

NORTH CAROLINA

In much of North Carolina, particularly in the mountains, mapping old growth is difficult, as Michael Schafale of the Natural Heritage Program has explained. In the past much of the logging involved removing the best trees. As a result, we find today extensive areas of forest that have been highgraded. The number of trees that escaped cutting, because they were (from a logger's perspective) undersized, malformed, inaccessible, or of unwanted species, varies with the site. On ridge tops and some upland slopes, which are prone to fire, researchers find many pockets of trees that look as though they were never logged. In moist gorges and coves are old hemlock, left when hardwoods were removed. No matter what the environment, however, we find today "a range of remnant forests, from those that clearly seem to have the characteristics of old-growth, to those that clearly don't" (Schafale 1992).

The chestnut blight further complicates the situation. American Chestnut that died in the early part of the century because of the blight were often removed. Today, stands that show evidence of logging may have experienced only the salvage cutting of chestnut; and some entire stands are now young, only because of the death of chestnut. "All of these factors make it hard to know what to classify as old-growth, even when you know everything you want to about a place," Schafale explained (1992).

In May 2000 a report on "Old-Growth Forest Communities in the Nantahala-Pisgah National Forest," compiled by Rob Messick, was released. For the report, Messick adopted a classification system that takes into account the problems of which Schafale speaks. The report documents 77,000 acres of Class A and Class B old growth in the Pisgah and Nantahala National Forests. Some fifty researchers in total contributed to the catalog.

Messick, weary of climbing through rhododendron thickets and of crunching acreage numbers, entitled the work a "Final Report," but, after a brief respite, he is again in the field. An inventory and catalog of the Blue Ridge Province has been funded for 2003. Rob Messick will head up the field work. He will receive much assistance from grassroots forest watch groups. It will mainly cover US Forest Service (USFS) lands in Georgia (Chattahoochee National Forest) and Tennessee (Cherokee National Forest). It will also include corrections and additions to the North Carolina catalog (Nantahala-Pisgah National Forest) that have come in since the report was released. Researchers have made new primary forest discoveries that need to be cataloged and digitized for acreage estimates. A final Blue Ridge Province catalog will be prepared in 2004. The Southern Appalachian Forest Coalition (SAFC) and The Wilderness Society are the sponsors (Messick 2002).

Because North Carolina has a large number of old-growth sites within vastly different regions, we have grouped the state's sites into two geographic sections: Mountains, Outlier Mountains and Piedmont, and Coast and Coastal Plain.

MOUNTAINS AND PIEDMONT

Two broad classes of rock types occur in the Blue Ridge Province of western North Carolina: predominantly crystalline substrates and predominantly metasedimentary substrates. The rock types differ markedly from one another, and their presence helps explain some of the broad-scale differences among forest types in the province. The Unicoi Mountains, Smoky Mountains, and parts of the Unaka Mountains, the Nantahala Mountains, and the Grandfather Window are in the metasedimentary category. The Black Mountains, Balsam Mountains, Cowee Mountains (Blue Ridge), parts of the Grandfather and Linville Mountain areas, and parts of the Unaka Mountains and Nantahala Mountains are in the crystalline category. An 1898 North Carolina Geological Survey map shows these basic rock types, and they are reflected more precisely in a map of the "Ecoregions of North Carolina" produced and reviewed in 2002 by the United States Forest Service, Environmental Protection Agency (EPA), North Carolina Natural Heritage Program, and other agencies. The rock types explain in part why the Great Smoky Mountains and the Grandfather District of Pisgah National Forest are as dissimilar as they are (Messick 2002 personal communication).

Great Smoky Mountains National Park

Extensive but undetermined acreage of old-growth forest exists within the 520,000-acre park. Estimates of acreage vary. Robert Leverett writes that the park has approximately 150,000 acres of old growth; that is, approximately 29.8% of the Park is old growth (Leverett 2002). "Trees and Forests," a brochure copyrighted in 1998 by the Great Smoky Mountains Natural History Association states that biologists estimate that the Park contains "over 100,000 acres [of never logged forest](about 20 percent of the park)." In 1992 the National Park Service, by overlaying satellite derived data on data regarding disturbances to the forest, produced a map indicating that 35.9% of the Park (187,000 acres) is uncut. NPS's Keith R. Langdon thought that these statistics were "probably 'ballpark' correct." Based on the map, the areas of the various types of old growth and the percentages of all old growth in the Park for these types follow: spruce/fir, 10,623 acres (5.7%); northern hardwood, 28,649 acres (15.3%); cove hardwood, 72,334 acres (38.7%); mesic oak, 12,948 acres (6.9%); mixed mesic hardwood, 24,782 acres (13.3%); Tulip Poplar, 3,188 acres (1.7%); xeric oak, 15,100 acres (8.1%); pine/oak, 1636 acres (0.9%); pine, 15,590 acres (8.4%); heath bald, 1438 acres (0.8%); grassy bald, 35 acres (0.02%); grape thicket, 220 acres (0.12%) (Langdon 1992).

Charlotte Pyle (1988) calculated that 20% of the Park is "high in virgin attributes." Her figure was based on "the absence [for a given area] of written records concerning historical human impacts on the forest and the absence of any mapped record of human land use" rather than on ground truthing. Her methods may not have taken into account Class B old growth, Messick notes (2002). The Park Service used her disturbance history in making its map (Langdon 1992). Pyle found that 20 of the 28 major watersheds contain acreages high in virgin forest attributes, but that 70% is in six watersheds: in Tennessee, the Middle and West Prongs of the Little Pigeon River (67% and 44% virgin forest attributes); and in North Carolina, Deep Creek (68%), Bradley Fork (54%), Raven Fork (97%), and Cataloochee Creek (32%). In Tennessee, the lower

boundary of the virgin forests is generally 3000 feet; in North Carolina it is variable, as logging in places went into the spruce-fir zone, which starts at about 4500 feet in the eastern and central areas of the Park (Pyle 1988).

Among the numerous trails along which old growth lies are **Alum Cave Bluff Trail*** (Yellow Birch, hemlock, and Red Spruce); **Appalachian Trail*** between Newfound Gap and Clingmans Dome (spruce-fir forest); **Boogerman Loop Trail*** (Tulip Trees, hemlocks, and White Pines that are among the Park's largest and tallest); **Cove Hardwood Nature Trail**; **Fork Ridge Trail*** (northern hardwood forest); and **Ramsay Cascades Trail*** (varied stands with Black Cherry conspicuous)(Earley 1992; Leverett 2001; GSM Natural History Association 1998).

The Park Service has mapped in the field a sampling of mesic oak and hemlock old growth in order to get baseline data on oak and hemlock stands before the arrival of the Gypsy Moth and the Hemlock Woolly Adelgid. Researchers delineated a total of 959 ha in 86 stands. The hemlock stands, unlike the oak, included areas showing little or no anthropogenic disturbance. Because of the loss of the American Chestnut, only two oak forests received the staff's highest rating (Yost 1994). William Blozan, one of the report's authors, has continued his research in the Park and has identified more than a dozen national champion trees there.

Non-native insects and fungi are killing trees in the Smokies. The Balsam Woolly Adelgid has decimated the mature Fraser Fir; and Dogwood Anthracnose has killed thousands of Flowering Dogwood (GSM Natural History Association 1998). In mid-May 2002 the arrival of the Hemlock Woolly Adelgid was confirmed. Park biologists have released the tiny predator beetle, *Pseudoscymnus tsugae* in an attempt to control this insect (Gray 2002). Other factors adversely affecting the Park include acid precipitation, ground-level ozone, and crowds of visitors, particularly those driving automobiles. Most of the visitors do not, however, leave their cars or go deep into the Park, which helps to keep the back country intact.

On a more cheerful note, scientists are conducting at the park the All Taxa Biodiversity Inventory, the first complete natural inventory of any US National Park. They estimate that the park supports 40,000 to 70,000 multicellular species, only some 10% of which had been identified when the inventory started. The inventory began in 1999 and is expected to last ten to fifteen years (Braasch 2000, Henderson 1999).

NANTAHALA-PISGAH NATIONAL FORESTS

Old-Growth Forest Communities in the Nantahala-Pisgah National Forest: Final Report (May 2000), compiled by Rob Messick, presents 77,418 acres of delineated old growth in the two forests. The forests have a total land base of 1,033,999 acres. Thus 7.5% of the land base is verified old growth. The 77,418 acres represent 141 sites that 15 field researchers, each with much experience, have verified and delineated. The report also lists 267 candidate sites deemed worthy of a visit.

