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VIRGINIA

In 1989, in response to a question about a specific ridge in the George Washington National Forest, Robert Mueller of Virginians for Wilderness wrote: "This is a typical xeric oak-chestnut type ridge forest. . . . It's sometimes difficult to tell if this type of forest is primary or secondary, unless the tree ages are known. The oaks . . . generally are stunted, thick-trunked and contorted and, if they escaped charcoal burning, frequently would have been rejected for timber use. I believe that there are probably a lot of scattered tracts of such inconspicuous, almost primary forest on exposed ridges throughout the Appalachians. They probably escaped the logging that destroyed the conspicuously large trees and more accessible stands along streams and in coves and on gentle slopes." At the time, his words seemed quite radical, at least to environmentalists who were not also scientists. Today the existence of extensive areas of uncut forest in the Appalachians is more commonly recognized. Even the tentative old-growth inventory of the George Washington National Forest put out by the US Forest Service (see below) bore out Mueller's speculation.

Tom Rawinski, speaking of the xeric pine and pine-oak forest types noted in the inventory, says that Virginia has "thousands and thousands of acres" of forest with Pitch Pine, Chestnut Oak, Table Mountain Pine, and Bear Oak that may have experienced little or no logging. This forest is found on ridge crests and on the upper, convex slopes of mountains, which means most frequently at elevations above 2000 feet. The forests are fire-maintained. If fire were removed, in many cases the pine would evanesce. Hence, he points out, they are not old growth in the classic sense of the term, although they may be original forest (1933).

Steven Stephenson notes that ridges in the Central Appalachians, below those that support primarily Chestnut Oak and pine, may bear old-growth Northern Red Oak and White Oak neglected by loggers because of the trees' poor growth forms. He is certain that patches of uncut Eastern Hemlock and Northern White-cedar survive in rocky ravines and inaccessible sites on steep slopes (1993).

Doug Coleman told us that inaccessible north-facing slopes support many very small plots of old growth, including shale barren communities that may be less than an acre in size. He also said that much land that has never been ploughed is scattered through the Appalachian forests. It can be identified through the species in the herbaceous layer, as the life histories of plants indicate whether a forest floor has been disturbed (1993).

Four of Virginia's coastal islands, owned by The Nature Conservancy, have forest that has never been cut, but the islands are constantly changing their forms and the vegetation is naturally young. Parramore Island has a ridge on which grow Loblolly Pine with Eastern Red-cedar, American Holly, Black Cherry, and Sassafras. (Pine bark beetles are killing the Loblolly Pine, but for each old tree that falls many young trees appear. Thus an even-aged pine forest will give way to an uneven-aged pine forest.) On the north end of Hog Island is a ridge over a hundred years old, on which is a myrtle thicket 15 feet tall and trees sticking out 15 feet above the myrtle. Maritime forest with Yaupon, Black Cherry, American Holly, and Live Oak among other species grows on recurved ridges on the south end of Smith Island; and Revels Island has a Holocene dune ridge with pine, cedar, and a small amount of Yaupon. The vegetation on Smith Island and Revels Island is 50 or 60 years old (Truitt 1993).

Small disjunct populations of Northern White-cedar occur in Virginia. Three sites that support Northern White-cedar communities that may be entirely or partly old growth are **New**

River (Giles County): limestone rock, no signs of disturbance (Larson et al 2000); **James River** (Buckingham County): a north-facing rock outcrop with steep slopes (Walker 1987, Young 1996); and **Natural Tunnel State Park** (Scott County): steep, exposed cliffs around both sides of a natural tunnel, the cliff top portion logged (Larson et al. 2000, Young 1996).

Other specific old-growth sites in Virginia in addition to those described below include **Sweetbriar College White Oak Woods** (Amherst County): on a flat ridge owned by the college, approximately 10 acres of White Oak-mixed hardwoods-mixed herb community in which most of the dominant trees have dbhs (diameters at breast height) of 30 to 36 inches (Rawinski 1993, Coleman 1993); **Pond Drain** (Giles County): old-growth forest dominated by Eastern Hemlock, large American Beech, and Yellow Birch on the floor of a ravine through which runs the stream that drains Mountain Lake (Stephenson 1993); **Great Falls** [National] Park (25 or more acres of old-growth mixed oak forest (Abrams and Copenheaver 1999)

GEORGE WASHINGTON NATIONAL FOREST

The Final Environmental Impact Statement for the Revised Land and Resource Management Plan published by the George Washington National Forest managers in January 1993 contains a Tentative Old Growth Inventory according to which the one million acre-Forest has 179,677 acres of old growth, divided as follows:

