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Old-Growth Communities

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Members of our pine savanna research team in awe of the high biodiversity groundcover at Blackwater River State Forest, FL. Photo courtesy of Jonathan Myers.

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EXPANDING THE "OLD-GROWTH" CONCEPT TO SOUTHEASTERN GROUNDCOVER

High-biodiversity native groundcover across the southeastern U.S. is special, in part because it is a characteristic component of the ancient vegetation types that naturally assembled here.

Setting the stage: The "old-growth" forest concept

For many of us, the longstanding phrase "old-growth forest" conjures up images of big trees, a diversity of organisms, and a pleasant place in which to enjoy the biophilic benefits of nature. Old-growth forests are stands in which the forest community type is an ancient—and generally predominant—element of the broader landscape, and whose current membership assembled over an extended period of time. Each old-growth forest stand has enjoyed forest status for a very long stretch without severe human-caused nor catastrophic natural disturbance (yet allowing for the characteristic small-impact disturbances of natural treefall gaps, animal burrows, etc.). In the U.S. Forest Service's first nationwide inventory of old-growth forests within the 178,488,890 acres of Forest Land under Forest Service and Bureau of Land Management jurisdiction (excluding non-inventoried portions of Alaska), only 18.3% was classified as "old-growth."[1] In short, **old-growth forests are very special for various reasons, including their antiquity and scarcity.**

Expanding the "old-growth" concept to grasslands, savannas, and open-canopy woodlands

Joe Veldman and colleagues argued that the world's ancient grasslands, savannas, and open-canopy woodlands "suffer from an image problem among scientists, policy-makers, land managers, and the general public."[2] The problem is that these community types are frequently misinterpreted. Ancient grasslands, savannas, and woodlands are all too often viewed as second best (or worse) seral or successional transients for the sites they occupy, as opposed to being the very types of communities that nature chose, or they are conflated with atypical, human-derived vegetation that results from land use. One solution to the problem is to more accurately position them within the global constellation of natural community types. **By applying "old-growth" status to all worthy communities, we better acknowledge just how special they are and better characterize them for future management and restoration.**[2,3]

Cleistesiopsis bifaria *(small spreading pogonia), a showy orchid which is endemic to the southeastern U.S., in bloom about two months after a prescribed fire at The Nature Conservancy's Lake Ramsay Preserve, LA. Photo by K. E. Harms.*

Our prime remnant and restored southeastern U.S. habitats of all sorts deserve the same reverence that we readily apply to old-growth closed-canopy forests. Actually, that's not much of a stretch for us here in the Southeast since we already recognize how important the groundcover is as a component of old-growth longleaf pine habitat.[4] I simply want to help promote the use of the old-growth label for all deserving relatively continuous herbaceous groundcover here on the Southeastern Coastal Plain.

It is important to recognize that terms like "forest," "woodland," "savanna," and even "old-growth," are all human constructs. Each of these labels can be applied objectively once practical criteria are established to classify particular sites, but the specific conditions for each label are arbitrary. For example, a continuum of tree-canopy cover exists from grassland, to savanna, to woodland, to forest, such that any quantitative divisions along that continuum are subjectively positioned. As soon as we define "forest" or "old-growth" by strict criteria (e.g., a threshold basal area or age), we have arbitrarily chosen conditions that separate forest from non-forest or old-growth from non-old-growth. Even so, these human-made concepts and criteria are useful since they provide objective means to classify vegetation in specified sites and compare vegetation among sites.