The report characterizes forests as Class A, B+, B, or C. Class A is forest "where no significant signs of human disturbance to the forest canopy or understory could be determined. Canopies are dominated by older trees generally over 150 years of age." Class B is forest in which either 1) "the canopy is dominated by old-growth trees, yet

signs of past human disturbance to the forest canopy or understory were found (generally a half century ago or longer).” These stands have often been impacted by American Chestnut blight; or 2) “no sign of past human disturbance could be confirmed, yet the forest canopy is dominated by younger forest. These stands can range from 100 to 150 years in age and were possibly affected by natural disturbances.” Class B+ forest has Class A and Class B characteristics. “Sites in this class tend to be large, with numerous forest communities.” Class A, B+, and B forest is considered to be old growth. Class C forest, “with obvious signs of past human disturbance” is not. “Forests in this class are suitable for old-growth recovery,” Messick states. The system is an adaptation of that used by the Great Smoky Mountains National Park’s Old-Growth Team in its study of mesic oak and hemlock forests.

Of the 77,418 acres of old growth listed in the May 2000 report, 36,379 acres are Class A; 23,839 are Class B+; and 17,200 are Class B.

In the Nantahala-Pisgah National Forest, the Southern Appalachian Assessment (1996) presents 32 inventoried roadless areas for a total of 152,378 acres. Twenty-one of these roadless areas include a total of 28,506 acres of old growth. Thus 37% of the delineated Nantahala-Pisgah old growth lies with inventoried roadless areas.

The report considers 30 forest types and presents 779 occurrences (“an occurrence can be defined as a forest type found in a definite location in the landscape”). Eight forest types account for 84% of the occurrences: dry oak (172), submesic oak (113), rich cove (108), acidic cove (81), high elevation northern red oak (71), northern hardwood (43), dry oak-pine (38), pine-oak heath (26).

For the report, Messick grouped the listed sites into ten clusters. We present these clusters below, by National Forest. Messick identified the clusters with capital letters of the alphabet and numbered the sites within the clusters. We give these designations in parenthesis to assist readers in referring to the report. We describe only selected sites within each cluster: those with 500 acres or more of old growth (30 sites in total) and, to provide continuity with the 1993 Survey of Eastern Old Growth, sites that were presented in that guide, most of which were smaller. We list sites in the geographic order that Messick presented them rather than in order of size. We include information on protection status, if provided by the report. We also give elevations when the report states them for an entire site. Unless otherwise indicated, all information comes from the “Site Specific Catalog of Old-Growth Forest Communities in the Nantahala-Pisgah National Forest: Final Report,” compiled by Rob Messick.

We should note that identification of old growth did not come to a halt with the publication of Messick’s report. Researchers continue to find undocumented old growth. In 2001 and 2002 Messick and others made significant new discoveries of old growth in the following mountain ranges: Balsam Mountains (4), Black Mountains (3), Grandfather Mountain (1), Unaka Mountains (1). With the help of Jess Riddle, two state champion trees were nominated in November 2002, Fraser’s Magnolia and Great Rhododendron. In July 2001, the North Carolina Vegetative Survey did large repeatable plots in many old-growth areas in Pisgah National Forest (mainly the Grandfather District).

NANTAHALA NATIONAL FOREST

--Unicoi Cluster (A) in the Tusquitee and Cheoah Districts, Hiwassee and Little Tennessee River Basins (Cherokee and Graham Counties)

A total of 8 delineated sites with 8313 acres of old growth. The cluster has 12 candidate sites.

----*Santeetlah Bluffs* (A 11) with 718 acres of Class A old growth. Forest types are acidic cove, hemlock, hemlock-mixed mesophytic, high elevation Northern Red Oak, and rich cove.

----*Little Santeetlah Creek / Upper Slickrock Creek* (Joyce Kilmer Wilderness) (A 13) with 5926 acres of Class A old growth. Forest types include hemlock-mixed mesophytic (along Memorial Loop Trail), acidic cove, northern hardwood or rich cove, and hemlock forest. The entire 5926 acres is preserved as Wilderness. **During a walk on Memorial Loop Trail in November 2009 we found that the towering hemlock in the area are virtually without leaves due to the ravages of the Hemlock Woolly Adelgid [11.10.09].

----*Yellowhammer Branch / Ike Branch* (A 18) with 844 acres of Class B+ old growth. Forest types include acidic cove, dry oak, hemlock-mixed mesophytic, submesic oak.

--Topton Cluster (B) in the Cheoah, Tusquitee, and Wayah Districts, Hiwassee and Little Tennessee River Basins (Cherokee, Clay, Graham, Macon, and Swain Counties)

A total of 24 delineated sites with 16,827 acres of old growth. The cluster has 25 candidate sites.

----*Cheoah Bald* *(B 8) with 4831 acres of Class A old growth, at elevations of 2000 -4550 feet. Forest types are northern hardwood (at upper elevations), high elevation Northern Red Oak, mesic oak, submesic oak, dry oak, rich cove, low-elevation rich cove, basic mesic forest, and pine-oak heath.

----*Briertown Mountain** (B 9) with 988 acres of Class A old growth. Forest types are mesic oak, dry oak, low elevation rich cove, and basic mesic forest (pp. 21-23). The Briertown Mountain site includes Blowing Springs, a USFS Special Interest Area, which supports numerous calcareous herbaceous species and some American Elm.

----*Upper Nantahala George** (southwest side) (B 11) with 906 acres of Class B+ old growth. Forest types are hemlock-northern hardwood and mesic oak.

----*Upper Dicks Creek** (B 17) with 846 acres of Class A old growth. Forest types are acidic cove, alluvial birch-poplar, dry oak, high elevation Northern Red Oak.

----*High Peak-Snowbird Mountains** (B 23) with 1946 acres of Class B+ old growth. Forest types are high elevation Northern Red Oak, mesic oak, dry oak, rich cove, acidic cove, hemlock-mixed mesophytic, and subxeric oak.

----*Valley River Mountains / Tusquitee Mountains** (B 26), with 1110 acres of Class A old growth, 2699 acres of Class B+ old growth, and 137 acres of Class B old growth. Forest types include northern hardwood, hemlock-northern hardwood, high elevation Northern Red Oak, submesic oak, dry oak, rich cove, acidic cove, and subxeric pine. This site includes the Big Choga Creek area with unspecified acreage of hemlock-northern hardwood and rich cove old growth.

----*Wesser Bald** (B 34) with 909 acres of Class A old growth and 322 acres of Class B old growth. Forest types are high elevation Northern Red Oak, submesic oak, dry oak, dry oak-pine, rich cove, acidic cove, pine-oak heath.

----*Wayah Bald Area--Upper Big Laurel Creek* (B 45) supports 15 acres of Class B+ old growth. The forest type is northern hardwoods. Ray Branch (B 43) has steep upland slopes that may be unlogged. Wayah Bald (south slopes) (B 44) includes the candidate old-growth sites Upper Camp Creek and Upper Bear Cove Creek. (Wayah Bald is mentioned in the 1993 edition of this guide.)

--**Southern Nantahala Cluster** (C) in the Wayah and Tusquitee Districts, Hiwassee, Little Tennessee, and Savannah River Basins (Clay and Macon Counties)

A total of 3 delineated sites with 2220 acres of old growth. The cluster includes 18 candidate sites.

----*Bearpen Gap** (C 4) in the Coweeta Hydrological Laboratory, described in the 1993 edition of this guide, under the names of Bakers Creek and Dryman Creek, as approximately 270 acres of old-growth upland hardwood forest (Dahl 1990). Messick, who lists Bearpen Gap as a candidate site, notes that these two names do not appear on standard topo maps but that “the area in question is most likely on steep headwater slopes on the east side of Nantahala Mountain ridge.”

----*Beech Creek* (C 8) in the Southern Nantahala Wilderness, described in the 1993 edition of this guide as 50 or more acres of old-growth forest, dominated by Northern Red Oak, on cliffs at the head of Beech Creek (Wharton 1993). Messick, who lists Beech Creek as a candidate, notes that it “is likely other steep sections of this watershed were missed by early logging operations.”

----*Blue Ridge / Chunky Gal Mountain **(C 12), with 1347 acres of Class B+ old growth. Forest types are high elevation Northern Red Oak and rich cove.

----*Boteler Peak** (C 17), with 794 acres of Class B + old growth. Forest types are dry northern hardwood, mesic northern hardwood, high elevation Northern Red Oak, rich cove, acidic cove, subxeric oak.

--**Highlands Cluster** (D) in the Highlands District, Nantahala National Forest, Savannah and Little Tennessee River Basins (Jackson, Macon, and Transylvania Counties).

