Powell Creek Preserve

CONSERVATION 20/20 LAND PROGRAM

Discover LEE COUNTY Parks & Recreation

Land Stewardship Plan 2006

Powell Creek Preserve

Land Stewardship Plan

Prepared by the Land Stewardship Section
Lee County Department of Parks and Recreation

Approved by the Lee County Board of County Commissioners: 01-31-06

Acknowledgements

We would like to thank the following individuals for their assistance in the development of this document: Roger Clark, Cathy Olson, the Lee County Land Stewardship staff and Michael Weston from the Division of Forestry for carefully reviewing the Powell Creek Preserve (PCP) land stewardship plan and providing constructive criticism; members of Management Sub-Committee of the Conservation Lands Acquisition and Stewardship Advisory Committee were also instrumental in providing valuable suggestions regarding land management issues and the formatting of the plan; Dean Cerdan, Lee County Parks and Recreation, for providing the plan on the Lee Parks website for public review; Jeff Morgan, Lee County Parks and Recreation, for printing assistance; Lee County Library System for making the plan available for public review and providing a meeting space for public comments; Scott Carter, Carol Schmitt and Bryan Smith for their historical knowledge.

Lynne Boyd
Sherry Furnari

TABLE OF CONTENTS

LIST OF EXHIBITS

Vision Statement

It is the vision of the Lee County Department of Parks and Recreation and the Conservation 20/20 Program to conserve, protect and restore Powell Creek Preserve to a productive, functional and viable ecosystem. Although the Preserve is small, it contains the northern most reaches of the natural channel of Powell Creek and provides water storage for areas to the north of the Preserve. The primary management objectives for Powell Creek Preserve will be exotic removal/control throughout the Preserve and hydrologic improvements on Powell Creek. Because the Preserve is in an urban area, it will provide hiking and birding opportunities for surrounding neighborhoods. As stewardship staff continues with the control of exotic plants, the Preserve will be a unique birding and outdoor learning experience for the local community due to its urban setting.

I. EXECUTIVE SUMMARY

Powell Creek Preserve (PCP) is located in North Fort Myers, in northern Lee County about 0.3 miles north of Bayshore Road and 0.75 miles east of Business U.S. 41. The site is bordered by the Powell Creek Bypass Canal to the west, Forest Park Mobile Home subdivision to the north, Hart Road to the east and Carriage Village Mobile Home subdivision to the south. The 77 acre Preserve was acquired in 2003 through the Conservation 20/20 (C20/20) Program for $618,000 after being nominated to the program in the spring of 2002 by Royal Palm Estates LLC. The Conservation 20/20 Program was established in 1996 after Lee County voters approved a referendum that increased property taxes by up to .5 mil for the purpose of purchasing and protecting environmentally sensitive lands.

The land where Powell Creek Preserve is located today was created during the Pleistocene Epoch between 1.8 million to 10,000 years ago. This period is also known as the Ice Age, where huge ice sheets formed across Canada and the northern United States. Throughout much of Lee County, including the area where PCP is located, the Caloosahatchee and Fort Thompson units are somewhat indistinct and have been combined as undifferentiated Tertiary/Quaternary Sediments. The Gulf Coastal Lowlands are found in northwest Lee County as well as most of Charlotte and Sarasota Counties to the north. This region is characterized as a gently southwestward sloping plain composed of deposited sediments. The Preserve's natural elevations range from 12' in northwest and central portions and slope towards the meandering creek to 6'.

There are six different soil types found at Powell Creek Preserve. A common relationship for all of these soil types is that their slopes range from 0-2%. All soil types are nearly level and poorly drained with rapid permeability at the surface. Covering 35% of the Preserve, Immokalee Sand is the most common soil type, which is found in south Florida flatwoods communities of the Preserve. Pineda Fine Sand is found on 28% of the Preserve and is present in the slough type communities within and adjacent to Powell Creek.

The Preserve contains six plant communities including mesic flatwoods, unimproved pasture, slough, scrubby flatwoods, hydric hammock and depression marsh. A portion of Powell Creek and its floodplain represent the slough community mainly with pop ash trees, buttonbush and willow. The Preserve's drier northwest corner resembles a scrub area with dwarf live oak, netted paw-paw and October flower. Powell Creek Preserve is also home to variety of animal species including warblers, pileated woodpeckers, feral hogs, gray squirrels, rabbits and gopher tortoises.

The Preserve lies within the Powell Creek Watershed, its namesake, which covers a surface area of approximately 13 square-miles. A primary consideration for acquiring PCP was the potential importance for flood management due to the proximity to adjacent water control structures. It was thought that this area might provide additional drainage or water storage for Suncoast Estates, Forest Park and other upstream developments. Several hydrological alterations affect the hydroperiod and sheet flow across the property, which flows in a southerly direction. Most hydrological impacts have occurred outside the property boundaries and consist of an adjacent roadway, an extensive drainage channel along the western boundary, widespread urban growth, several ditches and their associated berms. Within the Preserve, the natural wetlands located in the southeastern corner and Powell Creek and its floodplain are all disturbed.

Although not all elements of the land use history discussed here occurred on PCP, modifications made on adjacent properties directly influence the Preserve. An aerial photograph from 1944 showed that land uses included agricultural activities, a building in the northeast corner, and the abandoned Seaboard Air Line railroad bed and its associated ditch to the west. During the 1950's, several additional structures associated with the Hart's Dairy Farm operation were built, while in the 1960's another drainage ditch from the north was dredged leading to the Powell Creek waterway.

During the 1970's, mobile home subdivisions sprung up in areas adjacent to the Preserve, while cattle grazed on the property until the early 1980's. In 1987, a weir was installed in the bypass canal at the southwest corner of the Preserve at the confluence of the canal and Powell Creek. During the mid to late 1980's, wells were installed in preparation for the Royal Palm Estates development, a 325 unit mobile home planned development approved for this site. In the 1990's, another mobile home subdivision and storage facility were also built adjacent to this property. Before C20/20 acquired the property, additional uses observed during onsite property evaluations included camping, various childhood activities, dumping, off-road vehicles and hunting.

Natural trends and disturbances influencing native communities and stewardship at PCP include the pattern of wet and dry periods, flooding, occasional freezes, hurricanes and wildfire. In 1990, a conservation easement was granted to the Florida Department of Environmental Regulation (renamed FDEP) on approximately 10 acres of the property. This easement was granted to maintain the land in its natural vegetative and hydrologic conditions. The easement covers the creek bed throughout the entire property and the floodplain on the northern part of the creek. In addition, there is a 15 foot drainage easement and a 10 foot utility easement that are recorded along portions of the property boundary.

In September 2005, Lee County Division of Natural Resources began the process of hiring a consultant to develop the North Fort Myers Surface Water

Master Plan, which covers the area between U. S. Highway 41 and State Road 31 in the North Fort Myers area. These plans will provide suggestions for water storage and drainage within several watersheds. Land Stewardship staff will have input on projects that will affect water storage or flow on C20/20 Preserves.

Since the Preserve is relatively small, staff does not recommend any additional recreational activities beyond hiking, bird watching, nature photography and nature study that are allowed at all C20/20 Preserves. The proposed nature trail will be marked and at least ¾ mile long. This trail will be created within a highly disturbed plant community and will utilize portions of the existing trails on the eastern portions of the Preserve. A brochure box with trail maps, wildlife information and other environmental educational literature will introduce and orient visitors to PCP. An entrance for public access is already available for visitor usage.

The goal of this land stewardship plan is to identify Preserve resources, develop strategies to protect those resources and implement restoration activities to restore PCP to a productive, functional and viable ecosystem while insuring the Preserve will be managed in accordance with Lee County Parks and Recreation's Land Stewardship Operations Manual. Restoration and management activities at PCP will focus on control of invasive exotic plant and animal species, improving hydrologic components, maintaining upland ecosystems with prescribed fire or by other methods, enhancing wildlife habitat and public access for resource-based recreational opportunities. A Management Action Plan that outlines restoration and stewardship goals has been developed. This plan outlines these goals and strategies, explains how to accomplish these goals, and provides a timetable for completion. This land stewardship plan will be revised in ten years.

II. INTRODUCTION

Powell Creek Preserve (PCP) was acquired as one parcel in August 2003 through Lee County's Conservation 20/20 (C20/20) program for $618,000. The site totals 77 acres and is located in North Fort Myers along the west side of Hart Road. The site is a mixture of disturbed areas, pine flatwoods, a slough and the natural creek bed of Powell Creek.

Little land use history has been documented on the Preserve. It is known that the site was used as part of Hart's Dairy in the 1950's and remnants of a few structures associated with the dairy still remain on the property. The majority of the property is undisturbed except areas in the eastern portion that were used for grazing. The Preserve is surrounded by mobile home communities to the north, east and south, and bordered by a drainage canal to the west.

The main land stewardship challenges for the site will be invasive exotic plant control and hydrologic improvements. Exotic plant species are present across the Preserve and include twenty-nine (29) Florida Exotic Pest Plant Council (FLEPPC) Category I and eleven (11) FLEPPC Category II exotic invasive plant species that have been identified. The majority of these exotic plant species have been introduced from neighbors and controlling these species on the Preserve will be challenging. Hydrologic improvements on the Preserve will focus on increasing water flow in the creek and keeping the natural channel free of debris and exotic plants.

The purpose of this stewardship plan is to define conservation goals for PCP that will address the above concerns. It will serve as a guide for Lee County's Department of Parks and Recreation to use best management practices to ensure proper stewardship and protection of the Preserve. It also can be used as a reference guide as a significant amount of field surveys were conducted along with researching scientific literature, studies and historical records to understand how the Preserve functions in the ecosystem, what wildlife and plants are found within its boundaries as well as influences from human use.

III. LOCATION AND SITE DESCRIPTION

Powell Creek Preserve is located at 15601 Hart Road, North Fort Myers, in northern Lee County about 0.3 miles north of Bayshore Road (Figure 1). It is in the northwestern corner of Section 36, Township 43 South, and Range 24 East. The site is bordered by Powell Creek Bypass Canal to the west, Forest Park Mobile Home subdivision to the north, Hart Road to the east and Carriage Village Mobile Home subdivision to the south. The Preserve contains mostly upland pine flatwoods communities and a portion of Powell Creek and its floodplain (Figure 2). The floodplain represents a slough community with pop ash trees (*Fraxinus caroliniana*), buttonbush (*Cephalanthus occidentalis*) and Carolina willow (*Salix caroliniana*).

