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An Old-Growth Definition for Red River Bottom Forests in the Eastern United States

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Preface

Old growth is widely acknowledged today as an essential part of managed forests, particularly on public lands. However, this concept is relatively new, evolving since the 1970's when a grassroots movement in the Pacific Northwest began in earnest to define old growth. In response to changes in public attitude, the U.S. Department of Agriculture, Forest Service, began reevaluating its policy regarding old-growth forests in the 1980's. Indeed, the ecological significance of old growth and its contribution to biodiversity were apparent. It was also evident that definitions were needed to adequately assess and manage the old-growth resource. However, definitions of old growth varied widely among scientists. To address this discrepancy and other old-growth issues, the National Old-Growth Task Group was formed in 1988. At the recommendation of this committee, old growth was officially recognized as a distinct resource by the Forest Service, greatly enhancing its status in forest management planning. The committee devised “The Generic Definition and Description of Old-Growth Forests” to serve as a basis for further work and to ensure uniformity among Forest Service Stations and Regions. Emphasis was placed on the quantification of old-growth attributes.

At the urging of the Chief of the Forest Service, all Forest Service Stations and Regions began developing old-growth definitions for specific forest types. Because the Southern and Eastern Regions share many forest communities (together they encompass the entire Eastern United States), their efforts were combined, and a cooperative agreement was established with The Nature Conservancy for technical support. The resulting project represents the first large-scale effort to define old growth for all forests in the Eastern United States. This project helped bring the old-growth issue to public attention in the East.

Definitions will first be developed for broad forest types and based mainly on published information and so must be viewed accordingly. Refinements will be made by the Forest Service as new information becomes available. This document represents 1 of 35 forest types for which old-growth definitions will be drafted.

In preparing individual old-growth definitions, authors followed National Old-Growth Task Group guidelines, which differ from the standard General Technical Report format in two ways—the abstract (missing in this report) and the literature citations (listed in Southern Journal of Applied Forestry style). Allowing for these deviations will ensure consistency across organizational and geographic boundaries.

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Introduction

Red rivers originate in the Piedmont or mountains of the Southern and Southeastern United States (Kellison et al. 1982), where their floodplains are usually narrow and their waters are generally retained in their channels. After flowing over the fall line onto the Coastal Plain, the waters can flood the low ridges along the rivers (the first bottoms). Sediments are deposited across the bottoms as the waters lose turbulence, making these sites some of the most productive in the South. The red river bottom soils are well-drained loams and silt loams. Tree species found there include red maple (*Acer rubrum* L.), river birch (*Betula nigra* L.), water hickory [*Carya aquatica* (Michx. f.) Nutt.], green ash (*Fraxinus pennsylvanica* Marsh.), sweetgum (*Liquidambar styraciflua* L.), sycamore (*Platanus occidentalis* L.), willow oak (*Quercus phellos* L.), laurel oak (*Q. laurifolia* Michx.), overcup oak (*Q. lyrata* Walt.), water oak (*Q. nigra* L.), and elms (*Ulmus* L. spp.). Adjacent to the first bottoms are higher elevation second bottoms, where flooding is less frequent. Cherrybark oak (*Q. falcata* var. *pagodifolia* Ell.), swamp chestnut oak (*Q. michauxii* Nutt.), hickories (*Carya* spp.), American beech (*Fagus grandifolia* Ehrh.), and yellow-poplar (*Liriodendron tulipifera* L.) occur there.

History of Red River Bottomland Development

Red river describes the river water, colored by the large volume of red clay sediment it carries, particularly after storms. There is no evidence that red rivers occurred on the southern landscape before the 18th century—they are a modern invention. Trimble (1974)[1] described the development of the southern Piedmont from 1700 to 1970. He found that all the early explorers of the Southern United States noted that the streams and rivers ran clear. Colonel Byrd described the Dan River in 1728 as ". . . perfectly clear, running about two miles an hour." Spangenburg in 1752 called the water of the Catawba River "crystal clear, so that one can see the stones on the bottom even when the water is deep" and the water of the Yadkin River "clear and delicious." William Bartram described the streams he encountered on the Piedmont as clear, even one swollen with runoff from a previous day's rain. The few small turbid streams were considered anomalies. Erosion was very limited. The river bottom soils were dark, of uniform texture, and showed no signs of the sediment deposition that would later color them red and brown.

