

## FLORIDA

Florida has an impressive land acquisition program, which has preserved extensive old-growth tracts as well as other biologically significant lands. The main source of funding for purchases has been the state Preservation 2000 program and Florida Forever program. Preservation 2000 provided state funding of \$300 million a year from 1990-1999 for conservation projects of various types. P2000, as it was called, made possible the purchase of one million acres of Conservation and Recreation Lands (CARL). In 1999 the Florida legislature extended formal, permanent protection to these lands and also established the successor to Preservation 2000, the Florida Forever program focusing on land acquisition, environmental restoration, and water resource protection. If funded as anticipated, Florida Forever will provide \$300 million a year from 2000-2009 for projects in these areas.

A revision to the management plan for the National Forests in Florida was completed and a record of decision was signed in 1999. The revision designates as future old growth 10,200 acres of upland Longleaf Pine forest; 11,000 acres of southern wet pine forest, woodland, and savanna; 17,700 acres of cypress/tupelo swamp forest; 2900 acres of river floodplain hardwood forest; 24,200 acres of hardwood wetland forest; 2200 acres of dry and dry mesic oak/pine forest; 1700 acres of coast plain upland mesic hardwood forest; and 2100 acres of dry and xeric oak forest, woodland, and savanna (USDA 1999).

We do not describe individual mangrove stands, although Florida has an estimated 495,000 acres of mangrove swamps which include old-growth forest. The old-growth acreage is uncertain. The swamps, found along the coasts of the southern peninsula, are composed of Red, White, and Black Mangroves, and Buttonwood. Most of the swamps are in designated, protected areas, including Big Cypress Preserve, Everglades National Park, Rookery Bay National Estuarine Reserve, and various National Wildlife Refuges, National Monuments, and state aquatic reserves. Few swamps are in private hands, since most mangrove swamps are submerged sovereign lands that belong to the state.

Nobody knows how long individual mangrove trees live if not damaged by storms. Some species may live 250 years; others probably have shorter lives (Smith 1993). The size of trees varies with the habitat. Mature mangroves may be more than 60 feet or less than 4 feet tall. Mangrove swamps are important as habitat for many animals listed as Endangered, Threatened, or "of concern," including the American Crocodile, Hawksbill and Atlantic Ridley Sea Turtles, Florida Manatee, Bald Eagle, Brown Pelican, Atlantic Salt Marsh Snake, Eastern Indigo Snake, Key Deer, and Florida Panther (Odum and McIvor 1990).

Ariel Lugo discusses mangrove forests as old growth, and notes that the history of a site and the dynamics of the local coastal system help determine whether a particular mangrove forest is old growth. Furthermore, a distinction needs to be made between old-growth mangrove systems and old-growth mangrove tree stands. Old-growth systems consist of trees, which may be young or dwarfed, and of deep organic peat produced by generations of mangroves. A tree stand growing on young peat or on another substrate

should be considered to be old growth if the age and stand characteristics so indicate (Lugo 1997).

In presenting old-growth sites below, we divide the state into three sections: the panhandle, the northern and central peninsula, and the southern peninsula and the Keys.

## **FLORIDA PANHANDLE**

**Apalachicola National Forest**, southeastern Panhandle (Gulf, Franklin, Liberty, and Wakulla Counties)

--**Pond Cypress Swamps**. Thousands of acres of virgin Pond Cypress growing in patches that may be several hundred acres in size. The trees are gnarled, old, and generally stunted, but sometimes 50 feet tall. In some places they are like bonzai trees (Simons 1990).

--**Tupelo Swamps**. Probably uncut tupelo swamps, with Water Tupelo, Swamp Black Gum, and Ogeechee Tupelo, particularly in the floodplains of the New River, Apalachicola River, and Ochlockonee River. Loggers did not find tupelo attractive until recently (Anglin 1993, Alderson 2001).

--**Slash Pine Tracts**, in Bradwell Bay Wilderness (Wakulla County). The Florida Natural Areas Inventory sets the size of a Slash Pine-gum swamp in Bradwell Bay at roughly 100 acres. Bob Simon thinks this tract may be the best virgin Slash Pine left, and that it is larger than 100 acres (NeSmith 1990, Simons 1990). Gary Hegg reports that there are probably also small, unlogged islands (drier areas within a swampy area) with Slash Pine. One particular island he has seen is 7 to 10 acres, with Slash Pine, an understory of swamp species on the wet ground, and, on drier ground, a thick understory of Titi and Gallberry (1993).

**Eglin Air Force Base**, southwestern and south-central Panhandle (Santa Rosa, Okaloosa, and Walton Counties)

--**Old-growth Longleaf Pine-Turkey Oak-grasses**, within 400,000 forested acres. Eglin has 4 "Special Natural Areas" identified as remnant stands with significant old-growth Longleaf Pine, totaling 6795 acres. There are numerous other stands of old growth scattered throughout the reservation totaling an as yet undetermined acreage, likely ranging in the thousands of acres. In addition to Eglin's more pristine old-growth forests, approximately 200,000 acres have a Longleaf Pine old-growth component with a dense population of Red-cockaded Woodpeckers, and are frequently burned. These forests with old-growth characteristics typically contain 3 to 5 trees >150 years old per acre and have an uneven-aged size class distribution resulting from historical land use practices of the US Forest Service, the previous land management agency, from 1908 to 1940. Turkey Oak is the main species in the sparse understory, where it is often associated with Live Oak and Post Oak. Wiregrass is poorly represented except in areas with clayey soils--probably a natural situation. Several perennials, including dropseed and bluestem, fill its place beneath the Longleaf Pines and Turkey Oaks.

