14470

South Florida Cypress Dome

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Woody Wetland

Map Zones

56

Geographic Range

This system is endemic to south FL. The South Florida Cypress Dome system is found primarily in the Everglades and Big Cypress regions (NatureServe 2006).

Biophysical Site Description

This system consists of small forested wetlands in poorly drained depressions which are underlain by an impervious layer (marl--unconsolidated calcitic clay--and limestone bedrock) that impedes drainage and traps precipitation. Soils are typically acidic sands and/or clays (Monk and Brown 1965). Organic deposits accumulate over the clay or sand layers, and are generally deepest in the center of the dome (Monk and Brown 1965).

Cypress domes typically occur as small patch communities imbedded within a larger matrix of pine flatwoods (Abrahamson and Harnett 1990), marsh or other community types. These patches are roughly circular in shape and typically range in size from one to ten hectares (Mitch and Gosselink 2000). In profile, these systems display a characteristic domed shape, with the largest trees in the center of the dome and tree becoming progressively shorter towards the perimeter. Not all domes display this characteristic.

Pools of stagnant, highly acid water may stand in the center of these depressions ranging in depth, but becoming increasingly shallow along the margins (NatureServe 2006). Water is primarily derived from rainfall and drainage from adjacent uplands. Water levels may fluctuate greatly during the year, but typically cypress domes are inundated up to a meter or more (in the center of the dome) during the summer rainy season, and dry for several months during the winter and spring (Monk and Brown 1965, Brown 1981, Crownover et al. 1995).

Vegetation Description

Cypress domes are typically dominated by pond cypress (*Taxodium ascendens*) with occasional hardwoods and sabal palm in the canopy. At the drier end of this gradient, cypress domes may be characterized as dense, mono-specific stands of pond cypress (*Taxodium ascendens*), growing on mineral soil (Duever 2003). At the wet end of the gradient, the cypress are typically more widely spaced and grow on a deep organic soil (Duever 2003). Other minor associates include swamp bay (*Persea palustris*), dahoon holly (*Ilex cassine*), slash pine (*Pinus elliottii*), sweet bay (*Magnolia virginica*), strangler fig (*Ficus aurea*), and red maple (*Acer rubrum*). The canopy is generally dense, with larger trees towards the center of the dome on deeper organic soils.

Shrubs and ground cover vegetation may be dense to relatively sparse, depending on light availability (Mitsch and Gosselink 2000). The understory flora includes several species with tropical affinities such as cocoplum (*Chrysobalanus icaco*) and pond apple (*Annona glabra*). Other shrubs include shiny lyonia (*Lyonia lucida*) and wax myrtle (*Morella cerifera*). Ground cover vegetation can include ferns, various wetland herbs and grasses like maidencane (*Panicum hemitomon*). Shade-tolerant epiphytic bromeliads and orchids may be abundant. Many species of these bromeliads and orchids occur nowhere else in North America.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| TAAS | *Taxodium ascendens* | Pond cypress |
| PEPA37 | *Persea palustris* | Swamp bay |
| MAVI2 | *Magnolia virginiana* | Sweetbay |
| LYLU3 | *Lyonia lucida* | Fetterbush lyonia |
| MOCE2 | *Morella cerifera* | Wax myrtle |
| CHIC | *Chrysobalanus icaco* | Icaco coco plum |
| ANGL4 | *Annona glabra* | Pond apple |
| PAHE2 | *Panicum hemitomon* | Maidencane |

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

Disturbance Description

Fire is one of the primary disturbances that affect cypress domes. Without periodic fires, hardwood invasion and peat accumulation would convert the dome to a different wetland community type (Florida Natural Areas Inventory 1990). Marois and Ewel (1983) found that protection from fire in northern FL results in an increase in dominance of slash pine, bays, and black gum in cypress swamps. Ewel and Mitsch (1978) found that fire in a cypress dome in northern FL had a cleansing effect on the dome, selectively killing pines and hardwoods but relatively few pond cypress.