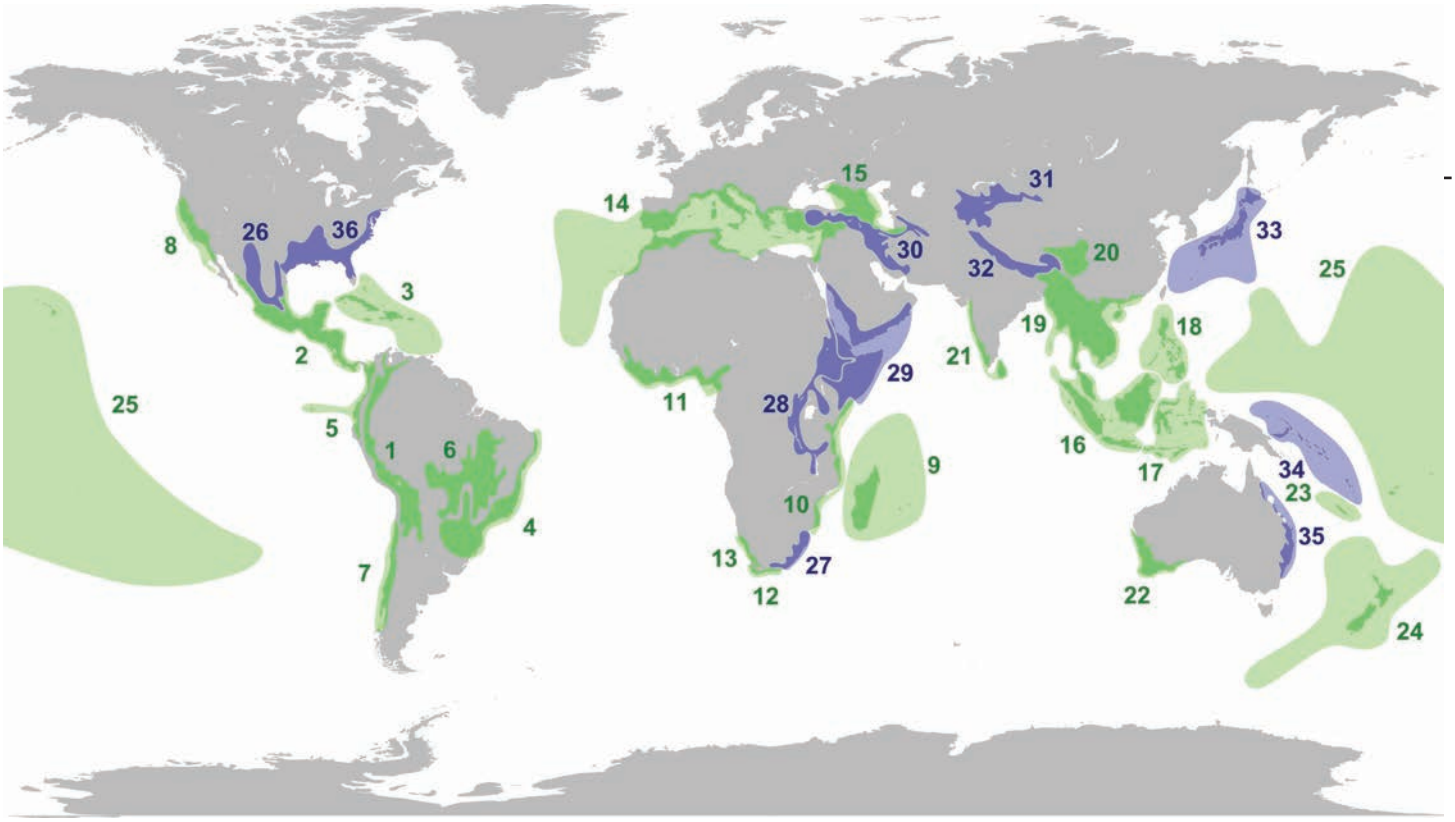
Mostly perennial plants in a half-square meter sampling quadrat resprouting about one month after a prescribed fire in the pine savanna at Camp Whispering Pines Girl Scout Camp, LA. Photo courtesy of Jonathan Myers.

Whether we label a particular site grassland, savanna, woodland, or forest, if that community type is meant to be in the site and has enjoyed long-term, relatively undisturbed persistence in the site, it should be considered "old-growth." These special natural communities in the Southeast share several attributes with old-growth communities worldwide: community assembly over long periods of time, generally high biodiversity (within each site's biogeographic context), invaluable natural capital plus ecosystem services, and vulnerability to anthropogenic destruction or degradation.

Long-term community assembly in the 36th global biodiversity hotspot

In 2016 the North American Coastal Plain (NACP), which contains the geographic range of precolonial longleaf pine ecosystems, was recognized as the 36th global biodiversity hotspot[5] (see map). Norman Myers[6] conceived of the global hotspot idea, then developed it with collaborators, including conservation biologists from Conservation International.[7] In the southeastern U.S., only the southern tip of Florida was included by 2000, forming part of the Caribbean hotspot. However, clear criteria were established to potentially add other regions of the globe. To be considered a biodiversity hotspot, a region must: (1) contain more than 1500 endemic species of plants, and (2) have lost more than 70% of its historic habitat. Noss et al.[5] marshaled the evidence, and now we're on the map!

Beyond demonstrating that the NACP meets the criteria for inclusion on the global biodiversity hotspot map, Noss et al.[5] detailed the evidence for long-term community assembly in ecosystems throughout the region. For example, even though shortgrass, mixed grass, and tallgrass North American prairies of the Midwest and Great Plains are also ancient ecosystems,[8] many of those sites were covered by ice a mile or more thick during the most recent ice age (in some places right up until only about 12,000 years ago). In sharp contrast, the NACP remained glacier-free during the Last Glacial



Global Biodiversity Hotspots. Regions identified by 2000 are shown in green, with subsequent additions in blue. The North American Coastal Plain is #36. Map courtesy of User: Ninjatacoshell, Wikimedia Commons, CC BY-SA 3.0.