Extensive upland clearing for farming occurred over the next two centuries. The soils were highly productive but very erosive, and were exhausted after several years of primitive farming. Land was cheap and considered disposable, so the farms were abandoned with little or no vegetative cover and continued to erode. By the middle of the 19th century, much of the South had been deforested and left to wash into the streams. This erosion led to dramatic changes in the hydrology and soils of the bottomlands. Many streambeds filled with sediment to levels near or above the valley floors. Some sections of bottomland aggraded dramatically >16.4 feet [>5 meters (m)]. Bottomlands often became swampy as groundwater levels rose. Many forests were drowned, and the sediment deposits often left the land unfit for agriculture.

This process was not interrupted until well into the 20th century. Conversion of the landscape from agricultural use back to forest reduced surface water runoff and increased evapotranspiration, thereby reducing the flow volume within the streams. Streams then downcut rapidly [more than 6.6 feet (2 m) in 20 years] as they dissected the sediment deposits. We believe that these landscape changes have resulted in streams with deeper channels that do not flow over their banks as often as they historically did. As a result, historic floodwater volumes are often contained within the channel, and the occurrence of floods is decreased. We expect that the net effect of these factors on site vegetation is a shift toward less flood-tolerant species (Shear et al. 1996). Dramatic changes to the red rivers and adjacent bottoms are still occurring, and the forests there have not yet stabilized. In some areas, the sediments are still migrating downstream; where channels continue to fill and flood, deposition causes the valleys to become wetter. The

[1] Much of this section is based on this excellent description of the modern development of the southern Piedmont landscape.

spatial distribution of this sediment migration has not been quantitatively described but is known to be widespread.

In addition to the effects of massive erosion, extensive areas of red river bottomland were cleared for agriculture and later abandoned. Because these bottoms are good wood producers, wood for fuel and fiber has been extracted from them continuously since European settlement. In recent years, many dams have been and continue to be built on the red rivers for flood control and water supply. These also have dramatically altered the hydrology of the bottomlands downstream, mainly by reducing the frequency and magnitude of floods.

Because red rivers are a relatively new landscape feature (most <250 years old), and because of the dramatic changes to their floodplains that continue to occur, we do not believe that any old-growth red river forests exist. All the stands along these rivers present at European settlement have been cut and/or otherwise severely altered. In the dynamic landscape after settlement, there have been no opportunities for new old-growth forests to develop. Stands older than 50 to 60 years are rare. Therefore, we propose a stand condition called older growth.

Examples of Older Red River Bottom Forests

Only two older red river bottom stands have been described in the scientific literature. In addition, we located and described five stands ≥100 years old. These stands are unusual because of the age and size of the trees and species composition and structure. All have been selectively cut, periodically burned, and probably grazed. However, none were ever cleared for agriculture and probably were never clearcut. We used these stands as the basis for our descriptions of older-growth red river bottom forests, and refer to them hereafter as the study forests. Species compositions are given in table 1.

Boiling Springs Natural Area (as described by Jones et al. 1981)

This is a 2.5-acre [1.0-hectare (ha)] stand in the poorly drained, alluvial floodplain of the Lower Three Runs Creek within the upper Coastal Plain in Barnwell County, South Carolina. The soil is wet, mucky, loam atop sand. The tract was designated as a natural area by the Appalachian Section of the Society of American Foresters in 1957. The dominant overstory trees are yellow-poplar, sweetgum, and loblolly pine (*Pinus taeda* L.). Five yellow-poplars were 113 to 186 years old, and five loblolly pines were 85 to 105 years old. Jones et al. (1981) speculated that the stand originated after a major catastrophic event 180 to 200 years ago and has not been disturbed since. However, we suspect that the pines became established after a later disturbance.

The loblolly pines were senescent and dying, with more than 50 percent of the large ones [>4.9 feet (>1.5 m) at breast height (d.b.h.), apparently older than the five trees cored] having died in the preceding 25 years. Red maple, green ash, and sweetgum are regenerating in the resulting gaps. The pines die standing, and therefore, do not expose bare mineral soil necessary for seed germination by species such as yellow-poplar. However, yellow-poplar is long-lived and is expected to maintain its density for another 100 to 150 years. Sweetgum and swamp tupelo [*Nyssa sylvatica* var. *biflora* (Walt.) sarg.] should respond favorably to the increased light and grow into the upper canopy on the wettest portion of the site. Shade-tolerant species (hickories and some oaks) in the understory will gradually gain importance.