All four stands listed below were used as a minor source of timber products early in the century. They also underwent cutting to remove wind-damaged and fire-damaged

trees. Roads and utility line right of ways pass through them. They have burned at times, sometimes because of fires started by weapons testing, but not enough to prevent the hardwood component of the stand from being thicker and larger than it would naturally be. The grasses in the ground layer have thus been, to varying degrees, shaded and suppressed.

Nevertheless, the four areas have not been heavily modified by forestry activities, and the Longleaf Pine-Turkey Oak-grasses system seems to be basically intact in terms of composition and structure. Management has reintroduced frequent fire as a maintenance and restoration tool. The four currently designated areas follow. Each of the first two harbors Red-cockaded Woodpeckers.

---**Patterson Natural Area Old Growth.** Next to a test range, 5018 acres of old growth. The area has enjoyed occasional wildfire. Prescribed burning was introduced during the growing seasons of 1991 and 92, resulting in some mortality to the old-growth Longleaf Pine. Longleaf Pine range in age from 100 to 500 years, with the average in the older part of the stand, 160 years. The average dbh (diameter at breast height) is 16 inches; the largest is 28 inches. The western "foot" of the area supports an excellent stand of Wiregrass as soils increase in silt content.

---**Field One Old-Growth Sandhills.** A 1252-acre area in which the absence of fire allowed mixed oaks and Sand Pine to grow up thickly. Aggressive fire reintroduction and Sand Pine removal in this stand has helped to restore the old-growth structure.

---**Brandt Pond Old-Growth Sandhills.** Three hundred eighty-two acres, it has had infrequent fire and has also become overgrown.

---**White Point Flatwoods Old Growth.** An "isolated 143-acre remnant stand" with dense groundcover of Wiregrass, Gallberry, and Saw Palmetto (Hardesty 1993, Claypool 1993). This stand's boundary lies along the Choctawhatchee Bay and has many individual trees in excess of 350 year old.

--**Sand Pine stands\*** (in addition to the Longleaf stands) that have probably experienced very little human disruption. They are found "in a matrix of Sand Pine stands of different age classes" in a "strip parallel to the coast on old dunes." Outcalt sampled two stands as an example of old-growth Choctawhatchee Sand Pine. The biggest trees were 80 years old (1997a). Outcalt notes that a 1910 survey showed that the Choctawhatchee National Forest, which became Eglin Air Force Base, had 9040 acres of Sand Pine type. Before World War II when the National Forest was taken over by the military, there was "very little market for sand pine." Therefore the 9040 acres were presumably little disrupted (Outcalt 1998). Sand Pines have invaded some sandhills sites at Eglin due to the decrease in natural fire (Outcalt 1997a).

--**Floodplain and bottomland forest** on the south bank of the Yellow River. The strip of floodplain and bottomland on the military reservation is approximately 10 miles long and 1 to 2 miles wide. The most disrupted areas would be those nearest roads and the river. Probably the strip includes pockets that have not been cut at all; the remainder was probably cut selectively before 1900. Tree species include Baldcypress, Sweetbay, magnolia, Spruce Pine, and tupelo. The north bank of the river is in private hands (Eilers 1993, Hassell 2002).

**Tate's Hell**, southeastern Panhandle (Franklin and Liberty Counties)

Approximately 2000 acres of basin swamp, containing areas of uncut, stunted Pond Cypress. The two main areas are each about 230 acres in extent; several other areas support scattered Pond Cypress. The trees are commonly 4 feet in diameter at the base but less than 15 feet tall. The US Soil Conservation Service has estimated the age of the trees as 275 to 300 years. Since 1993 the state has acquired 145,000 acres of Tate's Hell to form Tate's Hell State Forest. The balance of the swamp is privately owned (Hegg 1993, Johnson 1993, Knight 1993, Dedrick 2002).

**Yellow River Purchase,\*** western Panhandle (Santa Rosa County)

Possible old growth within an 11,000-acre area that in April 2003 the state was negotiating to purchase. Most of the 11,000 acres are flood plain in the basin of the Yellow River. The state did not know in April 2003 what it would find on the land, but biologist Harold Mitchell told us that it will "certainly be a magnificent property" (Mitchell 2003).

**Torreya State Park,** eastern Panhandle (Liberty County)

Within a park of approximately 10,000 acres, old-growth bottomlands and possibly upland old growth. The upland old growth would be a narrow band of 100 or more acres of beech-magnolia and Spruce Pine and oak on steep land. Dennis Hardin spoke of a possible 100 acres (1990). According to Jim Stevenson, the park has an upland area without stumps (1990). Bill Sweeney has written that the park may have as much as 200 acres of old growth on steep forested slopes (2003). Harold Mitchell does not think that the park contains upland old growth, but points out that a floodplain swamp next to the river in a corner of the park that was an out parcel, supports immense Baldcypress that were never cut and that a 400-acre addition to the park recently purchased from the Neal Lumber Company, is approximately half old growth, with Baldcypress, Water Oak, and American Sycamore (Mitchell 2003, Sweeney 2003). Torreya State Park contains numerous endemics, including the yew tree *Torreya taxifolia*.

**Edward Ball Wakulla Springs State Park,** southeastern Panhandle (Wakulla County)

A park of approximately 5000 acres with about 1300 acres of beech-magnolia hammock, of which 200 or 300 acres have never been logged and 400 or 500 acres are a little over 100 years old. The hammock has an unusually high diversity of tree species though not of herbs. Because of the thick shade, the ground is almost bare. Trees include White Oak, Eastern Hophornbeam, Sweetgum, Laurel Oak, and Red Bay. Along a river are many Baldcypress. The older trees, probably 400 to 500 years in age, are in the deeper water and probably for that reason were not cut; overall, however, half of the cypress in the original stand have been removed (Whitehouse 1993, Gatewood 1993).