- northern hardwoods (Sugar Maple-American Beech-Yellow Birch): 349 acres (180 years or older);
 - conifer-northern hardwoods subdivided as follows--hemlock-northern hardwoods: 1960 acres (180 years or older); White Pine-northern hardwoods: 1968 acres (180 years or older); spruce-northern hardwoods; 375 acres (180 years or older);
 - mixed mesophytic (cove hardwood-White Pine-hemlock; Tulip Tree; Tulip Tree-White Oak-Northern Red Oak): 3425 acres (180 years or older);
 - dry-mesic oak (Chestnut Oak; White Oak-Northern Red Oak-hickory; White Oak; Northern Red Oak; Scarlet Oak; Chestnut Oak-Scarlet Oak): 87,889 acres (130 years or older);
 - dry and xeric oak woodlands and savannas (Post Oak-Black Oak): 575 acres;
 - xeric pine and pine-oak forests and woodlands (Shortleaf Pine-oak; Pitch Pine-oak; Virginia Pine-oak; Table Mountain Pine-hardwood; Shortleaf Pine; Virginia Pine; Pitch Pine; Table Mountain Pine; Bear Oak-scrub oaks-Yellow Pine; scrub oak): 78,178 acres (80 years or older);
 - dry and dry-mesic oak-pine forests (upland hardwoods-White Pine; Chestnut Oak-Scarlet Oak-yellow pine; White Oak-Black Oak-Yellow Pine; Northern Red Oak-hickory-Yellow Pine): 4441 acres (130 years or older);
 - eastern riverfront forests (River Birch-sycamore; cottonwood): 206 acres (80 years of age or older).

The Virginia Natural Heritage Inventory and the staff of USFS itself have since discovered in the field extensive old growth. Nevertheless, USFS has allowed logging of certain old growth despite appeals and suits from environmentalists. The Hiner Hollow Timber Sale, for example, allowed the logging of two 20-25-acre streamside units of dry-mesic oak forest believed to be old growth, and the Hematite Sale cut into the edge of the Peters Mountain area described below (Krichbaum 1997). More recently the Hoover Creek Timber Sale resulted in the logging of 100 or more acres of old growth in Allegheny County (Neas 2001, Messick 2002).

Specific old-growth sites in the National Forest include:

--**Ramsey's Draft Wilderness** (Augusta County). Unlogged forest of uncertain extent within a 6720-acre Wilderness Area. According to the Audubon Society Field Guide to the

Natural Places of the Mid-Atlantic States, over 6000 acres at Ramsey's Draft "were never logged" (Lawrence and Gross 1984). The Forest Service characterizes 608 acres in the Wilderness, divided among 9 stands, as having a birth date of 1790 or earlier (Sitton 1989). Rawinski reports that Ramsey's Draft Natural Area is 1700 acres in size, but that "over 6000 acres" may be a more accurate figure for the extent of the old growth (1993). Dan Miles notes that as of 1998, many of the largest trees (dbh over 24") were "fire-scarred survivors surrounded by younger unscarred trees." He speculates that the forest was not logged, because during the height of logging, which occurred around 1900, the area had few trees of marketable size as a result of fire (Miles 1998).

--**Peters Mountain Study Area**, James River District (Alleghany County). Two large stands of old growth on rugged areas of the Peters Mountain ridges. (The two stands are described separately as Frozen Knob and Peters Mountain North in Wilson 2000a). The first stand covers about 3600 acres (1455 ha) on the northern ridge. It encompasses 2800 acres (1130 ha) of old, "generally oak-dominated forest" and 800 acres (325 ha) of "younger, pyrogenic forests that have regenerated following intense disturbance by fires." Except for one selectively cut area and five relatively small clearcuts, it has never been logged. The second stand covers about 1100 acres (445 ha) "of the more remote middle to upper slopes and crest" of the southern ridge. This stand is composed of old, oak-dominated forest, which has not been logged.

The lack of logging is indicated by the absence of stumps, the presence of thousands of boles of chestnut trees killed by the chestnut blight, and the size and age of the canopy trees. The oldest trees cored were a Northern Red Oak about 300 years old, a 289-year-old Chestnut Oak, and a White Oak about 280 years old. Size to age ratios vary with topographic position. The large number of dead chestnut bolls makes the site valuable for the study of the distribution and abundance of the species, among other subjects (Fleming 2002).

In 1996 Steven Krichbaum of Staunton, Virginia, filed a suit to stop the Hematite Timber Sale, which cut into the edge of the old growth on Peters Mountain. The suit did not prevent the logging unfortunately.