Falling Creek Tract (as described by Edwards and McNab 1986)

This 2.2-acre (0.9-ha) stand in Jones County, Georgia, is a bottomland oak association at the confluence of an intermittent stream and Falling Creek, a major stream that flows into the Ocmulgee River 1 mile [1.6 kilometers (km)] downstream. Loblolly pine was the dominant overstory tree species, although there were no small trees, seedlings, or sapling individuals. Florida maple (*A. barbatum* Michx.), red maple, water oak, white oak (*Q. alba* L.), yellow-poplar, green ash, and sycamore also were prominent in the overstory. Most of the seedlings and saplings were flowering dogwood (*Cornus florida* L.), with significant amounts of American hornbeam (*Carpinus caroliniana* Walt.), eastern redbud (*Cercis canadensis* L.), and eastern hophornbeam [*Ostrya virginiana* (Mill.) K. Koch]. The understory was dominated by dense cane [*Arundinaria giganta* (Walter) Muhl].

Loblolly pine was declining at a rate of 3 to 7 percent annually. The oaks were expected to decline, with hickory and maples gaining in prominence.

Tennessee Valley Authority Tracts (as described by Shear et al. 1996)

These three stands are on the first bottoms of two Tennessee River tributaries: Blood River and Jonathan Creek. They are in Marshall and Calloway Counties, Kentucky, part of the northern extension of the east Gulf

Table 1—Species composition and structure of the overstories of seven older-growth red river bottom forests

	Relative basal area						
Species	Boiling Springs	Falling Creek	Union Camp	Devil's Gut	Blood River S	Blood River N	Jonathan Creek
Liriodendron tulipifera	49.5	5.2		5.0	12.0		
Liquidambar styraciflua	23.0		13.7	10.6	30.7	15.3	1.0
Pinus taeda	13.0	21.4		22.4			
Quercus laurifolia	3.0						
Nyssa sylvatica	2.5		6.3	.2		2.8	
Fagus grandifolia	2.0			33.0			
Acer rubrum	2.0	2.0	4.6	.3	9.7	13.3	25.2
Magnolia grandiflora	2.0						
Carya ovata	1.5				2.7		4.1
C. cordiformis	1.0				.9		.6
Quercus nigra	.5	4.7					
Other species (not specified)		18.8					
Acer barbatum		14.3					
Platanus occidentalis		10.6	3.5	.1			9.1
Carya tomentosa		9.9		1.6			
Quercus alba		5.5		1.2			
Fraxinus pennsylvanica		5.0	17.2	.0	2.9	13.8	9.9
Betula nigra		2.8			11.9		
Ulmus americana			21.9	3.4	1.0	20.8	6.5
U. rubra			10.7				
Q. phellos			9.6				
Celtis occidentalis			7.4				
Diospyros virginiana			2.1			1.4	
Q. falcata var. *pagodaefolia*			1.9	18.6	9.1		
Acer negundo			.4				3.5
U. alata			.3				
Q. bicolor			.3				
Carpinus caroliniana				2.2		1.8	1.3
Q. michauxii				.7		20.7	
Ostrya virginiana				.4			
Q. lyrata					17.6		
Celtis laevigata					1.1		10.1
Prunus serotina					.4		
Q. palustris						10.1	28.6
Total number of species	11	11	14	15	12	9	11
Total basal area, m^2/ha	34	20	30	30	32	27	34
Density, number of trees/ha	276	339	255	220	400	350	450
Diameter of largest trees, cm	110	69	89	118	68	84	69

Coastal Plain bounded on the east by the Tennessee River. We determined from aerial photographs and Tennessee Valley Authority (TVA) records that these are the only remaining bottomland forests in these watersheds not cleared for agriculture at some time. All are ditched to some degree for mosquito control. The Blood River South stand is a 4.5-acre (1.8-ha) tract on Waverly silt loam. The Blood River North stand occupies 7.4 acres (3.0 ha) on Falaya silt loam. The Jonathan Creek stand is a 5.4-acre (2.2-ha) tract on Waverly silt loam.

In 1993, the oldest trees were >100 years old. The Blood River South stand was dominated by sweetgum, with lesser amounts of overcup oak, river birch, red maple, and cherrybark oak. The Blood River North stand was dominated by American elm (*U. americana* L.), swamp chestnut oak, sweetgum, green ash, red maple, and pin oak (*Q. palustris* Muenchh.). In contrast, sweetgum was only a minor component of the Jonathan Creek stand, which was dominated by pin oak, red maple, hackberry (*Celtis occidentalis* L.), green ash, and sycamore. American elm, red maple, sweetgum, and hackberry were the predominant midstory species in all stands.

