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Caribbean Swamp Systems

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
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Vegetation Type

Woody Wetland

Map Zones

56

Geographic Range

Caribbean Swamp Systems is an aggregate of two ecological systems, South Florida Bayhead Swamp and South Florida Hydric Hammock, both of which are endemic to south FL (NatureServe 2006).

Biophysical Site Description

NatureServe (2006) identifies Caribbean Swamp Systems as hardwood dominated wetland forests.

South Florida Bayhead Swamps are synonymous with the tree islands of the Everglades. They occur on slightly elevated sites within the large expanses of sawgrass marsh, occurring as round to generally teardrop shaped islands ranging in size from ¼ acre to 300ac+. Soils are typically organic and include Plummer fine sands, Gandy and Istokpoga peats and other bog soils (Davis 1943, Gunderson 1994).

South Florida Hydric Hammock occurs on flat lowlands underlain by limestone substrate. Davis (1943) identifies these as low hammocks that occur as elongated strips that occur along the outer border of swamps, streams and rivers. Soils are prevailingly fine sands and fine sandy loams with calcareous substrata as the Palmdale, Parkwood and Manatee soils (Davis 1943).

Vegetation Description

South Florida Bayhead Swamp:

Gunderson (1994) defines bayhead swamp as a broad-leaved hydrophytic hardwood association. It occurs as trees islands within the broad marsh expanses of the Everglades. The overstory includes red bay (*Persea borbonia*) and sweetbay magnolia (*Magnolia virginiana*) mixed with dahoon holly (*Ilex cassine*), pond apple (*Annona glabra*), wax myrtle (*Morella cerifera*), Carolina willow (*Salix caroliniana*) and strangler fig (*Ficus aurea*). The understory may be sparse to locally dense, depending on overstory shading and light availability. It is generally a dense mix of shrubs including cocoplum (*Chrysobalanus icaco*) and buttonbush (*Cephalanthus occidentalis*), regeneration of the canopy species, and giant leather fern (*Acrostichum danaeifolium*).

NatureServe (2006) lists several associations within this system including:

- Sweetbay magnolia (*Magnolia virginiana*) – swamp bay (*Persea palustris*) – cocoplum (*Chrysobalanus icaco*) – giant leather fern (*Acrostichum daaefolium exalta*) Forest
- Sweetbay magnolia – swamp bay – cocoplum – Sawgrass (*Cladium mariscus* ssp. *Jamaicense*) Woodland
- Buttonwood (*Conocarpus erectus*) – poisonwood (*Metopium toxiferum*) – Everglades palm (*Acoelorrhaphe wrightii*) – cocoplum Forest
- Laurel oak (*Quercus laurifolia*) – sabal palm (*Sabal palmetto*) – myrsine (*Myrsine floridana*) – wild coffee (*Psychotria nervosa*) Forest
- Bald Cypress (*Taxodium distichum*) – swamp bay – ash (*Fraxinus caroliniana*) – cocoplum – swamp fern (*Blechnum serrulatum*) Forest
- Red Mangrove (*Rhizophora mangle*) – bald cypress – poisonwood – cocoplum – nodding nixie (*Apteris aphylla*) Forest
- Royal Palm (*Roystonea elata*) – bald cypress – laurel oak – wild coffee – *Nephrolepis* spp. Forest

South Florida Hydric Hammock:

Davis (1943) describes this as low hammocks of mixed hardwoods and palms that contain such temperate zone species as the sweet-gum (*Liquidambar styraciflua*), water hickory (*Carya aquatica*), ash, hackberry (*Celtis laevigata*), laurel-oak, American elm, persimmon (*Diospyros virginiana*), mulberry (*Morus rubra*), and red maple (*Acer rubrum*) as well as the sabal palm. Slightly elevated hammocks on drier soils are usually dominated by the live-oak (*Quercus virginiana*), and many hammocks of intermediate elevations, particularly in the wet-prairie areas, are dominated by the sabal palm. Further south tropical zone hardwoods become more abundant. Shrubs and tree regeneration is typically dense and includes a mix of tropical and temperate zone species such as marlberry (*Ardisia escallonioides*), lancewood (*Ocotea coriacea*), wild-coffees, beautyberry (*Callicarpa americana*), shining sumac (*Rhus copallina*), wild lime (*Zanthoxylum fagara*) and hog-plum (*Ximenia americana*). Hammocks frequently have an abundance of vines, ferns and epiphytes.