The state just added to the park approximately 2000 acres (the park was previously 2860 acres) around the Cherokee Sink area. There is speculation that the additional acres include uncut forest, but the area has not yet been surveyed for old growth (Mitchell 2003).

**St. Joseph Peninsula State Park,** southeastern Panhandle (Gulf County)

Unharvested areas within a 1761-acre wilderness preserve on a peninsula that used to be a barrier island. According to Leo Minasian, the Sand Pine scrub on dunes in the wilderness is undisturbed (1993). Jim Stevenson described the Slash Pine, also in the wilderness, as probably never cut. The Slash Pine stand contains no visible stumps and was not big enough to have appealed to loggers (1990). Anne Harvey, the park manager, agrees. Turpentine was collected; the Spanish may have cut hardwoods in the 1700s; and cattle grazed in the 1800s; but the pines do not appear to have been logged (2002).

### **Apalachicola Bluffs and Ravines Preserve** on the Apalachicola River, eastern Panhandle (Liberty County)

Two to three hundred acres of old-growth mixed hardwoods and pine on the steep bluffs and ravines of the 6248-acre preserve. Oak and hickory were probably removed before 1940. Nevertheless, the preserve likely has trees 200 years old that are original. The site contains numerous endemic and disjunct species, and probably more species of plants and animals than any area of equivalent size in the Gulf Coastal Plain (Gatewood 1990 and 1993, Hardin 1990). Kwit et al. studied three ravines: Beaverdam Creek, Little Sweetwater Creek, and Kelley Branch. They found a difference in species between slopes with Florida Yew and those without. “Forests in midslope regions of north-facing steephead slopes that contain adult *T. floridana* more closely resembled the classical definition of the southern mixed species hardwood type,” with “a mixture of evergreen and deciduous species in the overstory and understory,” than did forests on other slopes in the Bluffs region. They speculate that human activity, including logging between ravines and along upper slopes, which caused erosion and drying of the soil, may have limited the distribution of Florida Yew (Kwit et al. 1998). The preserve is owned by The Nature Conservancy. In 2002 American Rivers designated the Apalachicola River as one of America’s Most Endangered Rivers (TNC 2002).

The state of Florida plans to buy three tracts of land on the upper Apalachicola River. One, the 9145-acre Sweetwater Creek Tract, which “includes some of the deepest steephead ravines in the state, with unique hardwood forests,” will connect the Nature Conservancy preserve with Torreya State Park (FDEP 2002).

### **Naval Live Oaks Reservation**, in Pensacola, southwestern Panhandle (Escambia County)

About 200 acres of old-growth coastal Live Oak within a reserve, now owned by the National Park Service (NeSmith 1990, Oetting 2002). There are many Live Oak hammocks along the Florida coast. These hammocks were usually logged for species other than Live Oak, and the oak left standing. Since the logging took place long ago, researchers looking at coastal hammocks have difficulty reconstructing their history (Simons 1990). Researchers assume the Pensacola hammock was selectively cut.

### **Topsail Hill**, south-central Panhandle (Walton County)

A block of land fronting for about 4 miles on the Gulf of Mexico and extending a mile inland, with old growth. Walking away from the ocean, one crosses a beach; sand dunes as high as 44 feet with coastal oak scrub and magnolia; swales and globally rare coastal dune lakes, one 50 and one 80 acres in extent and filled with pure water; coastal wet flatwoods; mesic flatwoods; and finally scrubby flatwoods. The canopy species in

the flatwoods is Longleaf Pine. Patches of the pine are old growth, inhabited by Red-cockaded Woodpeckers, though with scars reflecting past tapping for turpentine. Within the block is an old-growth Live Oak, magnolia, hickory maritime hammock more than 10 acres in size. As of January 2003, the state owned 1700 acres of the area as Topsail Hill State Park and was continuing to acquire land there (Hardin 1993, Johnson 1993, Gatewood 1993, McKenzie 2003). Research is being conducted on the area's wildlife (Mitchell 2003).

**Fred Gannon State Park,\*** near Niceville (Okaloosa County)

A 357-acre park, about one-third of which is Choctawhatchee Sand Pine, which Kenneth Outcalt describes as "a good example" of old-growth conditions for this species (1997a, 1998). According to a park ranger, the Sand Pine has apparently not been logged. Large, mature pines tower over shrub vegetation, including scrub oaks and Rosemary. The park is separated from Eglin Air Force Base only by a strip of privately owned land. The state obtained management of the 357 acres in 1996 through a lease agreement with the US Forest Service (Peredoy 2002).

**Woodyard Hammock,** northeastern Panhandle (Leon County)

A 74-acre (30 ha) old-growth southern mixed-hardwood forest (Batista 1998). The area suffered some salvage but little if any cutting and supports trees more than 300 years old (Hermann 1990). American Beech, Southern Magnolia, and Spruce Pine are prominent in the overstory; American Holly and Sweetgum in the understory (Peters and Platt 1996). The site is owned by Tall Timbers Research Station (Hermann 1990).

## THE NORTHERN AND CENTRAL PENINSULA

**Waccasassa Bay State Preserve,** on the Gulf Coast near Cedar Key (Levy County)

A 27-mile long, 30,784-acre preserve (of which 6775 acres are below water) with a coastal hydric hammock that was selectively logged for pine, cypress, and cedar around 1900 but that still shows many old-growth characteristics and is largely intact from an ecological standpoint. Trees in the hammock include Cabbage Palm, Southern Red-cedar, and Live Oak. Located between Georgia Pacific's Gulf Hammock property and the Gulf of Mexico, the hammock is sometimes flooded, but grasses cover much of the ground. On the edge of the hammock is a strip of coastal savanna. Along the Gulf are salt marshes, with occasional Cabbage Palm and islands of red-cedar. The Florida Department of Natural Resources owns the preserve (Gatewood 1993, Morgan 1993, Perry and Perry 1992).

