



Salt Lake Wildlife Management Area (Brevard County)

Photo by J. Richard Abbott

Mesic Hammock

Description: Mesic hammock is a well-developed evergreen hardwood and/or palm forest on soils that are rarely inundated. The canopy is typically closed and dominated by live oak (*Quercus virginiana*), with cabbage palm (*Sabal palmetto*) generally common in the canopy and subcanopy. Southern magnolia (*Magnolia grandiflora*) and pignut hickory (*Carya glabra*) may be occasional in the subcanopy. These species become less important where they reach their southern extent just north of Lake Okeechobee. South of this region, the overstory may contain a few tropical species such as gumbo limbo (*Bursera simaruba*) and satinleaf (*Chrysophyllum oliviforme*). Water oak (*Q. nigra*) and laurel oak (*Q. hemisphaerica*) may also be frequent in this community. Other than pignut hickory, only a few deciduous species such as sweetgum (*Liquidambar styraciflua*) and sugarberry (*Celtis laevigata*) are found in the canopy and subcanopy layers. Pine trees, particularly slash pine (*Pinus elliottii*) or loblolly pine (*P. taeda*), may form a sparse emergent layer.

The shrubby understory may be dense or open, tall or short, and is typically composed of a mix of saw palmetto (*Serenoa repens*), American beautyberry (*Callicarpa americana*), American holly (*Ilex opaca*), gallberry (*I. glabra*), sparkleberry (*Vaccinium arboreum*), hog plum (*Ximenia americana*), common persimmon (*Diospyros virginiana*), highbush blueberry (*Vaccinium corymbosum*), Carolina laurelcherry (*Prunus caroliniana*), yaupon (*I. vomitoria*), wild olive (*Osmanthus americanus*), and/or wax myrtle (*Myrica cerifera*).

Tropical shrubs such as Simpson's stopper (*Myrcianthes fragrans*), myrsine (*Rapanea punctata*), and wild coffee (*Psychotria nervosa*) are common in more southern mesic hammock. The herb layer is often sparse or patchy and consists of various graminoids, including low panic grasses (*Panicum* spp.), witchgrasses (*Dichantherium* spp.), woodsgrass (*Oplismenus hirtellus*), longleaf woodoats (*Chasmanthium laxum* var. *sessiliflorum*), sedges (Cyperaceae), and whip nutrush (*Scleria triglomerata*), as well as various ferns and forbs such as bracken fern (*Pteridium aquilinum*) and partridgeberry (*Mitchella repens*). Toothpetal false rein orchid (*Habenaria floribunda*) and other ground orchids are occasional.

In the central and southern peninsula, abundant epiphytes on live oaks and cabbage palms are a characteristic feature of mesic hammocks. In addition to the ubiquitous Spanish moss (*Tillandsia usneoides*) and other air-plants (*Tillandsia* spp.), epiphytic ferns such as resurrection fern (*Pleopeltis polypodioides* var. *michauxiana*), golden polypody (*Phlebodium aureum*), and shoestring fern (*Vittaria lineata*) are common in undisturbed stands. The most northern ranging epiphytic orchids in Florida, green fly orchid (*Epidendrum conopseum*) and Florida butterfly orchid (*Encyclia tampensis*), occur in mesic hammock. Vines are common and often abundant, occasionally creating a solid groundcover in disturbed hammocks. Species include muscadine (*Vitis rotundifolia*), sarsaparilla vine (*Smilax pumila*), greenbriers (*Smilax* spp.), yellow jessamine (*Gelsemium sempervirens*), eastern poison ivy (*Toxicodendron radicans*), crossvine (*Bignonia capreolata*) and Virginia creeper (*Parthenocissus quinquefolia*).

Mesic hammock may occur as "islands" on high ground within basin or floodplain wetlands, as patches of oak/palm forest in dry prairie or flatwoods communities, on river levees, or in ecotones between wetlands and upland communities. Historically, mesic hammocks were likely restricted to naturally fire-protected areas such as islands and peninsulas of lakes (Harper 1911). Other landscape positions that can provide protection from the spread of fire from one or more directions are thus likely places for mesic hammock development. These include edges of lakes, sinkholes, other depressional or basin wetlands, and river floodplains.