The old growth still has no formal protection. A large portion of it is, however, on lands declared to be unsuitable for timber production. Furthermore, because USFS logs within any specific area on the George Washington only once every ten or more years, it will not revisit the area for purposes of logging for ten years after the Hematite sale. By that time USFS expects to be well into revision of the management plan for the George Washington. The agency will consider setting aside the old growth in the revised plan, Steve Croy, USFS biologist reports (2003).

In a report on the site, the Virginia Natural Heritage Program states "unequivocally that the outstanding size and internal community type diversity of the Peters Mountain old growth warrants its exclusion from the timber base and justifies formal protection" (Fleming 2002).

--**Shenandoah Mountain Crest Special Biological Area**, Dry River District (Rockingham County). Within a 43,000-acre Biological Area, climax hardwood forest of unspecified extent. Northern Red Oak and White Oak are abundant in the overstory. The forest, at 1146 meters (>3500 feet) elevation, has much woody debris and no signs of logging. Terry Slater of USFS states that much of the area is old growth (2003). Mitchell et al. raise the question of whether the area is "virgin" (Mitchell et al. 1997).

--**Mount Pleasant National Scenic Area**, Glenwood/Pedlar Districts (Amherst County). Varied old-growth communities within a 7580-acre area. An old-growth grove with Northern Red Oak and White Ash, over 4 feet dbh, occupies the steep valley of Indian Creek on the east face of Mount Pleasant. Another, larger grove, possibly over 1000 acres, lies alongside Little Cove Creek and extends upslope to the summit of Bald Knob. Oak-hickory forest, typical of

ridges and slopes over 3500 feet, apparently unlogged, extends over the tops of Pompey Mountain, Bald Knob, and some of Mount Pleasant and Cole (Cold) Mountains (Miles 1998).

--**Skidmore Special Management Area**, Dry River District (Rockingham County). A 1300-acre area with extensive old-growth hemlock-northern hardwood forest. The old growth includes areas of pure hemlock. However, the hemlock is dead or dying because of the Hemlock Woolly Adelgid, an exotic species (Slater 2003). Miles estimates that the unlogged forest covers more than 1000 acres (1998). Virginia Natural Heritage describes the 2337-acre Skidmore area in general as containing "one of the largest tracts of old growth hemlock-northern hardwood forest in Virginia" and urges that it receive Research Natural Area status (VNHP [nd]).

--**Little Laurel Run Research Natural Area**, Dry River District (Rockingham County). At least 1000 acres of unlogged forest in a 2000-acre Research Natural Area. A lot of the area has been burned so the trees do not look old; but the hollows the fire did not reach have big, impressive trees (Rawinski 1993).

--**Little River Roadless Area**, Dry River District (Rockingham County). Substantial old growth within a 27,248-acre area proposed as Wilderness. The Roadless Area encompasses the Little River watershed, Skidmore Forks, Stony Run, and Wolf Run among other named areas. The old growth is mostly hardwoods and, as would be expected, is on the most inaccessible sites, for example at the head of the Little River. Oaks, hickories, and maples grow on the moister sites. Oaks and pines are on the poorer sites, particularly ridge tops, and southern and western exposures. The Dry River District has many sites up to 50 acres outside the Roadless Area and the other areas named above (Slater 2003).

--**Rich Hole Wilderness**, James River District (Rockbridge County). Within the Wilderness, hundreds of acres of old growth that follow a stream for a couple miles through very rough terrain. White Ash and Northern Red Oak have dbhs of 3 feet to 4 feet. Hemlock are almost as impressive. Sugar Maple are present though not big (Mueller 1993).

JEFFERSON NATIONAL FOREST

For the revision of the forest's Land and Resource Management Plan, underway in 2003, the staff of Jefferson National Forest compiled a Preliminary Inventory of Possible Old Growth. The Preliminary Inventory was based on the guidance on old growth provided by USFS's Region 8 Old Growth Team (USDA 1997). The inventory drew on three sources of information: USFS statistics in the form of the Continuous Inventory of Stand Conditions (CISC) database, the identification of areas withdrawn congressionally or administratively from timber production, and inventories conducted for the purpose of identifying old growth. Eleven Wilderness Areas have been designated on the Jefferson. According to the Preliminary Inventory, most of them "are not existing old growth," but they do qualify as future old growth. The inventories to identify current old growth included a review of aerial photography from the 1930s, Virginia Division of Natural Heritage inventories, and "local knowledge and citizen input." These inventories do not constitute a thorough field checking of the forest. Much field work remains to be done. The report lists separately the acreage garnered by each of the three approaches. It also combines the results of the three approaches to give total figures for the forest. Sites identified by two or three types of sources are counted only once in the totals, but these totals include much future old growth as well as actual old growth.