**William Beardsall Tosohatchee State Reserve** (Orange County)

**--Cabbage Palm Hammocks.** About 2000 acres of Cabbage Palm hammocks, of which at least half are virgin, except for past cattle grazing and a somewhat lowered water table. The remaining acres originally bore a mixture of Cabbage Palm, Eastern Red-cedar, and Live Oak; fire or logging removed the Eastern Red-cedar and Live Oak. The uncut areas were originally pure Cabbage Palm. The palms are tall, but they have no annual rings so their age is unknown. Research suggests that grazing would not have

greatly affected this type of community (Simons 1990). The reserve is owned by the Florida Department of Natural Resources.

--**Jim Creek Cypress Swamp.** One thousand virgin acres in a 2000-acre floodplain cypress swamp. Baldcypress is the dominant tree. Other important trees are Black Gum, Red Maple, Pumpkin Ash and/or Carolina Ash, Dahoon Holly, and Cabbage Palm. The area has undergone hydrological manipulations and grazing; but, as with the Cabbage Palm hammocks, the grazing has not had a major impact. The cattle move through cypress-hardwood swamp fast, because they do not find much to eat. They do more damage in areas dominated by pine and in hammocks other than palm (NeSmith 1990, Simons 1990, Stevenson 1990).

--**Beehead Ranch Pine Flatwoods.** Twenty to forty acres of Slash Pine mingled with Cabbage Palm in a 600-acre mesic flatwood area. The large trees are said to be 250 years old. The understory is Saw Palmetto-Wiregrass. The Florida Natural Areas Inventory characterizes this stand as "virgin" (NeSmith 1990). Jim Stevenson describes 40 acres of old-growth Slash Pine in Tosohatchee, probably the same stand, as having had selected trees removed, although the standing trees are original (1990). Florida's flatwoods were cleared decades ago, except for a few remnants, most of which are now surrounded by conifer plantations (Mitchell 1990).

**Hendrie Ranch**, central peninsula (Highlands County)

Approximately 1000 acres of Rosemary balds, Sand Pine forest, and oak scrub that has never been cut and probably has not been grazed by livestock. The old-growth scrub is on the southern tip of the Lake Wales Ridge. In a lowland is extensive additional acreage with bay tree swamp, pine flatwoods, and oak hammocks, which have been grazed by livestock. The ranch is privately owned (Lohrer 1993).

**Archbold Biological Station**, central peninsula (Highlands County)

At an independent ecological research facility on the southern end of the Lake Wales Ridge, 1050 acres, the Station's original property, that, according to the Station's Fred Lohrer, have never been lumbered, grazed, or tapped for turpentine. The balance of the approximately 5000 acres at the Station, the west sections, were logged for Slash Pine, and perhaps some Longleaf Pine, some time between 1933 and 1935, based on photographs in the Station archives, although not all trees were cut. The principal habitats in the uncut area are a) southern ridge sandhill (Slash Pine, Turkey Oak, Scrub Hickory, and an occasional Longleaf Pine in the tree layer, varied shrubs, and a ground layer in which Wiregrass is common); b) Sand Pine scrub (Sand Pine as the dominant tree, oaks or Rosemary in the shrub layer); c) scrubby flatwoods (an association of shrubs with an occasional Slash Pine); d) flatwoods (Slash Pine, Saw Palmetto, Gallberry, and Wiregrass); e) bayhead (evergreen forest of mixed bays); and f) swales and seasonal ponds (grassy depressions). (The largest stand of bay trees in the Northwest Tract of the original property was burned, after a prescribed fire escaped, in 1999.) The Station harbored 12 plants on the federal Endangered and Threatened lists as of March 1993, including Lake Placid Scrub Mint, Wedge-leaf Button Snakeroot, Scrub Blazing Star, Hairy Jointweed, Carter's Mustard, and Papery Whitlow-wort. The Station uses fires to maintain fire-dependent communities. (Lohrer 1992, 1993, and 2002; Abrahamson et. al. 1984; Main 2003).

**Platt Branch Mitigation Park,\*** central peninsula (Highlands County)

Two thousand acres of pine flatwoods, half Longleaf Pine and half Slash Pine, including old-growth savanna. The distribution of the trees is natural. The Slash Pine, which gradually takes over from the Longleaf Pine as the land gets wetter, is located in the wetter portion of the site. In the 1920s and 30s, turpentine was probably extracted. Probably some logging was done after the turpentine; and in the 1970s, 80 acres were logged. The Park was definitely grazed by livestock. However, it includes 500 to 600 acres of beautiful open savanna with tall, old trees and a fine understory. The pines are regenerating. Today the Longleaf Pine is not logged, although Slash Pine, which are too thick now, may be thinned. Red-cockaded Woodpeckers inhabit the area. The Florida Fish and Wildlife Conservation Commission purchased the Park from a private landowner with funds received as mitigation for disruptive activities elsewhere (Morrison 2002, Shattler 2002).

**Dunns Creek State Park,\*** north-central Florida (Putnam County)

Possible old-growth floodplain forest along five miles of Dunns Creek that flows through the 6222-acre park. Based on aerial photographs, which show no signs of logging, the floodplain has not been logged for at least sixty years. Presumably it experienced logging prior to 1940 but how much and when is not known. Possibly large Baldcypress were taken out a hundred years ago. Prominent tree species include Baldcypress, Black Gum, Red Maple, Carolina Ash, and Laurel Oak. The park, which the state acquired from The Nature Conservancy in 2001, encompasses 21 natural communities.

The St Johns River Water Management District owns property for at least two miles on the other side of Dunns Creek. Possibly there is old growth on this property also (Miller 2003).

