

**Hernando County Preserves Master Land Management Plan:**

**Adaptive Management for Peck Sink Preserve**

Adopted by Hernando Board of County Commissioners: April 12, 2022

## Introduction

This section constitutes a Management Plan for Peck Sink Preserve, a 112.6-acre property located approximately two miles southwest of the center of Brooksville. There is no prior Management Plan. However, a Forest Management Plan (McLaughlin 2007), a Cultural Resource Assessment Survey (Archaeological Consultants, Inc. 2009), a Storm Water Park Design and Phase II Archaeological Site Assessment (Archaeological Consultants, Inc. 2010), a second Phase II Archaeological Site Assessment (Ellis et al. 2021), and a Timber Assessment (Edwards 2021) have been conducted. This Management Plan makes use of information from these documents, as well as improved mapping of soils (i.e., a revision of the NRCS soils map to depict ground conditions more accurately), depth to water table, and current land cover.

Peck Sink preserve was acquired through two acquisitions in 2006 and 2008, respectively. ESL funding paid for the 2006 acquisition and a State appropriation (LP6725) in addition to matching funds from ESL paid for the second acquisition. The primary purpose of the acquisition was groundwater protection and environmental education. The property contains a significant sinkhole complex with a direct connection to the aquifer. The sinkhole complex drains 11,000 acres, including the urbanized west side of the City of Brooksville. Hernando County has made significant improvements for ground water protection by constructing stormwater treatment basins that remove trash, sediment, and nutrients from stormwater.

The 2009 Cultural Resource Assessment Survey concluded that: “Although of interest in terms of settlement and land-use patterns, the site does not appear to meet the eligibility criteria for listing in the NRHP (National Register of Historic Places). The artifact density is generally low and there is a paucity of diagnostic cultural materials, and subsurface features. As such the site has a rather low research potential.” The 2010 follow-up assessment by the same team (Archaeological Consultants, Inc.) made use of additional archaeological data discovered on the site during monitoring but came to a similar conclusion regarding its significance:

The Phase II testing of the Peck Sink Site (8HE647) consisted of surface reconnaissance combined with systematic subsurface testing in those areas recommended for additional work by the DHR. The artifact assemblages from both the proposed Restroom Facility and Dry Retention areas were similar in quantity, form, and function to the materials recovered during the previous investigations. The ceramics are indicative of the Seminole, Weeden Island, and a generic post- Archaic period, and the use of thermal alteration indicates a Middle to Late Archaic period component. Thus, no new data have been recovered concerning the periods of occupation of the site. No formal stone tools were recovered from either area. The lithic debitage assemblage from the Dry Retention Pond indicates early to middle stage stone tool manufacture while the other locale yielded evidence of later stages of tool manufacture. This is consistent with the original survey findings. Although of interest in terms of settlement and land-use patterns, the Peck Sink Site (8HE647) does not appear to be eligible for listing in the NRHP due to the

relatively low artifact density and diversity, paucity of diagnostic materials, and overall low research potential. No further investigations are warranted.

A second Phase II Archaeological Site Assessment was conducted by Gulf Archaeology Research Institute (Ellis et al. 2021) in preparation for development of a recreational trail and overlook at Peck Sink Preserve. This study, although limited in the area that it surveyed, came to the same basic conclusion as the previous studies, even though it documented a number of interesting prehistoric and historic artifacts, including flake blades, an unfinished Clovis projectile point, and square-cut nails from the early 19<sup>th</sup> century.

Although the Ellis et al. (2021) study did not recommend listing in the NRHP, the Florida Department of State, Division of Historical Resources disagreed, stating in a July 2021 letter to the Florida Department of Environmental Protection:

Based on the results of the survey, the site has been recommended ineligible for listing in the NRHP; however, our office recommends that the site is eligible for listing in the NRHP. Based on this and previous surveys of the site, stratigraphic integrity appears to be good through most of the site below the plow zone, and the presence of charcoal deposits presents the possibility of radiocarbon sequencing of the different temporal components. The site as a whole has the potential to produce intact features and contribute important information on local and regional lithic procurement strategies, as well as on the role of Hernando County's precontact quarries within the exchange networks in southern Florida during the late Archaic and Woodland periods. It is comparable in terms of assemblage and stratigraphy to two other nearby eligible quarry sites (HE0241 and HE0426).

Therefore, listing in the NRHP may be forthcoming. Otherwise, Peck Sink is of high hydrological value due to its ability to absorb significant quantities of stormwater from the watershed. Given the local geology, this sinkhole very likely also contributes substantially to recharge of the Floridan Aquifer.

The natural communities, with the partial exception of those on steep slopes surrounding the stream and sinkholes, were heavily altered by previous silvicultural and agricultural practices conducted on the property and are not of high quality; however, they have not been adequately surveyed and may hold some surprises. The second Phase II Archaeological Site Assessment (Ellis et al. 2021) The property also contains a stand of slash pine that was planted prior to its acquisition by the County. This stand provides timber management and small revenue opportunities. Figure 6.1 shows the management units of Peck Sink Preserve.

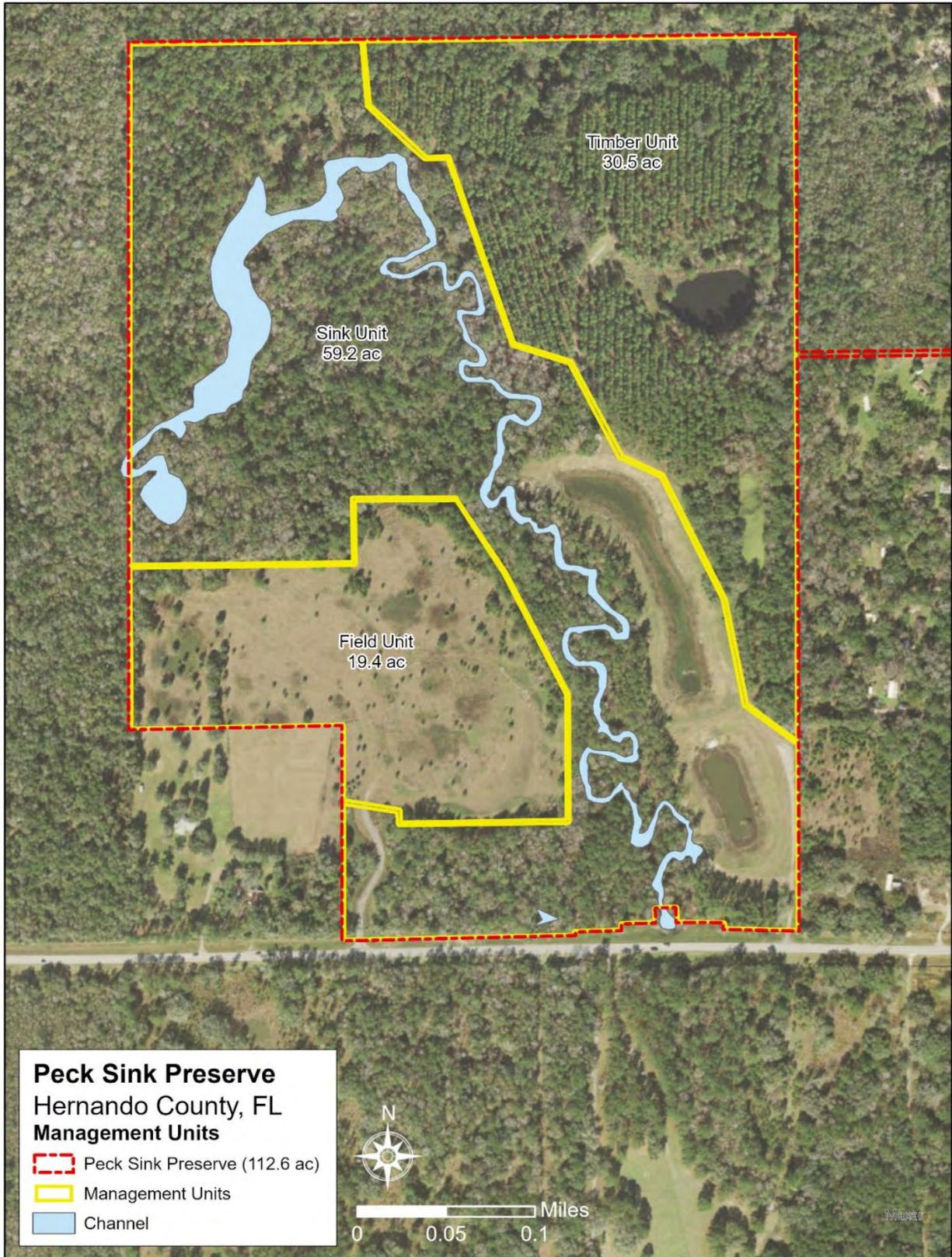


Figure 6.1. Management units of Peck Sink Preserve.

## Geography, geology, landform, and soils

Peck Sink Preserve lies in the Gulf Coastal Lowlands, immediately adjacent to the Brooksville Ridge to the north (Fig. 1.4). Its location is two miles southwest of Brooksville, south of SR 50, north of Wiscon Rd., and west of Mobley Rd. The topography is relatively level, except for the steep ravines that lead to Peck Sink. The depth to the sink apparently has not been measured but is “probably 50 ft or greater” (Archaeological Consultants, Inc. 2009).

The underlying geology is sediments of the Hawthorn Group of Miocene age, with the exposed limestones in the ravines, stream, and sinks probably Suwannee Limestone of older Oligocene age (Fig. 1.3). The surficial sediments of the Brooksville Ridge are windblown or coastal sands from the more recent Pleistocene and Holocene. Four soil types occur on Peck Sink Preserve, in order of percentage cover. Wauchula fine sand, covering 32.4% of the preserve, occurs on 0-5% slopes and with a 31 cm depth to water table (Fig. 6.2; Table 6.1). The Wauchula series consists of very deep, very poorly or poorly drained, moderately slow or slowly permeable soils. They formed in sandy and loamy marine sediments ([https://soilseries.sc.egov.usda.gov/OSD\\_Docs/W/WAUCHULA.html](https://soilseries.sc.egov.usda.gov/OSD_Docs/W/WAUCHULA.html)). Micanopy loamy fine sand covers 29.1% of the preserve on 2-5% slopes and with 61 cm depth to water table. The Micanopy series consists of somewhat poorly drained, slowly to very slowly permeable soils formed in thick beds of sandy and clayey marine sediments on uplands ([https://soilseries.sc.egov.usda.gov/OSD\\_Docs/M/MICANOPY.html](https://soilseries.sc.egov.usda.gov/OSD_Docs/M/MICANOPY.html)). Nobleton fine sand, covering 22.7% of the preserve, occurs on 0-5% with 59 cm depth to water table. The Nobleton series consists of deep, somewhat poorly drained, moderately slowly permeable soils that formed in thick sandy and loamy sediments of marine origin ([https://soilseries.sc.egov.usda.gov/OSD\\_Docs/N/NOBLETON.html](https://soilseries.sc.egov.usda.gov/OSD_Docs/N/NOBLETON.html)). Finally, Kendrick fine sand covers 15.3% of the preserve. It occurs on 0-5% slopes with 200 cm depth to water table. The Kendrick series consists of well drained, slowly to moderately slowly permeable soils formed in thick beds of loamy marine sediments on nearly level to sloping areas ([https://soilseries.sc.egov.usda.gov/OSD\\_Docs/K/KENDRICK.html](https://soilseries.sc.egov.usda.gov/OSD_Docs/K/KENDRICK.html)).

