Oglethorpe Oak:
Sunset of a Species

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Oglethorpe oak (Quercus oglethorpensis) is a newcomer to our tree-filled world. Originally thought by botanists to be a Southern form of shingle oak (Quercus imbricaria), a more careful series of observations proved otherwise. Oglethorpe oak was identified along a quiet creek in 1940 by a brilliant plant taxonomist, Professor Wilbur Duncan. He named the tree after Oglethorpe County, Georgia where he had first identified the tree. The name honors the British general James E. Oglethorpe (1696-1785), founder of the city of Savannah and the colony of Georgia.

A White Oak By Any Other Name

Oglethorpe oak is a member of the beech family. Oglethorpe oak is in the white oak group of oaks, and was probably not recognized earlier because its bark closely resembles white and post oak which also grow in the area. The typical tree of record was discovered along Buffalo Creek, 8 miles east of Lexington, GA in 1940. This oak is a rarity and seldom seen partially because of its low population numbers and because of its isolated habitat. Seedlings in the wild are rare. Small to medium sized trees will produce stump sprouts if damaged.

Oglethorpe oak is not listed or given any federal protection, but is a species which has been examined for federal protection. It was given a relative low priority compared with other species. It is listed by Georgia as "threatened" and by South Carolina as a species of "concern." By most definitions of protected species legislation, and associated administrative definitions, Oglethorpe oak is a species threatened with extinction in the foreseeable future.

Home Range

Oglethorpe oak grows in the Georgia and South Carolina Piedmont, and in isolated pockets on the Coastal plain of Louisiana and Mississippi. See Figure 1. Altogether there are fewer than 150 historic locations identified, of varying site and tree quality. There are approximately 70 sites in Georgia found in Elbert, Greene, Jasper, Oglethorpe, and Wilkes counties in the Northeast part of the State. There are about 70 sites in South Carolina found in Abbeville, Edgefield, Greenwood, McCormick, and Saluda counties in the Western part of the State. Three sites are found in Mississippi in Scott, Smith, and Jasper counties all on the Bienville National Forest (less than 100 stems total -- all less than eight inches in diameter). The last single site is found in Louisiana's Caldwell parish.

It is clear more trees probably exist but remain hidden in the marshes and stream bottoms of the Piedmont and Coastal Plain across the Southeast. Because the mature trunks can be mistaken for other white oak group trees, a more careful examination is warranted. It is also clear land use changes have (and continue to) disturb forests and disrupt hydrologic processes responsible for regeneration of this species. Several sites identified in the first few decades after discovery, no longer contain any individu-

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als of this species. Coupled with a serious pest problem (chestnut blight), Oglethorpe oak may be on its way out of the ecological system of the Southeast.

Who Are Your Parents?

There has been much confusion regarding the genetic background of Oglethorpe oak. It appears in the field to share many Winter traits with white oak (Quercus alba) and post oak (Quercus stellata). Within the white oak group, Oglethorpe oak most closely resembles the Durand oak (Quercus durandii or Q. sinuata var. sinuata), with some people considering it a variety of Durand oak. Note its similarity to Quercus durandii, not the bluff oak (Q. austrina) which is considered by some to also be a variety of Quercus durandii. Oglethorpe oak may be a relic derived from an outlying and long disconnected population of Durand oak. Oglethorpe oak does form hybrids with white oak.

Sites Called Home

Oglethorpe oak grows in stream bottoms and on first terraces where the soil is either heavy and poorly drained Piedmont soils, or marshy, poorly drained flatwood soils which are not sandy. Sites have very poor drainage but are not necessarily prone to flooding. Good drainage and sandy soils are detrimental to growth. Acorn germination requirements are wet, poorly drained mineral soils but not stagnant standing water or complete soil saturation. Oglethorpe oak does not colonize new areas well and is easily out-competed for newly opened sites by herbaceous and shrub layer species. Acorns quickly loose viability within weeks of falling from the tree, if they are not damaged by fungi or consumed by animals.