**Ocala National Forest**, northeastern Florida peninsula (Marion and Volusia Counties)

--**Mormon Branch Botanical Area**, in Ocala National Forest, northeastern Florida peninsula (Marion County)

----**Atlantic White-cedar Stand**. About 100 acres of Atlantic White-cedar, in which only a few trees have been cut, as if in acts of vandalism. The cedar are up to 80 feet tall and 3 feet in diameter. Dominant trees in addition to the cedar are Cabbage Palm and Loblolly-bay. Red Maple and Florida Willow are present, as is Needle Palm in the understory. Undine is at its southernmost limit; and the Florida Anise Tree is abundant, even though it is a fairly rare plant (Simons 1990, Miller 2001).

----**Hardwood Swamp**. Six hundred acres that appear to be a virgin swamp, adjacent to the Atlantic White-cedar stand described above. Red Maple, Swamp Tupelo, and Black Gum are the dominant trees. Underneath is Needle Palm, a Florida endemic (Simons 1990, Miller 2001).

--Extensive areas of essentially undisturbed **Ocala Sand Pine scrub**. More than half of the forest is comprised of the "big scrub." In the big scrub, islands of Longleaf Pine are scattered through a "sea" of Sand Pine. Most of the settlement took place in the Longleaf islands. Thus, the Sand Pine scrub was essentially natural in origin and had not been disrupted by EuroAmericans before the National Forest was created in 1908.

Wildfire created a mosaic of shifting age classes (Outcalt 1997a, 1998). Today clearcuts up to 320 acres in size have replaced wildfire in the scrub (USFS 1999) and fragmented the forest.

As of 2001, the Seminole District had 96,000 acres of Sand Pine scrub, of which 10,373 acres had never been logged. Of that 10,373 acres, 2500 acres were protected temporarily or permanently in special management areas such as Wilderness, 4000 acres were to be maintained intact for purposes of old growth, and 3600 acres were available for logging. (Hinchee 2001). The Lake George District has about 120,000 acres of Sand Pine. Five percent of the Sand Pine is to be left unlogged and probably never has been logged (Bailey 2001).

### **Baldwin Bay Property,\*** northeastern Florida (Duval and Nassau Counties)

Approximately 2000 acres of old-growth bottomlands within a private property of 7920 acres. The bottomlands show no signs of logging. Some stands of trees there are smaller and younger than others apparently as a result of natural events such as hurricanes and floods. The uplands in the property support pine plantations (Moll 2002). Most or all of the property has been approved for purchase with state funds under the Florida Forever program (White 2003).

### **Old-Growth Hammocks in the Jacksonville Area,\*** northeastern Florida (Duval County)

Scattered old-growth Live Oak hammocks, generally along salt marshes. Researchers believe that, in what is now northeastern Duval County, fields were cleared for cotton in the 1700s and early 1800s. Here only scattered Live Oaks were left standing. Some small areas, however, were never cleared. The only commercial logging of these areas was the cutting of Live Oaks for ship construction; and the logging was not heavy. These maritime hammocks are still dominated by Live Oaks. Southern Magnolia and Pignut Hickory are the main additional tree species. The hammocks are found in the National Park Service's Timucuan Ecological and Historical Preserve and on adjacent public lands, including areas owned by the City of Jacksonville, by St. Joe's River Water Management Area (White 2003), and by the State of Florida (in particular, Big Talbot Island State Park). Examples are:

--**Timucuan Ecological and Historical Preserve.** A 46,000-acre area, between the Nassau and St. Johns Rivers. "Only 60 percent is protected public land" (TNC 2003). Parts are owned by conservation organizations, parts by other private entities, and parts by government agencies. The National Park Service is working to purchase unprotected areas within the Preserve boundary. The old growth is primarily located on:

----**Fort George Island.** A 600-acre island with a strip of old-growth maritime hammock along its eastern edge. Old maps of the island show where fields were cleared and where woods were left standing.

----**Black Hammock Island.** An island of several thousand acres with old growth maritime hammocks around the perimeter of its southern end, the 100-200-acre Cedar Point. No written records of the logging history are known to exist (Bryant 2003). White estimates that many of the Cedar Point hammocks are at least 300-400 years in age (White 2003).

**--Big Talbot Island State Park.** A 2000-acre park, up to one-fourth of which may be old-growth hammock. The hammocks, which are mostly Live Oak, occur in patches across the island. No historical records indicate what was and was not logged (Strickland 2003).

**Dun and Register Longleaf Tract,** east-central peninsula (Volusia County)

Possibly as much as 800 acres of "old growth (virgin?)" Longleaf Pine. The Natural Areas Inventory found a healthy Wiregrass understory beneath the pine (NeSmith 1990).

**Caladesi Island State Park,** a barrier island on the Gulf of Mexico (Pinellas County)

A 630-acre uncut area, some of which is Slash Pine forest (Stevenson 1990).

**Highland Hammocks State Park,** central peninsula (Highlands County)

An approximately 500-acre hammock that has apparently never been logged and is buffered by flatwoods and marshes. Tree species important in the temperate forest include Live Oak, Cabbage Palm, Sweetgum, and Pignut Hickory. Citrus trees in the subcanopy are species brought to Florida by the Spanish explorers. Hurricanes disturbed the hammock in 1928 and 1960, each time opening the canopy, and causing a surge in the development of the undergrowth. Fire exclusion and canalization have contributed to the expansion of bayhead vegetation into the mesic flatwoods and marshes around the hammock (Alvarez 1993, Stalter 1981, Peroni 1986, Minno 1986).