Figure 1: Location Map

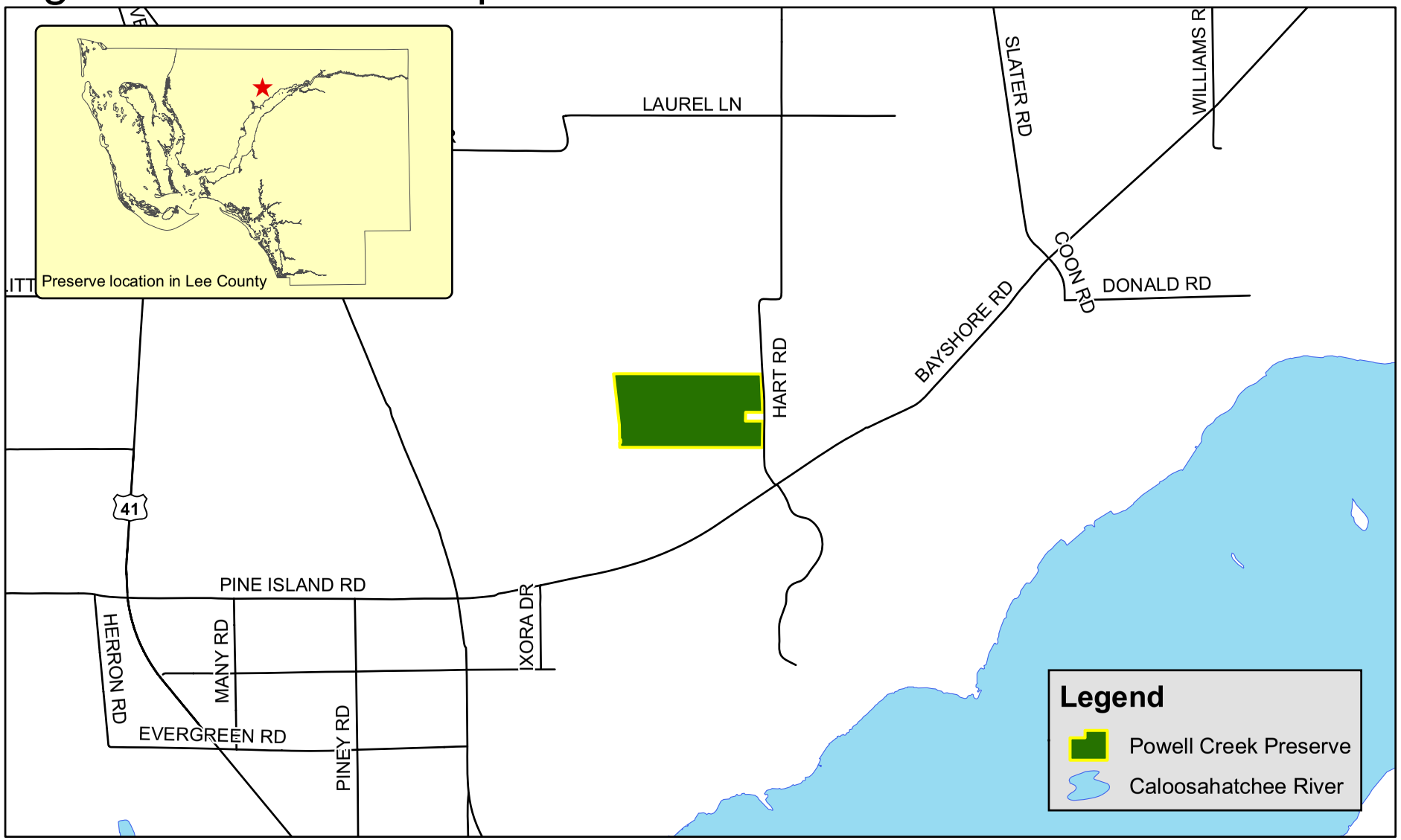


Figure 2: 2005 Aerial Photograph

IV. NATURAL RESOURCES DESCRIPTION

A. Physical Resources

i. Climate

Southwest Florida has a humid, sub-tropical climate due to its maritime influence from the Caribbean Sea and the Gulf of Mexico. The mild temperatures encourage winter residents and tourists to visit the area. Temperate climate influences are exerted as well, with infrequent but significant freezes occurring in December and January (FCC 2005). These freezes prevent some of the more tropical plants from becoming established and occasionally damage the subtropical vegetation. Cold fronts regularly push cool, sometimes moist weather from the Southeastern U.S. to Southwest Florida during the winter. These cold fronts also encourage migratory birds to utilize the Preserve as either a stop-off point on a longer voyage, or as a winter roosting and feeding area. Table 1 shows the average high and low temperatures for Fort Myers, Florida compiled by the Southeast Regional Climate Center from 1931 to 2004.

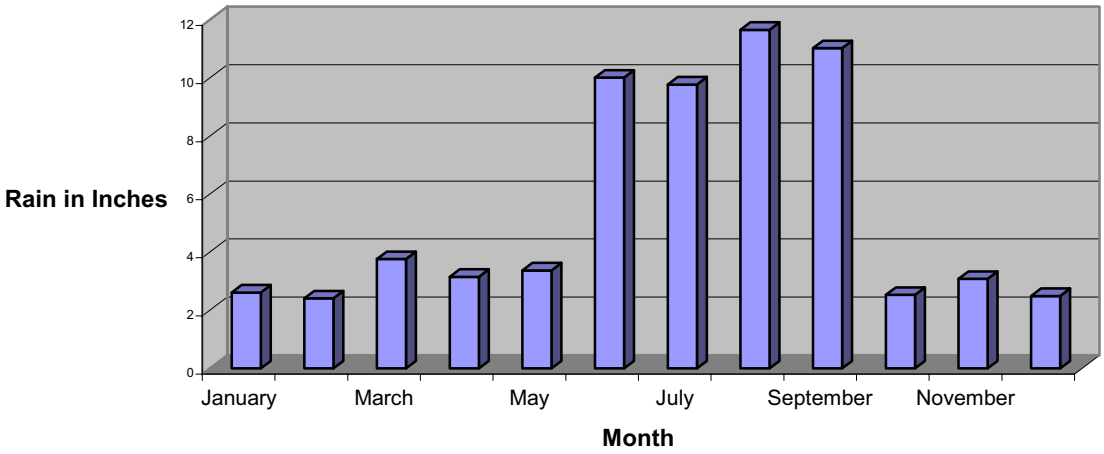
Table 1: Average High/Low Temperatures for Ft. Myers, FL (1931-2004)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High temperature (°F)	74.7	76.1	79.8	84.2	88.7	90.6	91.1	91.4	89.7	85.7	80.2	76.0
Low temperature (°F)	53.5	54.7	58.4	62.4	67.5	72.4	74.1	74.5	73.9	68.3	60.4	55.1

Exhibit 1 depicts the rainfall data collected by Lee County Division of Natural Resources on a daily basis from the North Reservoir rain gauge, located near the Bayshore Road and Samville Road intersection in North Fort Myers, which is approximately 2.25 miles northeast of the Preserve boundary. Average annual rainfall over the last fourteen years was 65.85 inches, slightly higher than the average rainfall for the entire county (64.76 inches).

EXHIBIT 1

Average Rainfall 1991-2005



Occasionally, major hurricanes pass through southwest Florida impacting natural ecosystems and man-made infrastructure. Although these effects are believed by many to be short-term, long-term consequences may result in plant canopy restructuring, invasive plant introduction and/or further dispersal, and increased wildfire severity to communities from increased fuel loads (dead vegetation). The effect of hurricanes on natural systems is compounded by the already present anthropogenic impacts. During 2004, tropical systems (Charley, Frances and Jeanne) passed over Lee County bringing hurricane force winds for all three systems (Appendix A). As a result, several slash pines and oaks and/or their limbs fell throughout areas of the Preserve. In addition, debris from neighboring mobile home communities was deposited along the Preserve's boundary. In 2005, Old World climbing fern (*Lygodium microphyllum*) was discovered, possibly introduced from the storms of 2004. In October 2005, Hurricane Wilma also passed through the area with hurricane force winds, but there was very little damage done to vegetation across the Preserve.

ii. Geology

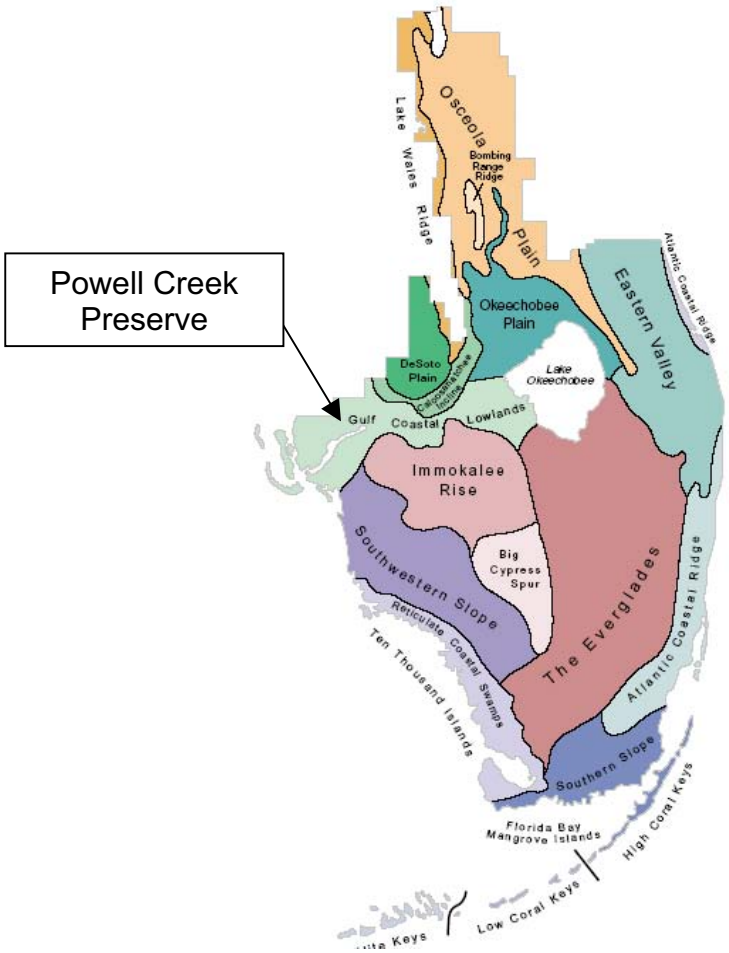
For millions of years, the Florida Platform was submerged in the ocean. Sediments accumulated upon it and hardened into sedimentary rock. Thirty-five (35) million years ago, portions of Florida rose above the ocean's surface and for the next 12 million years it alternated between emersion and submergence. From 23 million years ago to the present, at least a small portion of the Florida Platform has always been above the ocean surface.

The land where Powell Creek Preserve is located today was created during the Pleistocene Epoch between 1.8 million to 10,000 years ago. This period is also known as the Ice Age, where huge ice sheets formed across Canada and the northern United States. When these ice sheets were formed, they consumed large quantities of seawater, dropping the current sea level 300 or more feet, which greatly increased the land area of Florida. As the glaciers shrank, sea levels rose, and the Florida peninsula was again flooded. During the peak warm periods, sea level reached 150 feet above the current sea level. The waves and currents during these high sea level periods reworked the sediments and formed a series of geological units (Caloosahatchee, Ft. Thompson, Anastasia, Miami Limestone and Key Largo Limestone). Each of these geological units is characterized by their unique compositions. However, throughout much of Lee County, including the area where PCP is located, the Caloosahatchee and Fort Thompson units are somewhat indistinct and have been lumped together as undifferentiated Tertiary/Quaternary Sediments. This unit consists of a quartz sand blanket covering limestone and clay. Fossils, including mollusks and corals, are very common and usually in excellent condition (Missimer & Scott 2001).