Few trees have been moved successfully out of their habitats to upland, street, yard, or park sites. The tree is difficult to successfully transplant and maintain, especially with the chestnut blight fungus prevalent in the native forest. Oglethorpe oak grows across winter hardiness zone 7 and 8. Extending its growth range is possible, but reducing all stress causing agents and control of chestnut blight would be essential. The reason Oglethorpe oak survives in heavy, poorly drained soils can be partially explained because the chestnut blight fungus can not survive nor move well under these soil conditions. Oglethorpe oak grows in small wet areas where the blight cannot effectively attack. This also suggests Oglethorpe oak used to be in much greater numbers and on many more sites before 1900. It would have been decimated within the last century.

Size Matters

Oglethorpe oak is a medium-large sized tree usually reaching 60 to 80 feet in height. Maximum expected size under ideal old-growth circumstances is 8 feet in diameter and 65 feet tall with a crown spread of 70 feet. Expected normal size is 65 feet tall, 1.5 feet in diameter with a 45 feet crown spread. A good example of tree form and growth proportion (for a 25 year old tree), in an easily accessible location, is on the Oglethorpe county courthouse square in Lexington, Georgia.

Leaves

Oglethorpe oak leaves are deciduous, simple, and alternate along the twig. Leaves are narrowly elliptical with the leaf widest at or just beyond the leaf center. The leaf blade is thin but leathery, and yellowish-green in color. The leaf has a blunt tip with no bristle. Leaves are 2-6 inches long and 1-2.5 inches wide. The leaf margin is straight (entire) to slightly wavy. Some leaves, including juvenile leaves, can have edges which undulate strongly. Some juvenile leaves may have rare shallow lobes or “bumps” along the leaf margin near the tip. The leaf is smooth and somewhat shiny on the top. The underside of the leaf is covered with clumps, clusters or fields of tricombes (hairs), with density ranging from sparse to velvety. The tricombes are yellowish to tan in color and are branched with rays spreading parallel with the leaf surface. These tricombes are fused together at their base (in a pedestal) and spread

apart near their tips. The main vein on the leaf underside is yellow in color. Leaves have a very short stock (petiole) of less than 1/4 inch in length. In Fall and Winter leaves turn bright reddish-brown fading to brown, and persist on the tree until late into the Winter. (See Figure 2.)

Field of Confusion

Oglethorpe oak leaves can be confused with Durand oak (Q. durandii). The leaves can be confused with wider willow oak (Q. phellos) leaves, except for willow oak's bristle tip and no tricombes on the underside except tufts in vein axils. Shingle oak (Q. imbricaria – in the red oak group) can also be confused with Oglethorpe oak although the native ranges do not overlap – shingle oak is a more Northern tree. Shingle oak has leaves which are shiny on the upper side and pale with white hairs beneath. The clear features to use for best results in identifying Oglethorpe oak are white oak-like bark, narrow elliptical and unlobed leaves, and the relatively dense yellowish star-shaped hairs on leaf undersides.

Flowering

Oglethorpe oak is a monecious tree with both sexes of flower on the same tree, but separated into either male or female flowers. The male flowers are dangling catkins growing from the axils of last years leaves. The male flowers release pollen into the turbulent winds of Spring. The wind delivers pollen to receptive female flowers growing near the ends of twigs. The female flowers are small, short, greenish-colored spikes. Female flowers are easily damaged by late frosts, fungi, and insects, leading to poor acorn crops in many years. Oglethorpe oak flowers in early April.

Acorns

Oglethorpe oak's seed is a solitary or paired acorn. The acorn is small (½ to 2/3 inches long), round to oval, dull looking, dark reddish-brown in color, and covered with small flattened tricombes. The acorns grow directly from the twig or on very short stalks (<1/4 inch long). The acorn cap is bowl-like, not saucer-shaped, covering 1/3 to almost ½ of the acorn. The cap has many flattened, dull reddish-brown to grey-colored, hairy scales. The seed matures in the same year as it forms and has no cold requirement for germination. Acorns grow from the first year's twig. The seed immediately starts to germinate when it falls, but is prone to many types of damage in the wet understory. Acorn crops are usually small in number with poor viability. Acorns fall in October and November.