Soils of mesic hammock are sands mixed with organic matter and may have a thick layer of leaf litter. Rock outcrops are common in some hammocks, especially where limestone is near the surface. In South Florida, tree islands in the Everglades occasionally develop mesic hammock on organic soils, while further west in the Big Cypress, soils supporting mesic hammock are sandier (Wade et al. 1980). Mesic hammocks occupy soils that, although well-drained, maintain high moisture by heavy shading of the ground layer and accumulation of litter (USFWS 1999). Although mesic hammock is not generally considered a fire-adapted community, some small patches of hammock occurring as islands within marshes or prairies may experience occasional low-intensity ground fires.

Characteristic Set of Species: live oak, southern magnolia, cabbage palm, pignut hickory, American beautyberry

Rare Species: Rare plants occurring in mesic hammock include auricled spleenwort (*Asplenium erosum*), dwarf spleenwort (*Asplenium pumilum*), hammock rein orchid (*Habenaria distans*), Cooley's water-willow (*Justicia cooleyi*), Florida spiny-pod (*Matelea floridana*), pigmypoies (*Monotropsis odorata*), plume polypody (*Pecluma*

plumula), terrestrial peperomia (*Peperomia humilis*), pinkroot (*Spigelia loganioides*), green ladies'-tresses (*Spiranthes polyantha*), Peters' bristle fern (*Trichomanes petersii*), Craighead's nodding-caps (*Triphora craigheadii*), and Rickett's nodding-caps (*Triphora rickettii*).

Rare animals that commonly utilize mesic hammocks include eastern diamondback rattlesnake (*Crotalus adamanteus*), eastern indigo snake (*Drymarchon couperi*), Cooper's hawk (*Accipiter cooperii*), short-tailed hawk (*Buteo brachyurus*), crested caracara (*Caracara cheriway*), swallow-tailed kite (*Elanoides forficatus*), Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), Florida panther (*Puma concolor coryi*), southeastern weasel (*Mustela frenata olivacea*), Florida long-tailed weasel (*M. f. peninsulae*), southeastern bat (*Myotis austroriparius*), mangrove fox squirrel (*Sciurus niger avicennia*), and Florida black bear (*Ursus americanus floridanus*).

Range: Mesic hammock occurs throughout most of the Florida peninsula southward to Dade and Collier counties. It also extends north to North Carolina and west through the Florida Panhandle to Texas, although it is uncommon except near the coast in these areas. Mesic hammock is most common in Central Florida, south of the range of most deciduous tree species found in upland hardwood forests; however, these two communities overlap broadly in distribution in the eastern Panhandle, on the Brooksville Ridge, and in the northern peninsula (Greller 1980).

The term "hammock" often refers to a variety of hardwood forest types. In Florida, the name has been applied specifically to evergreen hardwood forests (Harper 1905). Harper (1911) noted that this type of vegetation was predominant on peninsulas and islands in the Lake Region of Florida, and contrasted with the pine savannas of the surrounding land.

Natural Processes: Mesic hammocks are not considered fire-adapted communities, although cabbage palms are fire tolerant and live oaks have a limited capacity to re-sprout from rhizomes (Vince et al. 1989; Cavender-Bares et al. 2004). These species tend to dominate in small mesic hammocks found in prairies that experience frequent low intensity fires (USFWS 1999). Destructive ground fires capable of killing most of the hammock vegetation are possible on organic substrates where the upper soil layer may be completely consumed, damaging roots and preventing resprouting (Wade et al. 1980). Although mesic hammock may develop on many soil types in peninsular Florida if protected from fire, whether naturally or artificially, there is evidence that more fertile soils will support hammocks even in the presence of regular fire (Harper 1921; Simons 1990).

Mesic hammock can arise in pyrogenic, naturally pine-dominated areas when shielded from fire as a result of human activities, a common example being old home sites overgrown with oaks and cabbage palms. Once mature, oaks and cabbage palms can provide shade and leaf litter that subsequently "fire-proof" an area and allow for the establishment of other hammock species (Davis, Jr. 1943; Craighead 1971). Hardwoods will also invade from the edges of natural hammocks into pine-dominated communities in the absence of fire. These invading hammocks are generally more species-depauperate than natural hammocks in the understory and often have an emergent pine canopy (USFWS 1999). Even in areas that are often burned, frequent cool season burn regimes

may still allow oak regeneration in pine-dominated communities and lead to hammock development (Jacqmain et al. 1999).