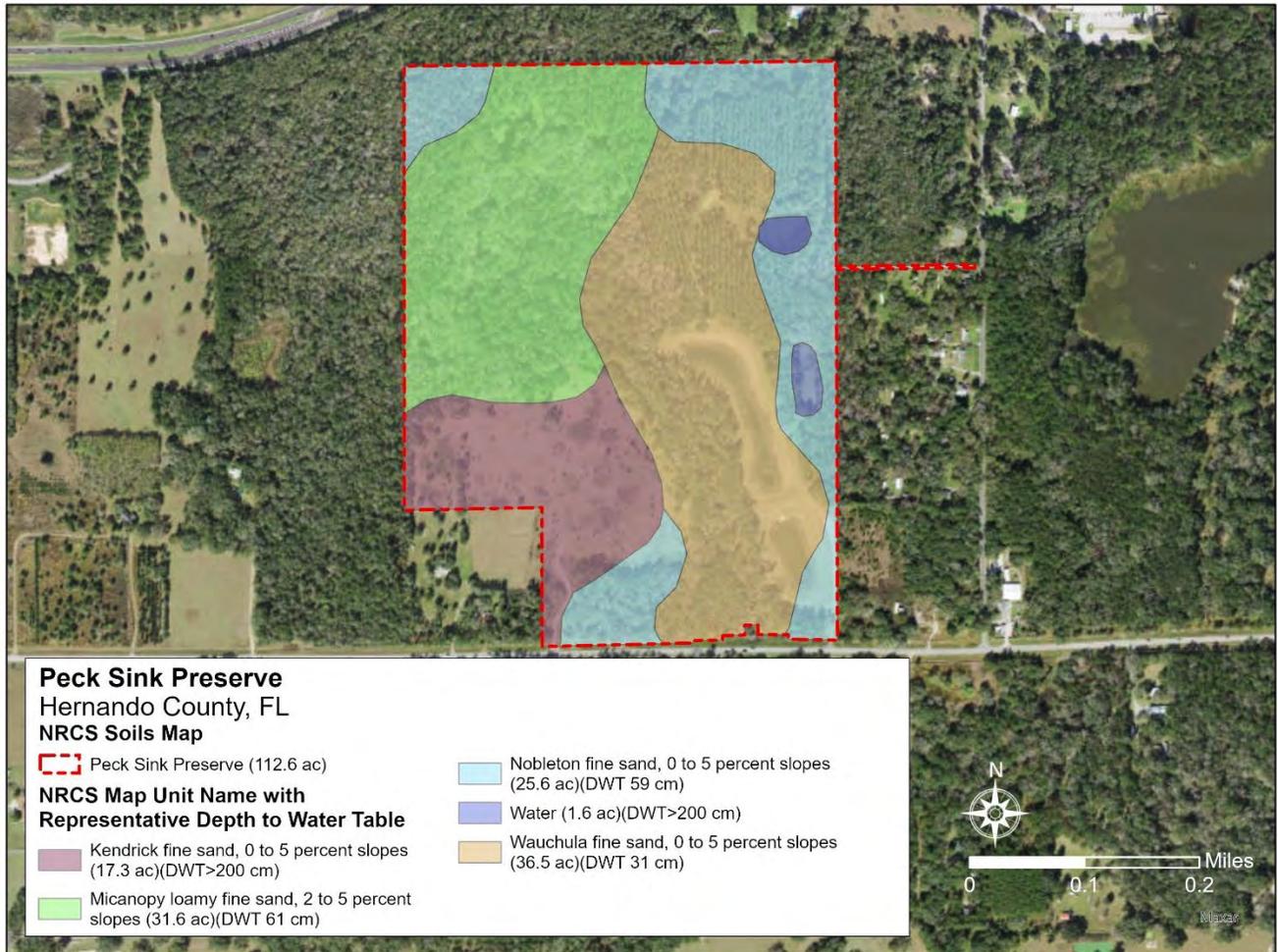


Figure 6.2. Natural Resources Conservation Service (NRCS) soil map for Peck Sink Preserve.

Table 6.1. Soil types on Peck Sink Preserve. The rating (in centimeters) refers to the depth to water table.

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
29	Kendrick fine sand, 0 to 5 percent slopes	>200	17.3	15.3%
34	Micanopy loamy fine sand, 2 to 5 percent slopes	61	31.6	28.1%
36	Nobleton fine sand, 0 to 5 percent slopes	59	25.6	22.7%
52	Wauchula fine sand, 0 to 5 percent slopes	31	36.5	32.4%
99	Water	>200	1.7	1.5%
<b>Totals for Area of Interest</b>			<b>112.6</b>	<b>100.0%</b>

## Landscape context

This is the only Hernando County Preserve (at present) that is not located within or close to the current conservation land network, as shown in Figure 1.2. The preserve is surrounded by agricultural and low-density residential land use at this time, and growth westward from Brooksville and eastward from Brookridge, Spring Hill, and other communities could result in the preserve being surrounded by development. Education and coordination with adjacent land owners on land uses compatible with the conservation of this preserve and more importantly protection of the aquifer should be implemented to increase conservation value and protection to this area.

## Hydrology

Peck Sink is of high importance for stormwater collection and recharge of the Floridan Aquifer. The Peck Sink Watershed covers approximately 17 square miles with an impressive elevational range of 20 to 250 feet (Karlin et al. 2016). The combination of topographic relief and clay soils near the surface has produced a history of flooding in the watershed.

A stormwater mitigation area and management plan were developed to improve the quality of stormwater before it enters the sinkhole complex, help relieve flooding from the surrounding area, and improve the water quality in the sink by developing a regional stormwater treatment system. Construction of the stormwater mitigation area at Peck Sink Preserve, which was designed by King Engineering Associates, Inc., was completed in 2012. The mitigation area consists primarily of the two artificial impoundments/reservoirs shown in Fig. 6.3, which include a diversion structure, an inlet structure, a stilling basin, marsh (in the reservoirs), and an outfall to the stream channel that flows into Peck Sink. Inspection and maintenance of the mitigation area is required following all rainfall events of 2" and greater or flood events (with an approximate 2-day lag time between rainfall and stream flooding). The Hernando County department of Public Works' stormwater engineering staff regularly monitor water quality within this system. Inspection is also required upon Storm Watch declaration and a month before the start of, and at the end of, hurricane season.

Tropical Storm Debby in 2012 delivered approximately 13 inches of rain as it passed over the watershed, which allowed the Southwest Florida Water Management District (SWFWMD), with the assistance of CH2M Hill Engineers, Inc., to test a floodplain model it was developing for the watershed. Modeled floodplain results indicated that 21% of the Peck Sink Watershed was inundated by Tropical Storm Debby, almost all within the central and southern portions of the watershed, which are flatter and lower in elevation, However, the models underestimated the overall extent of flooding (Karlin et al. 2016). This study was not able to fully investigate the ability of Peck Sink to absorb floodwaters or how this function could be enhanced by engineered changes in the watershed such as improved drainage structures and regulations limiting the amount of impervious surfaces.

CH2M HILL is currently under contract with SWFWMD to perform Watershed Management Program Consulting Services in the Peck Sink Watershed. The program incorporates Watershed Evaluation and Watershed Management Plan elements from the District’s Guidelines (CH2M Hill 2018). Improvements to the floodplain model, repair and maintenance of culverts, and other improvements in the watershed to reduce flood risk and enhance the ability of Peck Sink to absorb floodwaters are ongoing (CH2M Hill 2018).

Vegetation and natural communities

The natural and seminatural vegetation of Peck Sink has not been comprehensively studied. Much of the land cover (Fig. 6.3) is anthropogenic, including ca. 21 acres of old pasture (“Rural Open”; Fig. 6.4) and 33 acres of coniferous plantation (which has been studied), in which are embedded two apparent sinkhole ponds (“Non-Vegetated Wetlands”) and two artificial impoundments/reservoirs surrounded by mowed turfgrass (Fig. 6.5). These reservoirs comprise the stormwater mitigation area described above.