Buds, Twigs & Bark

Oglethorpe oak's twigs are somewhat shiny brown with purplish and red tints when young, turning grey with age. Twigs have scattered, stalked star-shaped tricombes when young, becoming smooth with age. Terminal buds are reddish-brown to brownish-grey in color, blunt, and small (<1/10 of an inch long) with rounded, hairy scales. Leaf scars are half round in shape and show many bundle scars. Lenticels are noticeably slightly oblong and light grey in color. There are usually many sprouts growing along the stem and branches, especially when the tree is stressed. The crown usually appears filled with sprouts and a dense growth of twigs. Bark of Oglethorpe oak is typical of white oaks. The bark is light grey to dull whitish in color with thin, scaly plates. The bark appears to be at a slightly smaller scale and more stringy than white oak. Smooth patch, a bark rotting fungi, may be present. Oglethorpe oak can be confused in the field with white oak (Q. alba), post oak (Q. stellata), and sand post oak (Quercus margaretta) bark characters.

Wood

The wood of Oglethorpe oak is ring porous. The mechanical properties are similar to white oaks. There are several noticeable differences between Oglethorpe oak and other white oaks – hardness value, compression strength, bending strength, and shear strength are all significantly greater in

Oglethorpe oak. Shrinkage rate upon drying was considered moderate compared with other white oaks. Only live oak, among the white oaks, is more dense than Oglethorpe oak. Oglethorpe oak specific gravity is 0.69 for green wood and 0.76 for dry wood. Care should be taken with these wood property values as they were derived from a small number of medium-small diameter trees with slow growth (~16 annual increments per inch).

Serious Pest

Oglethorpe oak is burdened with a susceptibility to chestnut blight. This blight organism remains resident in our native oak forests, living as a minor pest on other white oaks (i.e. post oak – Quercus stellata). Chestnut blight attacks Oglethorpe oaks especially hard when the tree is stressed by site resource changes, or by injury. Soil drainage improvements can initiate attacks. New wounds are easily infected. Chestnut blight generates stem and branch cankers which kill the cambium area. Initially the canker swells pushing out and cracking the bark. Later as the canker ages, the canker area becomes sunken as the tree attempts to compartmentalize the infection site. The bark over the canker can fall away leaving lines and fields of many tiny orange-yellow fruiting bodies. Multiple cankers grow and girdle the stem, killing the tissue above. Oglethorpe oak releases sprouts below the canker.

Chestnut blight is so damaging, most other pests which attack the white oaks can be present but are overshadowed in their impact by the blight. Chestnut blight causes many stem and branch cankers to form, many dormant buds to be released forming sprouts, and generates a crown with many dead twigs and branches before death. All the pathology research work has concentrated on resurrecting the American chestnut (Castanea dentata), not Oglethorpe oak. There is no cure or treatment of practical use. Within another 40 years, large Oglethorpe oaks may be gone. Within this century the species may be extinct.

Mindful Things

Oglethorpe oak can be treated as a white oak in most management systems. Managerial peculiarities concern the sites and the ever present chestnut blight fungi. Key components of good management is not changing how water moves in or across the soil. Improving drainage or altering water movement can generate poor growing conditions, abiotic stress, and opportunities for pests. Oglethorpe oak is not tolerant of resource limiting competitors, especially invasive exotics. It is a poor invader of newly opened sites even with scarification of the litter layer. Because Oglethorpe oak stump sprouts from small and medium sized trees, this oak can hold onto site through vegetative means.

Care must be taken with dry season fires as Oglethorpe oak seedling and pole-size trees are fire sensitive. Running prescribed fires into bottoms should be avoided. It is also critical that oak sites be fenced and domestic animal grazing be prevented. Silvicultural use of a single tree selection or group selection cutting prescription should be used which exposes mineral soil and releases some light resources, but controls shrub layer competitors. Exploring chemical competition control with this species is needed. More silvicultural research is required for effective Oglethorpe oak management.