Mesic hammocks in South Florida contain a variety of tropical species that may be significantly influenced by frost events, although some species may be able to re-sprout from rootstock or surviving branches (USFWS 1999). Occasional natural disturbances, mainly wind, fire, and flooding, can also lead to variation in floristic composition among sites and across time within a site and maintain a state of non-equilibrium (Platt and Schwartz 1990; USFWS 1999). Infrequent deep floods, even in higher areas along floodplains, can favor live oaks (Vince et al. 1989). Mesic hammock occurs across a broad gradient of soil moisture conditions, from somewhat xeric to almost hydric soils, and oak species characteristic of hammocks tend to show a broader tolerance of this range of conditions than do oaks in other habitats (Cavender-Bares et al. 2004).

Community Variations: Latitude is a primary cause of variation in species composition in mesic hammocks, with southern magnolia and pignut hickory common in central to northern hammocks, but absent from the southernmost hammocks. Tropical species gradually increase in frequency from the central to southern peninsula. Small portions of tree islands in the Everglades region may become dry enough to support a semi-tropical mesic hammock, although most “high hammocks” in South Florida are rockland hammock occurring on limestone (Loveless 1959).

Because some mesic hammocks develop as a result of fire exclusion within historically pine-dominated communities, species composition can be dependent on fire history. Vegetation in hammocks of more recent origin is typically intermediate to that of flatwoods communities, with saw palmetto, coastalplain staggerbush (*Lyonia fruticosa*), and shiny blueberry (*Vaccinium myrsinites*) frequent in the understory below an emergent pine canopy.

In addition to the typical form of mesic hammock, two variations are further classified here.

Variants: PRAIRIE MESIC HAMMOCK – Isolated patches of mesic hammock occurring within a larger matrix of pyrogenic vegetation, usually dry prairie or mesic flatwoods, but occasionally on higher rises within a basin marsh, wet prairie, or wet flatwoods. These hammocks may experience low intensity fires on a regular basis, leading to a somewhat species-depauperate canopy of cabbage palm, live oak, or a mixture of the two species, with saw palmetto common in the understory. Also see Hydric Hammock in this guide for description of prairie hydric hammock.

Associated Communities: Mesic hammock differs from hydric hammock by the absence of wetland trees such as sweetbay (*Magnolia virginiana*) and swamp tupelo (*Nyssa sylvatica* var. *biflora*), as well as by the presence of such mesic tree species as southern magnolia and pignut hickory. Live oak is common in both communities. Soils are better drained in a mesic hammock than in a hydric hammock. These two hammock types often occur as intermixed stands.

Xeric hammock is dominated by sand live oak, myrtle oak (*Quercus myrtifolia*), and other species of excessively drained sands. Mesic hammocks that are intermediate with xeric hammocks may include sand live oak (*Q. geminata*) in addition to live oak. Maritime hammock may have nearly identical dominant vegetation but is found exclusively in coastal situations on sand substrates of recent origin.

Upland hardwood forest, the predominant hardwood forest community found in the Panhandle and northern peninsular Florida, has greater tree species diversity, including many deciduous broad-leaved trees such as swamp chestnut oak (*Q. michauxii*), white oak (*Q. alba*), and flowering dogwood (*Cornus florida*). Upland hardwood forest is typically found on loamy or clay-based soils rather than the more sandy soils which support mesic hammock.

Mesic hammocks may be distinguished from tropical rockland hammocks by the dominance of temperate species in the canopy. Rockland hammock is comprised of predominantly tropical woody species, and occurs on limestone or very shallow soils overlying limestone, rather than sandy or organic soils.

Hardwood dominated forests are often a result of anthropogenic fire exclusion in pine-dominated natural communities. Older mesic hammocks should have a canopy of mature live oaks and cabbage palms. Young hammocks are often the result of hardwood invasion into historic pine communities. These areas often have a dense cover of younger mature water oak and laurel oak trees. If the community is altered significantly (and thus can no longer be considered a pine-dominated, fire-maintained system), the resultant community is a successional hardwood forest. This allows some distinction between mature mesic hammocks and vegetation that is clearly second growth.