A total of 26 delineated sites with 2842 acres of old growth. The cluster has 21 candidate sites.

----*Whitewater River Gorge* (D 3) with 30 or 40 acres, described in the 1993 edition of this guide as having never been logged. Here Carolina Hemlock grows next to Eastern Hemlock. Also White Pine, Tulip Tree, hickory, and oak grow on the deep, rich soils (Cawrse 1993). Stephen Sonderman found many downed trees in parts of the area.

----*Chattooga Cliffs* (D 8) is described in the 1993 guide under Chattooga Wild River Gorge as having patches of old growth. Some small ridge tops and “rugged cliffy areas” seem to be old growth (Pittillo 1993). Remnants survive down in the gorge, in particular in the Iron Bridge area, and on the top of Glade Mountain. Near the juncture of the Chattooga and another gorge is a 5 or 10-acre pristine area, dominated by hemlock, with many other species (Cawrse 1993). Messick and Zahner list Chatooga Cliffs as a candidate area: “Steep cliffs north and south of Bullpen Mountain likely have old-growth forests.” The cliffs are in the protected Chattooga Wild and Scenic River Corridor. Paul

Carlson searched for old growth in the Chattooga River Watershed for a 1995 report for USFS. This report was among Messick's sources.

----*Fodderstack Mountain* (D 19) with 157 acres of Class A old growth, mentioned in the 1993 version of this guide. The forest types are subxeric pine, represented by Pitch Pine (Big Fodderstack Mountain), hemlock forest (in the saddle between Big Fodderstack and Little Fodderstack and on a ridge to the west), and dry oak (on Little Fodderstack Mountain). The oldest Pitch Pine are about 400 years old and are dwarfed and gnarly. Between the groves of Pitch Pine is open slick rock with rare and endemic mosses and lichens. In 1875, the Ravenel family bought what was later known as the Fodderstack Mountain Estate Preserve as part of a 100,000-acre estate. It was passed down through the family who preserved it in its original condition. Windfalls have been the only disturbance (Zahner 1993, Gaddy 1992). The Nature Conservancy recently bought the land and turned it over to USFS. It is a protected area (Zahner 1998).

----*Whiterock Mountain* (including Whiterock Gap and the Bartram Trail Natural Area) (D 32) with 389 acres of Class B+ old growth, mentioned in the 1993 edition of this guide. The site is in the Fishhawk Mountain Range. Forest types are hemlock-northern hardwood and high elevation Northern Red Oak, the latter found near 4300 feet on the northeast side of the main ridge joining Little Fishhawk Mountain and Whiterock Gap. A big White Oak felled near the Bartram Trail had 400 to 450 rings. The only tree removal has been the salvage with horses of dead chestnut in the 1930s (Zahner 1993).

----*Piney Knob Fork Natural Area* (D 33) with 125 acres of old growth. The 1993 edition of *Old Growth in the East* described it as a 125-acre Eastern Hemlock-White Pine community within a deep ravine through which a stream named Piney Knob Fork runs. The upstream portion of the site supports old-growth Eastern Hemlock and White Pine to almost 3 feet in diameter. Catawba Rhododendron, which dominates the understory, is as much as 25 feet tall. Downstream, loggers in recent decades cut several areas where young trees now grow. However, the largest hemlocks on the site occur just east of these young patches. Some of these are more than 100 feet tall and almost 4 feet in diameter. Piney Knob Fork is a Natural Area of the Society of American Foresters and is protected (Gaddy 1992, Zahner 1998).

----*South Skitty Branch* (D 41), mentioned in the 1993 guide as having 30 acres of Class A old growth. The 30 acres include hemlock forest and high elevation Northern Red Oak. The lower part of the site has Eastern Hemlock over 90 cm (about 3 feet) in diameter at breast height (Gaddy 1992, Zahner 1993).

----*Kelsey Tract* (D 43), with 271 acres of Class B+ old growth, mentioned in the 1993 edition of this guide. The Kelsey Tract is a remnant of Ravenel's Woods, and was once almost 1000 acres of old-growth Eastern Hemlock and Carolina Hemlock, northeast of Highlands. The southern part of the Kelsey Tract is dominated by Eastern Hemlock up to 120 cm dbh (diameter at breast height). The main ridge top, which cuts through the middle of the site, supports a mixture of Eastern Hemlock and Carolina Hemlock and also forests with Carolina Hemlock, Table Mountain Pine, and mixed northern hardwoods. The slopes above 4000 feet on the east side of Ammons Branch support Carolina Hemlock forest with some Tulip Trees and Eastern Hemlock. The upper Ammons Branch watershed near 4000 feet has acidic cove forest. The Kelsey Tract provides habitat for four species of rhododendron, and a rare disjunct species of moss from the Dominican Republic (Gaddy 1992, Zahner 1993). The Kelsey site is a protected

natural area (Zahner 1998) and is adjacent to the privately owned Henry Wright Preserve (Pittillo 1998).

----*Shortoff Mountain / Cole Mountain* (D 45) with 502 acres of Class B+ old growth. Forest types are dry oak, high elevation Northern Red Oak, and northern hardwood (pp.83). Zahner described Cole Mountain Natural Area in 1993 as having approximately 200 acres of old-growth northern hardwoods on the north slopes of the mountain and old-growth White Oak and Northern Red Oak on the south slopes. The trees are not ancient but are very big and have old forest characteristics, including uneven age. The only disruption has been the salvaging of some big chestnut trees on the south slope in the 1930s. The Natural Area, which is protected, shelters many endemic and rare herbaceous plants (Zahner 1993, 1998).

---*Yellow Mountain* (D 46), described in the 1993 edition of this guide, as 50 to 100 acres of wind-blown, bonzai-type White Oak, growing on rocky ground. A few trees may have been cut to clear the view when a fire tower was put up, but Ranger David Cawrse suspects that the trees, which are not very tall, were short enough to have been left alone (1993, Pittillo 1993). Messick adds that the mountain has “steep dry slopes that were likely avoided by early logging operations.”

--**Cowee Cluster** (E) in the Highlands and Wayah Districts, Nantahala National Forest, Little Tennessee River Basin (Jackson and Macon Counties)

A total of 5 delineated sites with 211 acres of old growth. The area has 15 candidate sites.

--**Balsams Cluster**(F) in the Highlands and Wayah Districts, Nantahala National Forest, Little Tennessee River Basin (Jackson County)

A total of 5 delineated sites with 401 acres of delineated old growth. The area has 16 candidate sites. Four of the candidates, Lone Bald, Wolf Mountain, Upper Greenland Creek, Bonas Defeat, were listed in the 1993 edition of this guide under other names.

----*Lone Bald** (F 9), near the site listed in 1993 as Cherry Cove, with well over 100 acres of old growth (Leverett 1990). Messick writes that, according to a USFS map, dated May 2001, Cherry Cove is not on USFS land. The site is northeast of Lone Bald. Alan Smith describes the site as supporting Red Spruce forest, northern hardwoods, and two rare plant species. The old growth is in pockets; fire slides and erosion have affected some areas (Smith 1993).

----*Wolf Mountain* (Northwest) (F 18) on steep slopes between Cold Creek and Horseshoe Rock on USFS land. This site may be the location of the Wolf Creek Gorge listed in the 1993 guide. As of 1998, however, the Nantahala Power Company, a subsidiary of Duke Energy Corporation, controlled much of the land within Wolf Creek Gorge (Pittillo 1998).

-----*Bonas Defeat* *(F 20), likely described in 1993 as Tuckasegee River Gorge with a possible 500 acres of old growth. Pittillo related in 1993 that Herbert Nicholson, the former caretaker for Liberty Properties (which owned the area) and the son of a logger for the timber company, told him that the loggers “were [told] to stay 500 feet from the river” (Pittillo 1993). The vegetation in the gorge is primarily cove forest: Eastern Hemlock and Carolina Hemlock, the latter only on bluffs and on the edges of the stream bed; Fraser’s Magnolia; Tulip Tree; and other cove species (Pittillo 1976). Scott

Wood of Raleigh nominated Bonas Defeat for the survey. Messick notes that it is an area of rough topography between reservoirs on USFS land.

----*Upper Greenland Creek** (F 21), described in 1993 as Panthertown Valley with a few remnant stands of old growth. Loggers clearcut most of the valley in the 1920s and 30s, and fire went all through the valley. Nevertheless, dwarfed White Oak and Table Mountain Pine remained near the rock outcrops of Little Green, Big Green, and Blackrock Mountains. Also, a couple of acres of old hemlock forest grew along waterfalls (Pittillo 1993, Cawrse 1993).