What's Left

Since its discovery, almost 90% of the original Oglethorpe oak sites still remain. The sites lost include a lake inundation and agricultural land clearing. Because of the soil productivity values and access problems associated with many Oglethorpe oak sites, most of the trees remaining are probably immune from much active land use changes. Unfortunately, most of the damage to Oglethorpe oak populations occurred in the previous 200 years before botanical discovery when land clearance, settlement, agricultural production, and chestnut blight all took their toll. More sites and trees exist, but systematic surveys away from current growing locations are not available. (See Figure 3.)

Significant Literature

Scientific literature about Oglethorpe oak is listed below. This list is not comprehensive but allows tree managers and owners to explore major works and writings of important workers who have studied Oglethorpe oak.

Bishop, G.N. & W.H. Duncan. 1941. A new white oak from Georgia: Its associates and habitat. Journal of Forestry 39:730-731.

Brown, C.L. & L.K. Kirkman. 1990. **Trees of Georgia and Adjacent States**. Timber Press, Portland, OR. Pp.292.

Coombes, A.J. & W.N. Coates. 1997. Oglethorpe and the Oglethorpe oak. Arnoldia 57(2):25-30.

Duncan, W.H. 1940. A new species of oak from Georgia. American Midland Naturalist 24(3):755-756.

Duncan, W.H. 1950. Quercus oglethorpensis – Range extensions and phylogenic relationships. Lloydia 13(4):243-248.

Duncan, W.H. & M.B. Duncan. 1988. **Trees of the Southeastern United States**. University of Georgia Press, Athens, GA. Pp.322.

Haehnle, G.G. 1983. The phytogeography, autecology, and chemotaxonomy of the Quercus oglethorpensis population in South Carolina. Forestry Abstracts 44(11):711. (abstract of a MS thesis from 1981, Clemson University, South Carolina.)

Haehnle, G.G. & S.M. Jones. 1985. Geographical distribution of Quercus oglethorpensis. Castanea 50(1):26-31.

Kral, R. 1983. **A Report on Some Rare, Threatened, or Endangered Forest-Related Vascular Plants of the South** – Volume I: Isoetaceae through Euphorbiaceae. Paper #36, pp. 297-300. USDA-Forest Service, Southern Region, Technical Publication #R8-TP 2. Atlanta, GA.

Lee, A.W.C. & M.A. Taras. 1985. Strength and related properties of Oglethorpe oak. Forest Products Journal 35(2):50-52.

Marx, P.S. & R.D. Thomas. 1975. A survey of the vascular plants of Caldwell Parish, Louisiana. Louisiana Academy of Sciences 38:75-85.

Miller, H.A. & S.H. Lamb. 1985. **Oaks of North America**. Naturegraphs Publishers, Happy Camp, CA. Pp.327.

Patrick, T.S., J.R. Allison & G.A. Krakow. 1995. **Protected Plants of Georgia**. Georgia Department of Natural Resources, Georgia Natural Heritage Program. Atlanta, GA.

Thomson, P.M. & R.H. Mohlenbrock. 1979. Foliar tricombes of Quercus subgenus Quercus in the Eastern United States. Journal of the Arnold Arboretum 60:350-366.

Wiseman, J.B. 1987. Quercus oglethorpensis in Mississippi. Castanea 52(4):314-315.