The fire frequency of cypress domes is not concisely documented. Ewel (1990) stated cypress domes may burn several times each century in northern FL and that fires are more frequent in southern FL than in northern FL. FNAI (1990) states the normal fire cycle might be as short as 3-5yrs along the outer edge and as long as 100-150yrs towards the center. Personal observations indicate that the edges of cypress domes and cypress stringers burn frequently, often nearly as frequent as the surrounding pine flatwoods. However, the interior portions burn infrequently and only during extended drought periods. Fires typically are light surface fires that do not kill the cypress or burn deep into the organic soil. During drought conditions fires can burn into the organic soils and kill the trees.

Hydrology is another dominant force influencing cypress domes. Cypress domes are typically inundated for 200-300 days per year, but may dry out for several months during the winter and early spring (FNAI 1990). Drought conditions increase fire susceptibility and extended drought periods may influence species composition. Robertson et al. (1998) found that shallow water in cypress domes (usually resulting from drainage) provides conditions more favorable for successful competition by evergreen hardwoods and pines.

Cypress domes occur in hurricane prone areas of the southeast US. Several sources in the literature indicated that cypress trees appear more resistant to storm related mortality than many other species. K. Ewel, through a personal communication cited in Mitsch and Gosslink (2000), relayed an observation from SC following Hurricane Hugo that cypress trees remained standing while pines and hardwoods did not. Ogden (1992) reported that following Hurricane Andrew hardwoods in Everglades National Park were downed while cypress remained standing for the most part. Guntenspergen and Vairin (1996) in their documentation of the effects of Hurricane Andrew on LA reported that cypress-tupelo swamps remained almost unaffected by storm damage while hardwood forests lost almost one-third of their trees. Personal observations in cypress domes at The Nature Conservancy’s Disney Wilderness Preserve in Kissimmee, FL.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 128 | 7 | 100 | 150 |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) | 10 | 93 | 5 | 20 |
| All Fires | 9 | 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

Cypress domes are typically small patch communities, ranging in size from 1-10ha, within a much larger matrix community (pinelands or marsh). A single fire event within the matrix frequently will affect several cypress domes.

Adjacency or Identification Concerns

In some areas of south Florida (Big Cypress and the Everglades), poor growing conditions can stunt the growth of pond cypress. Cypress trees there only grow to about 10ft tall. These typically occur as South Florida Dwarf Cypress Savanna, but cypress domes may be imbedded in this system. Cypress domes sometimes expand and grow together to form meandering cypress strands (Duever et al. 1984). Cypress dome establishment within sawgrass marshes (i.e., the Everglades) can occur on batteries of peat (peat masses that float to the surface) which form the substrate and provide suitable for colonization. Peat batteries may be initially colonized by buttonbush, hurrahbush or dahoon holly. These shrubs stabilize the mass and increase the rate of peat formation, favoring subsequent invasion by bays and cypress. The resulting community is similar to that found in cypress domes. These communities are usually referred to as tree islands or cypress islands and usually succeed to hardwoods in a short period of time (Christensen 1988).

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 cypress domes which historically were protected by wet conditions and burned infrequently. It also can cause subsidence of organic soils through oxidation.

Issues or Problems

The fire frequency of this system as well as many other wetland types has not been well documented or specifically defined. Probabilities used in this model were based on literature estimates and personal observations. However, most literature estimates a general (several times per century) and personal observations are limited by time scale. More research and documentation is needed.

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 | A | A | A | A |
| Tree | 0-5 | A | A | A | A | A | A | A | A | A | A |
| Tree | 5-10 | B mix | B mix | B mix | B mix | B mix | B mix | B mix | B mix | B mix | B mix |
| Tree | 5-10 | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf |
| Tree | 5-10 | C con | C con | C con | C con | C con | C con | C con | C con | C con | C con |
| Tree | 10-25 | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix |
| Tree | 10-25 | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf |
| Tree | 10-25 | D con | D con | D con | D con | D con | D con | D con | D con | D con | D con |
| Tree | 25-50 | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix |
| Tree | 25-50 | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf |
| Tree | 25-50 | D con | D con | D con | D con | D con | D con | D con | D con | D con | D con |
| Tree | >50 | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix |
| Tree | >50 | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf |
| Tree | >50 | D con | D con | D con | D con | D con | D con | D con | D con | D con | D con |