PISGAH NATIONAL FOREST

--**Mount Pisgah Cluster** (G) in the Pisgah District, French Broad River basin (Buncombe, Haywood, Henderson, and Transylvania Counties; p. 92)

A total of 5 delineated sites with 2559 acres of old growth. The cluster includes 52 candidate sites, five of which were mentioned in the 1993 edition of this guide.ⁱ

----*Mount Hardy* (Middle Prong Wilderness) (G 4), referred to in the 1993 guide as Fork Ridge, Mount Hardy with “one of the best quality mature beech buckeye forests in the Southern Appalachians” (Dahl 1990).

----*Yellowstone Falls* (G 10) referred to in the earlier edition under Side of Graveyard Ridge, with at least 75 acres of old growth dominated by hemlock (Leverett 1990). Messick lists Yellowstone Falls as a candidate site.

----*Pisgah Ridge** (G 20), with 1867 acres of Class A old growth and 240 acres of Class B+ old growth. Forest types are spruce-northern hardwood, red spruce forest, northern hardwood (mesic, dry, and boulderfield), high elevation Northern Red Oak, mesic oak, dry oak, acidic cove, and rich cove. This area has the largest diameter Red Spruce found on Pisgah National Forest land, 43 inches dbh.

----*Pilot Rock / Upper Bradley Creek* (G 43) and *Buttermilk Mountain* (G 5), referred to as Bradley Creek in the 1993 guide. Bradley Creek was described as having old-growth hemlock scattered through an unlogged 5 to 10-acre area (Rowe 1993).

----*Mount Pisgah* (G 50), mentioned in the earlier edition as supporting at least 100 acres of old-growth. A figure of close to 500 acres is more accurate (Smith 1993). Messick points out that Alan Smith, in a Natural Areas Inventory for Haywood County (1993), described Red Spruce forest grading to high quality high elevation Northern Red Oak forest on upland slopes of many aspects on Mount Pisgah. Cove areas that are more moist grade to northern hardwood with dominant Yellow Birch. Shrubs are often abundant in the understory (Messick 2002).

--**Grandfather Cluster** (H) in the Grandfather District of Pisgah National Forest, Catawba River Basin (McDowell, Caldwell, Burke, and Avery Counties)

A total of 57 delineated sites (plus 18 candidate sites worthy of a visit) with 38,937 acres of delineated old growth (15,233 acres of class A, 11,472 of Class B+, and 12,232 of Class B).

The Grandfather District encompasses 189,000 acres, at least 20% of which is old growth. Messick subdivided the cluster into three areas: Black Mountain, Linville, and Grandfather.

Black Mountains Area, with 11 delineated sites and 11,102 acres of delineated old growth [not to be confused with the Black Mountains Cluster, see below].

----*Heartbreak Ridge* *(H 7) with 3055 acres of Class B+ old growth at elevations of 2200-4700 feet. Forest types are high elevation Northern Red Oak, mesic oak, submesic oak, dry oak, acidic cove, alluvial-birch-poplar, Carolina Hemlock, rich cove, hemlock-mixed mesophytic, hemlock-northern hardwoods. The site, which is part of USFS old-growth patch #26, is not in the timber base. Almost all of it is within the 7500-acre Jarrett Creek Roadless Area. On most edges, it is bordered by other USFS land and the Blue Ridge Parkway.

----*Mackey Mountain / Chestnutwood Mountain* (H 9) with 5008 acres of Class B+ old growth at elevations of 2000-3990 feet. Messick divides the site into two sections: Mackey Mountain and Chestnutwood Mountain.

Forest types in the Mackey Mountain Section are similar to those in H7 above, with the addition of pine-oak heath. The Mackey Mountain Section is part of old-growth patch #27 and is not in the timber base. Most of the delineated old growth is within the 5934-acre Mackey Mountain Roadless Area. Other USFS land surrounds it on almost all sides.

Forest types in the Chestnutwood Mountain section are submesic oak, dry oak, dry oak-pine, pine-oak heath, acidic cove, rich cove, lower elevation rich cove, hemlock-mixed mesophytic, and Carolina Hemlock. The Chestnutwood Mountain Section is part of old-growth patch #27 and is outside the timber base except for old growth on toe slopes near Curtis Creek. Most of it is in the Mackey Mountain Roadless Area.

----*Horsetrail Gap** (H 11) with 398 acres of Class B+ old growth and 149 acres of Class B old growth at elevations of 2200-4000 feet. Forest types are high elevation Northern Red Oak, mesic oak, submesic oak, dry oak, dry oak-pine, subseric pine, acidic cove, and rich cove. Horsetrail Gap is within large old-growth patch #27 and is not in the timber base. All of this site should be part of the Mackey Mountain Roadless Area. Now only a small portion is in this area. Other USFS land and the Blue Ridge Parkway lie along most of the site's border.

----*Upper Armstrong Cree*k* (H 12) with 690 acres of Class B old growth at elevations of 2600-3680 feet. Forest types are high-elevation Northern Red Oak, mesic oak, submesic oak, dry oak, pine-oak heath, and rich cove. This site is part of USFS old-growth patch #27, and is not in the timber base. Most of it lies within the 9606-acre Woods Mountain Roadless Area. Other USFS land and the Blue Ridge Parkway surround it.

Linville Area, with 14 delineated sites and 18,734 acres of delineated old growth. Five candidate sites were deemed worthy of a site visit.

----*Linville Mountain** (H 23) with 292 acres of Class A old growth and 394 acres of Class B old growth at elevations of 2200-3650 feet. Forest types are submesic oak, dry oak, dry oak-pine, pine-oak heath, acidic cove, and hemlock forest. The site is part of old growth patch #28 and is not in the timber base.

----*Dobson Knob** (H 24) with 4042 acres of Class A old growth and 279 acres of Class B old growth at elevations of 1600-3700 feet. "Dobson Knob is a massif with many ridge slopes and valley slopes dropping off from two peaks. It is at the terminus of Linville Mountain Ridge." Most of the mountain was not logged, because the timber was not saleable, slopes were steep, and "acidic quartzite boulderfields" were present. Researchers have found the following forest types: dry oak, dry-oak-pine, pine-

oak heath, subxeric pine, acidic cove, and Carolina Hemlock. The site comprises most of the 6128-acre Dobson Knob Roadless Area. It is also part of USFS's large old-growth patch #28. Except for an area on the west side at the foot of Dobson Knob, the site is not in the current timber base.

---*Linville Gorge* (H 25) with 10,039 acres of Class A old growth and 193 acres of Class B old growth at elevations of 1300-4000 feet. No industrial logging took place in Linville Gorge. Forest types are submesic oak, dry oak, dry oak-pine, pine-oak heath, subxeric pine, acidic cove, hemlock forest, mixed riverine, beech-Sweetgum . The last may be a relic of the mixed mesophytic and northern hardwood forests that were common in the area during glaciation to the north. Three patches of the rare Mountain Heather (*Hudsonia montana*) are present. The gorge is part of USFS old-growth patch #28 and is the only designated Wilderness Area in the Grandfather District. In 1984 the Wilderness was expanded southward to include much of Shortoff Mountain (H 26) and the Pinnacle. A trail extends along the ridge of Shortoff Mountain. The steep slopes near the trail are largely unlogged.

---*Upper Creek Gorge** (H 34) with 698 acres of Class B old growth at elevations of 1450-2500 feet. Forest types are submesic oak, dry oak, and acidic cove. The site is part of USFS's old-growth patch #29 and is not in the timber base. It is not in an official roadless area, however, and is surrounded by USFS roads and clearcuts.

---*Steels Creek Gorge** (H 35) with 860 acres of Class A old growth and 689 acres of Class B old growth, at elevations of 1400-2850 feet. Forest types include submesic oak, dry oak, dry oak-pine, acidic cove, alluvial birch-poplar (Class C only). A very small patch of rich cove exists in the gorge. Also, Pawpaw, unusual for this area, is found on a shelf in the gorge. Most of the site is in the timber base. It is not part of old-growth patch #29, although parts of Ripshin Ridge are physically within the patch. Steels Creek is one of 17 old-growth sites in the Nantahala-Pisgah that are 1000 or more acres in size, but the site does not have roadless area status. It is surrounded by clearcuts, roads, and "wildlife openings." In 2003 USFS proposed to conduct timber sales that would log old growth in the Steels Creek area.

Grandfather Mountain Area, with 32 delineated sites and 9101 acres of delineated old growth.

