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ATLANTIC OAK–GUM–CYPRESS

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Within the southeastern Atlantic Coastal Plain from Maryland through Florida, there are 13 million acres of oak–gum–cypress forests. These forests naturally divide into two broad types: Tupelo–cypress swamps and mixed bottom land hardwoods (*16*). Most sites of these forests are characterized by a profuse supply of water and include both alluvial and residual soils.

The best sites are the bottoms of major rivers that originate in the Piedmont and mountains. They are called "red water" rivers because of the color of their silt-laden muddy waters. Within a bottom land the soil texture is correlated with flooding: the more frequent and prolonged the flooding, the heavier the soil. Bottom lands in "black water" rivers, darkly stained with organic matter and originating in the Coastal Plain, are a smaller version of the major bottom lands. Soils are lighter textured and less fertile, and support a slightly different mixture of tree species.

Besides the alluvial soils there are broad interstream areas of tupelo–cypress swamp where soils range from heavy clays to coarse sand, to peats and mucks. Site quality is extremely variable. Finally, many swamp tupelo–cypress ponds are generally of low productivity.

Tupelo–Cypress Swamps

The deep swamps of red water bottoms are strongly dominated by water tupelo and baldcypress, with a small admixture of red maple, swamp cottonwood, green ash, and many understory species. Water tupelo is intolerant of shade and cypress only moderately tolerant; consequently, advance reproduction is sparse. Water tupelo produces good seed crops most years, occasional local bumper crops, and some complete failures (*18*). Baldcypress seed production seems to be generally adequate. Water tupelo and baldcypress seeds both float well and are dispersed by flood waters; they are also scattered by birds and animals. Both species sprout vigorously from stumps (*18*).

In non-alluvial headwater swamps, swamp tupelo is much more prevalent than water tupelo. Associates include red maple, sweetbay, redbay, and Carolina ash (*16, 18*). Seed crops of swamp tupelo are generally good to excellent, but the seeds do not float. Swamp tupelo sprouts prolifically unless the stumps are cut quite low (*4*).

The three species that characterize these swamps—water tupelo, baldcypress, and swamp tupelo—do not merely tolerate saturated soils and flooding, they thrive on them (*10*). Tupelo–cypress types are stable and will regenerate usually to what they were before cutting, although willow may temporarily dominate cutover areas (*1*). Additionally, it seems that following logging of old growth, the tupelos have gained at the expense of baldcypress for reasons unknown. Seedling establishment requires that a swamp not be flooded deeply or for any extensive period during the growing season. Tupelo and cypress seeds will not germinate under water (under natural conditions), and seedlings must grow tall enough to avoid long submergence during the growing season.

To regenerate mature swamp stands, an even-aged silvicultural system is indicated by the silvical characteristics of the tupelos and cypress. Also, existing stands are even-aged. Almost all swamps in the Southeast have been commercially clearcut at least once; little growth remained except large cull trees. Logging left good seedbed conditions provided the swamp became sufficiently dry and the cutting reduced competing shrubs and small trees. Virtually all logged areas have regenerated well; indeed, many have sapling densities far in excess of optimum.

For water tupelo and baldcypress, similar clearcutting is recommended but with the provision that cull trees be deadened. Seed will be provided by floating in if only the downstream part of a swamp is cut. Also, seed in place may remain viable for about 2 years. Germination occurs when waters recede.

Swamp tupelo–baldcypress swamps also require even-aged management. In contrast to water tupelo swamps, however, advance regeneration of swamp tupelo is often present (*13*). These swamps can be clearcut. If advance reproduction is scanty or lacking, provision should be made for a continuing supply of these non-floating seeds (*8*). Leaving a heavy shelterwood of 30 to 40 trees per acre will accomplish this. If there is a brush problem, chemical control may be necessary. When regeneration becomes established, logging of the remaining shelterwood can be accomplished with inconsequential damage to the seedlings because they sprout vigorously (*11*).

In swamps that flood deeply during the growing season, planting after clearcutting shows promise, but it is not yet on a solid operational basis. The seed-tree method is of doubtful utility in either subtype. Uneven-aged systems seem wholly unsuited to tupelo–cypress types.