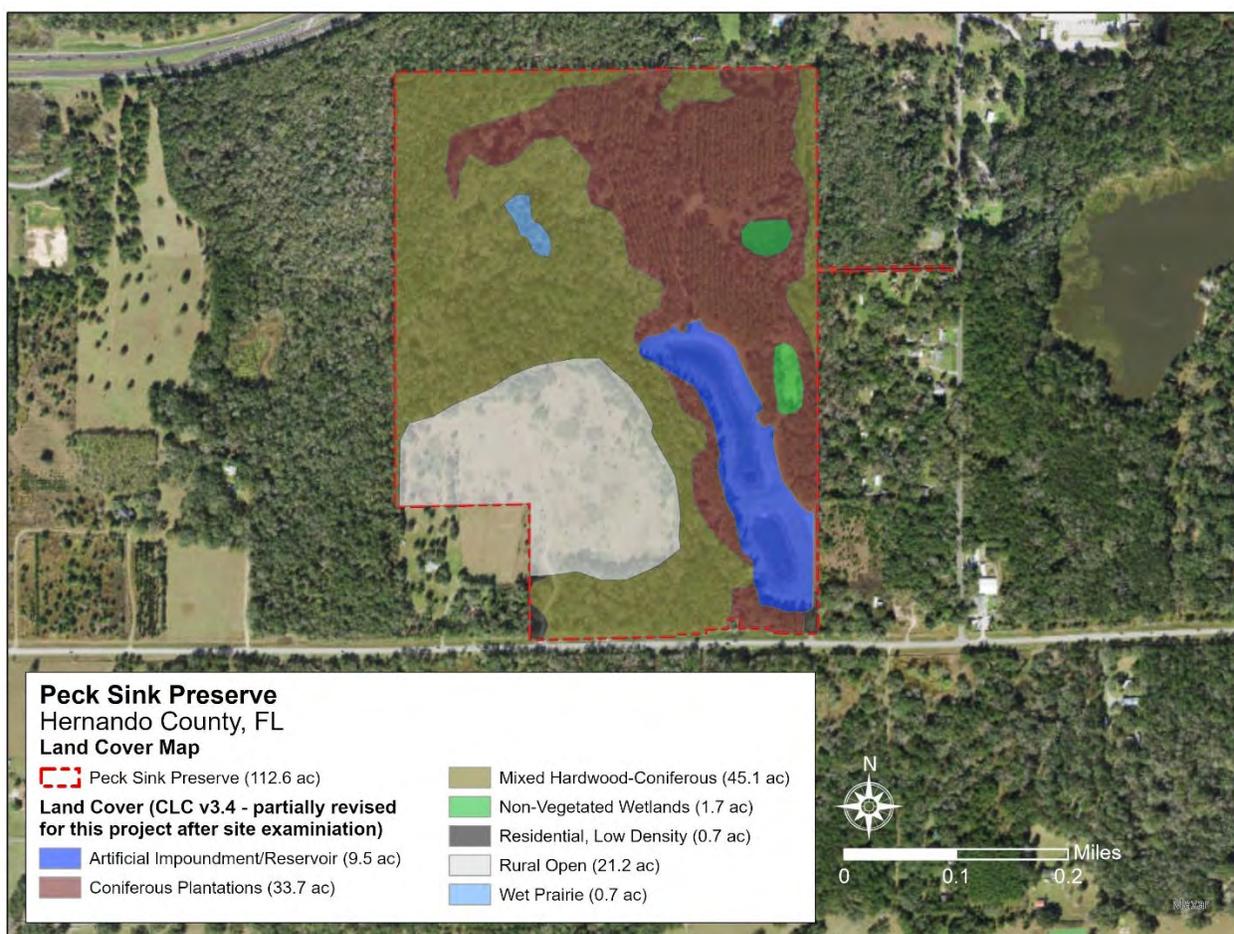


Figure 6.3 Land cover (vegetation) of Peck Sink Preserve.



Figure 6.4. Old pasture (Rural Open) in the southwestern portion of Peck Sink Preserve.



Figure 6.5. One of two artificial impoundments/reservoirs in the southeastern portion of Peck Sink Preserve. Surrounding these is slash pine (*Pinus elliottii*) plantation.

Ellis et al. (2021) provided a general description of the vegetation of Peck Sink Preserve as part of their archaeological site assessment. They noted that the natural vegetation of the preserve includes “upland hardwoods or mixed upland conifer-hardwoods dominated by loblolly, slash, and longleaf pines, water and laurel oaks, magnolia, hickory, ash, elm, with a subcanopy of ash, elm, sparkleberry, wax myrtle, and various hawthorns” and that:

A mixed pine-upland hardwoods hammock community surrounds Peck Sink and the upper southern or eastern slopes of the sink run to the east. The upper canopy is dominated by sweetgum, pignut hickory, loblolly pine, southern magnolia, water oak, laurel oak, swamp chestnut oak, and winged elm. Lower canopy and shrub layer species include winged elm, cabbage palm, hackberry, live oak, red mulberry, sparkleberry, black cherry, yaupon holly, devil’s walking stick, witch hazel, and parsley hawthorn. The eastern half of the sink run (outside the project area) has been cleared several times in the 19th and 20th century and is currently overwhelmed with laurel oak and loblolly pine. Broad bottomland areas (50 ft contours) are dominated by water oak, laurel oak, pignut hickory, loblolly pine, winged elm, and scattered live oaks and cabbage palms. Low shrubs and ground covers suffer from the excessive darkness and oak leaf cover. Common species include sparkleberry, saw palmetto, littlehip hawthorn, parsley hawthorn, greenbriar, and poison ivy. Low flood-prone areas adjacent to the channel are covered by buttonwood and various grasses and wetland plants. Steep-walled gullies with clay over rock are commonly covered by various ferns. Portions of the sink run formerly had higher sandy “bluffs” dominated by live oak, sweetgum, pignut hickory, sparkleberry and saw palmetto. These bluffs are much reduced subsequent to erosion from broadscale land clearing/timber harvesting. Today, they are marked by remnant patches of saw palmetto and bracken fern.

The forest community immediately above and on the slopes and bottoms of the sink run ravines and sinkholes is the highest quality vegetation on the preserve. Although labeled “mixed hardwood-coniferous” for now, further study may determine that this community is either mesic hammock or upland hardwood forest. The rocky stream bottom, with many large boulders, as well as the sinks, are interesting both geologically and biologically and deserve serious study. Figure 6.6 shows several scenes from above and along the slopes and bottoms of the main sink and stream.



Figure 6.6. Scenes of the ravines, stream, main sink (Peck Sink), and surrounding hardwood forest at Peck Sink Preserve. Photos by Reed Noss.

The Forest Management Plan for Peck Sink Preserve (McLaughlin 2007) and the more recent Timber Assessment (Edwards 2021) both note that the slash pine plantation was planted with genetically improved slash pine in 1987, with 732 trees planted per acre. As of 2007 the stand had not been thinned and was overstocked with a basal area of 170-200 square feet per acre and diameter at breast height (dbh) of 4-10 inches (McLaughlin 2007). The stand was subsequently thinned every third row, and in 2021 the basal area was 130 square feet per acre and dbh was 7-12 inches (Edwards 2021). This pine plantation has low natural or wildlife values and contains invasive non-native species including cogongrass (*Imperata cylindrica*), Japanese climbing fern (*Lygodium japonicum*), Caesar's weed (*Urena lobata*), and skunkvine (*Paederia foetida*). Options for managing the pine plantation will be discussed below, and the forest management plan and timber assessment are included as Appendix 4 and Appendix 5, respectively.

At-risk species and resource priorities

No biological surveys have been conducted at Peck Sink Preserve. Of the species of concern in Figure 6.7 and Table 6.2, none have been observed within the preserve, and the two species with “close” occurrences have no recent records. Intensive biological surveys are needed for Peck Sink, especially along the stream and its slopes and sinks. It is not unlikely that the

sinkholes, limestone outcrops, and other karst features hold rare ferns and other species of concern.

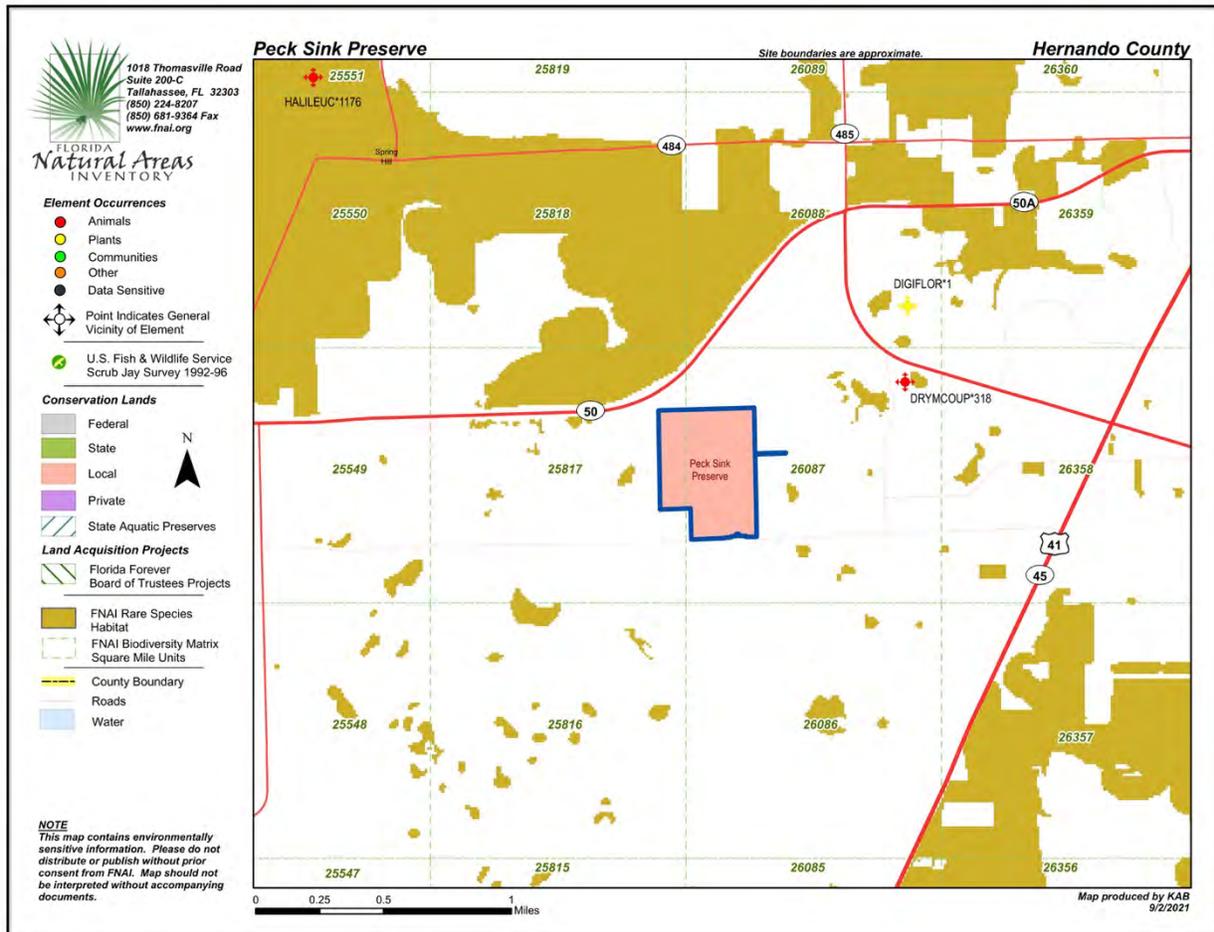


Figure 6.7. Species of conservation concern observed within or in the vicinity of Peck Sink Preserve. Species names on occurrences are abbreviations of the scientific names in Table 6.2

Table 6.2. Species of conservation concern with potential occurrence on Peck Sink Preserve. In the far-right column, “close to” means that a species has been documented to occur within ca. 1 mile of the preserve boundaries. The species below are of concern due to their high G-ranks or S-ranks (3 or above), presence on the federal or state list of threatened and endangered species, or listing as Species of Greatest Conservation Need in the Florida Wildlife Action Plan. Note: Because there is not yet a comprehensive species or natural community inventory for Peck Sink, additional species of conservation concern that are not on the list below likely occur within the preserves.

Species	G-rank	S-rank	Federal status	State status	SGCN	Present, close to, or potentially on site
<b>Animals</b>						
Eastern indigo snake ( <i>Drymarchon couperi</i> )	G3	S3	T	FT	Yes	Close (1936 record)
Swallow-tailed kite	G5	S2			Yes	CL

( <i>Elanoides forficatus</i> )						
<b>Plants</b>						
Florida fingergrass ( <i>Digitaria floridana</i> )	G1	S1				Close (1960 record)

\*Although not ranked high enough (G3 or S3 and above) to qualify for this list, we include the Florida black bear because it is a wide-ranging landscape species highly sensitive to habitat fragmentation by roads and development, with the Chassahowitzka population considered imperiled.