---*Lost Cove** (H 38) with 1098 acres of Class B old growth at elevations of 2600-3900 feet. Forest types are high elevation Northern Red Oak, mesic oak, submesic oak, dry oak, acidic cove, low elevation rich cove. Lost Cove, which is within USFS large old-growth patch #29, is not in the timber base. The site is in the Lost Cove Roadless Area, a Wilderness Study Area. Wilderness bills for Lost Cove have been introduced in Congress several times, but Congress has failed to pass them. The site is bordered on the west by the Blue Ridge Parkway and on the north by Roseboro Road, which divides it from the Web Creek (H 39) site with 287 acres of Class B old growth.

---*Upper Mulberry Creek** (H 53) with 1123 acres of Class B old growth at elevations of 1800-3150 feet. Forest types are submesic oak, dry oak, dry oak-pine, acidic cove, and low elevation rich cove. Upper Mulberry Creek is part of USFS large old-growth patch #30 and is not in the timber base. It is not, however, part of a roadless area.

---*Horsepen Creek** (H 67), with 500 acres of Class B+ old growth at elevations of 1500-2250 feet. Forest types are submesic oak, dry oak, dry oak-pine, low

elevation rich cove, and hemlock-mixed mesophytic. The site is only half in large USFS old-growth patch #29 and thus only half of it is outside the timber base. Horsepen Creek is not in a roadless area. In the 1980s and 1990s, the Forest Service clearcut areas on the west and south sides of the site. “It is a clear example of US Forest Service clearcutting in old-growth forest,” Messick points out. The Horsepen Creek watershed was not previously logged.

---*Tarklin Ridge** (H 72) with 509 acres of Class B old growth at elevations of 1400-2400 feet. Forest types are submesic oak, dry oak, pine-oak heath, acidic cove, and low elevation rich cove. Although Tarklin Ridge is not part of an old-growth patch or a roadless area recognized by USFS, most of it is not in the timber base.

Tarklin Ridge has a beautiful companion in Johns River Gorge (H 73) with 423 acres of B+ old growth. The Gorge is more interesting from a botanical point of view than Tarklin Ridge. Pinchgut Creek supports the lowest elevation occurrence of intact rich cove forest found in the survey, and the largest Black Walnut found during the survey (at 29.6 inches dbh).

--**Black Mountains Cluster** (I) in the Appalachian District, Pisgah National Forest, French Broad River Basin (Buncombe and Yancey Counties)

A total of 8 delineated sites with 5108 acres of old growth. The cluster has 27 candidate sites worthy of a site visit. Messick divides the cluster into three areas: Craggy Mountains, also known as Big Ivy (since the mountains are in the Ivy River watershed), Black Mountain Ridge, and Blue Ridge.

Craggy Mountains (Big Ivy)

---*Big Fork Ridge Area* (I 8) with 1066 acres of Class A old growth and 511 acres of Class B old growth. Forest types are acidic cove, hemlock, hemlock mixed with Northern Red Oak, high elevation Northern Red Oak, beech gap, and northern hardwood. The Big Fork Ridge Area includes Upper Mineral Creek (I 8 a) and Carter Creek / Waterfall Creek (I 8 b) (Messick, pp. 212-15).

---*Walker Branch Area* (I 10) with 45 acres of Class A old growth and 16 acres of Class B old growth. Walker Branch includes Walker Cove Research Natural Area (I 10 a), 45 (+) acres of rich cove old growth. The tallest Sugar Maple in the survey was measured by Bob Leverett here at 144.7 feet. The Nantahala-Pisgah has only three Research Natural Areas.

---*Big Butt Area* (I 11) with 290 acres of Class A old growth, 10 acres of Class B+ old growth, and 842 acres of Class B old growth. Forest types are spruce-northern hardwoods, northern hardwoods (dry and mesic), rich cove, high elevation Northern Red Oak.

Black Mountain Ridge

---*Middle Creek Research Natural Area* (also known as Black Mountain Research Natural Area) (I 24) with 1296 acres of Class A old growth. Identified forest types are spruce-fir, northern hardwood, hemlock, rich cove, high elevation Northern Red Oak, submesic oak, dry oak, and heath bald.

The Middle Fork of Upper Creek was investigated by Messick and Josh Kelly in the summer of 2002. Class A old growth of undetermined acreage was found in and above a gorge in the midsection of the watershed. Forest types included hemlock, hemlock-northern hardwood, beech gap, heath bald, and high elevation Northern Red Oak.

Blue Ridge

Since the release of the May 2000 report, Messick has discovered a significant mid-size patch of class A old growth in the upper section of the **Big Lost Cove Creek*** watershed. The find was later corroborated by early land acquisition reports found at the National Archive II. A 1932 photograph by C. A. Abell of the Appalachian Forest Experiment Station also confirms this. Forest types include spruce-northern hardwood, hemlock-northern hardwood, northern hardwood, and mesic northern hardwood (Messick 2003).

-- **Unaka Cluster** (J) in the Appalachian District, French Broad River Basin (Avery, Haywood, Madison, Mitchell, and Yancey Counties)

A total of 63 candidate sites worthy of a site visit. No sites have been delineated. Significant rich cove old growth was found in Nolichucky Gorge in 2001.

Plott Balsam Mountains (Jackson County)

Up to 1000 acres of old growth as of 1993. At that time, the south and east slopes had small patches of old growth, including a 5-acre stand of Red Spruce. The upper north slopes had heath with scattered trees; hemlock/heaths; northern hardwoods, in particular Yellow Birch; and related communities. Most of the range was privately owned. Lots were for sale on both sides of the crest, and roads were being repaired (Pittillo 1993).

In 1998 The Nature Conservancy purchased a 1600-acre tract with a “few patches of large old-growth stands in the more remote areas.” The 1600 acres protect the eastern crest of the Plott Balsams between Waterrock Knob and Pinnacle Park (Pittillo 1998). The tract has a two-mile common boundary with the Blue Ridge Parkway, a heretofore isolated 500-acre USFS tract, and the 1100-acre Pinnacle Park (created by the town of Silva on land in the Plott Balsams that was formerly the source of the town’s water). Pinnacle Park, which has been leased to a private foundation for twenty years for management, contains “some relatively mature hardwoods” (Pittillo 1998). The Nature Conservancy plans to turn the 1600 acres over to an entity that pledges to protect it, likely the North Carolina Wildlife Commission for dedication as a nature preserve (Lynch 2002).

Grandfather Mountain, northwestern North Carolina (Avery, Caldwell, and Watauga Counties)

Probably 200 or more acres of old-growth hemlock, spruce, and northern hardwoods in Lynn Cove (Leverett 1992), plus boulderfields with Black Cherry. The mountain is privately owned (Tager 1992). The North Carolina Vegetative Survey did extensive plot work on this mountain in the summer of 1995.

Rocky Mountain and Chimney Top, southwestern North Carolina (Jackson County)

More than 200 acres of old growth on the crest and fringes of these mountains: White Pine, various oaks, hemlock, dogwood, and a thick understory of rhododendron and laurel are present. The land is protected by private owners (Pittillo 1993, McKee 1993, Zahner 1998).

Baldrock Mountain and Ravines, southwestern North Carolina (Jackson County)

Perhaps 200 acres of old growth in ravines and on steep slopes and ridge tops on this mountain. The land is protected by private owners (Pittillo 1993; Zahner 1998).

Chimney Rock Park* (Rutherford County)

Dry oak, submesic oak, pine-oak heath, and subseric pine old growth within this privately owned park of a little over 1000 acres. Rough terrain prevented logging in numerous sections of the park. Dry oak, in which Chestnut Oak dominates, is found at higher elevations and on slopes with dry conditions. Submesic oak forest is found on talus slopes below some of the Hendersonville gneiss rock faces. Chestnut Oak, Northern Red Oak, Tulip Tree, and Mockernut Hickory achieve the largest diameters. Owners of the park are determined to protect its plant and associated animal communities. Over 550 species of vascular plants, 32 of them ferns, have been identified in the park (Messick 1999).

Paddy Mountain,* northwestern North Carolina (Ashe County)

Within a 230-acre tract, which comprises the top of Paddy Mountain, some 150 acres of old growth. The ground is very rocky and steep, and the trees, stunted. The 150 acres have probably therefore never been logged. The Nature Conservancy purchased the 230 acres in large part because they support two plant species that are endangered at the federal level (Lynch 2002).