Mixed Bottom Land Hardwoods

In alluvial bottom lands of major rivers, first bottoms (the sites lying immediately above swamps) support mixed stands principally of overcup oak, water oak, laurel oak, willow oak, sweetgum, water hickory, green ash, sugarberry, river birch, elms, American sycamore, and red maple. Overcup oak and water hickory are relatively more important on wetter sites having heavier soils, and sweetgum in drier areas. In addition, there is an understory composed of a variety of minor tree species and shrubs. In undisturbed stands of even moderately good density, the shrub layer is not dense nor are vines generally prolific (*18*).

In second bottoms, flooded less often and for shorter duration, cherrybark oak, swamp chestnut oak, white oak, various hickories, and white ash predominate. Loblolly pine may also be present. Among smaller associates are winged elm, boxelder, and American holly. On terrace sites, rarely flooded, American beech and yellow-poplar may be abundant. Second bottom and terrace sites are highly productive. There are, in addition, a number of other physiographic sites of varying productivity and more than 70 species to consider. The wealth of species with diverse requirements results in efficient utilization of the wide array of sites.

Most mixed bottom land species are light demanding or intermediate in shade tolerance. Very shade-tolerant exceptions are beech, small understory tree species, and shrubs. Shade tolerance will not guarantee successional trends as many stands are edaphic climaxes. Light-seeded species produce seed in abundance and that for heavy-seeded species is generally adequate for regeneration. Moreover, yellow-poplar and white ash seed remain viable for several years in the forest litter (*2*). All species produce excellent sprouts from damaged seedlings; sweetgum also sprouts prolifically from roots (*12*).

As with swamps, these mixed bottom land hardwoods are essentially even-aged—one age class in the dominant stand, perhaps another in scattered saplings and advanced reproduction. Light-demanding species predominate in these forests, thus even-aged management is in order. If adequate advance reproduction is present, as it generally is, clearcutting can be used to release it. A main consideration is that the cutting should be complete; all cull trees and other poor growing stock should be cut or deadened.

Many stands that were high-graded in the past, but not cut cleanly, now have a brush problem. Excessive brush needs to be controlled mechanically or chemically so that the reproduction can compete successfully. This can be accomplished most easily before the stand is cut. However, care must be used in treatment, as in bulldozing, which at times has resulted in an area clear of competition but also bereft of desirable reproduction. These forests are key habitats for certain species of wildlife; wildlife needs should be considered in determining cutting systems.

In the unusual situation where advance reproduction is not adequate, several options are available. If the stand is dominated by light-seeded species and they are desired, the stand may be clearcut after a good seed crop. Where sweetgum predominates, cutting can be done at any time because of prolific sprouting. If oaks are to be favored, or cutting cannot be scheduled to follow a good seed year, the shelterwood system can be used. Twenty or more of the best trees per acre of the favored species should be left (*3*). As soon as regeneration is adequate, the shelterwood should be removed, because the tolerant brush species will fare better under this partial shade than will the desirable tree species. Oak reproduction may require release from faster growing species to enable it to pull through.

If for some reason the size of regeneration areas must be kept small, the group selection system may be used. This has the disadvantage that regeneration will not develop as rapidly as in larger clearings; also epicormic sprouting occurs around the edges of clearcut groups with loss in timber quality (*6, 15*). In addition, where deer populations are heavy, reproduction in small openings is more prone to damage (*14*). Group selection, however, may have utility along roadsides and larger streams where clearcutting is esthetically objectionable.

Single-tree selection is not adapted to the southeastern bottom land types as it does not result in satisfactory development of seedlings and favors less desirable but shade-tolerant species (*9, 17*). The seed-tree method also is not recommended because in most cases seed from the residual trees is superfluous (*7*) and in others, as when oaks are favored, it is insufficient. Regeneration through planting cleared sites is rather difficult in mixed hardwoods. Competition on these rich soils is intense and natural regeneration often outgrows planted seedlings (*5*).

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