Several individuals of common atamasco-lily (*Zephyranthes atamasco*) (Fig. 6.7) were observed in March 2021 within the old pasture at Peck Sink Preserve. This species is not listed by the state or federal government and is not tracked by FNAI. However, the populations in Hernando County are at the southern limit of their range, disjunct from the closest populations in Marion County, whose populations are in turn disjunct from the species primary range in north Florida northward (<https://florida.plantatlas.usf.edu/Plant.aspx?id=3473>). Disjunct populations, because of their isolation (restricted gene flow) and divergent selective pressures, are likely to be genetically distinct and of high evolutionary significance (Lesica and Allendorf 1995).



Figure 6.7. Common atamasco-lily (*Zephyranthes atamasco*) in edge of old pasture and mesic hammock at Peck Sink Preserve. This species is disjunct and at the southern terminus of its range in Hernando County. Photo by Reed Noss.

The statewide Critical Lands and Waters Identification Project (CLIP) shows Resource Priorities in the vicinity of Peck Sink Preserve (Fig. 6.8) (<https://www.fnai.org/services/clip>). CLIP was

created in 2006 in response to the Century Commission for a Sustainable Florida's call for an identification of those lands and waters that are critical to the conservation of Florida's natural resources. CLIP was produced through a collaboration of the Florida Natural Areas Inventory, University of Florida Center for Landscape Conservation Planning, Florida Fish and Wildlife Conservation Commission, and an independent Technical Advisory Group. CLIP is a GIS database of statewide conservation priorities for a broad range of natural resources, including biodiversity, landscape function, surface water, groundwater, and marine resources. The latest version of CLIP (v4.0) shows Peck Sink in the second through fifth highest priority categories for biodiversity, lowest for landscape (due to its isolated location), fourth highest for surface water (but this is likely incorrect, due to the aquifer recharge functions of the sinkholes), and second to lowest for aggregated priorities (Fig. 6.8).

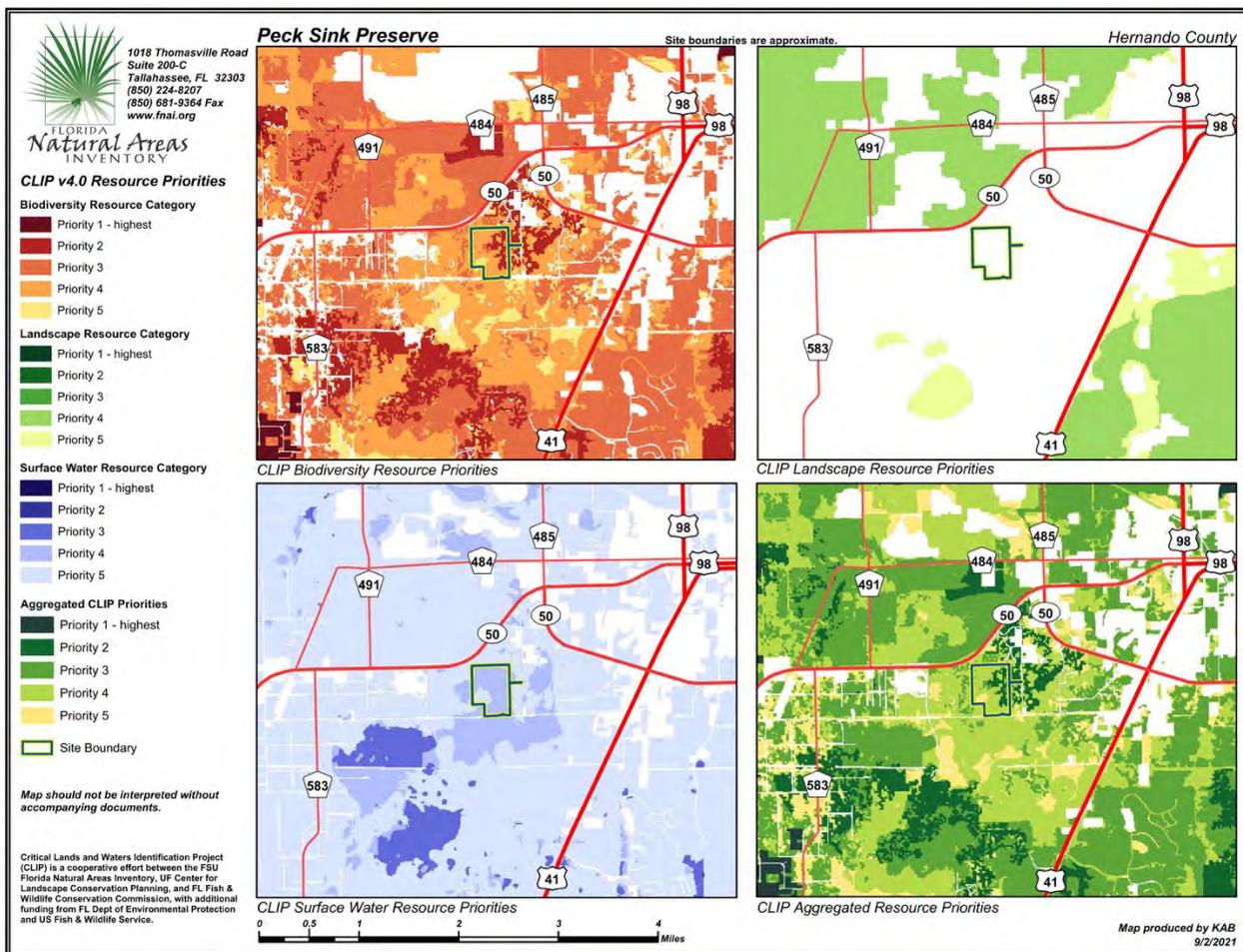


Figure 6.8. Resource Priorities in the vicinity of Peck Sink Preserve, as identified in the statewide Critical Lands and Waters Identification Project (CLIP), version 4.

### Non-native and invasive species

No comprehensive inventory of non-native and invasive species has been conducted at Peck Sink Preserve. Non-native species observed during timber surveys and a site survey by ESL staff in 2021 are the following:

Cogongrass (*Imperata cylindrica*)  
Japanese climbing fern (*Lygodium japonicum*)  
Caesar's weed (*Urena lobata*)  
Skunkvine (*Paederia foetida*)  
Bahigrass (*Paspalum notatum*)  
Limpograss (*Hemarthria altissima*)  
Guinea grass (*Megathyrsus maximus*)  
Camphor-tree (*Cinnamomum camphora*)  
Chinese tallow (*Triadica sebifera*)  
Chinaberry (*Melia azedarach*)  
Brazilian pepper (*Schinus terebinthifolius*)  
Coral ardisia (*Ardisia crenata*)  
Praxelis (*Praxelis clematitidea*)  
Rattlebox (*Sesbania punicea*)  
Showy rattlebox (*Crotalaria spectabilis*)  
Tropical soda apple (*Solanum viarum*)

### Site development, improvements, and access

#### *Existing improvements*

Besides the stormwater mitigation area described above, existing improvements at Peck Sink include an entrance gate (Fig. 6.9), paved entrance road, fencing, and a rudimentary trail and wooden fence on a slope overlooking the main sink.



Fig. 6.9. Entrance gate, sign, and paved entrance road at Peck Sink Preserve. Photo by Reed Noss.

### *Proposed improvements*

Archaeological Consultants, Inc. (2009) noted:

The Peck Sink property will become a preserve area that will include development of a small public park for mostly passive recreation, restroom facilities and associated utilities, driveway and parking, a pedestrian trail/boardwalk, and a viewing area. In addition, onsite stormwater mitigation will occur, and the restoration of native plant communities are also planned (King Engineering 2009). The trail may be constructed with Flexipave, or similar product, in the upland park area, but will most likely be a mulch trail within the wooded areas (Skidmore 2009).

The stormwater mitigation plan will improve the quality of stormwater before it enters the sinkhole complex, will help relieve flooding from the surrounding area, and will improve the water quality in the sink by developing a regional stormwater treatment system. The treatment system will provide additional storage for stormwater from the surrounding area, aid in the removal trash and sediments, and will help to manage stormwater volume (Hernando County News 2009; St. Petersburg Times 2006, 2008).

In 2018 a conceptual plan was prepared for Peck Sink Preserve, modified from King Engineering (2009). The plan (Fig. 6.10) shows proposed facilities including a parking lot, restrooms, trails, overlooks, and interpretive signs. The trails and signs will be an excellent way to educate the public about the fascinating geology of Peck Sink.



## *Access*

Access to Peck Sink Preserve is currently by appointment only. To schedule a visit please contact Environmentally Sensitive Lands via email, [ESL@hernandocounty.us](mailto:ESL@hernandocounty.us). Upon completion of the proposed Trail and Overlook Platform project accessibility will be re-evaluated and the Preserve is intended to be open during daylight hours on a conditional basis. The main entrance to the preserve is through an entrance off Wiscon Rd., ca. 2 miles southwest of Brooksville.

## *Easements, concessions, or leases*

No easements, concessions, or leases are known for this preserve.

## High-priority conservation values (summary)

The geology of Peck Sink Preserve and the associated imperiled Limestone outcrop (G2/S2) and Sinkhole (G2/S2) natural communities may be its most significant conservation value. It is likely that these karst features hold species of conservation concern (e.g., rare ferns) that have not yet been recorded due to the absence of biological surveys. Also of high value is its archaeological features, both prehistoric and historic, and its significance for stormwater uptake and likely recharge of the Floridan Aquifer.

## Desired outcomes and strategies

The desired outcome for management of Peck Sink Preserve is all natural communities restored to or maintained in high-quality condition, both for their habitat values for native species and for an improved visitor experience and to maintain timber management on the preserve where appropriate.

Strategies and tasks necessary to achieve this desired outcome include:

- Vegetation surveys of all natural communities on site. These are necessary to confirm the present and probable historic natural community composition and distribution within the preserve, which in turn are necessary to refine management goals and objectives. Although the natural and anthropogenic communities on the preserve are generally known and mapped, the details of their species composition are not known.
- Thorough biological inventories to create reasonably comprehensive lists of native and non-native plants, animals, and fungi present on the preserve. Surveys should be conducted using the best-accepted survey protocols for each taxonomic group. For example, breeding bird surveys should be conducted during the appropriate season, utilizing point counts and/or transects. Nest searches should be conducted for species of conservation concern. Gopher tortoises (if present) and their commensals should be surveyed using transects and burrow cameras. Other herpetofauna and small mammals

should be sampled using drift fence/pitfall trap arrays with funnel traps along the fences. Plants and fungi should be surveyed using transects and time-constrained searches of appropriate habitats. All surveys should be conducted by highly trained and experienced field biologists with expertise in the taxonomic groups concerned.