Southwest Florida can be divided into ten major physiographic provinces. These are broad-scale subdivisions based on physical geography features such as terrain texture, rock type and geologic structure and history. Exhibit 2 illustrates where Powell Creek Preserve lies within the Gulf Coastal Lowlands (Map from SFWMDb 2000).

EXHIBIT 2

Physiographic Regions



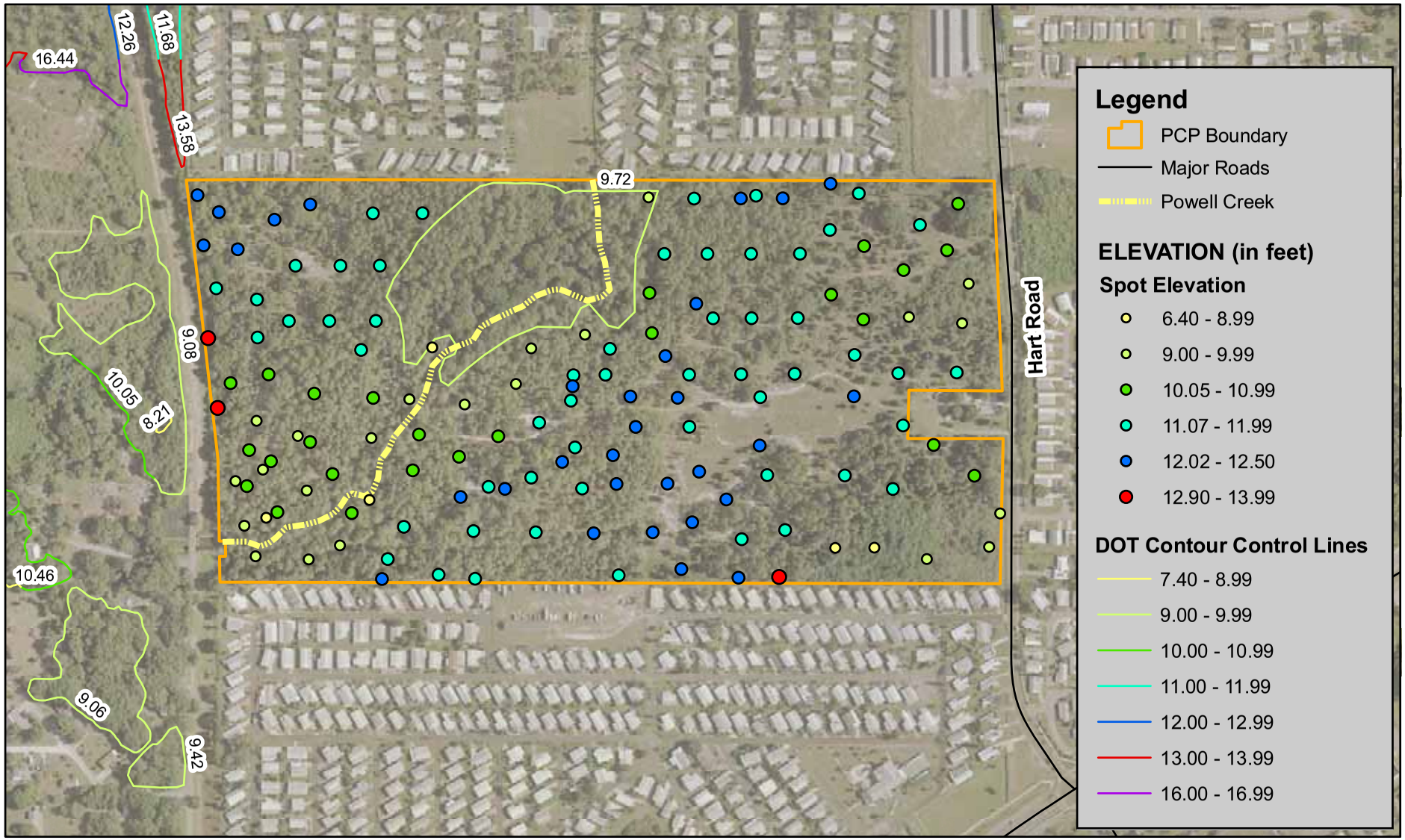
The Gulf Coastal Lowlands, where PCP is located, are found in northwest Lee County as well as most of Charlotte and Sarasota Counties to the north. This region is characterized as a gently southwestward sloping plain composed of deposited sediments. These sediments are aligned parallel to the coastline, which indicates they were formed by marine forces (Missimer & Scott 2001).

iii. Topography

Lee County is located within the Coastal Lowlands of Florida that extend around the coastal periphery of the state where elevations are generally below 100 feet (Stubbs 1940; Cooke 1945).

The natural elevations at PCP range from 12’ in northwest and central portions of the Preserve and slope towards the meandering creek to 6’. In addition, the wetland in the southeastern corner is only at 8 feet (Figure 3). Man-made topographic features include berms and spoil piles associated with channel and ditch dredging and neighboring developments have an elevation of approximately 13’.

Figure 3: Topography



iv. Soils

The Soil Survey of Lee County, Florida (Henderson 1984) was designed for a diverse group of clients to be able to comprehend soil behavior, physical and chemical properties, land use limitations, potential impacts, and protection of the environment.

There are six (6) different soil types found at Powell Creek Preserve (Figure 4 and Table 2). A common relationship for all of these soil types is that their slopes range from 0-2%. Slope is "the inclination of the land surface from the horizon." Essentially, it has been established that PCP is fundamentally level. Table 2 and the descriptions below have been organized to quickly provide conservation managers with pertinent soils information for understanding restrictions and/or results regarding future habitat restoration and probable recreational plan limitations and expense.

There are eight (8) generalized range site categories in Lee County, four (4) of which are found on PCP. Manmade areas are not included in range site categories. Note that these categories are not Florida Natural Areas Inventory (FNAI) natural plant community designations, but rather they are used to group soil types and where they might occur. The 4 identified on the Preserve are:

- South Florida Flatwoods - Nearly level areas with scattered to numerous pine trees (*Pinus spp*.), saw palmetto (*Sereoea repens*), gallberry (*Ilex glabra*), and other woody plants.
- Cabbage Palm Flatwoods - Nearly level areas with scattered cabbage palm (*Sabal palmetto*) trees throughout the landscape.
- Slough - Open grassland where nearly level areas act as broad natural drainage courses in the flatwoods. Potential plant community is dominated by blue maidencane (*Amphicarpum muhlenbergianum*), chalky bluestem (*Andropogon virginicus var. glaucus*), and blue joint panicum (*Panicum tenerum*).
- Freshwater marshes and ponds - Open grassland marshes or ponds (depressions) with the potential to produce significant amounts of various grasses, sedges, and rushes. Water fluctuates throughout the year.

Wetland classifications are used to identify locations that may retain water for an indeterminate amount of time.

- S-Slough (sheet flow): A broad nearly level, poorly defined drainage way that is subject to sheet-flow during the rainy season.
- P-Ponding: Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive

precipitation from long-duration storms. There are two hydrologic soil groups found on the Preserve:

- B - Soils having a moderate infiltration rate (low to moderate runoff potential) when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well-drained soils that have moderately fine texture to moderately coarse texture. Soils have a moderate rate of water transmission.
- D - Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist mainly of clays that have a high shrink-well potential, soils that have a permanent high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. Soils have a very slow rate of water transmission.

Note that some of the soil types are shown as having dual hydrologic groups, such as B/D. A B/D listing means that under natural conditions the soil belongs to D, but by artificial methods the water table can be lowered sufficiently so that the soil fits in B. The Preserve has been impacted by hydrological alterations through a series of ditches and an adjacent roadway. Since there are different degrees of drainage or water table control, an onsite evaluation would be needed to determine the exact hydrologic group of the soil at each particular impacted location.

Soil permeability is defined as “the quality of the soil that enables water to move downward through the profile.” Permeability is measured as the number of inches per hour that water moves downward through the soil. The water table columns indicate the amount of time water may be present at specified depth ranges. Terms describing permeability are below:

Very slow	< 0.06 inch
Slow	0.06 – 0.2 inch
Moderately slow	0.2 – 0.6 inch
Moderate	0.6 – 2.0 inches
Moderately rapid	2.0 – 6.0 inches
Rapid	6.0 – 20 inches
Very rapid	> 20 inches

Soils affect the type, quality and quantity of food and cover for wildlife. Wildlife diversity and abundance are also influenced by distribution of food, cover, and water. Wildlife habitat may be created or improved by planting appropriate vegetation, maintaining existing plant communities and promoting the natural establishment of desired vegetation. The soils of Lee County occur in four (4) different habitat types:

- Openland: Cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. Wildlife attracted includes

northern bobwhite quail (*Colinus virginianus*), sandhill cranes (*Grus canadensis*), hawks, various birds, and rabbits.

- Woodland: Deciduous plants, coniferous plants, grasses, legumes, and wild herbaceous plants. Wildlife attracted includes wild turkeys (*Meleagris gallopavo*), thrushes, woodpeckers, squirrels, foxes, raccoons (*Procyon lotor)*, white-tailed deer (*Odocoileus virginianus*), snakes, frogs, and bobcats (*Lynx rufus*).
- Wetland: Open, marshy or swampy shallow water areas. Wildlife attracted includes ducks, ibis, egrets, herons, shorebirds, snakes, frogs, alligators (*Alligator mississippiensis*), and otters (*Lutra canadensis*).
- Rangeland: Shrubs and wild herbaceous plants. Wildlife attracted includes white-tailed deer, bobwhite quail, opossums (*Didelphis virginiana*) and various birds.

The potential of the soil for wildlife habitat is rated as:

- Good - Easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected.
- Fair - Established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results.
- Poor - Limitations are severe as habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive.
- Very poor - Restrictions are very severe and unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.
- -- Soil was not rated.

Staff considers soil limitations that affect their suitability for recreational development. Although the Soil Survey of Lee County has other categories under recreation, these are not under consideration for this Preserve. The soils within the Preserve have all been identified as having severe limitations for recreation. Severe means “that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.” In particular, paths and trails for “hiking and horseback riding should require little or no cutting and filling” plus “should not be subject to flooding more than once a year during the period of use.” Therefore, as a guideline, the soil types at PCP are fairly sensitive and restrictive and considerations by the impacts of hiking or management trails must be addressed. Recreational opportunities are further discussed in the Public Access and Resource-Based Recreation section.