Period (115,000 - 11,700 years ago). The best available evidence indicates that relatively continuous, potentially high-diversity, herbaceous groundcover with discontinuous oak or pine canopies was common across the region for at least several tens of thousands — if not hundreds of thousands — of years.[9]

High-diversity groundcover

Our remnant and restored southeastern U.S. native groundcover often boasts extreme levels of biodiversity. This became broadly known when Joan Walker and Bob Peet[10] published results from Joan's dissertation research in North Carolina's Green Swamp and compared them to global compilations of groundcover diversity values. Walker and Peet[10] reported that "vascular plant richness was often near 40/m^2." Values in the 30s/m^2 from other frequently burned sites have since been reported,[11,12] and a single 1000-m^2 plot in Florida contained 168 species.[13]

Land managers and others across the Southeast have long known that groundcover diversity quickly declines under fire suppression.[14] **Frequent, low-intensity fire is the keystone process that helps maintain the groundcover diversity and structure.**[15] Resprouting perennials, not recruits from seed, account for the majority of post-fire biomass and species diversity. Even though fire keeps hardwood encroachment at bay in many ancient natural grasslands, savannas, and open-canopy woodlands, closed-canopy hardwood forests are not the successional "climax" state — they are aberrant results of anthropogenic fire suppression that can eliminate old-growth, high-diversity groundcover.[16,17]

Identifying old-growth groundcover

Just as the U.S. Forest Service has designed protocols to identify old-growth forest stands across forest-community types,[1] it would be helpful to develop methods to identify old-growth non-forest communities of all types across the southeastern U.S. In fact, it may be useful to develop methods to identify old-growth groundcover assemblages independent of the tree canopy. **In many individual sites, it may be that even though the trees would not meet old-growth standards, the groundcover nevertheless would, or vice versa.**

Dendochronology can often provide good estimates of ages for trees with annual rings, but similar tools are generally unavailable for herbaceous plants. Even so, ages can sometimes be inferred through demographic studies. Estimating the lifespans of perennial groundcover plants would provide valuable data for efforts to assess the minimum ages of groundcover assemblages. Many native bunchgrasses in our region are likely to have lifespans extending substantially beyond a century, as is true for some western U.S. bunchgrasses; for example, Lauenroth et al.[18] estimated individual-plant lifespans of 500 years for blue grama *(Bouteloua gracilis)* under lightly grazed conditions on the ancient Great Plains shortgrass steppe. Here in the Southeast, clonal shrubs — such as gallberry *(Ilex glabra)* — may live for at least centuries, and lifespans for genets (genetically unique individuals) of clonal saw palmetto *(Serenoa repens)* may exceed 10,000 years.[19] Many herbaceous non-tussock-forming species may live for decades to centuries. For example, orchids like small spreading pogonia *(Cleistesiopsis bifaria)* have the

potential for prolonged dormancy between reproductive events,[20] which complicates estimating the ages of individuals, but is one innate mechanism for their potential longevity.

Valuing natural capital and ecosystem services of old-growth groundcover

We need detailed economic analyses to fully understand the value of natural capital and ecosystem services in high biodiversity and/or old-growth groundcover across the southeastern U.S. Ecosystem services such as maintenance of pollinator populations, groundwater recharge, and natural carbon sequestration operate via Southeastern grassy groundcover. Monetizing the value of fully functioning high-diversity and/or old-growth groundcover would help determine the appropriate levels and sources for incentive programs for management and restoration.

High-biodiversity native groundcover across the Southeast is a defining feature of the ancient vegetation types meant to be here. Some of it deserves the extra-special status of "old-growth"; much of it could attain that status over the longer term. Managing and restoring the groundcover — not just the appropriate canopy trees across our Southeastern regional landscapes — should remain among our highest priorities. A groundcover focus is especially compelling now that global leaders have agreed to the "30 by 30" goal, i.e., to ensure the sound management and restoration of at least 30% in each of the the planet's ecosystems (not simply individual species of importance) by 2030 (United Nations Kumming-Montreal Global Biodiversity Framework, 2022 and separate U.S. Executive Order on Tackling the Climate Crisis at Home and Abroad, 2021).

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COVER Groundcover and longleaf pine restoration on the Apalachicola Bluffs and Ravines Preserve, Florida. Photo by Andrew Kornylak, courtesy of The Nature Conservancy.

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