Mount Jefferson State Natural Area, * northwestern North Carolina (Ashe County)

Unlogged forest and woodland on “most of the slopes” of Mount Jefferson above 4000 feet. The mountain is an isolated peak reaching 4684 feet (Frankenberg 2000). The slopes facing south, east, and west are dominated by oak forests, with an understory of Mountain Laurel, Flame Azalea, dogwood, and Catawba Rhododendron. On the north-facing slopes is a cove forest with Red Maple, Yellow Birch, basswood, and Tulip Tree, among other species. Trees on the north slopes and ridge are stunted. Mount Jefferson State Natural Area is a 550-acre state park managed by the North Carolina Division of Parks and Recreation. It was created in 1956 as the result of strenuous efforts by local residents to set aside land on the mountain (NC Div. of Parks 2002).

Moses H. Cone Memorial Park, northwestern North Carolina (Watauga and Caldwell Counties)

Numerous pockets of old growth within a 3600-acre tract that is part of the Blue Ridge Parkway. Unlogged hemlock forest occurs along an easy walking trail on Sims Creek. Areas of unlogged northern hardwood forest are also present. In 1997 the National Park Service asked Rob Messick to assist in verifying a remote section of hemlock forest in the park. He cored Eastern Hemlock 372 years old and Tulip Trees 170 years old there.

In 2000 an option to purchase a 192-acre islanded tract of land that is contiguous with the park and the upper Johns River watershed opened up. Through the work of the Conservation Trust of North Carolina, the tract was purchased and became part of the park. The purchase links three old-growth areas in the nearby National Forests with Moses H. Cone Memorial Park, an unofficial roadless area that stretches from the

Continental Divide (near 3700 feet) to lower Thunderhold Creek (near 1700 feet) (Parkway 2001).

Henry Wright/Madison Wright/Lindsay Olive Preserves, in the Tennessee River drainage (Macon County)

Fifty acres of old-growth hemlock-Tulip Tree-Red Maple, divided among three coves within a few miles of each other. The tracts are adjacent to the Kelsey Tract and, like the Kelsey Tract, were part of Ravenel's Woods. Each of the three uneven-aged stands supports huge Eastern Hemlock, Red Maple, and Tulip Tree, up to 5 feet in diameter and up to 400 years in age. The Henry Wright Preserve also has Carolina Hemlock and Table Mountain Pine (Gaddy 1992, Zahner 1993 and 1998, Schafale 1989). The coves are wet to moist with thick understories of rhododendron. They are also rich in mosses and herbaceous plants. In 2001 The Nature Conservancy transferred the Henry Wright Preserve to the Highlands Land Trust. The University of North Carolina Botanical Gardens owns the 4-acre Lindsay Olive Preserve. The Madison Wright tract is privately owned (Zahner 1993; Bucher 1993).

The North Carolina Botanical Gardens also owns the separate 7-acre Pinky Falls, likewise part of Ravenel's Woods and in Macon County (Jones-Roe 2002).

Little Sealy Mountain* (Macon County)

White Oak over 400 years old in a stand perhaps 40 acres in size. The oaks are on the main ridge and on a south-facing slope with shallow soil. They are in a stressful environment that causes them to grow slowly. The Unitarian Church owns and protects the area (Cawrse 1993; Zahner 1998).

Wolf Creek Gorge* (Jackson County)

Some old growth near the falls, although most of the area was cleared (Pittillo 1993). The Forest Service owns a part of the gorge, but the Nantahala Power Company, a subsidiary of Duke Energy Corporation, controls much of the slopes within the gorge and along the creek (Cawrse 1993, Pittillo 1998).

South Mountains Game Land,* southwestern North Carolina in the Catawba and Broad River Basins (Burke, Cleveland, McDowell, and Rutherford Counties)

Old growth of unknown extent within the 17,829 acres formerly known as the Rollins Tract. In 1996 Messick surveyed nine distinct areas in the tract. He found Class B+ old growth (2 occurrences) and Class B old growth (15 occurrences) in 44% of the forests he entered. The old growth included a small patch of rich cove forest, and submesic oak, dry oak, mesic mixed hardwood forest, dry oak-pine, mesic oak, Carolina Hemlock bluff, and White Pine forest. An uncut stand of mesic oak/hickory was found near Negro Creek Cascade. In this forest, numerous White Oak, Northern Red Oak, Black Oak, and Black Locust were 30 inches dbh and above. In the summer of 2001 an outing with the North Carolina Vegetative Survey revealed more potential acreage and additional occurrences of a federally listed plant species on the tract.

The Foothills Conservancy of North Carolina, in cooperation with the North Carolina Wildlife Federation and the North Carolina Chapter of The Nature Conservancy, raised funds to purchase the land from a private company. The

Conservancy made the purchase in 1998 and has transferred ownership to the North Carolina Wildlife Resources Commission. The land is open to the public for hiking, fishing, and hunting. Areas in the game land that are considered sensitive, old growth, or inhabited by rare or uncommon species, will not be logged. Light logging may occur elsewhere for specific purposes; but large commercial timber sales will not be allowed.

The South Mountains Game Land is in the Broad River basin on the south side of the South Mountains. To the north, the portion of the mountain range that is in the Catawba River basin is protected in the 7225-or-more-acre South Mountain State Park (Messick 1996 and 2001).

Mason Farm Biological Reserve,* Chapel Hill (Orange County)

Within the 367-acre reserve, 289 acres of forests that “were probably woodlots on a tract first farmed during the earliest European settlement in about 1740.” The forest is comprised of two adjacent tracts, Big Oak Woods, a bottomland forest, and the Southern Shagbark Hickory Slope. The canopy of Big Oak Woods include Swamp Chestnut Oak, Shumard Oak, Overcup Oak, and Willow Oak, and Sweetgum. The Shagbark Hickory Slope is dominated by hickories, oaks, and other hardwoods. Trees are up to 200 or more years old. The reserve is part of an 800-acre area left to the University of North Carolina by two members of the Mason family in 1894. It is managed by the North Carolina Botanical Garden, which has set it aside for research and study. A permit is required for entry (White 1996; Frankenberg 2000).

White Pines Natural Area, central North Carolina (Chatham and Lee Counties)

Several old-growth communities within a 258-acre preserve owned by the Triangle Land Conservancy and on adjacent private land. The preserve is located at the confluence of the Deep and Rocky Rivers, and grades from floodplain forest to ridges. White Pine over 180 years old and 20 inches in diameter grow on the slopes above the rivers, as do 200-year-old American Beech. The pines are reproducing. The dry ridge top supports an old-growth oak-hickory community. Pockets of White Pine also grow on neighboring private land on both sides of the Deep River. In 1995 Hurricane Fran caused some damage, and it is possible that the private owners did some salvaging. The Conservancy property has not been logged or grazed by livestock (Roe 1987, Nicholas 2003).

Shocco Creek Preserve,* in north-central North Carolina (Franklin County)

A 1283-acre preserve within which are 100 acres of old-growth alluvial forest. The forest has been lightly, selectively cut in the past. Trees include Green Ash, American Sycamore, Swamp Chestnut Oak, Tulip Tree, and Sweetgum. The Nature Conservancy bought the 1283-acre tract from Georgia Pacific and transferred it to the Wildlife Resources Commission (Lynch 2002).

COASTAL PLAIN AND COAST

Small old-growth sites include **Shumard Oak-Shagbark Hickory-Swamp Chestnut Oak on the Roanoke River** (Halifax County): more than 25 acres of alluvial

terrace forest that has been lightly selectively cut (Lynch 1993); **Big Pine Woods** (Hertford County): 19 acres of old-growth Loblolly Pine and mixed hardwoods, set aside as a natural area by the owner Union Camp Corporation (Roe 1987); **Scuppermong River Preserve** (Tyrrell County): a 15- to 20-acre site of large, uncut Atlantic White-cedar, from which Loblolly Pine was removed, within a 260-acre preserve (Lynch 1993).

Croatan National Forest (Craven, Jones, and Carteret Counties)

Some 10,000 acres of unlogged pocosin within a 157,000-acre National Forest. Pocosins are peatlands with a dense shrub layer dominated by a characteristic set of species and maintained by fire. The various types of pocosin range from communities on wet, deep peat, with only shrubs and occasional dwarfed trees (low pocosin) to quite tall forests on shallower, drier peat dominated by Pond Pine or Atlantic White-cedar. Two thirds of Croatan Forest's pocosin is high pocosin with sizeable Pond Pine and bay trees along with thick evergreen shrubs. The remaining one-third is low pocosin, mostly Gallberry and various bay trees. Much of the pocosin is within designated Wilderness Areas. The trees in the unlogged areas are generally not old, because of the frequency of fire.