Figure 4: Soils Map

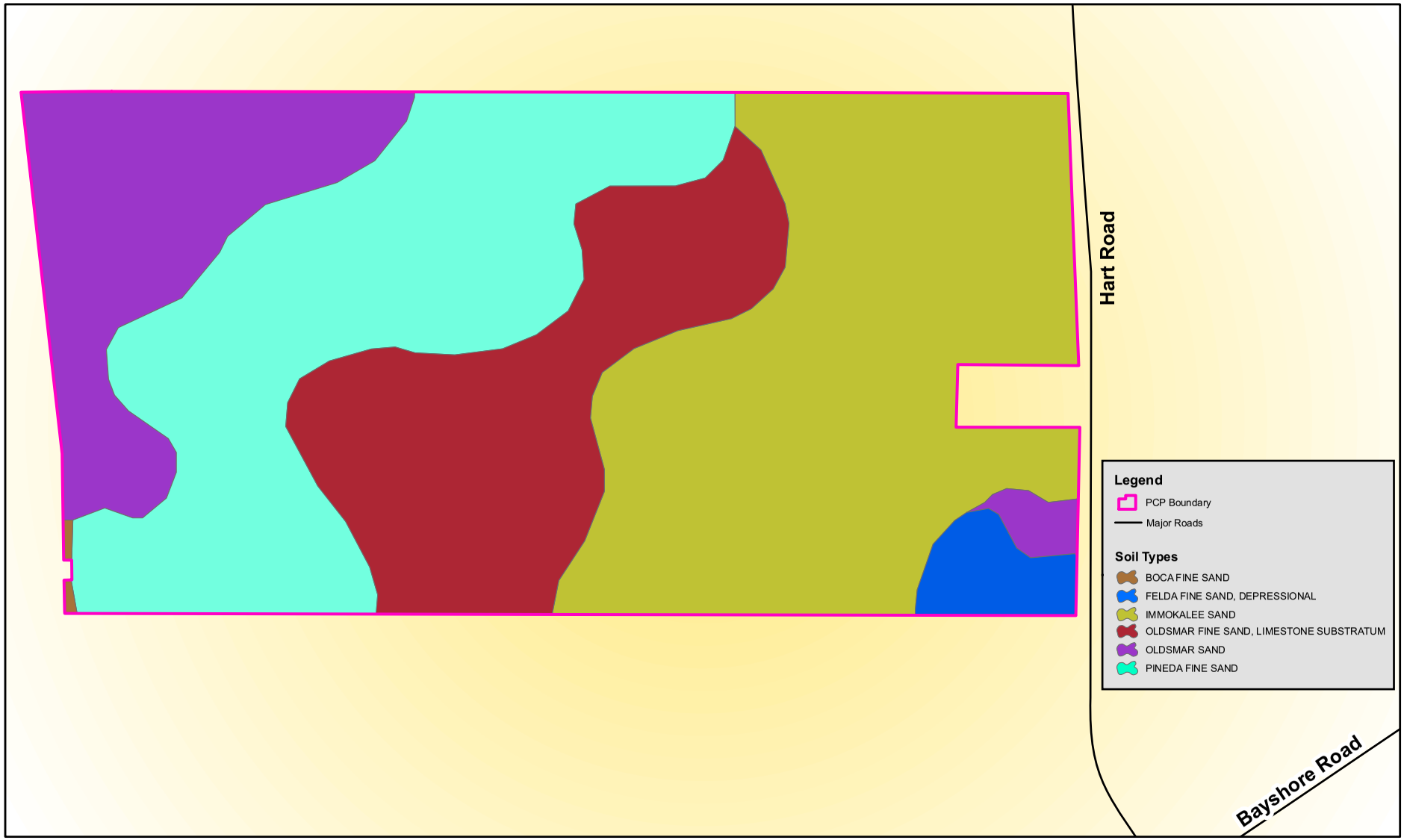


Table 2: Soil Type

				Physical Attributes							*Biological Attributes*				
Soil Types	Total Acres	% of Preserve	Habitats (Range Site)	Wetland Class (1)	Hydrologic Group (2)	Surface Permeability	Subsurface Permeability	Water Table within 10" of surface	Water Table below 10-40" of surface	% Organic Matter	Potential as habitat for wildlife in-- Openland	Woodland	Wetland	Rangeland	Limitations for Recreational Paths & Trails
Boca Fine Sand	0.1	0.13	south Florida flatwoods		B/D	rapid	rapid	2-4 months	6 months	1-3%	fair	poor	fair	good	Severe: wetness, too sandy
Felda Fine Sand, Depressional	1.78	2.31	fresh water marshes/ponds	P	B/D	rapid	rapid	3-6+ months (ponded)	4-6 months	1-4%	very poor	very poor	good	--	Severe: wetness, too sandy
Immokalee Sand	27.2	35.32	south Florida flatwoods		B/D	rapid	rapid	1-3 months	2-6 months	1-2%	poor	poor	poor	--	Severe: wetness, too sandy
Oldsmar Sand	11.51	14.95	south Florida flatwoods		B/D	rapid	rapid	1-3 months	> 6 months	1-2%	fair	fair	poor	--	Severe: wetness, too sandy
Pineda Fine Sand	21.6	28.05	sloughs	S	B/D	rapid	rapid	2-4 months	> 6 months	.5-6%	fair	poor	fair	--	Severe: wetness, too sandy
Oldsmar Fine Sand, Limestone Substratum	14.81	19.23	cabbage palm flatwoods		B/D	rapid	rapid	2-4 months	> 6 months	1-2%	fair	fair	poor	fair	Severe: wetness, too sandy

Color Key:

Wet

Wetter

Wettest

(1) S - Slough (sheet flow): A broad nearly level, poorly defined drainage way that is subject to sheet-flow during the rainy season.
P - Ponding: Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

(2) B - Soils having a moderate infiltration rate (low to moderate runoff potential) when thoroughly wet.
D - Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet.

v. Hydrologic Components and Watershed

Powell Creek Preserve is within the north-central portion of the South Florida Water Management District's (SFWMD) Lower West Coast Region (LWCR). PCP falls within a subset of the combined LWCR and Lower East Coast Region, within the 1,400 square-mile Caloosahatchee Basin (SFWMDa 2000). The Preserve lies within the Powell Creek Watershed (PCW), its namesake, which covers a surface area of approximately 13 square-miles. Figure 5 illustrates the location of PCW as well as adjacent watersheds. Essentially, PCW is nine miles long and is relatively narrow, varying from one to two miles across. PCW originates in Charlotte County and eventually empties freshwater into the Caloosahatchee River. The majority of land surrounding the Preserve has been developed as residential mobile home communities, scattered single-family homes, and a limited number of commercial developments.

Several hydrological alterations affect the hydroperiod and sheet flow across the Preserve. In general, sheet flow moves in a southerly direction. A survey performed on the property in 1988 identified 71.06 acres of uplands and 6.2 acres of wetlands. The natural wetlands in the southeastern corner and Powell Creek and its floodplain are all disturbed. The bordering mobile home communities to the north and south were built in the 1970s, during which a portion of the natural wetland was filled. Most hydrological impacts are outside the Preserve boundaries and include an adjacent roadway, an extensive drainage channel, smaller ditches and their associated berms. The interior impacts are minimal: two small trenches remain on either side of a trail bed that leads to the creek. Figure 6 illustrates the above hydrologic impacts and includes data layers from the National Wetland Inventory, Lee County Division of Natural Resources (DNR) drainage systems and Powell Creek.

By 1944, the old Seaboard Air Line (SAL) railroad bed existed along with the usual ditches adjacent to most railroad grades. Directly west of the Preserve and channel, the old railroad grade was transformed into North Evalena Lane and a maintenance road for access to the channel. The ditch on the eastern side of this railroad grade was upgraded to a channel for drainage to alleviate flooding problems for North Fort Myers and Bayshore areas. This channel (Powell Canal) runs along the Preserve's western boundary and Powell Creek empties into the Valencia Weir near the southwest corner of the Preserve. "The Valencia Weir was installed in 1987 and provides an effective barrier to maintain higher groundwater elevations in the upstream portion of the watershed during the dry season. At the Valencia weir, the main conveyance is an excavated channel about seventy feet wide that has its alignment inside the old SAL Railroad right-of-way" (JEI et al. 1991).

A primary consideration for acquiring PCP was its' possible importance for flood management due to the close proximity to these adjacent water control

structures. It was thought that this area might provide additional drainage or water storage for Suncoast Estates, Forest Park and other upstream developments. The Lee County Natural Resources Division is in the process of hiring a consultant for the North Fort Myers Surface Water Master Plan. This plan will cover areas north of the Caloosahatchee River, between U.S. 41 and S.R. 31. Land Stewardship staff will coordinate with Natural Resources staff during the planning stages.