The figures for the forest as a whole based on inventories conducted specifically to identify old growth are as follows: conifer-northern hardwood, 563 acres; dry-mesic oak, 27,769 acres; dry and dry-mesic oak-pine, 4808 acres; mixed and western mesophytic, 3647 acres; northern hardwood, 1969 acres; xeric pine and pine-oak, 903 acres; montane spruce and spruce-

fir, 23 acres; for a total of 39,685 acres. The total for the forest as a whole based on the combination of the three sources is 107,856 acres. That figure includes all the land in Wilderness Areas. The totals per district for old growth discovered through inventories to locate old growth are Glenwood, 2432 acres; Wythe, 13,998 acres; Clinch, 2280 acres; Newcastle, 7001 acres; and Blacksburg, 106 acres. The Mount Rogers Recreation Area, which is part of the Jefferson National Forest, has 6868 acres (Jefferson National Forest [nd]).

The Draft Revised Land and Resource Management Plan includes allocations for future and for existing old growth. The figures for existing old growth are in each case but one (dry-mesic oak) higher than those in the inventory. Two categories in the allocations were not included in the inventory figures (river floodplain and eastern riverfront; and dry and xeric oak forest, woodland and savanna). The allocations are northern hardwood, 2000 acres; conifer-northern hardwood 1300 acres; mixed mesophytic 4000 acres; river floodplain and eastern riverfront 13 acres; dry-mesic oak 22,400 acres; dry and xeric oak forest, woodland and savanna 10,400 acres; xeric pine and pine-oak forest and woodland 1300 acres; dry and dry-mesic oak-pine 8800 acres; montane and allied spruce and spruce-fir 120 acres (USDA 2003).

--**Pick Breeches and Flannery Ridges**, Clinch District (Scott County). Nine hundred contiguous acres of old growth on portions of Flannery Ridge, Pick Breeches Ridge, and Laurel Fork Gorge, which links the ridges. The stand is significant for its size and for the fact that much of it is on gentle to moderately sloping terrain. Steep rocky slopes on three sides of the gentle terrain seem to have protected the trees in that area.

The majority of the old growth is Chestnut Oak forest on mesic, infertile land. Old-age associates of the Chestnut Oak are White Oak, Black Gum, and Red Maple. Younger trees in the canopy include Black Oak, Scarlet Oak, and Fraser's Magnolia. Dead chestnut trees appear to have been removed from Pick Breeches Ridge, but not from Flannery Ridge. As is typical for mesic, infertile land, the shrub layer is dominated by heath and the herbaceous layer is sparse.

Laurel Fork Gorge supports acidic cove forest dominated by Eastern Hemlock, many individuals over 100 feet tall. Other canopy trees are Yellow Birch, Tulip Tree, Fraser's Magnolia, Red Maple, and several oaks. The understory is dominated by rhododendron with Mountain Pepper-Bush (*Clethra acuminata*), and alternate-leaf dogwood (*Cornus alterniflora*). The herb layer is either nonexistent or dominated by mosses and ferns.

Montane oak-hickory forest is found on middle and lower slopes on the south side of Pick Breeches Ridge. The dominant trees on talus are Chestnut Oak, Northern Red Oak, and Tulip Tree. On a small area with more fertile soil, Red Oak, Sweet Pignut Hickory (*Carya ovalis*), and Chestnut Oak are dominant.

The site is not protected. Virginia Natural Heritage recommends an immediate prohibition on mining and road building within the significant communities and consideration of the site as a Special Interest Area (Wilson 2000b).

--**Pickem Mountain**, Clinch District (Wise County). Old-growth mixed mesophytic forest and Chestnut Oak-Pitch Pine forest, possibly 700 acres in extent. The mixed mesophytic forest is on the north-facing slopes of Pickem Mountain. Dominant trees are Tulip Tree, Chestnut Oak, and Northern Red Oak, with the larger individuals 3 to 4 feet in diameter. The upper slope shows no signs of logging. The lower slopes had not been studied at the time of the report that is our source. The Chestnut Oak-Pitch Pine forest occupies the mountain's drier ridge crests, south-facing slopes, and knobby highlands. As would be expected, the canopy oaks here are not as large or straight as those in the mixed mesophytic forest. A relatively recent logging road crosses this forest; but, off the road, researchers found no signs of logging. Virginia Natural Heritage recommended further study of the site and its designation as a Special Interest Area (Virginia 1995).