Sand ridges, most of them uncut. They support old-growth Longleaf Pine-Wiregrass communities with blueberries and Gallberry in the understory (Kaylor 1993, Davis 1993). Michael Schafale names two small sites that have never been logged and have a good ground cover: **Millis Road Savanna** in the Pringle Road Sand Ridge and Pocosin Complex, a set of ridges; and **Catfish Lake Sand Ridge**. At Millis Road, which is subject to periodic burns, the maximum tree age is about 180 years (Kush 2001). The National Forest's sand ridges total an estimated 2000-3000 acres; obtaining an accurate figure would be difficult. These areas are small and isolated and they have not been computer mapped. Kush estimates 50 acres of old-growth Longleaf for Millis Road, but states that this figure is a conservative estimate and that "a more exhaustive field survey is needed" (Kush 2001). The Forest has numerous rare and endangered plants, some of which are carnivorous and occur in the borders between the pocosin and the sand ridges. They include Venus Flytrap, pitcher plants, sundews, and Rough-leaf Loosestrife. Red-cockaded Woodpeckers make their homes in the pines (Davis 1993, Kaylor 1933).

As of October 2002, USFS had gone through most of the process to revise the forest's management plan, but no record of decision had been signed.

Green Swamp (Brunswick County)

A 16,400-acre preserve of unlogged low pocosin with very stunted Pond Pine, and both wet and dry Longleaf Pine savannas. The savannas were logged about 60 years ago, but the ground layer is in unusually good condition. The wet savannas are scattered on ridges within the pocosin. In 2000 The Nature Conservancy, which owns the preserve, purchased and added to it 537 acres that provide a wildlife corridor between Green Swamp and nearby areas. Those wishing to visit the preserve should request permission from the Conservancy (Roe 1987, Bucher 1993, "Landmarks" 2000).

Holly Shelter Gameland (Pender County)

A 48,500-acre Gameland, more than 30,000 acres of which are Pond Pine woodland and pocosin, an underdetermined portion of which was never logged. Merrill

Lynch speaks of many pockets of old-growth Pond Pine pocosin (2002); John Finnegan describes the pocosin as probably unlogged (2002). The Gameland also supports Longleaf Pine communities, covering perhaps 10,000 acres (Finnegan 2002). These communities include a portion of what was known as the old-growth Southwest Ridge Longleaf Pine-Wiregrass Savanna, part of which is owned by The Nature Conservancy (see below). In 1986 a vast, hot fire killed many of the trees in the Gameland including those in the Southwest Savanna (Schafale 1993). The North Carolina Wildlife Resources Commission owns the gameland (see below).

Angola Bay Gameland* (Pener and Duplin Counties)

A 20,052-acre gameland of Pond Pine woodland and pocosin, at least part of which has never been logged (Finnegan 2002). Angola Bay is to the north of Holly Shelter Gameland.

In 2002 The Nature Conservancy bought about 29,000 acres of land to link Angola Bay and Holly Shelter Gamelands. The acquisition was part of a 38,000-acre purchase from International Paper Company. Some 8000 of the 29,000 acres with scattered Pond Pine and various bay trees may never have been logged, but they were ditched in the 1970s and early 80s in an attempt to drain and convert the land to pine plantation (McIver 2002). The Nature Conservancy has not decided exactly what to do with the 38,000 acres but may retain part and transfer part to the North Carolina Wildlife Resources Commission to form additions to the gamelands, which the Commission already owns (Lynch 2002).

Air Force-Navy Bombing Range (Dare County)

Pond Pine woodland, a form of pocosin. The extent is uncertain, but is probably at least several thousand acres. The logging history is also unknown. Schafale notes that the several thousand acres include both disrupted and undisrupted acres (1998). Lynch has written that any cutting was probably light and selective. Occasional natural and man-made fires have maintained the ecosystem (Lynch 1993). The land is owned by the federal government. For additional old growth in the Bombing Range see Alligator River National Wildlife Refuge below.

Bald Head Island, in the Smith Island Complex (Brunswick County)

Some 400 acres of old-growth maritime evergreen forest. Bald Head Island is one of three “highlands” of the Smith Island barrier island complex at the mouth of the Cape Fear River. Salt marshes separate the “highlands” from one another. (NCNERR Web 2002). The Bald Head forest has experienced intermittent logging for timber for ship building, but it nevertheless has the largest trees on the North Carolina barrier islands, with some trees more than 200 years old. The canopy is composed of Live Oak and Laurel Oak (Taggart 2002). Under the oaks grow American Holly, Yaupon, and Catbrier, and shade-tolerant herbaceous plants such as Ebony Spleenwort (NCNERR Web 2002). Cabbage Palm, at its northernmost occurrence, is scattered through the forest. The North Carolina Division of Coastal Management owns 177 acres on Bald Head and preserves them as Bald Head Woods Coastal Reserve, a dedicated State Natural Area (Finnegan 2001). At least two hundred acres of maritime forest are unprotected

(Taggart 2002). Some maritime forest has already been lost to development. The western part of the island has already been developed and the rest of the island is threatened (Finnegan 2001).

Currituck Banks,* northeastern North Carolina,(Currituck County)

Relatively undisturbed maritime forest in two natural areas within Currituck Banks, “an undisturbed barrier island and low-salinity estuarine system” (NCNERR Web 2002). 1) The 1385-acre Swan Island Natural Area supports an “authentic cluster of maritime communities,” including maritime forest. The Swan Island Natural Area is one of five tracts that comprise the Currituck National Wildlife Refuge, owned by the US Fish and Wildlife Service. 2) The 925-acre Corolla Natural Area is the site of a “rare maritime swamp forest,” among other communities (Finnegan 2002). The Nature Conservancy, US Fish and Wildlife Service, and the state Division of Coastal Management each own part of the area (Taggart 2002).

Kitty Hawk Woods* (Dare County)

At 1562 acres, the largest maritime forest on the North Carolina coast. The forest was probably never clear cut, although it was selectively logged. John Finnegan of North Carolina Natural Heritage describes the site as one of the best of the few examples globally of maritime deciduous forest and maritime swamp forest (2002). John Taggart of the North Carolina Coastal Reserve speaks of 600 acres of mature maritime forest (2002). The 891-acre Kitty Hawk Woods Coastal Reserve, owned by The Nature Conservancy (95 acres), the town of Kitty Hawk (462 acres), and the state of North Carolina, protects a portion of the forest. (The town land is under a conservation easement with the state.) The balance is unprotected. The North Carolina Division of Coastal Management is constantly working on enlarging the reserve, which is managed by its North Carolina Coastal Reserve Program (Finnegan 2002).

Theodore Roosevelt State Natural Area* (Carteret County)

A 273-acre State Natural Area with old-growth maritime forest. The forest may have been selectively cut for Live Oak and may have had some grazing, but has never been clear cut (Finnegan 2002). Shrub and forest communities flourish on dunes and swales that slope off to marshes along Bogue Sound. The land belonged to the family of Theodore Roosevelt, which donated 308 acres to the state. The state used 35 acres of the gift for construction of access roads and the North Carolina Aquarium. Two trails wind through the forest. The Natural Area is the property of State Parks and Recreation and is managed as a unit of Fort Macon State Park (Taggart 2002).

Nags Head Woods Preserve* (Dare County)

Possibly 100-200 acres of old-growth pine and hardwood maritime forest growing on ancient, 60-foot high dunes within a 1092-acre preserve. The woods have never been surveyed for old growth. They include areas where Loblolly Pine and dogwoods were selectively cut, but elsewhere there was only selective and low-intensity logging that removed a few trees (Lynch 2001). Trees up to five hundred years old can be found. The preserve is on the western edge of a portion of Bodie Island, a barrier island. A marsh system, which extends into Roanoke Sound, borders the preserve on the west. The Run

Hill and Jockey's Ridge sand dunes border the preserve on the north and south respectively. The preserve is composed of lands owned by The Nature Conservancy and by the towns of Nags Head and of Kill Devil Hills (TNC Web 2002).

Black River Preserve,* southeastern North Carolina (Pender and Bladen Counties)

Baldcypress, some more than 1600 years of age, within a 3614-acre preserve owned by The Nature Conservancy. The Black River is a blackwater tributary of Cape Fear River. Merrill Lynch estimates that one third to one half of the preserve is old-growth Baldcypress (2002).

