must be inferred from successional stands. The original dominants probably were *Quercus alba*, *Q. falcata*, *Q. stellata*, *Q. marilandica*, *Q. nigra*, *Q. phellos*, *Q. michauxii*, *Carya tomentosa*, *C. pallida*, *Liquidambar styraciflua*, *Nyssa sylvatica*, and *Acer rubrum*. *Fagus grandifolia* and *Liriodendron tulipifera* appear to have been more common on moist or calcareous sites. On dry sites that grade into longleaf pine stands, *Q. marilandica*, *Q. stellata*, and *Q. laevis* are the dominants along with *Pinus* spp. and *Carya* spp. Because of the extreme disturbance of these forests by farming and continued selective timbering, *Pinus taeda* is now a dominant over much of the area where the type occurs.

3.2. Longleaf pine-turkey oak

Deep, well-drained, coarse sands, which occur mostly in the southern half of the Coastal Plain, are dominated by *Pinus palustris* and *Quercus laevis*. This type has a characteristic appearance, consisting of an open layer of scattered pines with a lower layer of scrubby oaks, primarily *Q. laevis*, with *Q. incana*, *Q. margareta*, and *Q. marilandica* also usually present. *Gaylussacia dumosa* is the most common shrub and *Aristida stricta* is the dominant of the herb layer. Other herbs, all showing obvious adaptations to an extremely dry environment, are also present. The type is perpetuated by fire. In the absence of fire, the oaks become dominant and *Pinus palustris* becomes less important.

3.3. Pine flatwoods

This type, often called savanna, occurs in the southern Coastal Plain on gently sloping, sand ridges and on extensive, poorly-drained flatlands. *Pinus serotina* and *P. palustris* are the major trees. Shrubs are common in some places and absent in others. The herb layer is composed of grasses, chiefly *Aristida stricta* and *Ctenium aromaticum*, numerous species of *Orchidaceae*, *Sarracenia* spp., *Drosera* spp., *Dionaea muscipula*, and many *Asteraceae*. This is perhaps the most showy of all North Carolina's vegetation

types. The type is maintained by repeated fires, which favor grasses and repress shrubs and trees other than the pines. Where flatwoods are protected from fire, they change rapidly into tree- or shrub-dominated communities.

3.4. Pocosin

These wetland communities, also known as bays or shrub bogs, occur on shallow to deep peats and are dominated by a dense layer of evergreen shrubs with *Pinus serotina* scattered throughout. The most important shrubs are *Cyrilla racemiflora*, *Ilex glabra*, *Lyonia lucida*, and *Clethra alnifolia*. *Magnolia virginiana*, *Persea borbonia*, and *Gordonia lasianthus* often occur as large shrubs or small trees. Although the water table is near the surface throughout the year, pocosins are not regularly flooded. Where the peat is deepest and wettest, dwarf shrubs such as *Kalmia angustifolia* var. *caroliniana* and *Chamaedaphne calyculata* often dominate. Pocosins owe their origin to fires and fire plays a major role in perpetuating them.

3.5. Bottomland hardwood and gum-cypress swamps

Bottomland hardwoods occur on the floodplains of the rivers flowing through the Coastal Plain from the Piedmont. The major trees are *Quercus phellos*, *Q. nigra*, *Q. falcata* var. *pagodaefolia*, *Liquidambar styraciflua*, *Fraxinus* spp., *Platanus occidentalis*, *Betula nigra*, and *Ulmus* spp. Gum-cypress swamps are best developed on floodplains of black water rivers and on flats associated with upland drainage channels. The soils are peaty and are usually covered with water throughout the growing season. *Taxodium distichum* occurs where the soils are wettest, with *Nyssa aquatica* and *N. sylvatica* var. *biflora* more abundant on less wet sites.

3.6. Salt marsh

Salt marshes occur along the inner fringes of the Outer Banks (barrier islands) and the mainland margin of the sounds. Regularly-flooded salt marshes, dominated by *Spartina alterniflora*, occur where lunar tides flood the soil twice daily to depths of 2-5 feet. Clumps of *Juncus roemerianus* are found scattered throughout such marshes. Irregularly-flooded marshes

occur on the upper reaches of tidal creeks along the entire coast, behind the Outer Banks, and around Core, Pamlico, and Currituck Sounds. *Juncus roemerianus*, *Spartina patens*, and *Distichlis spicata* are the dominants. Where there are significant effects of fresh water, *Typha* spp., *Cladium jamaicense*, and *Scirpus* spp. are common.

3.7. Dunes and maritime forest

This map unit occurs along the entire Outer Banks and contains three vegetation types: a) Dunes. Sand dunes, covered by *Uniola paniculata*, form at the upper edge of the sandy beaches of the Outer Banks. *Amnophila breviligulata*, commonly used for dune stabilization, occurs widely in these dunes. b) Maritime shrub thicket. Landward of the innermost dunes and in areas protected from the effects of salt spray, maritime shrub thicket occurs. This community is a dense thicket of mostly evergreen shrubs bound together by vines. The crowns of the shrubs are pruned by salt spray into an espalier form. *Ilex vomitoria*, *Myrica cerifera*, *Juniperus virginiana*, and *Smilax* spp. are the dominants. c) Maritime forest. Inland of the shrub zone, where distance or dunes provide protection, maritime forest, dominated by *Quercus virginiana*, develops. On the southern coast, *Sabal palmetto* is found in these forests along with *Quercus laurifolia*, *Prunus caroliniana*, and *Pinus taeda*. On the northern coast, maritime forests have a more varied composition and some contain species such as *Fagus grandifolia* and *Carya* spp. that are characteristic of inland forests. Such species are likely relicts of recent periods of low sea level associated with Wisconsinan glaciation.

The western boundary of the Loblolly pine-oak-hickory unit is mapped as the Piedmont-Coastal Plain physiographic boundary in LEE (1955). The eastern boundary is from FOREST SERVICE-USDA (1955) and the southern boundary is generalized from the southern limits of the Norfolk-Ruston soil association shown in LEE (1955). The northern and western boundary of the Pine flatwoods unit is the southern and eastern boundary of the Loblolly pine-oak-hickory type. Distribution of the Longleaf pine-turkey-oak, Pocosin, and Bottomland hardwoods-gum cypress types is from FOREST SERVICE-USDA

(1955). Occurrence of Salt marsh, Dunes and Maritime forest is generalized from NORTH CAROLINA WILDLIFE RESOURCES COMMISSION (1950) and from field observations of the author.

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