Figure 5: Watershed Map

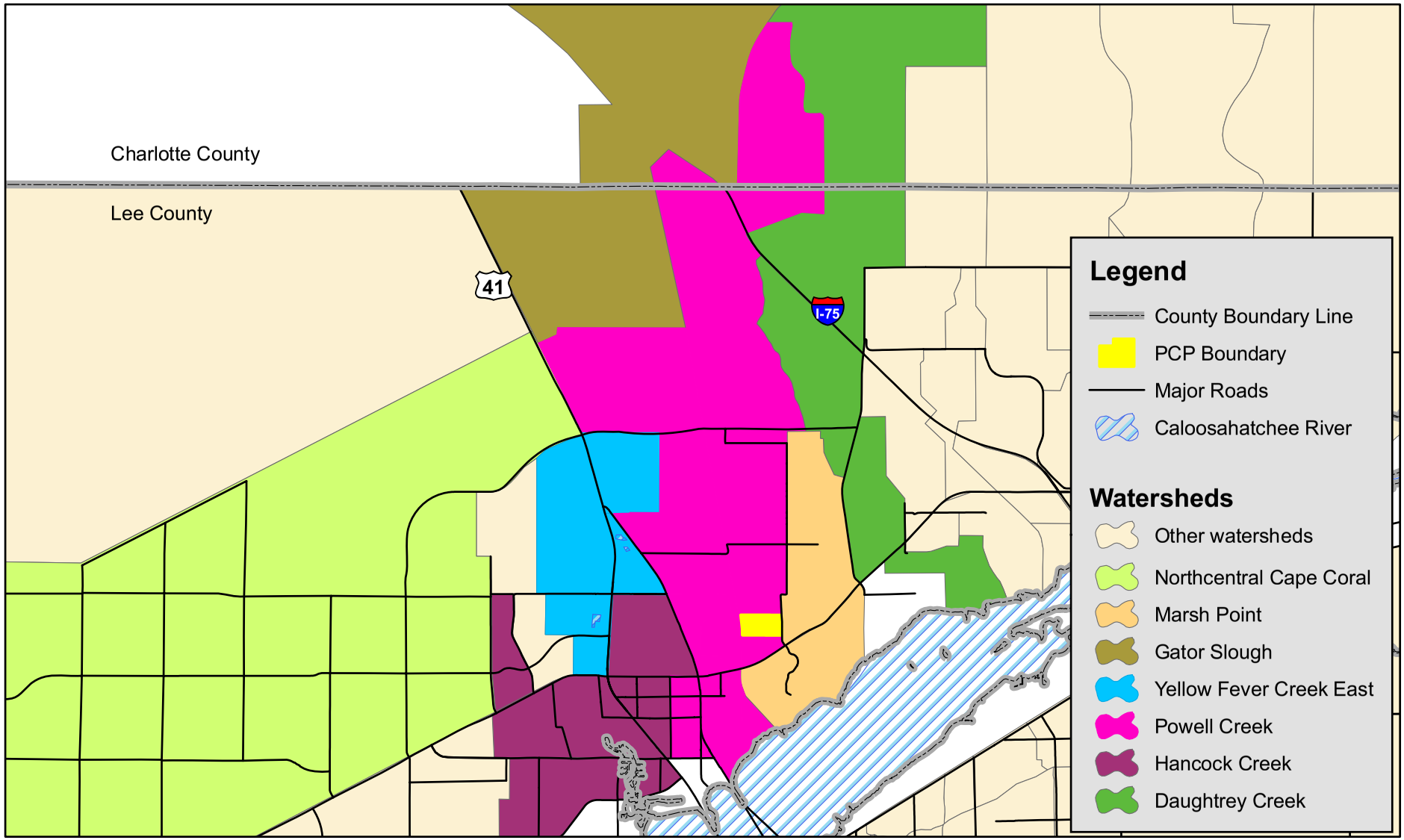
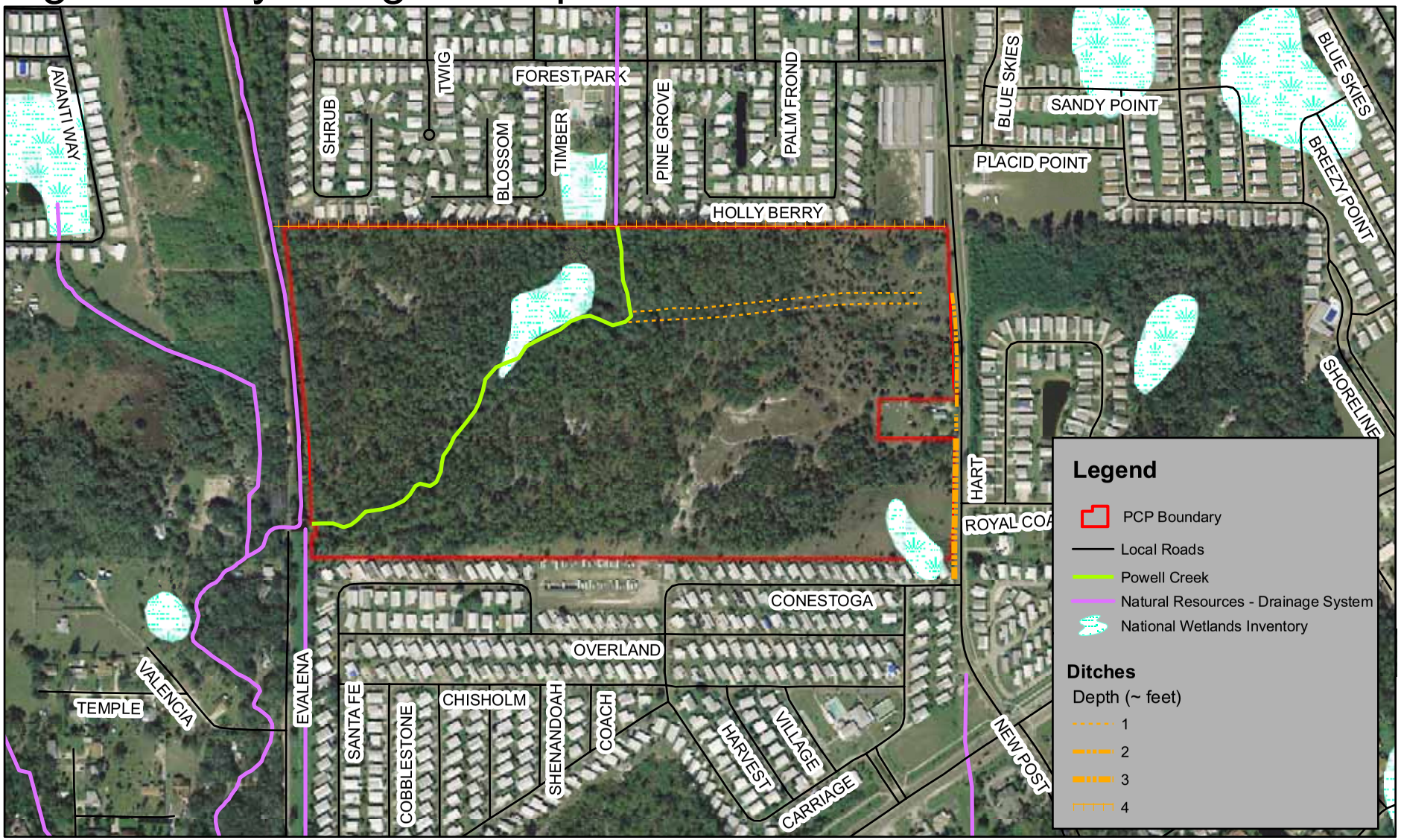


Figure 6: Hydrologic Components of Powell Creek Preserve



B. Biological Resources

i. Ecosystem Function

Powell Creek Preserve protects a remnant portion of Powell Creek's natural waterway. To the north, the creek is now a series of canals and no longer functions as a natural system. The portion of the creek on site slows water flowing from canals in developments to the north and allows sediment to settle (and trash to be collected) before reaching the lower branches of the creek and further downstream, the Caloosahatchee River.

The Preserve is home to variety of bird species including warblers (*Parulidae*), robins (*Turdus migratorius*), and pileated woodpeckers (*Dryocopus pileatus*). The northwest corner of the Preserve is drier and resembles a scrub area with dwarf live oak (*Quercus minima*), netted paw-paw (*Asimina reticulata*) and October flower (*Polygonella polygama var. brachystachya*). This portion of the Preserve is home to many gopher tortoises (*Gopherus polyphemus*). The majority of the remaining lands contain a mix of south Florida slash pine (*Pinus elliottii* var *densa*) and live oak (*Quercus virginiana*). A large number of exotic plant species are present on the Preserve and are beginning to negatively affect the native species. The majority of these exotic species are concentrated on the boundaries where they have escaped from neighbors' yards.

ii. Natural Plant Communities

Powell Creek Preserve consists of a wide variety of plant communities ranging from scrubby flatwoods to sloughs. Figure 7 shows the plant communities found at PCP. They are defined using the Guide to the Natural Communities of Florida (1990) prepared by the Florida Natural Areas Inventory (FNAI) and the Florida Department of Natural Resources (FDNR). The following are descriptions of the dominant plants and characteristic animals found within each FNAI community (with exception to the disturbed land, designated by Florida Land Use and Cover Forms Classification System (FLUCCS)). A list of plant species identified thus far during site inspections can be found in Appendix B. This list will be updated on a seasonal basis to identify plants in their inflorescence phase.

Mesic Flatwoods Community – 41.5 acres, 54% coverage of PCP

Mesic flatwoods communities are found across the Preserve. Synonyms for this plant community include pine flatwoods and pine savannahs. Mesic flatwoods occur on relatively flat, moderately to poorly drained soils. Standing water is common for brief periods during the rainy season. Mesic flatwoods are characterized as having an open canopy with widely spaced pine trees and a dense ground cover of herbs and shrubs. Typical plants growing in these

communities at PCP include south Florida slash pine, saw palmetto, wax myrtle (*Myrica cerifera*), grape vine (*Vitis spp*.) and netted pawpaw.

Exotics present include air potato (*Dioscorea bulbifera*), Schefflera (*Schefflera actinophylla*) and queen palms (*Syagrus romanzoffiana*).

A few animals that have been documented utilizing mesic flatwoods at the Preserve include pileated woodpeckers, red-bellied woodpeckers (*Melanerpes carolinus*), warblers and an eastern cottontail rabbit (*Sylvilagus floridanus*).

Historically, natural fire probably burned in these communities every 1-8 years. Without frequent fires mesic flatwoods will succeed into hardwood dominated forests whose closed canopy will gradually eliminate the groundcover of herbs and shrubs. On the other hand, too frequent or too hot fires would eliminate pine recruitment and eventually transform the mesic flatwoods into palmetto prairie.

Disturbed Land – Unimproved Pastures (FLUCCS #212) – 15.9 acres, 21% coverage of PCP

This category includes cleared land with major stands of trees and brush where native grasses have been allowed to grow. These areas at PCP include live oak, grape vine and a variety of exotic species including silk oak (*Grevillea robusta*), Caesar's weed (*Urena lobata*) and wedelia (*Sphagneticola trilobata*).

Slough Community – 8.3 acres, 11% coverage of PCP

Sloughs are characterized as broad shallow channels, inundated with flowing water except during extreme droughts. Typical plants here include pond apple (*Annona glabra*), buttonbush, Carolina willow and pop ash. They are often aligned with the lowest part of linear depression in the underlying limestone bedrock. The soils are peat, unless they have been destroyed by catastrophic fires that may occur during droughts. Sloughs are extremely vulnerable to hydrologic disturbance and must have a reliable, quality water source to persist.

Exotics include Brazilian pepper (*Schinus terebinthifolius*), two-leaf nightshade (*Solanum diphyllum*) and Britton's wild petunia (*Ruellia tweediana*).

Scrubby Flatwoods Community – 6.3 acres, 8% coverage of PCP

The scrubby flatwoods at PCP are found in a small area in the northwest corner of the Preserve. Synonyms for this community include xeric flatwoods or dry flatwoods. Scrubby flatwoods are characterized by an open canopy of widely scattered pine trees with a sparse, shrubby understory and numerous areas of barren white sand. Plants found here are south Florida slash pine, dwarf live oak and October flower. The white sandy soil found here is typically several feet deep and drains rapidly. These areas usually do not flood even under extremely

wet conditions. Naturally occurring fire returns every 8 to 25 years. This longer return interval is due to the lack of ground vegetation and abundance of non-combustible scrub-oak leaf litter that is present.

Exotics present include Brazilian pepper and rosary pea (*Abrus precatorius*).

Animals seen in this community include gopher tortoises, cardinals (*Cardinalis cardinalis*) and blue jays (*Cyanocitta cristata*).

Hydric Hammock Community – 3.2 acres, 4% coverage of PCP

There are two areas along the creek that are characteristic of hydric hammock communities. They are well-developed hardwood and cabbage palm forest with a variable understory dominated by palmettos and ferns. Plants found in this community at PCP include live oak, laurel oak (*Quercus laurifolia*) cabbage palm, saw palmetto, swamp fern (*Blechnum serrulatum*) and golden polypody (*Phlebodium aureum*).