- Species-specific management plans should be created for each species of conservation concern documented on site. These can be brief.
- Natural community-specific restoration and management plans should be developed for all natural and seminatural communities documented on site.
- An adaptive management approach accompanied and informed by ecological monitoring should guide all management decisions. Refer to Chapter 7 (Management Protocols, Best Management Practices, and Performance Measures) for guidance on fire management, invasive non-native species control, viability of species of conservation concern, landscape context, adaptation to climate change, and visitor management.

Beyond these desired outcomes and strategies for natural communities and nature-related visitor experiences, Peck Sink Preserve will implement a forest management plan, perhaps including periodic timber harvests for the slash pine plantation portion of the preserve. Decisions will be made concerning the specific type of harvests and management.

As summarized in the Timber Assessment (Edwards 2021; Appendix 5), several options for forestry activities exist, but the overriding objective is to make timber management as consistent as possible with the ecological management objectives of ESL preserves. As noted by Edwards (2021), the timber management objectives for Peck Sink Preserve are oriented toward “establishing and maintaining a healthy ground cover of grasses and forbs. Adequate sunlight must reach the ground to achieve these objectives. From a timber management standpoint, this means that in general pine-stocking levels should be maintained at a BA (basal area) range of 40 to 60 square feet per acre.” Thinning of trees, prescribed fire, and ground cover restoration are key management practices.

Appendices 4 and 5 should be consulted for more detailed recommendations for timber management on the preserve. The forest management plan, when fully developed, will identify the actions that balance budgetary considerations and the desirability of revenue from timber harvests with ecological considerations, smoke management issues, and impacts on the visitor experience.

## Chapter 7. Management Protocols, Best Management Practices, and Performance Measures

Given the management issues identified in the individual preserve management plans (preceding chapters), what is the current thinking about alternative treatments and Best Management Practices? Across Hernando County preserves, six issues stand out as warranting concerted attention from managers:

- fire management
- invasive non-native species control
- viability of species of conservation concern
- landscape context
- adaptation to climate change
- visitor management

Before delving into these issues individually and offering guidelines for best management practices, it is necessary to briefly summarize the importance of an adaptive management framework for guiding management decisions in the face of uncertainty about the effectiveness of different approaches, especially in the face of rapid environmental change (for more information, see Appendix 1).

### An adaptive management framework

Adaptive management, in principle, is simple and straightforward. It is essentially a structured and systematic process of learning by doing. Explained in somewhat more detail, adaptive management is “an iterative process of gathering new knowledge regarding a system’s behavior and monitoring the ecological consequences of management actions to improve management decisions” (Howes et al. 2010). Adaptive management is applicable when resources are responsive to management intervention, but the impacts of those interventions are uncertain (Williams 2011).

Adaptive management can be summarized by two questions site managers can ask about any particular management treatment or intervention: 1) If this intervention were successful, how would we know? And, 2) If this intervention were unsuccessful, what would we want to know to do better next time? These questions can be answered only through ecological monitoring and adjustment of management approaches based on feedback from monitoring.

The iterative and cyclic nature of adaptive management is shown in Figure 7.1. The figure illustrates the progression from defining the problem to articulating management goals; developing an ecological model of the system; defining desired outcomes and performance

**Appendix 5. Florida Division of Forestry Forest Management Plan, Hernando County, Peck Sink Tract. 2007.**

# **Florida Division of Forestry Forest Management Plan**



## **Hernando County Peck Sink Tract**

**Kenneth B. McLaughlin  
Hernando County Forester  
October 15, 2007**

# FOREST MANAGEMENT PLAN

## HERNANDO COUNTY PECK SINK TRACT

### DESCRIPTION OF TRACT

#### Location

This 80-acre tract is located in SW quarter, Section 29, Township 22 South, and Range 19 East, Hernando County, Florida. The property can be accessed from Wiscon Road just west of Mobley Road in Brooksville.

#### Management Objectives

The property was acquired by the Environmentally Sensitive Lands program of Hernando County in 2006. The primary objective on this property is to eventually return the ecosystems to their natural condition. In the short term the objective is to maximize returns from timber production while implementing sound forestry operations that will move the stands to more natural conditions. Florida's Best Management Practices (BMP's) will be employed during forestry activities to protect soil and water resources.

#### Soil and Water

The soils found on this property are Micanopy loamy fine sand, Nobleton and Wauchula fine sands. These soils are poorly drained and have some management concerns regarding equipment limitations during periods of heavy rainfall; extra care should be taken during these times to prevent unnecessary soil damage.

**TABLE 1. SOILS FOUND ON THE PECK SINK PROPERTY**

Soils	Ecological Community*	Drainage	Avg. Depth To Water Table	Productivity/ Site Index**
Wauchula Fine Sand	Longleaf & Slash Pine, wax myrtle, saw palmetto	Poorly drained	10-40 inches	Slash Pine – 80 Longleaf Pine – 70
Nobleton Fine Sand	Oaks, hickory, Loblolly & Slash pine, wax myrtle	Somewhat Poorly drained	20-40 inches	Slash Pine – 90 Loblolly Pine – 90 Longleaf Pine – 75
Micanopy Loamy Fine Sand	Longleaf & Slash pines, wax myrtle, saw palmetto	Somewhat Poorly drained	20-30 inches	Slash Pine – 90 Loblolly Pine – 90 Longleaf Pine – 75

\* Ecological Community is an *approximation* of the type of forest or ecosystem before the influence of man, and is not always accurate. \*\* The estimated height of dominant and co-dominant trees at 50 years of age.

**STAND 1: PINE PLANTATION – 26 Acres**

Description: This 26-acre stand was planted with genetically improved slash pine in 1987. 732 trees were planted per acre. The stand has never been thinned, and currently is severely overstocked with a basal area of 170 to 200 square inches; diameters from 4 to 10 inches DBH. The site is capable of producing a good amount of pulpwood once it is properly thinned, but in its current condition is growing very slowly. The stand contains the invasive weeds cogon grass, Japanese climbing fern and skunkvine. There are many large oaks and other hardwoods established on the property.

Recommendations: This stand of pines should be thinned in the near future. We recommend removing every third row, which will increase the sunlight and growing space for the remaining rows while leaving the soil between the retained rows relatively undisturbed, using the removed rows for logging access. The retained rows should be selectively thinned in the same entry, removing trees which are poorly formed, overtopped, or diseased. Since the stand is so severely overstocked, the target basal area should be 80 to avoid suddenly stressing the residual stand. The invasive weeds present another management problem. Ideally they should be treated before logging, since they can be easily spread around the site and to other sites by equipment used in the stand. If this is impossible, provisions should be made for equipment and products leaving the site to be checked and any invasives found removed before exiting to the public roads. This thinning is so essential to the future management of the stand that if no commercial sale is feasible, a precommercial thinning should be done to the same standards.

After thinning, the site should be prescribed burned to reduce the logging slash, stimulate the growth of any remaining native plants and to prepare for the chemical treatment of the non-native invasives. The invasive plants should be sprayed with an appropriate herbicide as soon as they begin resprouting, hitting them when they are already using their stored energy to resprout and are starting to rebuild their reserve energy in their roots.

A fireline should be established around the property and maintained on an annual basis or as needed to help protect the stand from wildfires.

To achieve the long term goal of restoring and maintaining the native ecosystems, once the pine plantation has again reached a basal area of 110 it should be thinned again, this time to a basal area of 50. At this thinning the average diameter should have increased to make a commercial operation more feasible. This and future thinnings should be planned to reduce the visual impact of the planted rows. In the very long term the species composition and distribution should be maintained through natural forces and the periodic application of prescribed fire.

Contact your local County Forester in five (5) years or as needed to get an updated management plan.

## **STAND 2: MIXED HARDWOOD/PINE – 52 Acres**

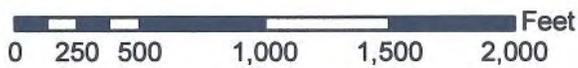
Description: This stand is mainly in the northwest corner of the property, with some along the stream in the southern portion and some along the east property line.

Recommendations: Because the primary objective for the property is the restoration of the native ecosystems this stand will need little in terms of management other than controlling entry, protection from wildfire and invasive exotic plants, and the judicious use of prescribed fire. The limited amount of fine fuels will make burning difficult, but the existence of scattered pines will provide some areas of fallen needles allowing small patches to burn. With repeated burning, these patches will have more fine fuels and will expand allowing more areas to burn in the future. Virtually all native plants will benefit from burning, helping to attain the primary goal of restoring native ecosystems.

Table 2. Timeline of management recommendations for the Peck Sink tract in Brooksville, FL.