--**Roaring Branch**, Clinch District (Wise County). Old-growth acidic cove forest and Chestnut Oak forest within an 1167-acre (472-ha) site, the watershed of Roaring Branch between State Route 23 and High Butte.

The acidic forest, a "spectacular" example of Lucy Braun's "hemlock-mixed mesophytic forest," occupies a steep-sided ravine near the mouth of the stream. Eastern Hemlock and Yellow Birch dominate adjacent to the stream; Tulip Tree, on the slopes. Many trees are 70 to 100 cm dbh and 200 to 300 years old. Great Rhododendron forms the shrub layer; Intermediate Wood-fern (*Dryopteris intermedia*) dominates the mossy ground layer. Two millipedes new to science were found in the forest.

An almost four-mile-long strip of old-growth Chestnut Oak forest, dominated by White Oak and Chestnut Oak is found in the middle and upper reaches of the drainage. Large trees are less dense than might be expected either because of fires or the former importance of American Chestnut in the stand.

Virginia Natural Heritage, which describes this site, does not estimate the acreage of the old growth that they identified and did not have time to explore the steep side-slopes of the watershed, where there may be additional old growth. They set the boundary for the site at the drainage divides for the valley in order to best protect the identified old growth and the side slopes.

All except 30 acres of the site are owned by USFS. USFS's land is not protected. Natural Heritage recommends that the agency designate the site a Special Interest Area (Wilson 2000b).

--**Cliff Mountain**, Clinch District (Lee and Scott Counties). A 2763-acre (1082-ha) site with at least 505 acres of old growth on low cliffs and steep slopes on the northwest face of Powell Mountain and the southwest face of Cliff Mountain. Two complexes of old-growth forest, 275 acres and 230 acres respectively, support montane oak-hickory forest and four occurrences of rich cove/mesic slope forest of the Wood Nettle-Blue Cohosh type. Numerous trees in the slope forest are up to 4.5 feet in diameter, and age classes of 179-190 years and 200-300 years are typical. Virginia Natural Heritage remarks that "the old growth rich hardwood forests at this site are probably the finest examples of this type anywhere in Virginia."

Another community on the site is an "outstanding example of a Xeric Calcareous Cliff woodland." Natural Heritage does not describe this community as old growth, but since it is on the southwest-facing exposures of Cliff Mountain and since much of the site is "essentially inaccessible," it seems likely that this woodland is primary.

The boundaries of the site include "substantial areas that have not been explored due to logistical constraints and the ruggedness of the area. This unexplored area is likely to contain additional natural heritage resources."

Roughly two-thirds of the site (1594 acres) belongs to USFS; the other third is in private hands. National Heritage recommends the USFS land for designation as a Special Interest Area (Wilson 2000b).

--**Indian Grave Gap**, Clinch District (Wise County). A 373-acre site at the headwaters of Phillips Creek and Laurel Fork, with 4 old-growth communities and a significant wetland community. The site is partially bounded by the ridgeline of Pine Mountain.

Chestnut Oak forest, with no signs of chestnut salvaging or other logging, covers approximately 150 acres. Most of this forest is dominated by old Chestnut Oak and White Oak and has a relatively open understory. It is found on moderate to gentle slopes and rounded crests. The density of large, old trees is high. On average about 20 trees with diameters at breast height of 30 to 40 inches occur per acre, and 28 such trees per acre are frequently found. Small portions of the Chestnut Oak forest are dominated by Chestnut Oak over a dense understory of

Great Rhododendron or Mountain Laurel. Shortleaf Pine and Pitch Pine also grow in these small areas, which are found on steep slopes.

Pine-oak/heath woodland with tall Shortleaf Pine and Pitch Pine covers approximately 42 acres on a ridge crest and steep slopes. The understory is dense, and pine is not being recruited, which may indicate need for prescribed fire.

Montane oak-hickory forest occurs as inclusions of 11 and 10 acres respectively in the Chestnut Oak forest. This forest type may have suffered selective high grading.

The site is unprotected and should be considered for designation as a Special Interest Area, Virginia Natural Heritage states. Furthermore, the fire and vegetation history needs study (Wilson 2000b).

--**Dark Hollow**, Clinch District (Wise County). A 109-acre site composed of a ravine with "a relatively pristine, impressive old growth hemlock" stand and a 200-foot buffer. The older hemlocks are 200 to 300 years old and often 3-4 feet in diameter. Growing with them are equally large Tulip Tree and Northern Red Oak. The site shows no signs of logging, but is unprotected (Wilson 2000b).