Exotics present include Brazilian pepper, air potato and Surinam cherry (*Eugenia uniflora)*.

Hydric hammocks are generally saturated, although only inundated for short periods following heavy rains. The normal hydroperiod is seldom over 60 days per year. Because of their generally saturated soils and the sparse herbaceous cover, hydric hammocks rarely burn.

Normal hydrological regime must be maintained in hydric hammocks. If the water table is lowered, hydric hammocks will gradually change to more mesic communities. If the hammock is flooded, many trees will die and eventually be replaced by more hydrophytic species.

Depression Marsh Community –1.8 acres, 2% coverage of PCP

Synonyms for this community include isolated wetland, ephemeral pond and seasonal marsh. This community typically consists of open, treeless areas with vegetation that is often growing in concentric bands. Typical plants here include primrose willow (*Ludwigia octovalvis*) and cattails (*Typha latifolia*). A wide variety of grasses, sedges and other herbaceous plants occur within this community.

Exotic plant species such as rattlebox (*Sesbania punicea)* and Brazilian pepper are present here.

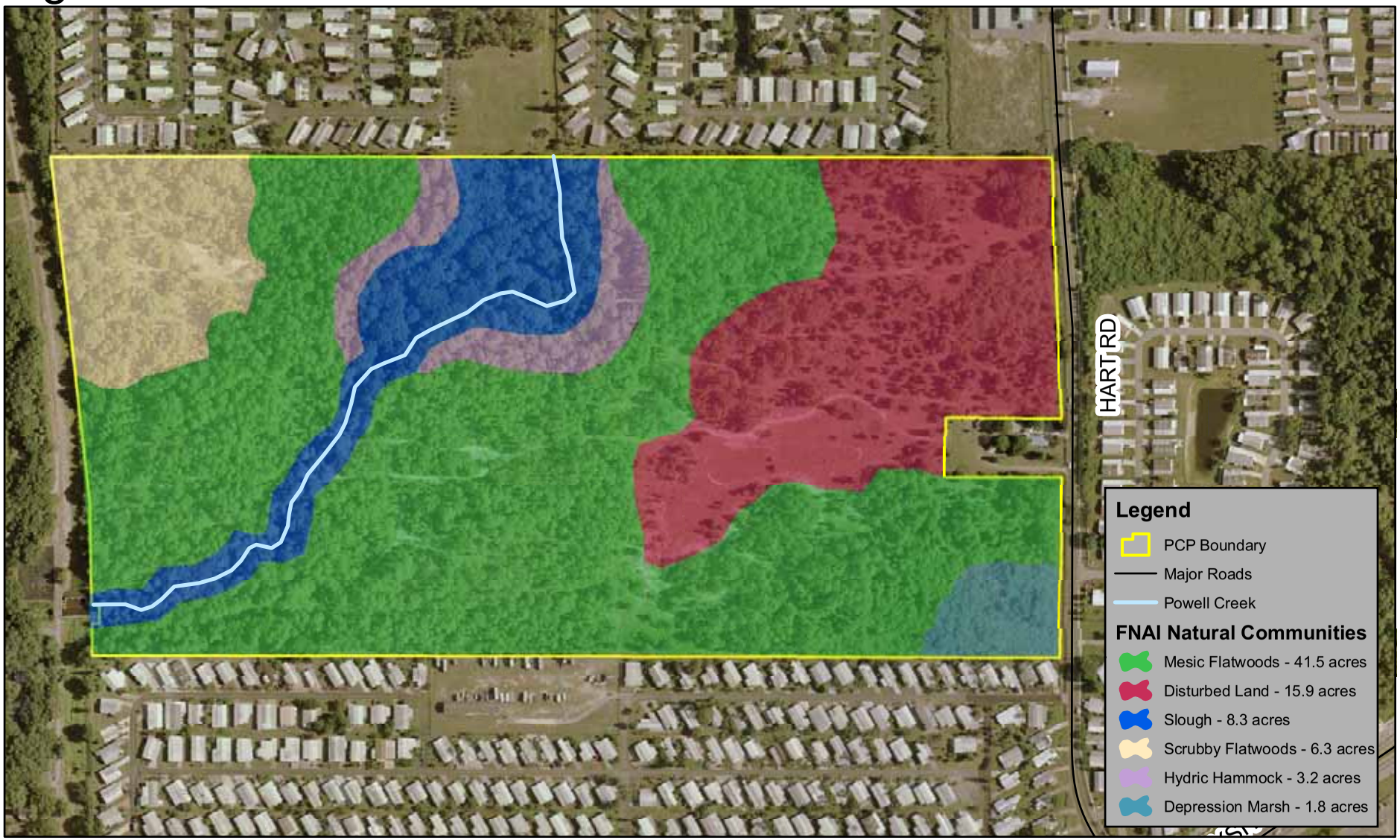
Animals documented utilizing this community include the green heron (*Butorides virescens*) and great blue heron (*Ardea herodias*). A couple of empty non-

indigenous channel apple snail (*Pomaceae canaliculata*) shells were noted in this community, although staff did not locate any live snails or their eggs.

Depression marshes are extremely important in providing breeding and foraging habitat for a variety of wildlife. They provide excellent breeding and foraging habitat for amphibians. Because of their temporary nature, few large predatory fish occur in these wetlands, which would feed heavily on the tadpoles. Since this community typically dries down in most years, the aquatic animals become quite concentrated and are an excellent food source for birds and other wildlife.

Fire is important to maintaining this community by restricting the invasion of shrubs and trees, which would eventually reduce the hydroperiod through evapotranspiration and increased biomass as well as shading out the wetland. The ideal burn regime for this plant community would be to burn the surrounding uplands every 1-3 years, allowing fire to actually burn through the wetland every third burn. These wetland burns should occur in late spring to early summer, just before the rainy season to maximize the effectiveness (Printiss 2003).

Figure 7: Natural Plant Communities



iii. Fauna

Due to the small size and isolation of the Preserve, the number of fauna present on site is lower than on other preserves. See Appendix C for a list of wildlife documented at the Preserve. Wildlife species were recorded during numerous site inspections. Future sightings through site inspections, elementary school activities, and possible Lee County Bird Patrol volunteers will continue to be recorded. There are also several exotic wildlife species that have been documented at the Preserve (Table 3). Of primary concern is the feral hog (*Sus scrofa*). Signs of damage from the hogs including soil disturbance and vegetation damage are apparent in the understory of the hydric hammock.

Table 3: Exotic Wildlife at Powell Creek Preserve

Scientific Name	**Common Name**
Osteopilus septentrionalis	Cuban treefrog
Anolis sagrei	brown anole
Sus scrofa	feral hog
Pomaceae canaliculata	channel apple snail

Wildlife management at the Preserve will focus on providing optimal habitat for native species. Restoration of the disturbed areas, control of invasive exotic plants and application of prescribed fire will be critical restoration components to provide habitat for wildlife. Powell Creek Preserve is part of a countywide quarterly site inspection program for all Conservation 20/20 Preserves. A copy of the site inspection form is available in the Land Stewardship Operations Manual (LSOM). These inspections allow staff to monitor for any impacts and/or changes to each preserve and include lists of all animal sightings and new plant species that are found. If, during these inspections, staff finds FNAI listed species, they will be reported using the appropriate forms.

iv. Designated Species

Although all native plant and animal species found at the Preserve have some protection due to the preservation of this property, certain species need additional attention. For stewardship purposes, all plants and animals listed by the United States Fish and Wildlife Service (USFWS), Florida Fish and Wildlife Conservation Commission (FWC), Florida Department of Agriculture and Consumer Services (FDACS), the Institute of Regional Conservation (IRC) and Florida Natural Areas Inventory (FNAI) will be given special consideration. Typically, designated species will benefit from proper management of the biological communities in which they occur. However, some species may require additional measures to ensure their protection. Management practices likely to benefit wildlife at the Preserve including exotic plant control, prescribed burning, trash removal, wildlife monitoring and feral animal control, restricting trails in

certain areas and enforcement of no littering, no weapons and no motorized vehicles regulations will all help with the protection of listed species.

To date, the only listed wildlife species found at Powell Creek Preserve is the gopher tortoise. It is listed as a species of special concern (SSC) by the FWC. Gopher tortoises are in decline throughout their range due to loss and degradation of habitat. This species is dependant on dry, upland communities, which are often converted into urban and residential development, agriculture, citrus groves, mining and pine plantations. Additional threats include a highly contagious respiratory disease and human consumption (Hipes et al. 2000). Management activities at the Preserve that will benefit this species include exotic plant control and prescribed fire. Land Stewardship staff will continue to record location of individual burrows for staff knowledge and protection during restoration activities. A list of plant species of concern at Powell Creek Preserve can be found in Table 4.

Table 4: Listed Plant Species Found at PCP and Their Designated Status

Scientific Name	Common Name	USFWS	FDA	FNAI	IRC
Tillandsia fasciculata var. densispica	stiff-leaved wild-pine, cardinal airplant		E		
Tillandsia utriculata	giant airplant		E		
Carex lupuliformis	false hop sedge				I
Cyperus retrorsus	pinebarren flatsedge				R
Andropogon virginicus var. glaucus	chalky bluestem				R
Aristida spiciformis	bottlebrush threeawn				R
Viburnum obovatum	Walter's viburnum				I
Balduina angustifolia	coastalplain honeycombhead				R
Elephantopus elatus	elephantsfoot				R
Asclepias tuberosa	butterfly weed				R
Polygonella polygama var. brachystachya	October flower				I
Habenaria quinqueseta	longhorn false reinorchid				R
Quercus minima	dwarf live oak				R

KEY

USFWS-U.S. Fish & Wildlife Service	**FNAI**-Florida Natural Areas Inventory
FWC-Florida Fish & Wildlife Conservation Commission	
FDA - Florida Department of Agriculture & Consumer Services	**G**-Global rarity of the species
	S-State rarity of the species
CE - Commercially Exploited	**T**-Subspecies of special population
E-Endangered	
T-Threatened	**1**-Critically imperiled
	2-Imperiled
IRC - Institute for Regional Conservation	**3**-Rare, restricted or otherwise vulnerable to extinction
CI - Critically Imperiled	**4**-Apparently secure
I - Imperiled	**5**-Demonstrateably secure
R - Rare	

The following is a brief summary of the designated plant species explaining why they are in decline.

Plant Species

Cardinal and Giant Airplants

Cardinal airplants (*Tillandsia fasciculata var. densispica*) and giant airplants (*Tillandsia utriculata*) are found in hammocks, cypress swamps and pinelands. Scattered plants have been documented in several portions of PCP. Threats to these plants include illegal collecting, habitat destruction and the exotic Mexican bromeliad weevil (*Metamasius callizona)* (Save 2004). Now listed as endangered, these bromeliads were once considered common before the arrival of the weevil in Florida. Currently, scientists are researching biological control agents for the weevil. Staff will follow the research developments and work with scientists in the future if it is determined that these insects are affecting epiphytes and the U.S. Department of Agriculture (USDA) is in need of release sites.