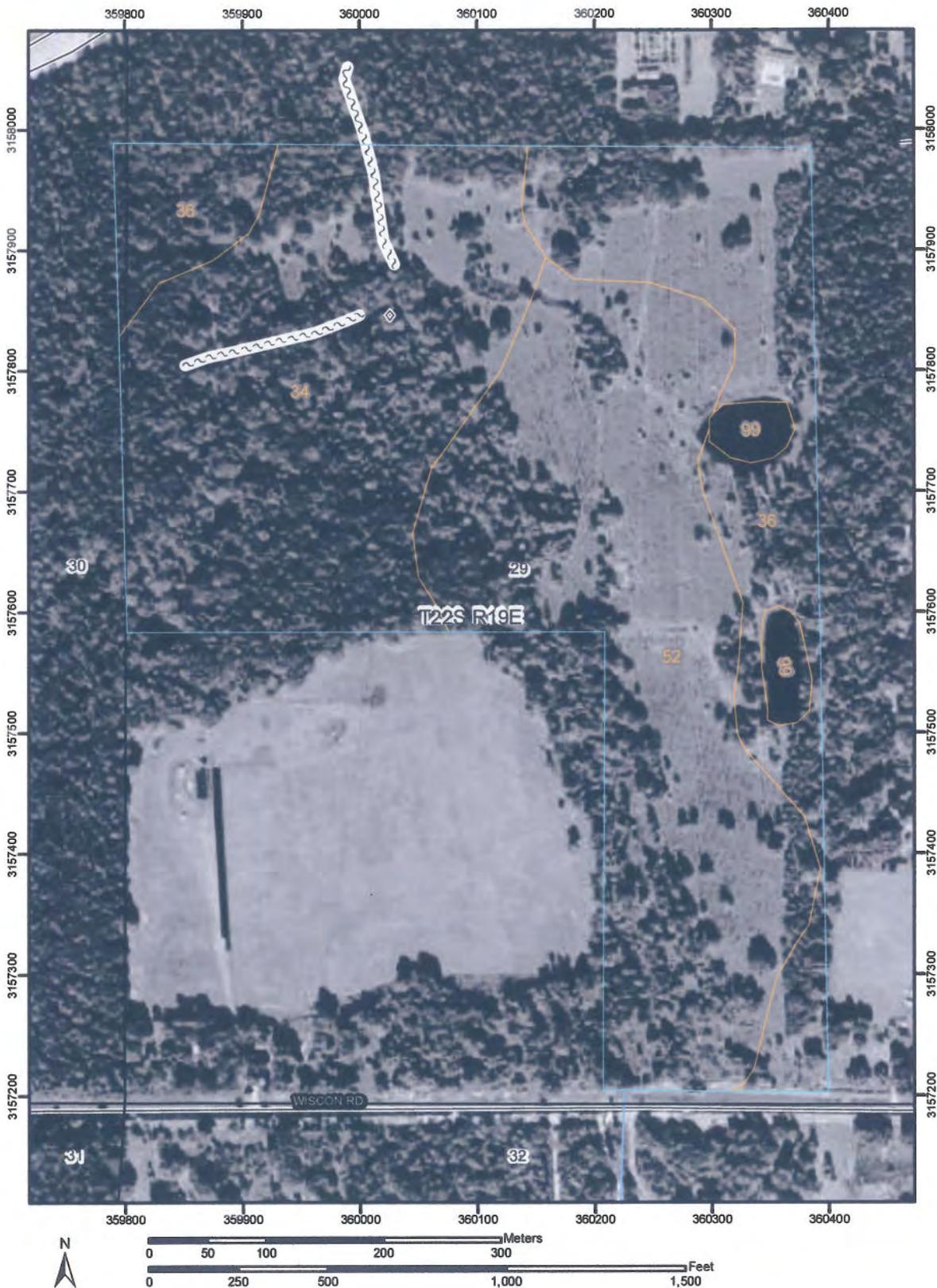
STAND	SEASON/YEAR	RECOMMENDATIONS
1	Winter 2007-2008	Thin the pine stand
1 & 2	Winter 2007-2008, then every 3-4 years or as needed	Prescribe burn
1 & 2	Spring 2008	Herbicide invasive exotics
All	Winter 2011	Contact County Forester to update management plan
All	Annually or as needed	Disc firelines

# Hernando County Peck Sink Tract Sec 29, T22S. R19E



This map is the product of Department of Agriculture and Consumer Services, Division of Forestry, and was prepared on 10/15/2007. This map was produced with the intent that it be used for locating timber management stands. There are no warranties made as to the fitness of this map for any unlisted purpose or reproduction at other than the original scale.

Custom Soil Resource Report  
Soil Map (Peck Sink)



## Map Unit Legend (Peck Sink)

Hernando County, Florida (FL053)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
34	Micanopy loamy fine sand, 2 to 5 percent slopes	28.5	35.5%
36	Nobleton fine sand, 0 to 5 percent slopes	19.3	24.1%
52	Wauchula fine sand, 0 to 5 percent slopes	30.7	38.3%
99	Water	1.7	2.1%
Totals for Area of Interest (AOI)		80.1	100.0%

## Map Unit Descriptions (Peck Sink)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic

## Custom Soil Resource Report

classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.



Florida Department of Agriculture & Consumer Services  
CHARLES H. BRONSON, Commissioner  
The Capitol ● Tallahassee, FL 32399-0800

Please Respond to:  
Withlacoochee Forestry Center  
15019 Broad St.  
Brooksville, FL 34601  
(352) 754-6777

October 15, 2007

Hernando County Planning Dept.  
Environmentally Sensitive Lands Program  
Attn: Jim King  
20 N. Main Street, Room 262  
Brooksville, FL 34601



Dear Mr. King:

Enclosed is the Forest Management Plan developed for the Peck Sink Tract. We hope this plan is useful to you in planning the overall management of this property.

If you have any questions, please feel free to call me at (352) 754-6777, ext 108.

Sincerely,

**Charles H. Bronson**  
Commissioner of Agriculture

A handwritten signature in black ink, appearing to read "Ken McLaughlin".

Kenneth B. McLaughlin  
Hernando County Forester

**Appendix 6. Timber Assessment. Peck Sink Preserve, Hernando County. 2021.**



## **TIMBER ASSESSEMT**

PECK SINK PRESERVE  
HERNANDO COUNTY

PREPARED BY:  
MICHAEL EDWARDS, SENIOR FORESTER  
OTHER PUBLIC LANDS REGIONS 3 & 4  
FLORIDA FOREST SERVICE

Revised-January 18, 2022

### **PURPOSE**

This document is intended to fulfill the timber assessment (TA) requirement for Peck Sink Preserve (PSP) of Hernando County's Environmentally Sensitive Lands (ESL) as required by Section 1. Section 253.036, Florida Statutes. The goal of this TA is to evaluate the potential, and feasibility of managing timber resources for conservation, and revenue generation purposes. This is an update to the 2007 TA.

### **BACKGROUND**

#### **LOCATION**

The legal description of PSP property location is; Southwest quarter of Section 29, Township 22 South, Range 19 East, Hernando County, Florida. PSP is in the Upper Coastal Drainage Watershed, central Hernando County, and approximately three miles west of U.S. Highway 41, on Wiscon Road in Brooksville.

#### **HISTORY**

The 112-acre PSP site was purchased in 2006 and 2008 through Hernando County Environmentally Sensitive Lands program. Currently the PSP consists of three different management units; improved pasture, slash pine plantation, and mixed hardwood pine. This TA will be focusing on the slash pine plantation since this has merchantable timber. Most of the improved pasture is being managed for a hydrological project and the mixed hardwood pine stand can be left alone besides invasive plant species control.

#### **PAST LAND MANAGEMENT**

Prior to ownership by Hernando County, the property was managed for grazing and timber production. Hernando County has used the pastures for hydrological projects. There have been no forest management activities conducted by Hernando County.

#### **ADJACENT LAND USE**

There is a hospital to the west, rural single-family homes to the northeast, and south. Also, Hernando County road, Wiscon Road immediately to the south and U.S. Highway 50 to the north and northwest. The adjacent land uses make prescribed burning on PSP very difficult due to smoke management issues.

#### **PRESCRIBED BURN HISTORY**

One component of proper land management in Florida is the re-establishment of a prescribed fire regime that mimics the habitat's natural burn regime. The Florida Natural Area Inventory (FNAI) recommends prescribed fire return interval of two to four years. PSP has no apparent burn history. The land manager said there will most likely not be any planned prescribed burning due to smoke issues relating to the



surrounding development. If prescribed fire cannot be safely or practically applied, the manager will need to consider other methods like mechanical and chemical to control the understory competition and pine plantation.

## **GOALS AND OBJECTIVES**

Multiple field visits and discussions with the PSP land manager was conducted in the summer and fall of 2020, as well as a document review of the of the 2018 PSP's FNAI report. This background information has resulted in the identification of one goal and five objectives that can be achieved through silvicultural treatments of the PSP timber resources. It is feasible to manage timber resources for conservation of natural resources, plants, and wildlife with the possibility for revenue generation, while meeting Hernando County's goals and objectives described below.

### **GOAL**

The goal of Hernando County for purchasing PSP was to preserve and restore, site's natural plant communities and ecosystem functions to a condition suitable for maintaining viable populations of all species indigenous to the PSP's habitats and control flooding off site.

### **OBJECTIVES**

- Continue to restore selected wetland and upland areas.
- Continue to establish an exotic species removal plan for both plants and animals.
- Continue to manage for all listed species that have been documented on site or that may potentially occur.
- Continue to conserve soil and water through control and prevention of soil erosion.
- Continued protection and additional surveys of cultural resources.

## **EXISTING CONDITIONS**

The term Management Units (MU) will be used when referring to habitat types in this TA for land management activities and when identifying timber management recommendations.

### **SLASH PINE PLANTATION MU (24 acres)**

This MU was planted with genetically improved slash pine at a density of 732 trees per acre in 1987. The stand was third row thinned in 2013. A timber cruise was conducted with the assistance of the land manager in the fall of 2020. The plantation has a basal area of 130 square feet per acre with tree diameters from 7 to 12 inches DBH. The stand contains the invasive weeds cogongrass, Japanese climbing fern and skunkvine in the understory. There are some hardwoods in the understory, but not a lot of grasses and forbs. The site can produce a good amount of pulpwood once it is properly thinned, but in its current condition is growing very slowly. The stand is considered overstocked and should be thinned to allow more space for the residual trees to grow and allow more sunlight to the ground for grasses and forbs to grow. Based on the cruise data and the goal and objectives for the property there are two management options.

One option is to clearcut the stand. A clearcut would yield an estimated 1,080 tons of pulpwood. With the clearcut option it is recommended to replant with either slash pine or longleaf pine; see the *Soils & Productivity* and *Reforestation* sections below for details. Due to the age of the stand and the unlikely growth response from a thinning operation, this is the recommended option.



The second option is to selectively thin the MU, removing about one third of the stand volume, focusing on removing the suppressed, diseased and poor formed trees. This would yield an estimated 481 tons of pulpwood. This option is only recommended if there isn't a budget for replanting after a clearcut. A second thinning on 35-year-old pine stand that was 14 years late for its' first thinning won't do much to release the residual trees for more growth.

**MIXED HARDWOOD PINE MU (59 acres)**

This MU is comprised of three separate stands surrounding the pine plantation. This MU is a mix of mature loblolly pines and mature mesic hardwood species like live oaks, hickories and magnolias. There isn't much of a hardwood midstory or ground cover layer due to the heavy shade of the overstory canopy. In the largest portion of this MU in the northwest there is a sinkhole. The MU requires little active management. The main management activity would be invasive exotic plant removals using mechanical and chemical methods. Presently there isn't a hardwood market in the area and the pines are few and scattered.

**PASTURE MU (29 acres)**

This MU is comprised of two separate stands in the southwest and south-central area of PSP. The majority of the pasture has been utilized for a hydrology restoration project. Hernando County installed a series of retention ponds and culverts to control the flow of water on and off PSP. The remaining pasture areas are used for two trail access to the rest of the property. There is no recommended timber management for this MU. Hernando County occasionally mows the pasture and treats any invasive exotic plants growing in the pasture.

**SOILS AND PRODUCTIVITY**

The United States Department of Agriculture, Natural Resource Conservation Service publishes soil series profiles and site index (SI) for pines. SI is the average height in feet that dominant and codominant trees of a given species attain in a specified number of years. The SI listed in the table below uses 50-year basis. The SI applies to fully stocked, even-aged, unmanaged stands. The following is a generalized summary of the most prevalent soils and the SI for each commercially marketable pine species.