NatureServe (2006) defines this system as wet hammocks dominated by mixed hardwood species. They list three associations within this system including:

- Sabal palm – Live Oak (*Quercus virginiana*) – American elm (*Ulmus americana*) – Strangler fig (*Ficus aurea*) – giant leather fern – sword fern (*Nephrolepis exaltata*) Forest
- Sabal palm – laurel oak – live oak – sweetbay magnolia – American elm Forest
- Laurel oak – Sabal palm – myrsine – wild coffee Forest

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
PEBO	<i>Persea borbonia</i>	Redbay
MAVI2	<i>Magnolia virginiana</i>	Sweetbay
ILCA	<i>Ilex cassine</i>	Dahoon
ANGL4	<i>Annona glabra</i>	Pond apple
QUVI	<i>Quercus virginiana</i>	Live oak

QULA3	<i>Quercus laurifolia</i>	Laurel oak
CHIC	<i>Chrysobalanus icaco</i>	Icaco coco plum
SAPA	<i>Sabal palmetto</i>	Cabbage palmetto

Species names are from the NRCS PLANTS database. Check species codes at <http://plants.usda.gov>.

Disturbance Description

Fire and hurricanes can significantly affect forested communities in south Florida (Gunderson 1994). Wade et al. (1980) states all bayhead and hammock communities in south Florida are detrimentally affected by fire. During dry conditions, because they are slightly higher than the surrounding wetlands and contain organic soils, severe fires can consume the organic soils and completely eliminate a tree island or hammock. The result frequently is development of a willow thicket (Wade et al. 1980).

Studies in Everglades National Park indicate several spatial and temporal cycles of fire activity (Beckage et al. 2003, Gunderson and Snyder 1994). Smaller fires occur on an annual cycle that corresponds to the transition between the dry and wet seasons (Beckage et al. 2003, Gunderson and Snyder 1994). Lightning-strike fires are most numerous from March to September, with a peak in July (Curnutt et al. 1998). Most of the acreage burns from April to June during the drier, early lightning season (Gunderson and Snyder 1994). Fires in wet months tend to leave behind a mosaic of burned and unburned patches, while in the dry season burning is still patchy, but much more complete (Taylor 1983). Moderate to high intensity fires occur at 6-15yr intervals, and appear associated with El Nino Southern Oscillation influences (Beckage et al. 2003, Gunderson and Snyder 1994, Beckage and Platt 2003). Less common (1-2 per decade) severe fires associated with drought occur primarily from March-May (Gunderson and Snyder 1994). To our best understanding, fires were predominately during the wet season (i.e., lightning), and often limited in area because of the associated rain. However, some natural fires were larger (>10,000ha), especially during drought years.

Intense (Category 4+) hurricanes occur about every 30-50yrs in south Florida. Storms such as Andrew in 1992 uproot and defoliate trees. Gunderson (1994) reported than five months after this storm forested areas still lacked a developed canopy, although there was regrowth from stumps and seedlings. Less intense (Category 1-3) hurricanes and frost or cold weather occur about every 15yrs, and can "open-up" portions of the previously dense, closed-canopy.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	1368	100		
Moderate (Mixed)				
Low (Surface)				
All Fires	1368	100		

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

Tree islands may range in size from 1/4 acres to >300ac+. Schnieder (1966) estimates that tree islands comprise between 5-10% of the Everglades land area.

Adjacency or Identification Concerns

Systems comprising this aggregate may also be called tree islands, temperate or tropical hammocks and bayheads. Many examples of these systems are surrounded by large expanses of sawgrass marsh.