In the future, the overstories will probably consist of American elm, hackberry, and red maple. They are moderately shade tolerant and respond well to release at advanced ages (Fowells 1965). Since they are vigorous stump sprouters, future disturbances will not likely alter the current successional trends toward these species. The shade-intolerant sweetgum, an overstory dominant, loses sprouting ability after 50 years of age (Fowells 1965). It will probably become a minor overstory component as succession continues.

Devil's Gut Tract

This 49.4-acre (20-ha) stand is in Martin County, North Carolina, on a Coastal Plain ridge adjacent to Devil's Gut, a small tributary of the Roanoke River. The soils are of the Conetoe and Roanoke series, formed in sandy and loamy fluvial sediments.

The major dominant tree species is American beech, with lesser amounts of loblolly pine, cherrybark oak, and sweetgum. Two pines measured were 154 and 162 years old, and two beeches were 100 and 92 years old. There is some evidence of selective removal of the loblolly pine during the past 100 years. The high relative basal area of beech is typical of second-bottom forests. The stand should continue to be dominated by beech as it ages, while the pines gradually lose prominence and the oaks gain prominence.

Union Camp Tract

This 4.9-acre (2.0-ha) stand is located in Greensville County, Virginia, on the floodplain of the Meherrin River. The river has no dams and still floods one to four times a year. The soils are Congaree, a moderately well to well-drained fluvial loam soil, and the Riverview series, a well-drained fine, sandy loam.

The stand is an undisturbed remnant of an approximately 100-year-old tract that was logged. The overstory is dominated by elms, green ash, sweetgum, willow oak, and hackberry. The elms and hackberry should continue to dominate as the green ash, sweetgum, and oak gradually diminish.

Distinguishing Characteristics of Older Red River Bottom Forests

It is generally recognized that there can be no universally accepted definition of old-growth forests (Thomas et al. 1988, Hunter 1989). Hunter (1989) outlined a core definition as "old-growth forests are relatively old and relatively undisturbed by humans." He proposed several age and disturbance criteria that characterize an old-growth forest, each of which is discussed below in relation to the seven sites we have described.

1. The forest has reached an age at which the species composition has stabilized (the climax stage has been reached).

None of the species compositions of the study forests have stabilized (predictions about changes in species composition are given in the descriptions). The species composition of each study stand is expected to change over time, probably to a climax stage in which the forests are dominated by elm, hackberry, ironwood (*Bumelia* spp.), and boxelder (*A. negundo* L.).

2. The forest has reached an age at which the average net annual growth has stabilized.

Held and Winstead (1975) suggested that basal area might be an indicator of climax status for mesophytic forests, with basal areas of 130.8 square feet per acre (30 m^2/ha) for all trees greater than 3.9-inches [10-centimeters (cm)] d.b.h. representing climax stands. However, basal areas of natural

Piedmont bottomland hardwood forests peak at 130.8 to 174.4 square feet per acre (30 to 40 m^2/ha) between the ages of 50 and 60 years (depending on site index) and then may gradually decrease over time (Kenney 1983). Therefore, we do not believe that the stabilization of average net annual growth is a distinguishing characteristic of older-growth red river bottom stands.

3. The forest is significantly older than the average interval between natural disturbances severe enough to lead to succession.

The frequency of catastrophic events in these stand types has not been adequately described. We believe that a disturbance, either natural or man-made, allowed for the establishment of the loblolly pine of advanced age in a number of the stands we examined. No major disturbance could have occurred since because the pines would have been the first species eliminated by minor disturbances or to reintroduce themselves if the disturbance was great enough.

4. The dominant trees have reached the average life expectancy for that species on that site type.

All the study stands contain early- and mid-succession species (loblolly pine, sweetgum, oaks, etc.) that have reached maturity. However, these tree species are successional to the elms and hackberry and are not dominant in a climax stage.

5. The annual growth rate is below the average annual growth rate.

This criterion is met by a forest that has not been cut at the typical rotation age. All the study stands are older than the typical rotation age (40 to 60 years) of red river bottom forests. Shear et al. (1996) analyzed the patterns of growth over the past 30 years in the TVA stands. Biomass accumulation was constant during the 30 years and was about one-third that of 50-year-old stands.