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 11 Early Development 1 - All Structures

DBH

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| TAAS | Taxodium ascendens | Pond cypress | Upper |
| PAHE2 | Panicum hemitomon | Maidencane | Lower |
| RHYNC3 | Rhynchospora | Beaksedge | Lower |
| ELEOC | Eleocharis | Spikerush | Lower |

Description

The early post replacement class includes seedling and sapling size pond cypress that have resprouted post disturbance (ususally fire). This class generally occurs in a band around the outer perimeter of the cypress dome. The width of this band may vary depending on suitable conditions for cypress seed germination and fire. Under suitable conditions and in the absence of a killing fire, this band of seedling or sapling size cypress may expand outward into the adjacent wet prairie or marsh community. Following a severe fire, trees around the outer perimeter will be killed. Cypress in the remaining protected portions of the dome provide seeds to re-colonize the area.

Understory vegetation may include a mix of those found in the interior of the cypress dome and those found in the adjacent wet prairie, marsh or pine flatwoods/savanna systems. In higher fire environments, grasses and sedges tend to predominate.

This portion of the cypress dome may be affected by fire almost as frequently as the surrounding pine flatwoods/savannah systems. Surface and replacement fires may occur. Hurricanes have a minimal impact on this age class, and drought conditions may reduce the percent cover by cypress and allow encroachment of more mesic species from the surrounding pine communities.

*Maximum Tree Size Class*  
Sapling >4.5ft; <5" DBH

Class B 1 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| TAAS | Taxodium ascendens | Pond cypress | Upper |
| PEPA37 | Persea palustris | Swamp bay | Upper |
| MAVI2 | Magnolia virginiana | Sweetbay | Upper |
| CHIC | Chrysobalanus icaco | Icaco coco plum | Middle |

Description

Class represents the mid-development closed condition. In cypress domes, closed refers to the structure and physiognomy of the understory vegetation and the level of encroachment of hardwoods into the canopy. This class is characterized by cypress trees with a significant component of hardwood trees, pines, mid-story trees and shrubs that have established in the absence of fire. This class typically contains an abundance of larger woody shrubs such as wax myrtle, coco plum and fetterbush, and understory trees such as swamp bay and sweet bay that have established in the absence of fire. Ground cover vegetation may include ferns and other species.

A single surface fire would not significantly affect the composition and structure of this class. Repeated surface fires can remove the hardwood component and return the class to an open condition. This is simulated in the model by repeated surface fires. Replacement fires, occurring during extended drought periods, would result in consumption of the accumulated peat and mortality of the trees. This would return the system to the early post replacement class.

*Maximum Tree Size Class*  
Pole 5-9" DBH

Class C 24 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| TAAS | Taxodium ascendens | Pond cypress | Upper |
| CHIC | Chrysobalanus icaco | Icaco coco plum | Middle |
| BLSE | Blechnum serrulatum | Toothed midsorus fern | Middle |
| PAHE2 | Panicum hemitomon | Maidencane | Lower |

Description

Class represents the mid-development open condition. In cypress domes, open refers to the structure and physiognomy of the understory vegetation and the level of encroachment of hardwoods into the canopy. Class is characterized by a canopy composed almost exclusively of pond cypress. Hardwoods may occur. Shrubs and mid-canopy species such as coco plum and swamp bay occur occasionally, but do not represent a significant component of the system. Ground cover vegetation may be sparse to locally abundant, depending on light availability, and may include ferns, panic grasses, beakrushes and other sedges. In some systems, sphagnum mosses are the predominant ground cover.

The outer edges of the class may receive a surface fire. Fire frequency generally declines towards the center of the dome and surface fires may only reach the interior portions occasionally. Replacement fires occur once a century or so. This event occurs during extended drought periods, and results in consumption of the organic material and mortality of many of the trees, returning the class to an early post replacement condition.