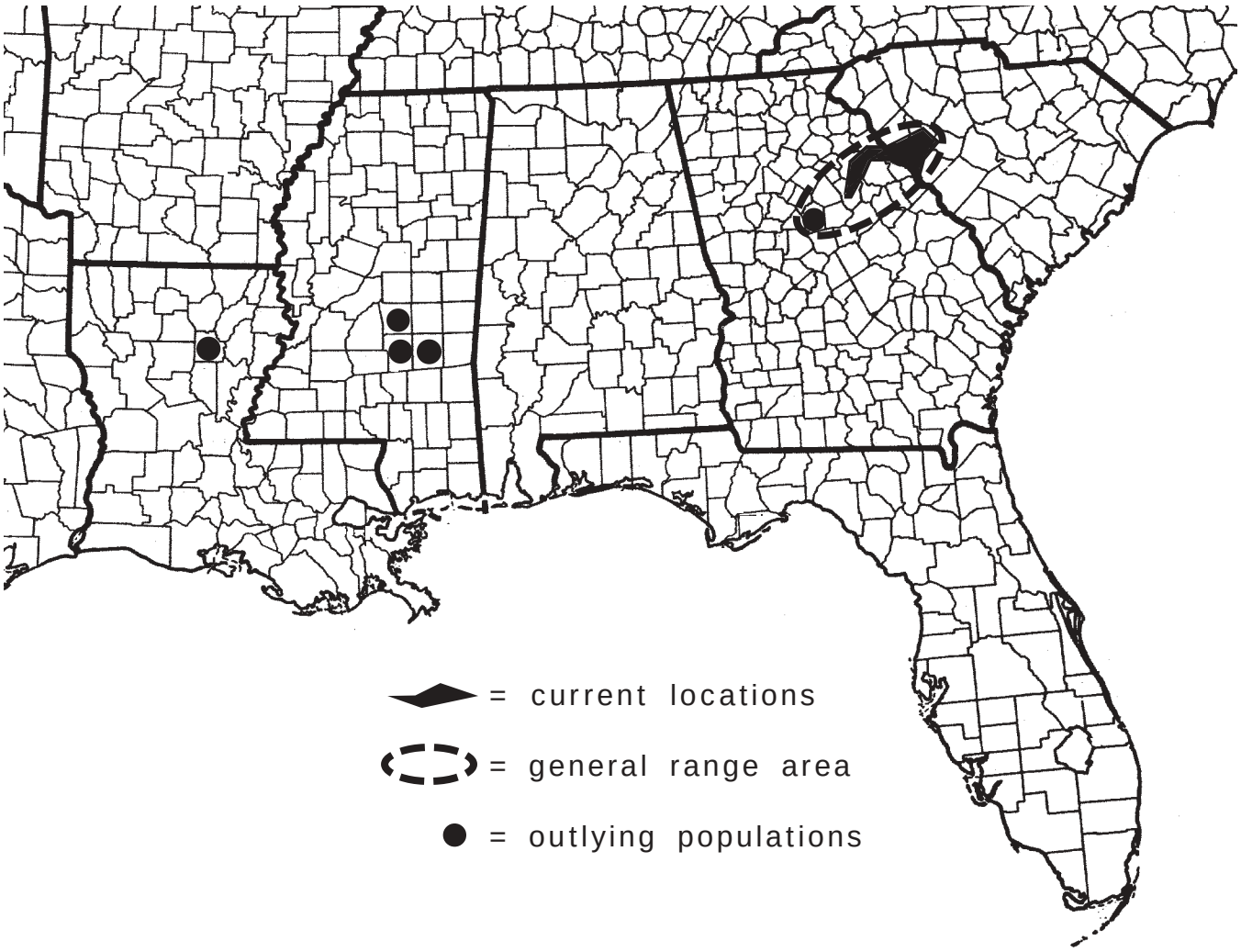

Figure 1: Native range of Oglethorpe oak -- Quercus oglethorpensis.

Map derived from:

Haehnle, G.G. & S.M. Jones. 1985. Geographical distribution of Quercus oglethorpensis. Castanea 50(1):26-31.

Little, Elbert L., Jr. 1977. **Atlas of United States Trees:** Volume #4 -- Minor Eastern Hardwoods. USDA-Forest Service, Miscellaneous Publication #1342. Washington D.C.

Marx, P.S. & R.D. Thomas. 1975. A survey of the vascular plants of Caldwell Parish, Louisiana. Louisiana Academy of Sciences 38:75-85.

Wiseman, J.B. 1987. Quercus oglethorpensis in Mississippi. Castanea 52(4):314-315.

Figure 2: Scan of selected leaves from Oglethorpe oak -- Quercus oglethorpensis representing general variability in leaf size.

(Leaves from Oglethorpe County, GA.)