--**Tributary East of Laurel Fork**, Clinch District (Wise County). Five old-growth communities along the second un-named tributary flowing into Pound Reservoir to the east of Laurel Fork. Acidic cove forest is located near the mouth of the tributary and extends along it to 2000 feet and above. Dry oak forest is found near 1950 feet on a south-west facing slope, between two shallow valleys. Dry oak-pine grows near 2000 feet, also on a southwest-facing slope. Shortleaf Pine, Pitch Pine, Chestnut Oak, Black Oak, Tulip Tree, Red Maple, Fraser Magnolia, and Witchhazel are found in this type. Acidic cove forest is found above 1960 feet in a rocky ravine. Mixed mesophytic forest is located on an east-facing slope near 2300 feet. In 1997 no roadbeds, trails, or signs of logging were found in any of the communities except the acidic cove forest near the mouth of the tributary, where there is an abandoned homestead and a campsite. Steve Brooks and Rob Messick, who discovered the site, have not specified the old-growth acreage (Brooks and Messick 1997).

--**Good Spur Ridge**, Clinch District (Scott County). Seventy-five acres of confirmed and suspected old growth on a steep west- and southwest-flank of Good Spur Ridge. There are no signs of logging. Chestnut Oak, including trees more than 200 years old, dominates the canopy. Associated trees are Red Maple, Black Gum, Pitch Pine, and Sourwood. Chestnut Oak is found in the understory and the herb layer. The shrub layer is ericaceous (Virginia NHP [nd]).

--**Thunder Ridge Wilderness**, Glenwood District (Bedford County). At least two old-growth oak stands of 15 acres each. The two stands, only about 2 miles apart, are at an elevation of 3400-3600 feet. One stand, dominated by Northern Red Oak, is "on a flat to gently rolling, exposed ridgetop." The other, dominated by Chestnut Oak, is "on a steep talus sideslope." Researchers have contrasted their history and successional status (Abrams et al. 1997).

-- **Salt Pond Mountain**, in Mountain Lake Wilderness (Giles County). Virgin Eastern Hemlock-Red Spruce forest at the bottom of a ravine. Other trees present include Yellow Birch and Sweet Birch. Great Rhododendron is the most important shrub. The shrub layer and the herb layer have few species (Stephenson 1993, Adams and Stephenson 1989). Mueller points out that the site supports both the southern species Galax and the northern species Canada Mayflower. He estimates the old growth as being around 10 acres in size and at an elevation of approximately 3600 feet, and he suspects the Jefferson National Forest has other such uncut ravines (1993).

Mount Rogers National Recreation Area (Jefferson National Forest) and Grayson Highlands State Park, southwestern Virginia

Thousands of acres of subalpine Red Spruce and Fraser Fir that are apparently unlogged, plus some small areas of lower elevation old growth (Tyrrell 1998). Reinhardt and Ware studied 49,400 acres (20,000 ha) in the Virginia Balsams, which encompass Mount Rogers, Mount Whitetop, and their “associated ridges and smaller peaks” and lie within the 140,000-acre Mount Rogers National Recreation Area and 4822-acre Grayson Highland State Park. They wrote that most undisrupted forests are found above 1150 m in elevation and that “about 70% [of the 49,400 acres, ie about 35,000 acres]is covered by old growth forests” (1984). USFS’s Preliminary Inventory of Possible Old Growth lists for the Mount Rogers Recreation Area, 2228 acres based on CISC data, 12,147 acres based on designated protected areas, and 6868 acres based on old-growth inventories. Combining them, the Preliminary Inventory gives a total from all sources of 19,309 acres of old growth (Jefferson [nd]). Half of the National Recreation Area is in the timber base, according to the 1990 management plan (Parsons 1999). Specific examples of old-growth sites include:

--**Mount Rogers** (Grayson County}. Subalpine Red Spruce-Fraser Fir, probably uncut, on the summit and north slopes of Mount Rogers (Reinhardt and Ware 1984). A map by Pyle and Schafale presenting the disturbance history of the mountain's spruce-fir zone shows a substantial uncut and unburned area (1988). Mount Rogers is protected, because it is within the Lewis Fork Wilderness (Parsons 1999).