*Maximum Tree Size Class*  
Pole 5-9" DBH

Class D 57 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| TAAS | Taxodium ascendens | Pond cypress | Upper |
| BLSE | Blechnum serrulatum | Toothed midsorus fern | Lower |
| PAHE2 | Panicum hemitomon | Maidencane | Lower |
| CHIC | Chrysobalanus icaco | Icaco coco plum | Middle |

Description

Class represents the late development open condition. In cypress domes, open refers to the structure and physiognomy of the understory vegetation and the level of encroachment of hardwoods into the canopy. This class occurs in the central portion of the dome on deeper organic soils. Class is characterized by a canopy composed almost exclusively of pond cypress. Hardwoods may occur. Shrubs and mid-canopy species such as wax myrtle, red maple and swamp bay occur occasionally, but do not represent a significant component of the system. Ground cover vegetation may be sparse to locally abundant, depending on light availability, and may include ferns, panic grasses, beakrushes, and other sedges. In some systems, sphagnum mosses are the predominant ground cover.

Surface fires may reach the interior portions of the dome. Replacement fires occur about every century or more. Replacement fires occur during extended drought periods, and result in consumption of the organic material and mortality of many of the trees, returning the class to an early post replacement condition. In some circumstances this can appear to create a hole in the donut effect where the outer bands of trees remain intact and the center portion returns to the early post-replacement class.

*Maximum Tree Size Class*  
Medium 9-21"DBH

Class E 7 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| TAAS | Taxodium ascendens | Pond cypress | Upper |
| PEPA37 | Persea palustris | Swamp bay | Upper |
| MAVI2 | Magnolia virginiana | Sweetbay | Upper |
| CHIC | Chrysobalanus icaco | Icaco coco plum | Middle |

Description

Class represents the late development closed condition. In cypress domes, closed refers to the structure and physiognomy of the understory vegetation and the level of encroachment of hardwoods into the canopy. This class occurs in the central portion of the dome on deeper organic soils. Class is characterized by a mixed canopy of pond cypress and hardwoods including swamp bay, sweet bay, loblolly bay and others. Mid-canopy trees, shrubs and ground cover vegetation may be sparse to locally abundant, depending on light availability. Species include wax myrtle, coco plum, ferns, panic grasses, beakrushes, and other sedges. In some representatives, sphagnum mosses are the predominant ground cover.

A single surface fire would not significantly affect the composition and structure of this class. Repeated surface fires can remove the hardwood component and return the class to an open condition. This is simulated in the model by a surface fire occurring at a low probability but it represents repeated surface fires. Replacement fires, occurring during extended drought periods, would result in consumption of the accumulated peat and mortality of the trees. This would return the system to the early post replacement class if a seed source is available. In some circumstances this can appear to create a hole in the donut effect where the outer bands of trees remain intact and the center portion returns to the early post-replacement class. Severe fires may also initiate a transition to a different type of system such as marsh or shrub dominated swamp.

*Maximum Tree Size Class*  
Medium 9-21"DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:OPN | 15 |
| Mid1:OPN | 16 | Late1:OPN | 60 |
| Mid1:CLS | 16 | Late1:CLS | 60 |
| Late1:OPN | 61 | Late1:OPN | 999 |
| Late1:CLS | 61 | Late1:CLS | 999 |

Probabilistic Transitions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disturbance Type** | **Disturbance occurs In** | **Moves vegetation to** | **Disturbance Probability** | **Return Interval (yrs)** | **Reset Age to New Class Start Age After Disturbance?** | **Years Since Last Disturbance** |
| Alternative Succession | Early1:ALL | Mid1:CLS | 1 | 1 | Yes | 14 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.2 | 5 | No | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 30 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.2 | 5 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:OPN | 0.04 | 25 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 60 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0067 | 149 | Yes | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.05 | 20 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.0067 | 149 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:OPN | 0.01 | 100 | Yes | 0 |

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