**SLASH PINE PLANTATION SOIL TYPES**

#34 MICONOPY LOAMY FINE SAND	2-5% SLOPE	SI- SP 90, LLP 75
#36 NOBLETON FINE SAND	0-5% SLOPE	SI- SP 90, LLP 75
#52 WAUCHULA FINE SAND	0-5% SLOPE	SI- SP 80, LLP 70

**GENERAL TIMBER MANAGEMENT GUIDELINES**

*Note: Any timber harvest, site preparation, seedling planting, or other timber management activity will adhere to Florida's Silviculture Best Management Practices (BMP), available online. In addition, all known historical and archeological sites will also be protected.*

A useful measurement of tree stocking and density is basal area (BA). BA is the total cross-sectional area in square feet per acre of all the trees at a certain point in the MU. The diameter of individual trees is measured at four and one-half feet above the ground. This height is referred to as the diameter breast height (DBH). A fully stocked pine MU has enough trees per acre of a size large enough to utilize the growing space without causing over-crowding. SP and LLP MU with 80 to 120 square feet of BA per acre are considered fully stocked. It requires more, smaller diameter trees than it does larger diameter



trees to equal one square foot of BA. For example: It takes 357 evenly spaced, six-inch DBH trees to equal 70 square feet BA per acre. Whereas, only 89 twelve-inch DBH trees per acre equal the same 70 square feet BA. BA can be roughly correlated to crown coverage and therefore needle-cast. About 40 to 60 square feet BA per acre should provide sufficient needle-cast to carry prescribed fire and adequate sunlight for native grasses to be maintained.

Natural communities are dynamic things. A MU of scattered mature trees has not looked exactly as it does today throughout its existence. In natural, pine dominated forest systems trees die because they become old and less able to withstand insect and disease attack. SP has a life expectancy of about 100 years. LLP has a life expectancy of 250 years or more. Bark beetles might invade a weakened tree then multiply and kill some of its neighbors. Lightning strikes and windstorms do the same thing. Thus, holes of various sizes are continuously being created in the canopy. These openings allow full sunlight to reach the forest floor. In addition, lightning caused fires to burn away leaf litter and expose bare mineral soil. The bare soil and canopy openings permit large numbers of sun loving pine seedlings to become established and grow straight and tall.

Where naturally occurring, fire has kept the understory open, pine seedlings will become established in these canopy holes at very high densities. It is common to have ten to twenty thousand seedlings per acre in scattered openings. Recurrent wildfires and competition for sunlight, moisture and nutrients favor the strongest, fastest growing pine saplings. The rest die off continually over the life of a stand of trees until the trees mature and another opening is created that replaces the survivors with young seedlings again. The result is an uneven aged MU where each group of trees created by a canopy opening is about the same age. However, the MU is a mosaic of clusters that have different ages and densities. The long-term BA will fluctuate around a constant figure depending on soil productivity (as low as 20 square feet per acre on extremely poor sites, up to 80 square feet per acre on highly productive sites). The goal of ecologically based timber management is to mimic these natural processes and still be able to harvest trees that are destined to die anyway. The challenge is to capture the value of the timber while minimizing any negative impact on the system.

Thinning type harvests in pine MU help maintain the health and vigor of the stand by removing weak, diseased, and deformed trees. Enough co-dominant trees are removed during thinning to insure crown retention and continued growth in the remaining trees. To create uneven aged pine MU, group selection openings are cut during thinning activities. These openings allow young trees to become established by seed falling from nearby trees or by planting seedlings. Since pine seedlings require direct sunlight to grow, all trees within the opening must be removed. However, to minimize the visual impact, openings can be as small as one-half acre. For natural regeneration, the minimum width of the openings is about two to three chains (1 chain = 66 feet). Lack of cover followed by dense stands of young pine trees created by large openings can become impediments to animal foraging and migration patterns. For example: To prevent saplings growing in these openings from becoming barriers to RCW flight patterns, group selections should not exceed five acres in size.

Combined acreage of all openings cut within a MU during each thinning is kept to no more than five to ten percent of the total MU acreage. Since each MU only gets thinned every ten-plus years, over-harvesting of old-growth trees is avoided, and a steady supply of young trees is ensured. For example: suppose that today there is a MU of 20-year-old pine trees. Every 10 years 95 percent of a MU gets thinned to keep the canopy open and 5 percent clearcut to allow regeneration of young pines. At the end of the tenth cutting cycle (100 years from now) 50 percent of a MU would have 120 plus year-old trees and 50 percent would range from seedlings to 100-year-old trees. If the cutting cycle is extended to 20 years (which is more likely on poorer soils) and 10 percent is cut for openings, the age distribution at the end of 100 years is the same as for the 10-year cycle.



Planting activities, group selection openings, hardwood control measures, and natural regeneration in thin stands will produce young tree stands of various sizes. A well-stocked MU of young pine trees will usually require the removal of weak, diseased, and some overcrowded trees beginning by the age of 15 to 20 years. By this time, the crowns have grown together, and ground cover begins to get shaded out and hardwoods can begin to compete with shade intolerant pine seedlings. Harvesting a portion of the timber maintains healthy pine growth and provides sunlight to the forest floor. Trees removed in the thinning process can be sold to generate revenue to be used in other land management projects. Likely markets for early thinnings from pine stands currently include pulpwood, fence posts and landscape mulch.

Due to shading effects, trees grown in tight spacing produce fewer and smaller lower limbs. The shedding of the lower limbs makes them more desirable for fence posts and later, more valuable products. Planting at least 500 seedlings per acre also helps ensure the marketability of the pine trees and increases future management options.

The need for second and later thinnings depend on how low the BA was taken in the first thinning and successive growth rate. If the BA is reduced to 50 to 70 square feet per acre in the first cut, another harvest will probably be needed in ten to fifteen years. Trees removed from the second and succeeding operations produce ever more valuable products and therefore more money. Current market conditions have some second thinning products worth at least five times as much as the original wood that was cut. Third thinning trees can be worth twice as much as the second thin. Revenue can be generated, and the MU can still have a healthy ecosystem.

### **TIMBER MANAGEMENT RECOMENDATIONS**

The following are general descriptions and management recommendations. The main goal of Hernando County managers is to preserve, restore, enhance, and maintain PSP's natural plant communities. Most of the objectives for PSP comes down to establishing and maintaining a healthy ground cover of grasses and forbs. Adequate sunlight must reach the ground to achieve these objectives. From a timber management standpoint, this means that in general pine-stocking levels should be maintained at a BA range of 40 to 60 square feet per acre.

### **LONG TERM RECOMENDATIONS**

Many factors affect the need for and timing of future thinnings. These include initial planting density, number of trees surviving to merchantable size, crown closure (ground cover shading), and a live crown ratio below 40 percent. The following recommendations are guidelines to be used in areas where the described conditions exist on newly acquired lands, currently unknown stands, and in the distant future as planted seedlings, and natural regeneration matures.

**BA < 10-** These MU have insufficient pine trees to regenerate themselves. Control the saw palmetto and woody species using roller drum choppers and prescribed fire. Plant forest source LLP or SP as described under the *Artificial Regeneration* section below.

**10 to 30 BA-** These MU may or may not have enough seed trees to regenerate themselves. Though for certain, any further loss of mature trees could preclude a healthy future. MU with these marginally low BA should be included in the regeneration plan. See *Natural* and *Artificial Regeneration* sections below.

**40 to 70 BA-** These MU have an adequate number of pine trees to utilize the growing space without overcrowding. No harvests are necessary in these MU unless thinning is required to allow access for roller drum chopping of palmettos, or overgrown woody vegetation. If chopping is needed, follow



spacing recommendations as described in the *Natural Regeneration* section. In large stands with little regeneration, some group selection openings may be cut to promote seedling establishment.

**80 BA & UP**– These MU with this level of stocking are probably beginning to shade out the ground cover. These MU should be thinned to 40 to 60 square feet BA. If chopping for palmetto control is needed, follow spacing recommendations as described in the natural regeneration section. Group selection openings should be scattered throughout these MU to promote seedling establishment.

### **SALVAGE SALES**

On occasion, small volumes of wood may need to be removed due to fire, windstorm, insect, or other damage. The decision whether to harvest the affected timber depends on the threat to the surrounding MU and the volume/value of the trees involved. For example, small, isolated lightning-strike beetle kills are a natural part of a healthy ecosystem and normally would not be cut. However, if a drought caused the insect infestation to spread, the infected trees and a buffer zone might have to be removed. *Note: due to forest health and timber market factors, it is recommended contacting the FFS Forester as soon as possible.* Many times, a salvage sale may be added to an existing sale to expedite the removal of dead and dying trees.

### **MISCELLANEOUS FOREST PRODUCTS**

#### *PINE STRAW*

Pine needle raking could be an option to convert the slash pine plantation into a longleaf pine plantation, while still generating money. Since this MU is already highly disturbed, the use of herbicides to control the understory for easy needle raking, would have less impact than in MU with native ground cover species. Pine straw raking operations generally are set up for multiple year contracts where either the landowner or buyer agrees to spray/mow the understory to keep it clean of woody plants and grasses for ease of raking and equipment maneuverability. Pine straw raking can begin as soon as year 6, generating 50-75 bales/acre and be carried through the third thinning of a stand in some cases. Depending on several factors like species of pine (longleaf is best) and fertilization, it is possible to harvest 200-300 bales/acre during maximum output, at year 15.

Income can range from \$0.50-\$0.70/bale. Pine straw raking in a MU coincides with prescribed fire use and in some cases can be conducive with wildlife management. Money generated from pine straw raking is a good way to offset the planting costs of the MU as well as ground over restoration. *Note: higher density plantings of 726 trees per acre (6' X 10' or 5' X 12') are required to create a stand with the conditions favorable to needle raking.*

### **REFORESTATION**

#### **NATURAL REGENERATION (ONLY USED WITH MATURE, CONE BEARING TREES)**

The MU on PSP could utilize natural regeneration. The following methods of natural regeneration should be applied to current and future MU that have adequate number of seed trees. SP and LLP require 30 square feet BA per acre of seed trees. That would be a minimum of 12 trees per acre at 10" DBH. SP generally produce seeds on a three-year cycle. LLP produce seed from three to nine years. When a good seed crop is anticipated by flower or cone crop counts the previous year, the MU should be treated with one of the following site preparation methods described below.

**10 to 30 BA**- In this MU control the understory invasive plant species. This can be accomplished by the use of herbicides and application of prescribed fire (if practical) to the MU in the fall to remove the dead plants and other grasses and forbs for a cleaned-up ground surface ready to receive pine seeds.



Establishment of SP MU requires 1,000 or more seedlings per acre to have seeded in and begin growing. Successful establishment of LLP stand requires 4,500 seedlings per acre. Timing of reintroduction of prescribed fire into regenerated MU depends on seedling height growth and fuel loads. Generally, 400 or more trees per acre should be at least head-high in light fuels before the MU is burned. With short trees and heavier fuels, the first burn might have to be accomplished at night to prevent excessive scorch and mortality. These MU can probably be returned to the normal burn rotation following the first post-establishment burn, if fuels are light and fire frequent enough. See the section; *Artificial Regeneration*, if more consistent and quicker results are required.