--**Whitetop Mountain** (Washington, Smyth, and Grayson Counties). Red Spruce, probably uncut, on the north slope and summit (Reinhardt and Ware, 1984). Whitetop Mountain does not support Balsam Fir. The lack of fir could be the result of past temperature changes or of anthropogenic disruption (Reinhardt 1984). Pyle and Schafale show an uncut and unburned area (1988); and Ware believes that the stand is unlogged (1993). However, Adams and Stephenson do not include Whitetop Mountain in their list of uncut Red Spruce stands in the mid-Appalachians (1989). According to Virginia’s Treasures, the 5919-acre Whitetop Mountain area includes 1323 acres “of possible old growth” (Parsons 1999).

--**Horse Heaven** (Wythe County). A dry, lower-elevation area of oak, hickory, and pine with 534 acres of possible old growth. The Horse Heaven area as a whole covers 4744 acres (Parsons 1999). This site and the following site are only examples of various possible old-growth areas of less than a thousand acres.

--**Raccoon Branch** (Smyth County). A 4384-acre area with 321 acres of possible old growth. USFS identified Raccoon Branch as a roadless area (Parsons 1999).

Warm Springs Mountain, western Virginia (Bath County)

At least 425 acres of old growth within a 9000-acre tract on and around the mountain. Old-growth oak hickory forest occupies about 300 acres. The trees, mostly oaks with a scattering of hickory, have dbh’s up to 2-3 feet, and the majority are well above 120 years in age. A montane pine barren that has not been grazed by livestock and may not have been logged is in 3 patches that total at least 125 acres. The area is high, dry, and acidic; the trees are mostly Pitch Pine. Researchers do not know what the barren actually looked like 300 years ago. Therefore, they do not know if it has changed. The Nature Conservancy has purchased the 9000 acres (Ludwig 2003).

Bottomland on the Meherrin, Nottoway, and Blackwater Rivers, in southeastern Virginia

Old-growth bottomland hardwoods of unknown extent, mostly dominated by Baldcypress and tupelo. Chris Ludwig of the Virginia Division of Natural Heritage thinks the old growth

probably totals hundreds of acres. Much of the forested bottomland is owned by lumber companies and by private individuals. Therefore, access is difficult; and no aerial survey has been carried out (1993, 2003). Gary Williamson, who floated the river swamps with John Dennis looking for old growth and rare species, says that the Blackwater has more pristine acreage than the other rivers. Along this river he found corridors of uncut, unspoiled cypress-tupelo several miles in length (1993). Two areas on the Blackwater with old growth are now in Blackwater River Preserve and Dendron Swamp Natural Area Preserve (see below). The Nottoway River in Isle of Wight County has 2 or 3 areas of old growth. Of the 3 rivers, the Meherrin has been the most heavily logged, but Fountain's Creek, a small tributary of the Meherrin, has a couple of old sites (Williamson 1993).

Caledon State Natural Area, east-central Virginia (King George County)

Old-growth forest within a 2600-acre, state-owned Natural Area. Opinions as to the extent of old growth differ. John Zawatsky, Park Manager, reports that the only remnants of original forest are scattered individual trees and patches of trees in ravines (1993). Tom Rawinski of the Virginia Division of Natural Heritage says that, although trees may have been cut in the early 1700s, the tract has 300 or so acres of oak and beech climax forest that are generally considered to be old growth (1993). Stewart Ware, professor at William and Mary, agrees that the upland forest includes old growth, perhaps a couple of hundred acres. He notes that very old trees, which appear to have lived 250 years or longer, have broad canopies as if they were grown in the open, and that there are gaps between the trees. He speculates that pigs or other livestock heavily grazed the area and ate the seedlings. After a while, he suggests, the animals were removed, and a new generation of trees began to establish itself. He also notes that many of the older oak are dying, while beech is reproducing profusely (1993). In addition to the upland old growth, the Natural Area, which is bounded by the Potomac River, includes a marsh and a climax White Oak swamp. Parts of the area are closed to the public at certain times of the year to protect wildlife (Duffy 1993).

****Chestnut Ridge Natural Area Preserve**, southwestern Virginia (Giles County)

A 225-acre old-growth forest within 2250 acres of forest owned by Bob and Darlinda Gilvary. Philip Coulling of the Virginia Natural Heritage Program (VNHP) has described the old-growth area as supporting "significant" Northern Red Oak and Chestnut Oak communities, in the midst of extensive "nearly unbroken forest." Other scientists from the Natural Heritage Program later confirmed the existence of trees from 300 to 400 years in age. Cucumber Magnolia and American Basswood are among the older trees in the forest.