Management Considerations: Mesic hammocks are of considerable importance to wildlife, providing cover, nesting sites, and hardwood mast. Migratory birds use hammocks for resting cover and foraging, and animals of neighboring wetland communities may take refuge in mesic hammock islands during floods (USFWS 1999). Many mesic hammocks have experienced disturbances from human activities, especially since these hammocks provide desirable home, camp, and recreation sites. Logging, understory clearing, cattle grazing, and introduction of feral hogs have altered natural mesic hammock canopies and disturbed soils. Cattle trample understory plants as they take refuge from the heat in shaded oak hammocks, and rooting by hogs causes severe soil disturbance.

Past and ongoing disturbance leaves hammocks vulnerable to invasion by a wide variety of exotic invasive plants which compete with native plants and often become the dominant ground or vine cover. Rosary pea (*Abrus precatorius*), coral ardisia (*Ardisia crenata*), air-potato (*Dioscorea bulbifera*), Japanese climbing fern (*Lygodium japonicum*), melaleuca (*Melaleuca quinquenervia*), skunk vine (*Paederia foetida*), guava (*Psidium guajava*), Brazilian pepper (*Schinus terebinthifolius*), tropical soda apple (*Solanum viarum*), bowstring hemp (*Sansevieria hyacinthoides*), wedelia (*Sphagneticola trilobata*), and Caesar's weed (*Urena lobata*) are common exotic pest plants that invade mesic hammocks. EPPC (2007) reports that these species displace native species in natural habitats or that they have the most potential to do so in the future. Consumption of oak mast by feral hogs also puts stress on native animal species that must compete for

food resources. White-tailed deer, turkey, and Florida black bear are negatively impacted, particularly during low mast years (USFWS 1999).

Because mesic hammocks are often associated with wetlands, either occurring as a matrix with hydric communities or as a transition to uplands, hammocks are sensitive to hydrologic alteration in the landscape. An increase in flooding frequency and/or duration can kill most characteristic mesic hammock tree species. Lowered water tables can result in a shift in vegetation to more xeric species or allow intense fires to burn and destroy the hammock. Intense fires can also destroy hammocks, particularly where surrounding uplands have been fire-excluded in the past (Wade et al. 1980; USFWS 1999).

Early aerial photography and accounts of Florida's natural areas show that mesic hammocks originally existed in small, naturally fire-excluded pockets. Widespread fire suppression throughout the 20th century has made this community far more common (USFWS 1999). Placement of firebreaks around hammocks can disrupt the natural ecotones with surrounding pyrogenic communities. Ecological management and protection of mesic hammock habitats should include limitations on development and grazing, restoration of natural fire regimes and hydrology in the overall landscape, and control of invasive species.

Exemplary Sites: Lake Panasofkee Outlet (Sumter County), Little Big Econ State Forest (Seminole County), Flying Eagle Ranch (Citrus County), Three Lakes Wildlife Management Area (Osceola County), Highlands Hammock State Park (Highlands County), Withlacoochee State Forest (Sumter County), Okaloacoochee Slough State Forest (Hendry County; Prairie Mesic Hammock variant), and Little River Conservation Area (Suwannee County)

Global and State Rank: G3/S3?

Crosswalk and Synonyms: The term “mesic hammock” is often used broadly in the literature to denote any non-bottomland hardwood forest. This classification attempts to split these types into three main groups that are similar to Greller (1980). Greller's “southern mixed hardwood forest” is broadly comparable to FNAI's Upland Hardwood Forest, his Temperate Broadleaf Evergreen Forest to FNAI's Mesic Hammock, and his Tropical Forest to FNAI's Rockland Hammock. The divisions drawn between these types, however, vary between the two systems.

Kuchler	112/Southern Mixed Forest
Davis	12/Upland Hardwood Forests
SCS	11/Upland Hardwood Hammocks 15/Oak Hammocks
Myers and Ewel	Temperate Hardwood Forests
SAF	89/Live Oak 105/Tropical Hardwoods
FLCFC	425/Temperate Hardwood 426/Tropical Hardwoods 427/Live Oak

Other synonyms: *Magnolia grandiflora-Quercus virginiana* association (MQa; Daubenmire 1990), TBEF/SMHF – TBEF – TBEF/TRF (Greller 1980), prairie hammock - in part (FNAI and FDNR 1990), high hammock - in part (Alexander 1958)

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