Encroachment by exotic species is a significant problem in south Florida. Many representatives of these systems may be heavily invaded by Brazilian pepper, melaleuca or a number of other invasive exotic plant species. Some of the rarer components of these systems, orchids, bromeliads and ferns have been extirpated by over collection. Changes in the hydrology of the Everglades system have had a significant effect on all natural communities in the region. This “drying out” results in an increased frequency of severe fires in some systems like hammocks and bayheads which historically were protected by wet conditions and burned infrequently. It also can cause subsidence of organic soils through oxidation.

Issues or Problems

Native Uncharacteristic Conditions

Comments

Succession Classes

Mapping Rules

Upper Layer Lifeform	Height (m)	Canopy Cover (%)									
		0-10	11-20	21-30	31-40	41 - 50	51-60	61-70	71-80	81-90	91-100
Herb	0-0.5	A	A	A	A	A	A	A	A	A	A
Herb	0.5-1.0	A	A	A	A	A	A	A	A	A	A
Herb	>1.0	A	A	A	A	A	A	A	A	A	A
Shrub	0-0.5	A	A	A	A	A	A	A	A	A	A
Shrub	0.5-1.0	A	A	A	A	A	A	A	A	A	A
Shrub	1.0-3.0	A	A	A	A	A	A	A	A	A	A
Shrub	>3.0	A	A	A	A	A	A	D	D	D	D
Tree	0-5	A	A	A	A	A	A	D	D	D	D
Tree	5-10	B	B	B	B	B	B	B	B	B	B
Tree	10-25	C	C	C	C	C	C	C	C	C	C
Tree	25-50	C	C	C	C	C	C	C	C	C	C
Tree	>50	C	C	C	C	C	C	C	C	C	C

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

Description

Class A	14	Early Development 1 - All Structures
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PEBO	Persea borbonia	Redbay	Upper
MAVI2	Magnolia virginiana	Sweetbay	Upper
QUVI	Quercus virginiana	Live oak	Upper
SAPA	Sabal palmetto	Cabbage palmetto	Upper

Description

Class represents vegetation recovering post-disturbance, primarily a high intensity hurricane. It also represent gap-phase regeneration in forests that have experienced a less intense storm event. This class is characterized by resprouting stumps and germinating seedlings of canopy and understory species.

Class can experience a severe fire during dry conditions. This would result in consumption of the organic layer and conversion of the hammock to a willow thicket.

Maximum Tree Size Class

Sapling >4.5ft; <5"

Class B	35	Mid Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PEBO	Persea borbonia	Redbay	Upper
MAVI2	Magnolia virginiana	Sweetbay	Upper
QUVI	Quercus virginiana	Live oak	Upper
SAPA	Sabal palmetto	Cabbage palmetto	Upper

Description

Class represents a mid-development closed condition. This class is characterized as moderately dense to dense with a well-developed shrub and ground cover layer. High intensity storms can down trees and drive this class back to an early post replacement stage. Less intense storms can create canopy gaps that return to the early post replacement stage. Class can experience a severe fire during dry conditions. This would result in consumption of the organic layer and conversion of the hammock to a willow thicket.

Maximum Tree Size Class

Medium 9-21"DBH

Class C	36	Mid Development 2 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PEBO	Persea borbonia	Redbay	Upper

Stress						
Replacement Fire	Early1:ALL	Late1:CLS	0.002	500	Yes	0
Replacement Fire	Mid1:CLS	Late1:CLS	0.002	500	Yes	0
Wind or Weather or Stress	Mid1:CLS	Early1:ALL	0.02	50	Yes	0
Wind or Weather or Stress	Mid2:CLS	Early1:ALL	0.02	50	Yes	0
Replacement Fire	Mid2:CLS	Late1:CLS	0.002	500	Yes	0
Wind or Weather or Stress	Mid2:CLS	Mid2:CLS	0.068	15	No	0
Alternative Succession	Late1:CLS	Early1:ALL	0.005	200	Yes	0

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