**30 to 50 BA-** In these MU, again control invasive plant species as above. Follow the fire regime as described above.

**> 50 BA-** These MU need reforestation treatments only where invasive plant species must be controlled, or additional age classes are desired (i.e. insufficient number of trees younger than ten years old). Where invasive plant species control is a priority, thin pines to 30 to 40 sq. ft. per acre. Implement fire regime as above.

### **ARTIFICIAL REGENERATION**

The slash pine plantation MU on PSP will require artificial regeneration to restore the land back to historical natural communities of mesic flatwoods if the existing stand is clear cut. Forest source LLP or SP seedlings should be planted in meandering strips to make a more natural appearance to the stands. To minimize damage from reproduction weevils, do not plant pine seedlings where pine stumps are present until at least one growing season has passed since the harvest.

The following recommendations are designed to generate the highest possible revenue stream while maintaining healthy ground cover. In areas where native ground cover is to be restored, consider planting pine seedlings immediately after sowing the seed and packing of the soil. This should help reduce losses due to moisture competition from established grasses during dry weather. Follow the fire regime described above in the *Natural Regeneration* section.

### *SITE PREPARATION*

Prescribed fire may be used to prepare the planting site for hand planting or machine planting. Burn in the fall to provide access for planters, reduce groundcover competition (short term), hardwood and palmetto control, and allow adequate sunlight to the ground. Negative aspects of fall burning include lack of suitable habitat for wildlife until the spring growing season, and if not performed under the correct weather conditions, scorching of mature pine over-story can occur.

Mowing and roller chopping have also been used for site preparation; these techniques allow sunlight to reach the germinating seed or planted seedlings. Negative impacts include mowed/chopped debris on the ground, which can inhibit good soil to seed contact, and potentially the buildup of too much fuel for burning that can be damaging to new seedlings. Mowing "selects" for grasses, but like disking, roller chopping selects for forbs resulting in reduced fine fuels and soil disturbance of native groundcover.

To ensure adequate survival and avoid the expense of replanting, some form of herbicidal control, scalping, or prescribed fire may be necessary. Competition from grass for soil moisture during hot, dry weather can cause severe losses of young seedlings. Applying a contact herbicide such as Roundup either in two-foot-wide strips or in spots can control these grasses. The herbicide should be applied far enough in advance of planting time, so the grasses have time to "brown up" and indicate where to plant the seedlings.

A release treatment of herbicide can be applied after planting to aid in the new seedling survival. Once



seedlings have started root growth apply a six-ft. band over planted rows in mid-April to mid-May. For either SP or LLP seedlings, use 2 oz./acre of sulfometuron + 24 oz./acre hexazinone for herbaceous weed control (wiregrass is tolerant). This could be used for example if the site prep could not be completed before planting. If the site has extra dense hardwoods that should be controlled apply a broadcast foliar spray in June to October, 40-48 oz. imazapyr + 2-3 quarts of glyphosate. Alternatively, a spring treatment with hexazinone 2-6 quarts could be applied to treat the hardwoods to allow the seedlings adequate growth before regular prescribed burning can resume. Some units may require a combination of chemical then prescribed burn or mowing/chopping then prescribed burn to prepare the site for planting and ensure good survival in the subsequent years.

### *HAND PLANTING*

Hand planting of containerized (tubeling) forest source LLP or SP seedlings is one option for reestablishment in areas where an inadequate number of seed trees exist. Bare-root trees are planted in the winter. Tubelings can be planted in winter or summer, thereby extending the planting season. Plant approximately 600 bare root seedlings per acre at varying spacing but averaging 6' X 12' overall. Due to the increased likelihood of survival and higher cost of containerized seedlings, as few as 500 seedlings per acre can be planted (8' X 11'). Still, for fear of not being able to reestablish essential grasses, land managers may insist on planting less than the recommended number of pine seedlings overall. To ameliorate these concerns, 400 seedlings per acre can be hand planted in small, irregularly shaped clusters (2 to 5 acres) with two to five chains between clusters. If machine planting is employed, plant three to five curved rows (9' X 12'). Leave 2 to 5 chains unplanted between sets of rows. The entire area can be inoculated with native grass seed prior to planting the SP or LLP seedlings. However, tremendous cost savings can be made by only sowing the area between tree plantings and relying on these areas to seed the rest over time.

### *MACHINE PLANTING*

Meander planting containerized LLP or SP seedlings at an average spacing of 6' X 12' yields about 600 trees per acre. It is more difficult to vary the spacing and make the planting look random with machine planting. This is due primarily to the inability of tree planters to make sharp turns and still pack the soil around the seedling roots. Tight turns are also hard on the planter's bearings. The desired effect can be obtained by gradually curving the planting rows and varying the distance between and within the rows. Another way to create the random look is to locate the planting rows twice as far apart as normal (averaging approximately 24'). Then, plant a second set of rows at some angle approaching 90 degrees to the first set of rows spaced about the same distance apart.

Again, competition for soil moisture during dry weather can cause heavy losses of seedlings and waste of planting costs. Where grass is thick, it is best to either herbicide strips as described above or use a combination planter/scalper to plant the seedlings. The scalper should be set to no more than 2 to 3 inches deep and 18 to 24 inches wide. These settings will minimize soil disturbance and maintain continuity of fuels for future prescribed burns, but the seedlings will have a decent chance of survival.

### **GROUND COVER RESTORATION**

Portions of the ground cover on of PSP have been severely impact by past management practices. The historical natural communities would have been mesic flatwoods. Native grasses and forbs were partially or entirely replaced by imported varieties like Bahia grass or invasive plant species that usually will not burn during the natural lightning-induced fire season.

Reestablishment of native groundcovers can be extremely expensive. Many methods have been tried with varying degrees of success. The following describes an alternative method to the expensive direct



planting of containerized seedlings. It has worked on similar sites across the region. Undisturbed donor sites are chosen that have similar soil types as the area to be re-vegetated. Sites are burned at the right time (usually spring to early summer) to produce viable seed from a broad spectrum of native plants. Mechanical harvesters are used to gather the seeds. More than one trip maybe required, over a period of weeks, and with the machine set at different heights to get seeds from all the species found at the donor site. This precious cargo is hauled to the treatment site and scattered using a hay blower. Some form of roller, light disc or packer should then be used to insure close contact with the soil. Results vary, but if everything goes well, at least some of each species becomes established. Following the planting with well-timed prescribed burns should stimulate seed production in the newly established vegetation and further spread each species.

### **PRESCRIBED FIRE**

Frequent lightning induced fires are natural to most Florida's natural communities. Prior to European settlement, they occurred at regular intervals of one to five years. Without fire, native habitats would probably have turned into densely shaded hardwood hammocks. Introduction of effective fire suppression in the mid-1900's resulted in thick MU of saw-palmetto and subsequent loss of other grassy and herbaceous ground covers. Use of prescribed fire is essential to the maintenance of open healthy, pine-dominated ecosystems. The needles shed by pine trees planted in old pastures help carry fire across the landscape which in turn helps maintain fire dependent communities.

Caution must be exercised when reintroducing fire into these systems, as desirable as burning is. Survival of (expensive, newly planted seedlings or time intensive, natural seedlings) as well as valuable mature timber depends on timing and careful execution of burns. To prevent damage to delicate root systems and avoid smoky duff fires, be sure that there is adequate moisture in any organic matter thicker than approximately one inch. In stands with heavy duff layers, try to burn no more than one inch of duff at a time on approximately two to three-year intervals. At least the first burn should be at nighttime, during the dormant season after the seedlings have reached six feet or more in height and there is enough needle litter to carry the fire. If ground fuels are not too heavy, succeeding burns can be switched to the growing season.

### **ACCESS**

Public pedestrian access is from a gate on the southern portion of the property located at 18279 Wiscon Road. Currently there are no improved interior roads on PSP. 4 x 4 pickups and ATVs can access the property sufficiently driving through the pasture in the west portion and a two trail on the east portion of PSP. This is satisfactory for existing use and management activities. If Hernando County were to conduct a timber sale there may be needed to reinforce the two trails with lime rock or shell. This is because logging equipment and semi-trucks weigh more.

### **SUMMARY**

In rapidly urbanizing areas of the state, public lands are often the only refuges for native plant and animal communities. Restoring and maintaining these ecosystems is an important function of land managers. Saleable timber is a byproduct of good ecosystem management. Carefully designed timber harvests; protect water quality, create openings in the tree canopy allowing sunlight to reach the forest floor, promote herbaceous growth and pine regeneration. The seedlings then grow to replace trees killed by lightning, wind damage and insects or disease. Mechanical equipment involved in timber harvests helps reduce dense understory vegetation such as saw palmetto and undesirable hardwoods. Thinning of dense timber stands can result in enough space between trees to allow a tractor pulled roller-drum chopper to be



used, further reducing the understory vegetation. This fuels reduction results with easier, safer, and more effective prescribed fire application. The ability for Hernando County to maintain a frequent burn schedule is essential to maintaining a healthy ground cover. These clearings and their ecotones are favorite spots used by wildlife for feeding, resting, mating, nesting, and rearing of offspring.

Hernando County land managers of PSP have expressed a desire to restore native groundcover, especially in the old field and flatwoods. Just as important to these natural communities is the reestablishment of vertical structure provided by trees and the reintroduction of periodic fires. Needle litter from growing pines helps carry these frequent, low intensity burns. In all restoration scenarios the exact methods and results will be guided by the best available ecological information to conserve biodiversity of the affected habitats.

Likely purchasers of forest products from PSP include multiple mulch mills. There are eight pine straw purchasers that work in Hernando County. PSP is located 34.5 miles from the closest mulch mill. More timber is sold in the region than might be expected. Timber harvests have taken place on nearby Hernando County lands, State Forests, and State Parks.

The cost of hauling the trees to the larger, north Florida mills could keep timber prices down and reduce interest in timber offered for sale. Therefore, successful timber sales may require timing to match the market. When north Florida woodlands are inundated with water and south Florida is dry, loggers tend to drive long distances to obtain wood from drier land. These circumstances would allow Hernando County land managers to take advantage of the opportunity to sell timber that otherwise might be hard to sell. The secret to timing the markets is to be flexible about when stands should be cut and keeping up with market factors throughout the state.

Clearly, managing trees for timber as part of the overall management strategy is worthwhile for many reasons. Timber sale revenues can relieve the long-term burden on taxpayers for much needed management activities. As general revenue funds become more difficult to secure, revenues generated from the sale of timber thinnings could be used to help pay for PSP Management Plan's projects like; habitat restoration, reforestation, prescribed burning, and road repair.