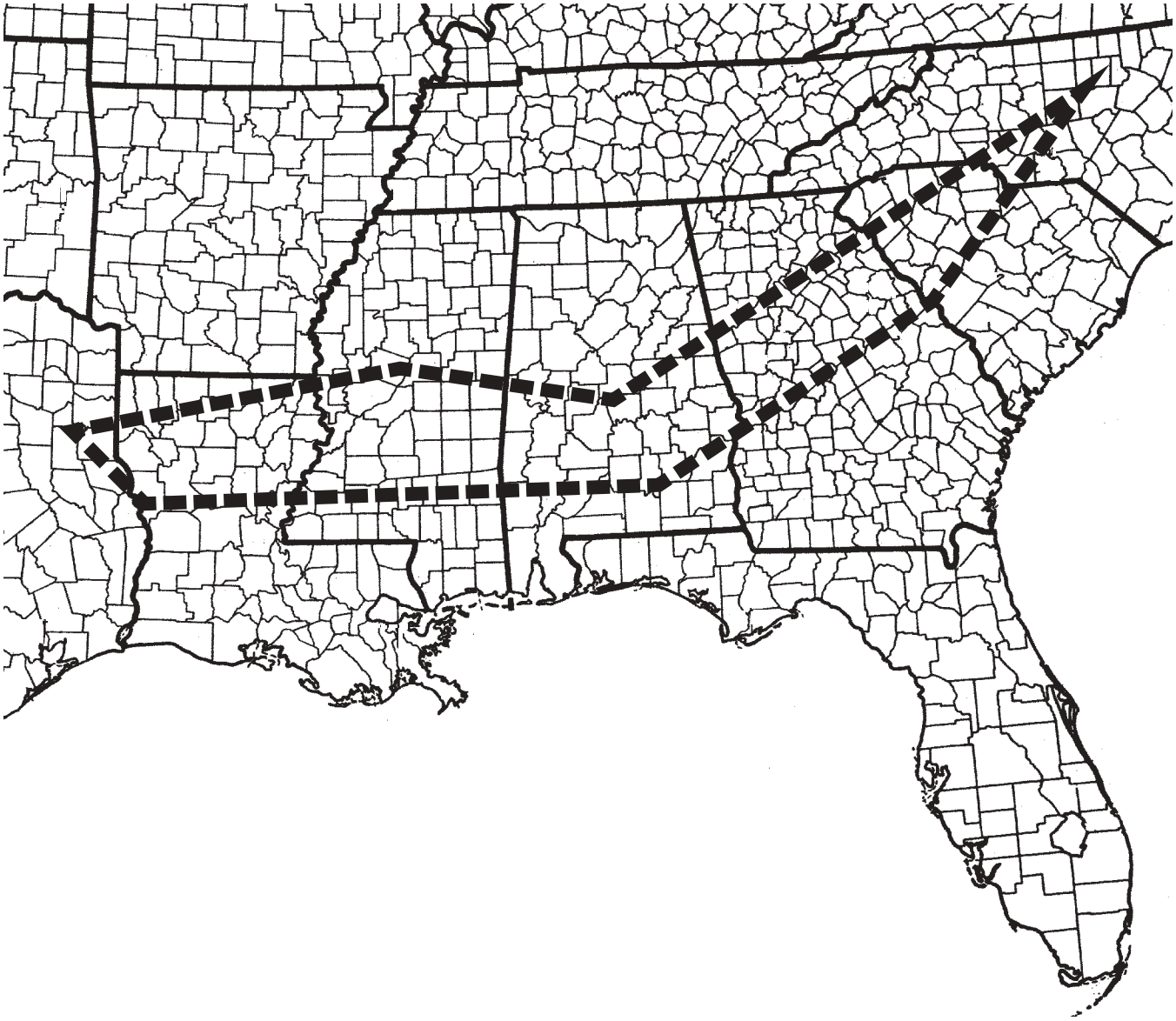

Figure 3: Potential growth range and search area for additional Oglethorpe oak -- Quercus oglethorpensis populations based upon silvics and site preferences.