Devil's Gut Preserve (Martin County)

Two old-growth communities within a 1046-acre preserve on a stream that flows into the Roanoke River. One is a Water Tupelo swamp forest more than 200 acres in size. Selective harvesting of Baldcypress about 50 years ago has been the only cutting. The other, nearby on slightly higher terraces, is a Loblolly Pine-bottomland oaks-American Beech forest, at least 50 acres (20 ha) in size. Here the only logging has been selective cutting of Loblolly Pine (Lynch 1993). The higher site includes pines more than 150 years old and beech up to 100 years in age. Shear et al. describe the site as an example of "older-growth red river bottom forests" (1997). The Nature Conservancy owns the preserve.

Hammocks Beach State Park* (Onslow County)

More than 100 acres of old-growth maritime forest divided between Bear and Huggins Islands. The 892-acre Bear Island is a barrier island, 3.5 miles long and 1 mile across. Its northeast end supports 45 to 50 acres of Live Oak and Red Bay woods that shade into Loblolly Pine on dunes. The 225-acre Huggins Island is just east of Bear Island in the mouth of Bogue Inlet. Lowland marsh surrounds 115 acres of upland, most of which is home to a maritime swamp forest, also dominated by Live Oak and Red Bay. Neither forest is known to have suffered any substantial logging, although a few trees may have occasionally been removed when the forests were in private ownership. Both forests have experienced varying degrees of hurricane damage (Senter 2002; Bland 2002).

Alligator River National Wildlife Refuge (Dare County)

Within a 118,000-acre addition to the Refuge, about 100 acres of old-growth Baldcypress-Loblolly Pine-Swamp Black Gum-Atlantic White-cedar. Apparently this old-growth tract has never been cut. It is in a non-riverine swamp forest over deep organic soil within a pocosin. The federal government owns the land. Other patches of old-growth forest of this type, some 50 to 100 acres in extent, exist along the Alligator River in Hyde and Dare Counties on federal land used by the National Wildlife Refuge and the Air Force-Navy Bombing Range (Lynch 1993).

The Refuge and the Bombing Range together have nineteen clusters of pure, mixed, and scattered stands of Atlantic White-cedar for a total of 6000 acres, giving Dare County the most extensive White-cedar acreage of any county in the state. The inventory of the state's remnant stands describes many of the Dare County stands as "mature," but none as unlogged (Davis and Daniels 1997). Kelly Davis, the inventory's primary

author, wrote that he did not think “any of our sites were virgin; most were regrowth from logging. . . . The most pristine sites are probably located on the Alligator River” refuge (Davis 1999).

Indiantown Creek/North River Cypress Forest* (Currituck County)

A 1991-acre expanse that includes an approximately 90-acre stand of never-logged cypress-gum swamp and an approximately 35-acre old-growth nonriverine wet hardwood forest. The majority of the site is mixed wetland forest formerly dominated by Atlantic White-Cedar and now with scattered remnants of that species. A portion is owned by an individual; the remainder by the North Carolina Wildlife Resources Commission, which has dedicated it as a state nature preserve (Finnegan 2001).

Jones Lake State Park, in Bladen Lakes State Forest (Bladen County)

--**Bushy Lake**. A Carolina bay--an egg-shaped depression, filled with a peat bog--within a 2275-acre satellite area of Jones Lake State Park. Pond Pine that has presumably never been cut, and shrubs like Fetterbush and blueberry, grow in the bog (Helms 1993, Bucher 1993, Roe 1987). On xeric sand ridges around the rim (most pronounced on the southeast) are second-growth Longleaf Pine and stunted Turkey Oak (Frost 1993). White Wicky Laurel, Rough-leaf Loosestrife, and Venus Flytrap are among the rare and endemic plants at the site.

--**Jones Lake and Salter Lake**. Carolina bays that still include open water as well as areas filled with peat. The bays and peatlands around the lakes support high and low pocosin, Pond Pine woodland, and a few Baldcypress. Sand ridges are similar to those next to Bushy Lake. Presumably the pocosin deep in the bays, like that deep within other Carolina bays in the forest, has not been cut (Helms 1993, Bucher 1993, Roe 1987, Patterson 1999).

Alluvial forest on the Roanoke River (Halifax County)

Around 100 acres of Eastern Cottonwood-American Sycamore-Green Ash-Sugarberry alluvial forest. The site includes cottonwoods 150 or more feet tall, with diameters up to 5 feet. A privately owned tract, it has suffered some selective logging of ash, but has not been cut for more than 75 years (Lynch 1993).

Lassiter Swamp, in Merchants Millpond State Park (Gates County)

An apparently uncut Baldcypress-Water Tupelo swamp forest. Size is uncertain, but is probably greater than 100 acres. The cypress are up to 117 feet in height and 8 feet in diameter (Lynch 1993, Roe 1987). Up Bennetts Creek, which runs through the swamp, are additional old-growth Black Gum and tupelo (Schafale 1999).

Northeast Cape Fear River Floodplain* (New Hanover County)

A “drowned blackwater river corridor” with tidal freshwater marshes at the lower end and tidal cypress-gum swamp communities at the upper end. The area includes some 70 acres of apparently unlogged old-growth Longleaf Pine on sandy islands. It also has mature to old-growth examples of wetland communities including 300 acres of Atlantic White-cedar on peatland and cypress-gum swamp (Schafale 1998). Ownership is varied. What is known as the Bellhammon Property (1143 acres) is owned by the North Carolina

Wildlife Resources Commission, but much is in private hands. The Longleaf Pine is owned by an individual who has enrolled it in the Forest Stewardship Program (Finnegan 2001; LeBlond 1995 and 2002).

Southwest Ridge Preserve (Pender County)

A 180- to 200-acre unlogged, dry Longleaf Pine savanna owned by The Nature Conservancy. Most of the Longleaf Pine died in a wildfire and the backfire set to stop it. The trees are beginning to grow back, and the ground cover is good. Among the herbaceous plants is the federally Endangered Rough-leaf Loosestrife. The Nature Conservancy restricts access. Another portion of Southwest Ridge is within the Holly Shelter Gameland (Bucher 1993).

Weymouth Woods State Natural Area, also known as Weymouth Woods Sandhills Nature Preserve, southeastern North Carolina (Moore County)

Within the 164-acre Boyd Estate Section of the 900-acre Nature Preserve, a sandhills and clayhills site with 60 acres of old-growth Longleaf Pine-mixed oaks (Kush 2001). The stand is "near virgin" (Lynch 1993) and some trees are greater than 350 years in age (Kush 2001). However, about eighty years of fire suppression allowed oaks to codominate. Now, prescribed burning is taking place in the winter, and hardwoods are being cut back.

Red-cockaded Woodpeckers inhabit the upland portions of the Nature Preserve, including the old growth. The North Carolina Division of Parks and Recreation manages the Preserve for the state. Contact the Preserve (910-692-2167) for information about visiting it (Schafale 1992, Roe 1987, Hartley 2002).

Bonnie Doon Natural Area, southeastern North Carolina (Cumberland County)

A clayhills, 160-acre old-growth tract of Longleaf Pine. In the recent past a dense subcanopy of Turkey Oak grew up; and Wiregrass was suppressed. To restore the site, a program of prescribed burns began around 1997. The city of Fayetteville owns the site, which is part of the city's watershed and not open to the public (Schafale 1992, 1993; Kush 2001; Finnegan 2002).

H. H. Bate Tract (Craven County)

An old-growth upland American Beech-Tulip Tree-mixed oaks and hickory forest around 75 acres in size. The oaks have had very light selective logging, but there has been no cutting for the past 75 to 100 years. The forest, which is across a river from Croatan National Forest, is privately owned (Lynch 1993, 1999).

Baldcypress tract (Currituck County)

Fifty to one hundred acres of tremendous old Baldcypress with some Swamp Black Gum and Red Maple. The stand, which is privately owned, apparently escaped several bouts of logging in the early 1900s. It adjoins the Indiantown Creek/North River Cypress Forest (see above)(Lynch 1993 and 2002).

Camp Lejeune Tract * (Onslow County)

Approximately 50 acres (20 ha) of old-growth Longleaf Pine on a sand ridge. The stand is frequently burned. The US Department of Defense (Marine Corps) owns Camp Lejeune (Kush 2001).

Conoho Creek Slopes and Floodplain (Martin County)

A 1656-acre tract with pockets of old-growth cypress-tupelo. Remnant trees are up to 1000 years old. Small areas of old bottomland hardwoods are also present. Conoho Creek flows into the Roanoke River; and 414 acres of the tract are part of the Roanoke River Wetlands Gameland. A portion of the other 1242 acres is privately owned and unprotected, but the remainder is owned by the North Carolina Wildlife Resources Commission and constitutes a dedicated state nature preserve (Lynch 2001; Finnegan 2001).

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