**Big Pine Tract,\*** west-central Florida (Hernando County)

A large, sandhill tract of old-growth Longleaf Pine, with individual trees up to 160 years old. Kush lists the site as 420 acres, but says that this estimate is probably high. The site has been burned infrequently, and the understory is not in good shape. However, a restoration program with burns and removal of hardwoods is underway. Animal species associated with Longleaf, including Gopher Tortoises, are present, as are numerous herbaceous species. The site is owned by the Florida Fish and Wildlife Conservation Commission (Kush 2001).

**Santa Fe River,\*** north-central Florida (Alachua and Gilchrist Counties)

As much as 200-300 acres of possible old-growth forest along the 20-mile stretch of the Santa Fe River between O'Leno State Park and the Route 47 bridge. Live Oak, Water Oak, and Baldcypress dominate. The few stumps that are present apparently represent small cypress trees that were more solid than the older, hollow cypress that were left standing. Camp Kulaqua, opposite O'Leno, has a Live Oak that is 18.5 feet in circumference. Many of the Live Oak are between 13 and 15 feet around (Sweeney 2003).

**Archer Karst Plain,** northwestern peninsula (Levy County)

About 200 acres of scattered "low rocky calcareous hammock" on a linear karst plain. The plain is characterized by karst lakes and many small caves in addition to the

hammock, which is composed of "magnificent live oaks," huge Red Bays, and a variety of other plants that like soils with lime. The area has been fragmented and grazed, but as of 1993 still functioned as an ecological community. A number of rural families owned the plain (Morgan 1993).

**Wannee Natural Area**, northwestern peninsula (Dixie County)

More than 160 acres of Water Hickory-Overcup Oak swamp forest on a terrace of the Suwannee River. Trees average 3 to 4 feet dbh and 100 feet in height. The area also has scattered large cypress. Probably it has been highgraded; but it definitely shows old-growth characteristics and is probably the finest of its type left in Florida (Gatewood 1993).

**Gulf Hammock/Spring Run**, northwestern peninsula (Levy County)

Approximately 40 acres of degraded oak/palm/magnolia old growth owned by Georgia Pacific and perhaps a total of 100 to 150 acres of old-growth inholdings within the lumber company's Gulf Hammock property. The 40 acres, along Spring Run just before it enters Waccasassa Bay State Preserve, were selectively cut for pine and cedar around 1900; but Georgia Pacific has not logged them because of their inaccessibility and extreme rockiness. The inholdings, which give glimpses of the former glory of Gulf Hammock, are owned by individuals who have built houses on them and/or use them for hunting (Morgan 1993).

**Osceola National Forest**, north-central peninsula (Baker County)

Two or three areas of never-logged Pond Cypress, each perhaps 100 acres in extent. One is in a 128-acre cypress-gum maple swamp within a 373-acre Research Natural Area. Another is in Fanny Bay, a 300-acre site (NeSmith 1990, Simons 1995, Spencer 2003).

**San Felasco Hammock State Preserve**, north-central peninsula (Alachua County)

Eighty acres of selectively logged old growth in a mature mesic hammock covering roughly half of the 6176 acre preserve. Mesic hammock is a mixed species, predominantly hardwood forest, apparently with more species of woody plants than any other community type in North America north of Mexico (Noss 1989). Sanchez Prairie Basin, outside the 80 acres but within the hammock, is comprised of about 500 acres of forest that looks like old growth, as it has not been logged much and not for a long time (Cole 2003).

**Venus Flatwoods Preserve**,\* central peninsula (Highlands County)

A hundred acres of remnant Longleaf Pine-Wiregrass flatwoods, owned by The Nature Conservancy. Fred Lohrer at Archbold Biological Station, which used to manage the property for The Conservancy, said that a forester told him that the Longleaf Pines are reported to have been left after logging around the turn of the century; but Lohrer has never seen any stumps. The ground cover is undisturbed. The Conservancy burned the site with prescribed fires twice between 1992 and 2002; the site also burned because of a wildfire around 2000. The adjacent land to the north was logged about five years ago. To

the south and west is pasture with pines that were logged in the recent past. To the east is an orange grove (Lohrer 1993 and 2002; Morrison 2002).

Two smaller Longleaf sites in central Florida are **Crooked Lake Sandhill** (Polk County): a 24-acre site that looks unlogged, with large, old Longleaf Pines, owned by the Polk County Board of Commissioners (Morrison 2002); and **Babson Park Audubon Center** and **Webber College** (Polk County): adjacent 2- or 3- acre and 5-acre tracts respectively of apparently unlogged Longleaf (Morrison 2002, Gordon 2002).

**Avon Park Air Force Firing Range**,\* central peninsula (Polk and Highlands Counties)

Fifteen thousand acres of natural Longleaf Pine and Slash Pine with varied histories. Most of the acreage has been "cutover" (Morris 2002) or "thinned" (Van Hook 2002). However, there is a beautiful savanna of old-growth cutthroat grass-Longleaf flatwoods, of "maybe 50" (Morris 2002) or "about 100 acres" (Van Hook 2002) and possibly other unlogged stands of pine. The cutthroat grass-Longleaf community has burned every 2 to 3 years (Van Hook 2002).

**Andrews Wildlife Management Area**, northwestern peninsula (Levy County)

A few dozen acres of old-growth upland hardwoods within a mile of the Suwannee River. The area has probably been lightly highgraded and grazed by livestock, but is otherwise fine. With its hickory, oak, ash, maple, and other species, it constitutes "one of the finest upland forests left in the state," Steve Gatewood says. The 3877-acre Management Area belongs to the Game and Fresh Water Fish Commission (Gatewood 1993, Minasian 1993, Perry and Perry 1992).

**Orange Lake Cypress**, east-central peninsula (Marion County)

Forty acres of Baldcypress, apparently undisrupted by grazing or logging, in three separate clusters within a basin swamp. The Nature Conservancy owns 107 acres, including the cypress. The cypress are up to 8 feet dbh and to 100 feet tall (Gatewood 1993, Schultz 1985).