6. The forest has never been extensively or intensively cut.

This criterion includes not only clearcuts but also selective cuts that could change species composition. There is evidence (stumps, land records, etc.) that there has been partial cutting in the five stands we measured ourselves. The reports of the Boiling Springs and Falling Creek stands indicate that they have been undisturbed but do not elaborate on selective cutting. It is unlikely that any of the study forests are virgin.

7. The forest has never been converted to another type of ecosystem.

None of the study forests has ever been converted to agriculture or another type of ecosystem, so far as we can determine.

The study sites meet only criteria 2, 5, and 7. Hunter (1989) suggested that stands that meet criteria 2 and 6 be called old growth, while those that meet criteria 3 and 7 be called simply “old.” Other criteria have been suggested as characteristic of old-growth forests, such as high species richness and diversity, snags and coarse woody debris, and tree-fall gaps (Thomas et al. 1988, Muller and Liu 1991, Martin 1992).

Many red river bottomlands were cleared for agriculture and later abandoned. Shear et al. (1996) compared the plant community structures and compositions of the TVA stands to 50-year-old stands that had been restored on agricultural fields. They found that the restored stands were composed almost entirely of light-seeded species. Importation of heavy-seeded species (oaks, hickories, etc.) was occurring slowly (fig. 1), and they were likely to be absent from the restored stands for a long time. A criterion for classification as an older-growth red river bottom forest should be that the nut species are prominent in the stand.

Many gaps were noticed in the two stands we measured directly and the three TVA stands. The gaps were created by fallen trees and standing dead trees and contained large numbers of various tree seedlings and saplings. These gaps are not apparent in the typical, younger red river bottom forests.

A large accumulation of coarse woody debris is often considered an important old-growth condition (Parker 1989, Muller and Liu 1991). To our knowledge, coarse woody debris has never before been characterized in an older red river bottom forest. On a floodplain, woody debris constantly comes and goes with flood waters. How this affects the accumulation of such debris is not known. Scouring of the soil surface was apparent in the Union Camp stand and the TVA stands. In many places, this removed the leaf litter and exposed bare soil and fine roots. Woody debris was piled up in mounds next to standing and fallen trees, where it was pushed by flood waters. Because of the constant redistribution by flood waters, with export apparently exceeding import in the stands we observed, we do not believe that coarse woody debris is an important characteristic of older red river bottom stands. The Devil's Gut stand did not show signs of scouring and redistribution