The majority of the designated plant species at PCP have been listed by the Institute for Regional Conservation (IRC), which is not a regulatory agency. However, the scientists working for this Institute have conducted a tremendous amount of fieldwork and research documenting plants occurring in conservation areas in the 10 southernmost counties of Florida. This initial floristic inventory allowed the IRC to rank plant species to indicate how rare/common these plants are in protected areas. At PCP, several Rare and Imperiled plants occur. Rare plants are defined as being either very rare and local throughout its range in south Florida (21-100 occurrences, or less than 10,000 individuals), or found locally in a restricted range. IRC only ranks as rare those taxa with fewer than 100,000 individuals. Imperiled plants are those that are imperiled in south Florida because of rarity (6-20 occurrences, or less than 3,000 individuals) or because of vulnerability to extinction due to some natural or human factor. IRC only ranks as imperiled those taxa with fewer than 10,000 individuals.

In their book, Rare Plants of South Florida: Their History, Conservation and Restoration, Gann et al. (2002) provide an entire chapter of recommendations to help restore south Florida's rare plant diversity. Several of these recommendations, particularly those that protect plants on the Preserve and relate to stewardship practices, will be followed. More information on the specific techniques utilized on the Preserve will be discussed in the Management Action Plan. The following list highlights those recommendations by IRC that will be incorporated into the management of PCP:

- Plan recreational activities such as off-road vehicle use and equestrian activities so as to avoid impacts to rare plant populations.
- Insure that park improvements and management activities do not needlessly threaten or destroy rare plant populations.
- Prevent illegal poaching of rare plants.

- Prosecute poachers to the fullest extent of the law.
- Implement an ongoing exotic pest plant control program.
- Educate exotic plant control crews about the rare plants to ensure they avoid non-target damage.
- Remove wild hogs that can completely destroy the above ground vegetation and disturb all the soil in an area where they are feeding.
- Reintroduce fire to the site since many plant communities in South Florida are fire adapted and the use of natural and prescribed fire as a management tool is extremely critical for the protection of many rare plants. Divide the site so the entire area is not burned during the same year to help protect these communities.

v. Biological Diversity

Powell Creek Preserve's diversity is apparent in the range of plant communities found at the Preserve. These communities range from dry scrubby areas that are rarely flooded, to the slough areas that nearly always contain water. Along the banks of the creek you can also find a number of large oaks and slash pines. There are multiple live oak trees that span across the creek, including one that was removed from the creek channel in 2001 because it was blocking the flow of water and collecting debris. Pictures of this tree are in Appendix D. Protecting the native plants across the Preserve and the creek will protect the overall biodiversity of the Preserve.

The integrity and diversity of PCP must be protected when and where possible. Land Stewardship staff will perform the following actions in this regard:

- Control of invasive exotic vegetation followed by annual maintenance to provide more suitable habitat for native aquatic and terrestrial species.
- Secure the boundaries with fencing and signs to eliminate illegal access to the Preserve and protect fragile ecosystems.
- Remove any debris and prevent future dumping on site.
- Restore hydrologic flows and remove trash in the historic creek bed.
- Implement a prescribed fire program to closely mimic the natural fire regimes for different plant communities to increase plant diversity and insure the canopies remain open.
- Control feral hog populations to reduce their impacts on the herbaceous plants and soils.

C. Cultural Resources

i. Archaeological Features

In 1987, Piper Archaeological Research, Inc. conducted an archaeological site inventory of Lee County. They were able to identify 53 additional sites increasing the total number of known archaeological sites in Lee County to 204. They also created a site predictive model and archaeological sensitivity map for the county that highlighted potential areas likely to contain additional archaeological sites. There are no known archaeological sites or potential areas predicted by the model at Powell Creek Preserve.

ii. Land Use History

Although not all elements of the land use history discussed below occurred on PCP, modifications made on adjacent properties directly influence the Preserve. From the late nineteenth century until the 1930's, intense logging of slash pine virtually eliminated all virgin stands of the southern mixed forest in south Florida. These activities likely reduced slash pine densities throughout the Preserve and explain the lack of old growth pine trees found on the site, although several large pines have been located near the creek.

According to interpretations based on aerial photography dating back to 1944 (Figure 8), land uses included agricultural activities, a building in the northeast corner, and the abandoned SAL railroad bed and its associated ditch to the west. Besides the original flow way of Powell Creek, this photograph also illustrated Hart Road as a straight dirt trail that ended at the northeast corner of the property. The 1953 aerial photograph includes additional structures, including a portion of Hart's Dairy Farm in the southeast portion of the Preserve (Carter & Smith 2005), a trail from Hart Road running west to the creek and a home and sheds on the 1-acre residential out-parcel (Figure 9). Although not discernable on the photograph, there are remnants of a concrete block structure at the end of this trail adjacent to the creek. The 1958 photograph shows the original size of the southeastern wetland and the sandy upland area on western section of the site (Figure 10).

The stumps from the logged slash pines were removed from many properties in the region during the 1960's and 1970's. This activity, referred to as "stumping", was conducted to extract turpentine from the wood. Stumping created depressions in the soil, which created a microhabitat where soil moisture is higher for longer periods than adjacent habitats, allowing different plant species to occur.

Additional activities were derived from either historical aerial photographs taken between 1966 and 2002, speaking with local residents (Carter, Schmitt & Smith 2005) or the Phase I Environmental Site Assessment report (WRS 2003). By

1966, the drainage ditch from the north (north and center of the Preserve) was dredged leading to the Powell Creek waterway, while the buildings associated with the farm were removed from the southeast portion the Preserve.

In 1970, the construction of Carriage Village subdivision began to the south, and a portion of the Preserve's southeast wetland was filled. By 1974, the building in the northeast corner was removed, while north of the Preserve, the Forest Park subdivision was partially completed. During the 1970's until the early 1980's, cattle grazed on the property (Smith 2005).

In 1987, the Valencia Weir was installed in the bypass canal at the southwest corner of the Preserve at the confluence of the canal and Powell Creek. During the mid to late 1980's, five wells were installed in preparation for the Royal Palm Estates development, a 325 unit mobile home planned development (WRS 2003). In 1990, the Royal Coach Village subdivision was under construction on the east side of Hart Road and by 1999, the Hart Road Storage facility was built to the northeast of the Preserve.

Before C20/20 acquired the property, additional uses observed during onsite property evaluations included camping (still smoldering campfire), various childhood activities (tree house), dumping, off-road vehicle (ORV) tracks and hunting (tree stand and old hog pens).

Figure 8: 1944 Historical Aerial Photograph

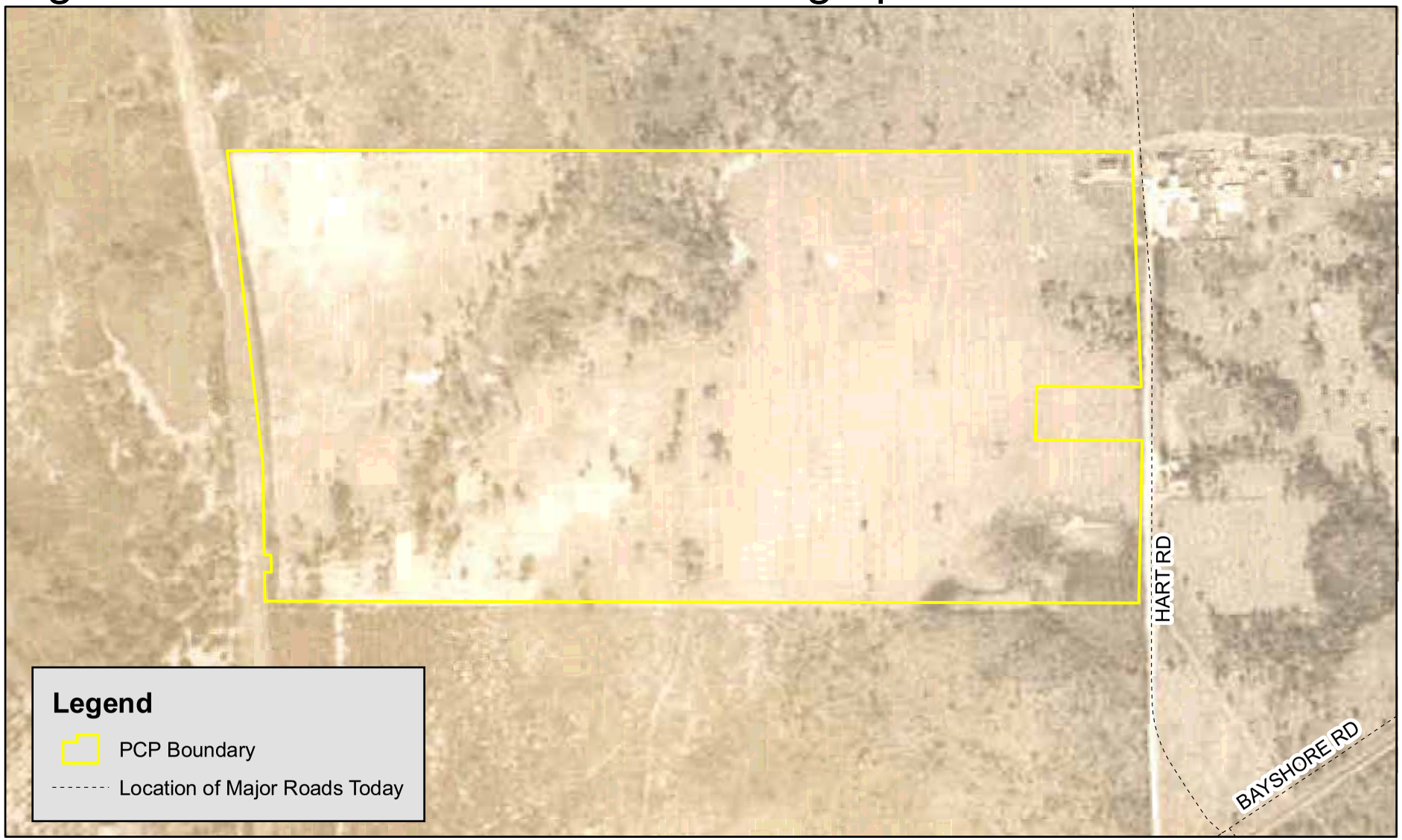
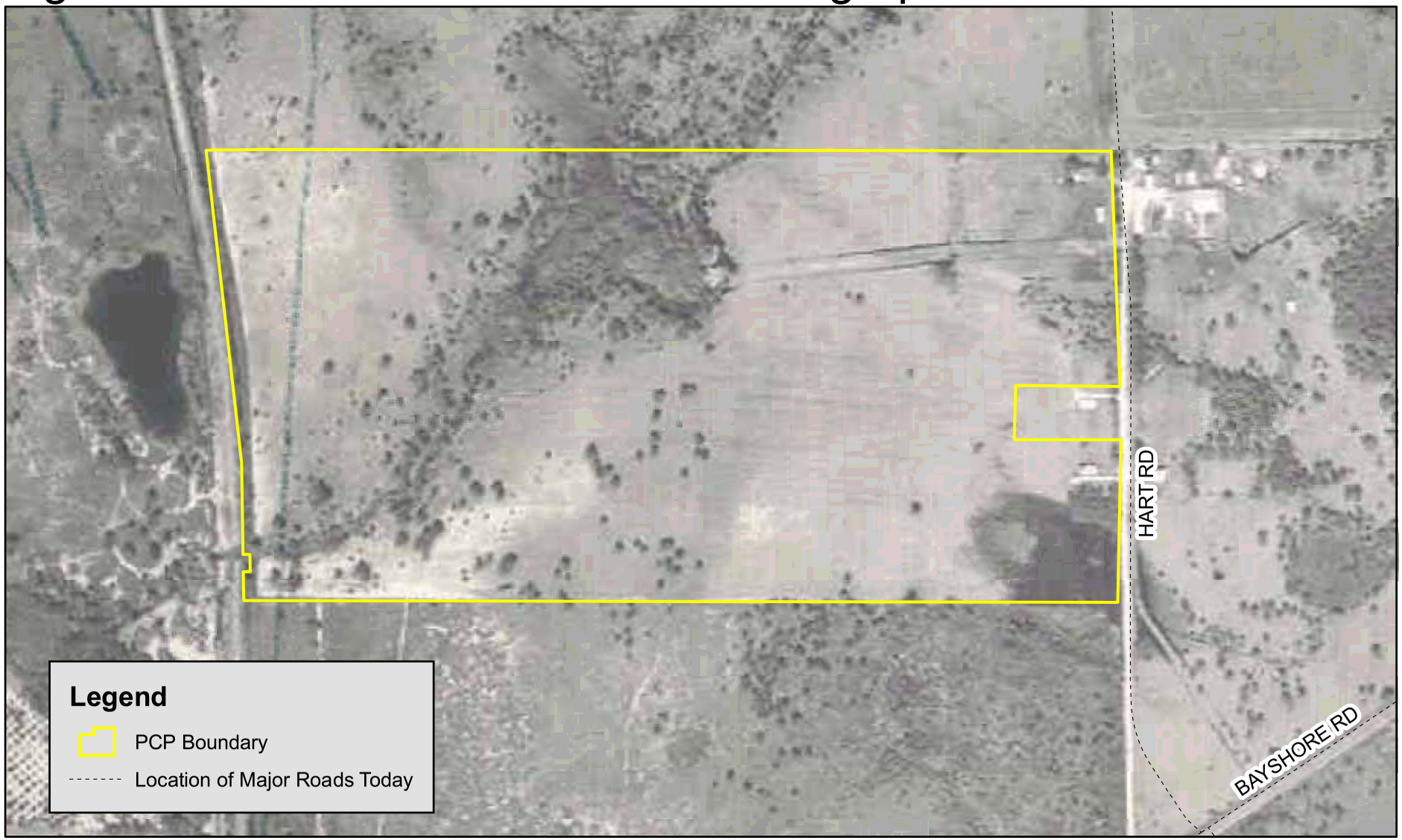