**Mitchell Sink**, northeastern peninsula (Madison County)

Small hummocks of ancient, dwarfed Live Oak in the midst of white sand pan. Some of the oak have trunks 20 feet in circumference, yet are only 20 feet tall. Mitchell Sink, which covers several square miles, is part of a complex karst drainage system. The water table has apparently fallen sharply in the past twenty years; in other sinks nearby, old cypress trees have been left dry. Local residents have used the sink as a garbage dump (Morgan 1993).

## THE SOUTHERN PENINSULA AND KEYS

**Big Cypress National Preserve** (Monroe and Collier Counties)

Unlogged scrub cypress on 158,000 acres of the 729,000-acre Preserve. The large cypress in Big Cypress were removed, but the "hat rack" Pond Cypress were never cut, because they are no more than 33 feet tall (often only 10 to 20 feet) with dbhs under 6 inches, and are sparse--as much as 45 to 60 feet apart. Typically they grow on shallow sand or marl (clayey grey or white soil) (Snyder 1993, Beaver 1993).

Twenty-three thousand acres of unlogged Florida Slash Pine (Snyder 1993). At Lostman's Pines, a 25,000-acre area in the southern part of the Preserve, are scattered islands of Slash Pine, mostly 50-250 acres in extent, on limestone outcroppings amid wetlands, usually marl prairies (Ross et al. 1997, Platt et al. 2000). The old-growth pines are, however, mostly on flatlands in the northeast section of the Preserve, which the loggers of the 1930s, 40s, and 50s did not reach. Beneath the Slash Pine grow Saw Palmetto, Cabbage Palm, Wax Myrtle, Florida Myrsine, and shrubs and grasses. Something over 50% of the Slash Pine may be growing under hydric conditions (Snyder 1993). Landers and Baldwin list Raccoon Point as a representative stand of old-growth Slash Pine (1999). Jim Beever points out that not all of the hydric Slash Pine flatwoods in Big Cypress are within the Preserve (1993).

### **Everglades National Park**, south Florida (Monroe and Dade Counties)

An unknown number of undisrupted acres in at least 3 types of communities.

--**Slash Pine**. William Platt refers to Slash Pine savanna (1993), and R. F. Doren reported to Lucy Tyrrell that the National Park contains unlogged Slash Pine, 100 to 200 years in age, of uncertain acreage (Tyrrell 1991).

--**Hardwood hammocks**. Doren wrote of hardwood hammocks with mahogany (1991). Simons described small tropical hammocks, probably virgin, scattered through the Saw Grass (1990); and Myers and Ewel name as an example of surviving old growth; "some inaccessible tropical hammocks" in the Everglades (1990).

--**Mangrove swamps**. The seaward side of the Park has an enormous belt of mangroves (Odum and McIvor 1990). The mangrove forest, many thousands of acres in extent, is the largest area of forest in the Everglades (Simons 1995).

### **Southern Charlotte County** (southwestern peninsula)

Thirty thousand acres of hydric Slash Pine flatwoods, up to 2360 of which are old growth. During the logging era, loggers cut pine growing on xeric and mesic sites in preference to pine on wet sites, because logging in the hydric areas was difficult and unpleasant and the trees were spaced farther apart and were more likely to be malformed than those on dry sites. Mature trees on hydric sites are typically 10 to 12 inches in diameter and 60 to 75 feet tall. Their canopies cover only 10 to 20% of the area of each unlogged stand. The older Slash Pine in the county are 150 years in age, and probably originated after fire. Prescribed burns are now used to maintain them. In the winter the flatwoods are dry, but in the summer they are under surface water of 6 to 12 inches.

The flatwoods in Charlotte County are found both on private land and on public land, in particular the 65,775-acre Fred C. Babcock-Cecil M. Webb Wildlife Management Area and the adjacent Charlotte Harbor Flatwoods Project. The latter is an 18,000-acre project, for which the state has already acquired more than 16,000 acres (FDEP 2002). Collier and Lee Counties also have hydric Slash Pine flatwoods (see entries on the Everglades and Big Cypress).

The Slash Pine flatwoods host many rare, Threatened, and Endangered species, including the Florida Panther, Black Bear, Florida Sandhill Crane, Eastern Indigo Snake, Big Cypress Fox Squirrel, Gopher Frog, Snowy Egret, Tri-colored Heron, and Wood Stork. Eighty-nine of the 112 known Red-cockaded Woodpecker colonies in southwest

Florida live in healthy hydric Slash Pine flatwoods. All but one of the 92 active colonies forage in these flatwoods (Beever and Dryden 1992, Beever 1993 and 2003).

**Jonathan Dickinson State Park,\*** southeastern Florida (Martin County)

A park of over 11,500 acres with 1500 acres of naturally seeded Sand Pine scrub (Parker et al. 1997). The only trees considered to be of value on the land before it became a park were the cypress and the Slash Pine, which were logged. The Sand Pine were without timber value as timber and were left alone (Schuh 2002).

**Strand W of Cow Bone Island,** Seminole Indian Reservation, south-central peninsula (Hendry County)

Approximately 700 acres of strand swamp with virgin cypress (NeSmith 1990). Strand swamp is a broad channel with peat over a mineral substrate, seasonally inundated with flowing water, tropical or subtropical in climate, and subject to occasional fires (Bettinger 1990).

**Corkscrew Swamp Sanctuary,** in southwestern Florida (Collier County)

Seven hundred acres of old-growth Baldcypress of which 200 acres are virgin, in an 11,000-acre sanctuary, owned by the National Audubon Society (Carlson 1990). The cypress are up to 130 feet in height and 25 feet in girth, and many are over 700 years old. The trees were spared from logging because their wood had a spiral grain (Stevenson 1990).