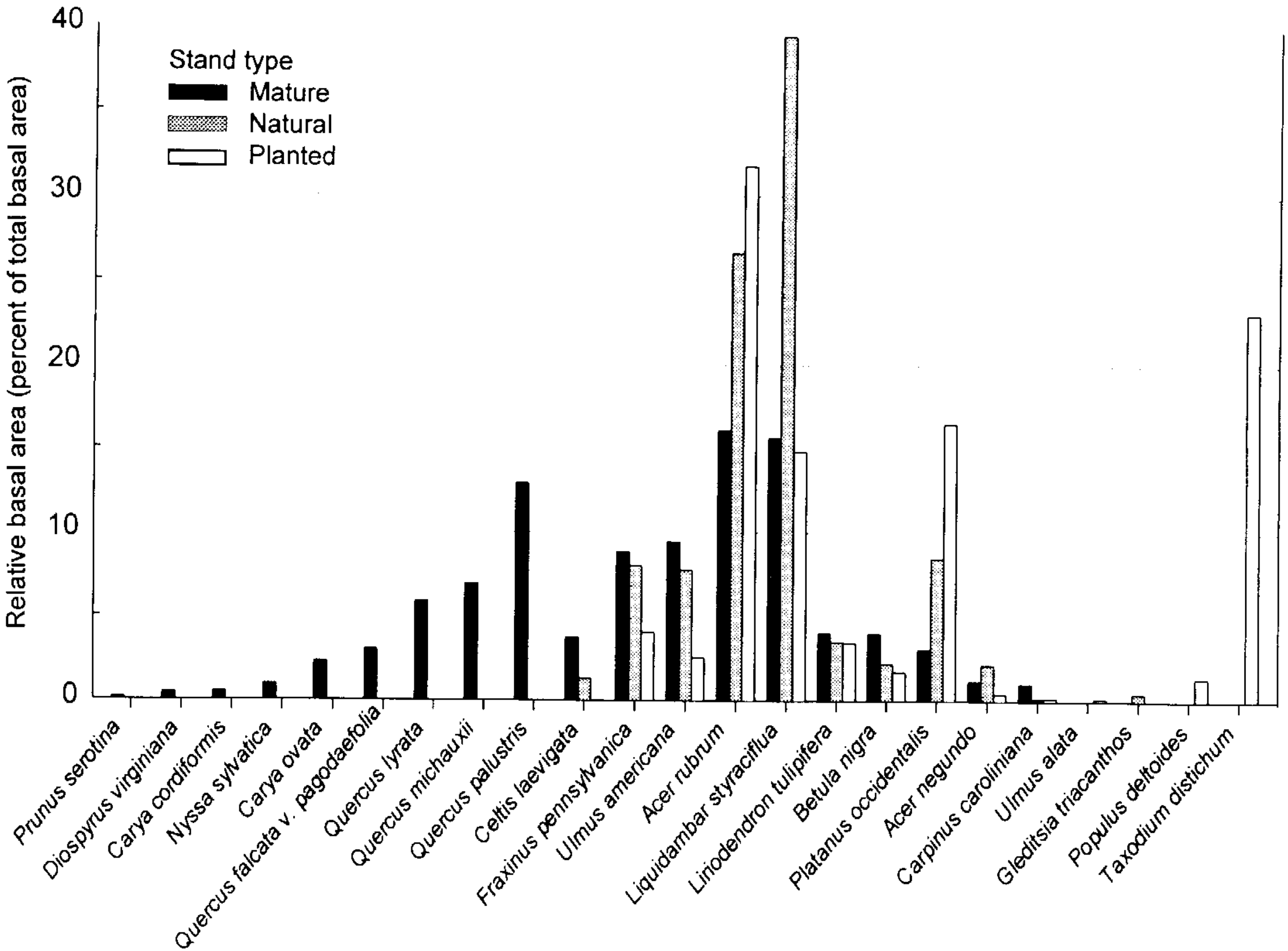

Figure 1—Relative species basal areas of older-growth (mature) and 50-year-old red river bottom forests restored on agricultural land by planting and natural regeneration. Note that the restored stands are depauperate of heavy-seeded species (adapted from Shear et al. 1996).

of coarse woody debris. Therefore, we measured the amount of debris (using the method of Brown 1974). The stand contained 7.2 metric tons per acre [16.1 megagrams (Mg)/ha] of coarse woody debris, which is about 10 percent of the total biomass of the overstory [81.2 metric tons per acre (182 Mg/ha, calculated from basal area from Gardner et al. 1982)]. This is within the range found for warm, temperate zone, deciduous forests [7.6 to 10.7 metric tons per acre (17 to 24 Mg/ha)] (Muller and Liu 1991). Muller and Liu (1991) found 9.7 metric tons per acre (21.8 Mg/ha) of coarse woody debris in an old-growth upland deciduous forest in southeastern Kentucky, also equivalent to 10 percent of the overstory biomass [95.3 metric tons per acre (213.6 Mg/ha)].

We inventoried the understory of the Devil's Gut stand and also examined the descriptions of the understories of the three TVA stands (table 2). There was nothing about the species composition that would be characteristic of older-growth forests. Poison ivy (*Toxicodendron radicans* Ktze.) was the dominant understory species in all the stands, equalled in abundance only by spicebush (*Lindera benzoin* L.) in the Devil's Cut stand. The presence of poison ivy usually indicates disturbance. However, poison ivy occurred in much greater abundance in the older TVA stands than in the restored stands mentioned above (Shear et al. 1996). In addition, sweetgum seedlings were prevalent in the restored stands but were completely absent from the older stands.

Based on our observations, we define older-growth red river bottom forests as having the following characteristics:

- Relatively undisturbed for at least 50 years
- Never converted to field or pasture and abandoned
- The oldest trees are >100 years old
- Low tree densities [<988.4 trees per acre(<400 trees/ha)]
- Trees of all diameters, including >15.8 inches (>40 cm) in diameter
- A variety of plant species of many seed types, with a large proportion of heavy-seeded species, including oaks (cherrybark, swamp chestnut, overcup, and pin), hickories, and blackgum (*Nyssa sylvatica* Marshall)
- Well-developed midstories and understories similar to younger stands, with poison ivy often predominating in the understory
- Gaps distributed throughout the stand

With time and stable site conditions, we believe that old-growth red river forests can develop from older-growth forests. We expect these old-growth forests to have basal areas equivalent or slightly lower than older-growth forests, lower tree densities, and to be dominated by elms, hackberry, ironwood, and boxelder. On higher second bottoms, beech will also be an important component.