The Virginia Land Conservation Fund awarded Virginia's 500-Year Forest Foundation \$224,130 to purchase 50% of the logging rights on the 225 acres. The Gilvarys donated the other 50%. VNHP, the Gilvarys, and the foundation are developing a conservation plan for the forest (500-Year 2006). (*Added July 14, 2006*)

North Landing River Preserve, City of Chesapeake, southeastern Virginia

An estimated 200 or more uncut acres, mostly Pond Pine, with some Atlantic White-cedar, within a 6000-acre area co-owned by the Virginia Division of Natural Heritage, Natural Areas Subsection, and The Nature Conservancy. The land is woodland and scrubland grading into Pond Pine pocosin. The trees in the uncut pocosin are as far apart as in a savanna (Ludwig 1993, 2003). The community is fire dependent and last experienced fire in the 1980s.

The Nature Conservancy also owns on North Landing River an 1100-acre preserve called Gum Swamp, with several dozen scattered ancient cypress (Van Eerden 2002).

James Madison Estate, Montpelier, central Virginia (Orange County)

A 200-acre National Natural Landmark of essentially undisturbed forest surrounded by 400 acres of forest that includes scattered old-growth remnants. The forest is on the northern side of a small foothill, cut by ravines, in the Blue Ridge. White Oak and Northern Red Oak are dominant on the upper slopes; Tulip Tree, hickory, and oak on the lower slopes and in the ravines. The site includes trees over 300 years old. A very few Tulip Tree have a 6 foot dbh; more abundant are Tulip Tree and oak 3 to 4 feet in diameter. On the uppermost, driest slopes, some American Chestnut died, and 60 or 70 years later a few of them were cut; but the 200 acres bear no other evidence of harvesting.

The forest is owned by the National Trust for Historic Preservation and is open to the public as one of the features of visits to the estate as a whole. Researchers wanting to see only the forest can call 703-672-2728 for permission to go directly there (Fleming 1993, Tice, 1993).

Shenandoah National Park, northern Virginia (Madison County)

One hundred or more acres of old growth, mostly in hollows. Researchers for the Virginia Natural Heritage Program, which inventoried the park, reported the following old-growth sites and acreages: **Limberlost** (in White Oak Canyon): 25 acres; **Ivy Creek**: 15 acres; **Mount Marshall**: 5 acres; **Pocosin Hollow and Entry Run**: 5 acres; **Stony Man** (a 0.4 mile band): no estimate made; **Upper Staunton River**, an area with huge Tulip Trees: 15 acres; Laurel Prong, a small area: no estimate made (Winstead 1993). Robert Leverett would add 25 acres to **White Oak Canyon**--an area of small but old hardwoods down in the gorge--for a total of 50 acres at that site (Leverett 1993). Dominant trees in White Oak Canyon are hemlock and White Oak. Core samples from trees in the Limberlost as a whole show that hemlocks date back to the 1600s and White Oak to 1587 (Adams 1990).

Short Hill, northern Virginia (Loudoun County)

Old growth of undetermined extent, possibly totaling well over 100 acres, in scattered pockets across the mountain. Species include Sugar Maple, Northern Red Oak, White Ash, White Oak, Black Birch, Yellow Birch, plus a little Hackberry and Sassafras. Part of the old growth is owned by Harpers Ferry National Historic Park and part by private parties (Sweeney 2002).

Bottom Creek Gorge, southwestern Virginia (Montgomery County)

A 90-acre tract, approximately half of which, by a waterfall, is thought to be virgin old-growth hemlock. The tract is owned by The Nature Conservancy (St. Clair 1993).

Blackwater Preserve, southeastern Virginia (Southampton County)

Seventy acres of Baldcypress-Water Tupelo extending for a mile on the west bank of the Blackwater River. The site has been only selectively logged. Chris Ludwig describes it as having 30 or 40 acres of old growth (2003). Cypress are up to 800 or more years old. Up and down the river are tracts of younger cypress-tupelo and occasional patches of older trees. Therefore prospects for retaining flooding processes are good. Away from the river the terrain is less natural with old field pine and pine plantations. The Nature Conservancy owns the preserve (Van Eerden 2002).

Dendron Swamp Natural Area Preserve, southeastern Virginia (Sussex County)

A 179-acre preserve with cypress-tupelo swamp on the Blackwater River. A fact sheet from the Department of Conservation and Recreation describes the preserve as “old growth” (DCR 2002). Brian Van Eerden speaks of it as possibly having pockets of old growth (2002). Parts along the river are old growth, but how much is old growth is open to debate, Chris Ludwig summarizes (2003). The Natural Area includes the 19-acre Charles C. Steirly Natural Area, donated to the Department of Conservation and Recreation to protect a nesting site for the Great Blue Heron (DCR 2002).

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