**Fakahatchee Strand State Preserve,** southern Florida (Collier County)

Within the 46,000-acre preserve, mixed hardwood swamp forest, some of it uncut, and a small amount of uncut cypress. The swamp forest supports tropical hardwoods, giant Baldcypress, the shrub Pond Apple, and many endemic orchids, among other species. Something less than 10% of the preserve may have escaped logging (Beever 1993). The preserve has around 20 acres of uncut Baldcypress (Minasian 1993). NeSmith wrote that there are about 40 acres of unlogged Baldcypress, some of which may be outside the preserve (1990). A 40-acre tract named "Big Cypress Bend" has a boardwalk through it (Gatewood 1993). The State Preserve is adjacent to Big Cypress National Preserve.

**Coastal islands of southwestern Florida** (Collier, Lee, and Charlotte Counties)

Uncut tropical hardwood hammocks on islands between the mainland and the barrier islands. The islands on which hammocks survive are those edged with mangroves rather than with beaches, because people chose to settle on the islands with beaches. The unlogged islands include Buck Key, Joselyn Island, and Mound Key. The last was a center of culture for the Caloose Indians, who lived on mounds of seashells, amidst hammocks. After the Indians left, the whole island grew up in hardwood hammock. (Horr's Island, an island that until recently was unlogged, is in the process of being developed.) Tree species are very diverse; two unusual trees common here are Gumbo Limbo and Pigeon Plum (Beever 1993).

**Dade County Archipelago Project,\*** southeastern peninsula (Dade County)

Scattered sites in Dade County representing “outstanding examples of rockland hammock” and some of the “best remaining examples of the highly endangered pine rockland.” The sites include areas recognized as old growth, in particular **Castellow Hammock**. The Dade County sites were severely damaged by Hurricane Andrew but are recovering. The sites in the project total 1400 acres (Outcalt 1997b, Gatewood 1993, FDEP 2002).

### **The Florida Keys**, around the southern tip of Florida (Monroe County)

In addition to old-growth mangrove swamps described above, the Florida Keys have old-growth tropical hammock and pine rockland habitat.

The best old sites of high hardwood hammock are almost all within three preserves on Key Largo in the Upper Keys, James Duquesnel reports: the 6606-acre **Crocodile Lake National Wildlife Refuge**, the 2500-acre **Dagny Johnson Key Largo Hammock Botanical State Park**,\* and **John Pennekamp Coral Reef State Park**.\* The last is largely underwater, but has a land base of a few acres with hammocks. **Lignumvitae Key State Botanical Site**, a 381-acre preserve (280 land acres) also in the Upper Keys, has a largely undisturbed hammock. According to Outcalt, Lignumvitae Botanical Site is, in fact, “the best remaining example of an old-growth hardwood hammock” (1997b). Early in the century land was cleared for a large house, which still stands, and the island is also the site of older blockhouses and a huge rock wall, but overall is healthy. The Division of Recreation and Parks owns it (Perry 1992, Simons 1990).

Species composition rather than tree height and girth characterize the older stands of hardwood hammock. In the Upper Keys native trees are generally restricted in height to 40 or 45 feet by storm winds; relatively recently introduced exotics that are taller are likely to be damaged in storms. Redberry Stoppers (*Eugenia confusa*) larger than 12” dbh and lignum vitae (*Guajacum sanctum*) in leaf litter 8-12 inches deep seem to be signs of the best forest stands, Duquesnel writes. Associated species may include *Calyptranthes* spp., *Guettarda* spp., *Manilkara jamiqui*, *Thrinax* palms, and epiphytic orchids (in particular *Encyclia boothiana* and or *Vanilla barbellata*) (Duquesnel 2003).

Hammocks in the Lower Keys tend to have the same species as those in the Upper Keys but to be lower. Twenty feet is the usual height of trees. Twenty-five feet would be tall. The hammocks are also dense. It would be difficult to imagine their being extensively logged, Randy Grau says. Probably only scattered homesteads were cut into the hammocks. Biologists and other researchers discuss whether specific sites in the Lower Keys are old growth, but actual evidence seems to be lacking, and opinions go both ways. Grau mentioned **Middle Torch**\* and **Big Torch Keys**\* as sites of possible old-growth hammock (Grau 2003).

The Lower Keys have a great deal of virgin old-growth pine rockland, perhaps 2000 acres of fractured or fragmented stands, Robertson estimated in 1990. Putting it in other terms, Tate wrote that “most pine rocklands” are likely to be old growth (1993). Widely separated Slash Pine dominate pine rockland communities. Palms are also present, and the ground cover is comprised of fairly lush grasses and herbs (Robertson 1990).

Phil Frank, Project Manager for the Florida National Wildlife Refuges, three of which are in the Lower Keys, estimates that the refuges include in total about 4000 acres

of pine rockland and about 4000 acres of tropical hardwood hammock. He describes these hammocks as old growth, because they are hurricane dependent and tend to be scraped off every one hundred years. The pine rocklands are undergoing prescribed burning. The 8542-acre **National Key Deer Refuge** includes much pine rockland and tropical hardwood hammock. The **Key West** and **Great White Heron Refuges** are largely composed of mangrove islands (Frank 2003).

Owners of land in the Keys include the US Fish and Wildlife Service, the state of Florida, The Nature Conservancy, the National Park Service, and private parties. The state for one has made a major effort to protect habitat on the Keys. On North Key Largo the state has bought more than 4000 acres for the North Key Largo Hammocks project (FDEP 2002), and in the Lower Keys it has acquired 2100 acres that comprise the Florida Keys Wildlife and Environmental Area, managed by the Florida Fish and Wildlife Commission as a conservation area (Singleton 2003).

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