Landscape changes have altered species composition. Many wetland forests in which the hydrology has been disturbed appear to develop overstories dominated by red maple. This shift to red maple is also apparent throughout the eastern deciduous forest, where it replaces oaks in relatively mature forests (Abrams 1992). This is probably a result of fire suppression. We have also observed that American beech is gaining prominence in red river bottom forests, particularly on the second bottoms. This is apparently a response to reduced flooding. These conditions of reduced flooding and burning are likely to continue. As a result, red maple and American beech are likely to become more common in bottomland forests than they were before European settlement.

Table 2—Understory species composition of four older-growth red river bottom stands

	Percent cover			
Species	Union Camp	Blood River S	Blood River N	Jonathan Creek
Lindera Benzoin	17.3	9.5		
Toxicodendron radicans	16.1	10.5	33.6	20.3
Smilax rotundifolia	8.9	1.8	<.1	7.8
Ilex decidua	6.9			
Viburnum prunifolium	5.6			
Boehmeria cylindrica	3.4	.9	1.0	2.3
Campsis radicans	3.4		.8	7.3
Arisaema triphylum	1.6			
Saururus cernuus	1.4	3.2	2.5	
Anisostichus capreolata	.8		1.5	.7
Viola spp.	.7	<.1	<.1	.2
Urtica dioica	.6			9.3
Cryptotaenia canadensis	.5	.5		2.3
Grasses	.4		1.6	4.6
Tovara virginica	.4	.5		.8
Lonicera japonica	.4	3.1	.2	
Onoclea sensibilis	.4			
Impatiens capensis	.2	2.9	4.3	.3
Arisaema dracontium	.2			
Crataegus viridus	.2			
Parthenocissus quinquefolia	.1	1.6		
Fraxinus pennsylvanica	.1	1.7	.3	
Passiflora lutea	.1			
Mitchella repens	.1			
Oxydendrum arboreum		6.5		
Clethra alnifolia		4.0		
Asteracea (composites)		2.6		
Sambucus canadensis		2.3		2.1
Corylus americana		2.0		
Microstegium vimineum		1.6		7.2
Polistricum spp. (moss)		1.5		
Agrostis spp.		1.4		
Aster dumosus		1.0	5.1	.2
Athyrium asplenioides		.8		
Carex spp.		.8	.7	.1
Geum canadense		.7	.1	.4
Clematis virginiana		.5		
Lactuca spp.		.5		
Sanicula gregaria		.5		.2
Vitis baileyana		.5		
Smilacina racemosa		.3		
Acer rubrum		.2		
Cornus stricta		.2	.3	
Euonymous americanus		.2		
Galium triflorum		.2		.1
Rubus allegheniensis		.2		
Hypericum spp.			.3	
Celtis occidentalis			.3	5.5
Asimina triloba				.4
Dioscorea villosa		.2		.8
Botrychium virginianum		.3		.1
Carya spp.		.3		
Ulmus americana		.3	.6	.3
Lycopus virginicus		.1		
Quercus spp.		.1	.4	.2
Pilea pumila				.2
Solidago spp.			1.2	.7
Crataegus marshallii			.5	
Peltandra virginica			.5	
Carpinus caroliniana			.2	
Juncus spp.			.1	
Acer negundo				.7
Vitis riparia				.7
Stachys tenuifolia				.6
Woodwardia aerolata				.2
Total percent cover	70	66	56	77
Total number of species	24	40	24	30

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Our goal was to develop a description of old-growth red river bottom forests of the Southeastern United States. We compared the characteristics of forests described in the scientific literature and forests we examined to various published criteria for old-growth condition. Because red rivers are a relatively new landscape feature (most < 250 years old, resulting from human-induced soil erosion) and because dramatic changes to their floodplains continue to occur, we do not believe that any old-growth red river forests exist. All the stands along these rivers present at European settlement have been cut and/or otherwise severely altered. In the dynamic landscape after settlement, there have been no opportunities for new old-growth forests to develop. Stands older than 50 to 60 years are rare. Therefore, we propose a stand condition called older growth and list the characteristics. With time and stable site conditions, we believe that old-growth red river forests can develop from older-growth forests.

Keywords: Bottomland hardwood forests, old growth, red river bottomlands.