Figure 9: 1953 Historical Aerial Photograph

Figure 10: 1958 Historical Aerial Photograph



iii. Public Interest

Powell Creek Preserve was purchased for its potential to provide water quality enhancements and flood protection in North Fort Myers. At the time of purchase, the site was approved for a 325 unit Mobile Home Planned Development. Purchasing the property was important in providing drainage and flood protection for developments to the north. SFWMD and Lee County Division of Natural Resources expect to be able to fund water management improvement projects on this site in the future. The Preserve is an important part of improving water quality flowing into Powell Creek and eventually into the Caloosahatchee River. Powell Creek Preserve is also home to a healthy gopher tortoise population. Land Stewardship staff has observed up to 15 active burrows on site.

Since urban areas surround the Preserve and it is small in size, it would best serve as a neighborhood preserve. The Preserve will be open for hiking, bird watching and photography. Trails will be maintained where existing trails are located in the Preserve. This may lead to increased use and trash, but Land Stewardship staff will work with neighboring residents in assisting a volunteer group for the Preserve.

V. FACTORS INFLUENCING MANAGEMENT

A. Natural Trends and Disturbances

Natural trends and disturbances influencing native communities and stewardship at PCP include the pattern of wet and dry periods, flooding, occasional freezes, hurricanes and wildfire. Implementation of the Management Action Plan will take into consideration the possibility of these factors and their influence on projects at PCP. For example, a tropical storm or hurricane could damage large amounts of vegetation. It may be necessary to remove or mulch downed vegetation following a hurricane if it increases the chance of negative impacts to wildlife habitat from a wildfire.

Wildfires caused by lightning strikes are a natural occurrence in Florida. The Florida Division of Forestry (DOF) – Caloosahatchee District - and Lee County Department of Parks and Recreation are developing a wildland firefighting protocol for County preserves. The DOF has been provided a map of the Preserve showing the locations of gates, firebreaks and management units. The DOF will utilize existing firebreaks to contain wildfires at PCP whenever possible. No new firebreaks, such as plow lines, will be created unless there is potential for the wildfire to harm property outside the PCP boundary. This agreement between DOF and the County will protect PCP from the potential damage associated with emergency firefighting equipment. Land Stewardship staff will lead periodic site visits in order to familiarize DOF staff with PCP and current

management efforts. A comprehensive C20/20 fire plan, to be completed in 2005, will help decrease the impact of catastrophic wildfires on the Preserve and neighboring lands.

Management (exotic plant control, prescribed burning, etc.) of PCP is influenced by seasonal hydroperiods. The Land Stewardship Operations Manual's (LSOM) exotic plant prescription form will be used to define the conditions for control activities. The use of heavy equipment will be limited to the dry season for the majority of the site. The timing of prescribed burns will also be influenced by seasonal rain, weather and wind patterns.

B. Internal Influences

In November 2003, neighbors in Carriage Village subdivision to the south of the Preserve called with concerns of the lack of a firebreak between the properties and their risk of wildfire. Because of this concern, the Preserve was listed as high priority for installing firebreaks. In September 2004, firebreaks were installed on the eastern and southern boundaries of the Preserve and along the northern boundary from the eastern corner to the creek. The line was created using a Brontosaurus mulching machine and is approximately 15 feet wide. Mowing twice a year and disking as needed for prescribed fire and wildfire protection will maintain firebreaks. At the same time the firebreaks were installed, approximately 3.5 acres on the southeast corner were cleared of Brazilian pepper. In August 2005, exotic species in these firebreaks and cleared areas were sprayed with herbicide. Any exotic plant species on the EPPC list was targeted for control. Follow-up treatments will occur at 1.5, 3 and 6 months after initial treatment.

C. External Influences

In November 2004, neighbors to the south in the Carriage Village subdivision requested that the county clear a portion of the wetland at the southeast corner of the property that was eroding their property and pulling down the fence. After a site visit, Land Stewardship staff determined that the neighbor's fence was approximately eight feet onto county property and the neighboring property was not in jeopardy. In order to prevent further erosion the fence will be moved to the actual property line in the fall of 2005. Fill will be brought in and a slope of 8:1 will be created and wetland plants planted. Appendix E outlines the proposed wetland erosion and maintenance work to be done.

D. Legal Obligations and Constraints

i. Permitting

Land stewardship activities at Powell Creek Preserve may involve obtaining permits from regulatory agencies. The proposed hydrologic improvements to the

site require an environmental resource permit from the Florida Department of Environmental Protection (FDEP). Once invasive exotic plants have been removed and controlled in the upland portions of the Preserve and fuel loads have been reduced, prescribed fire may be used as a management tool, requiring burn authorization from the Florida Division of Forestry.

ii. Other Legal Constraints

In 1990, a conservation easement was granted to the Florida Department of Environmental Regulation (renamed FDEP) on approximately 10 acres of the property. This easement was granted to maintain the land in its natural vegetative and hydrologic conditions. The easement covers the creek bed throughout the entire property and the floodplain on the northern part of the creek. Any management activities on these areas of the Preserve must be permitted by terms of the easement. A copy of the conservation easement is located in Appendix F.

There is a 15 foot wide drainage easement along the western border starting at the southwest corner running to 35 feet north of the outfall of the creek. There is also a 10 foot wide utility easement that lies to the west of the right of way of Hart Road that crosses the property boundary on the east side.

The 1991/1992 Lee County Surface Water Management Master Plan recommended cleaning tributaries of the Caloosahatchee River for optimum performance of outfalls and flood prevention. Starting in 2002, Lee County Division of Natural Resources received funding from SFWMD for Caloosahatchee River Tributaries Maintenance. SFWMD provided $50,000 for the fiscal year October 2002 – September 2003. Starting September 2003, $200,000 per year was issued for maintenance and will continue through the fiscal year starting October 2006. With this funding, exotic plants and other debris were removed from the portions of Powell Creek on the Preserve in 2001.

Records show that between May 1987 and November 1988, five wells were installed on the Preserve. It is believed that these wells were installed for on site irrigation for the proposed mobile home development on the property. During field work for this stewardship plan, Land Stewardship staff only located 3 wells. In January 2005, the well use permit came up for renewal through SFWMD. At this time, it was determined that the wells would not need to be used as a water source on the Preserve, and the permit was not renewed.

iii. Relationship to Other Plans

In October 2005, Lee County Division of Natural Resources hired a consultant to develop the North Fort Myers Surface Water Master Plan, which covers the area between Highway 41 and State Road 31 in the North Fort Myers area. These plans will provide suggestions for water storage and drainage within these

watersheds. Land Stewardship staff will have input into any projects that will affect water storage or flow on Conservation 20/20 Preserves.

The Lee County Greenways Master Plan provides framework for the implementation of a comprehensive greenway system for use by Lee County residents and visitors (Lee County 2005). This plan proposes that the greenway will pass on the western side of PCP along the canal. At this time, C20/20 staff is working with Greenways Planning Group staff to determine if the greenway will be connected with other trails on the Preserve.

The Lee Plan, Lee County's comprehensive plan, is designed to depict Lee County as it will appear in the year 2020. Several themes have been identified as having "great importance as Lee County approaches the planning horizon" (Lee County 2004). These themes are:

- The growth patterns of the County will continue to be dictated by the Future Land Use map.
- The continued protection of the County's natural resource base.
- The diversification of the County's traditional economic base.
- The expansion of cultural, educational and recreational opportunities.
- A significant expansion in the County's physical and social infrastructure.

The entire Lee Plan can be found on the Internet at: http://www.lee-county.com/dcd1/Leeplan /Leeplan.pdf. The four chapters that affect the management of PCP are **Chapter II – Future Land Use, Chapter IV – Community Facilities and Services**, **Chapter V – Parks, Recreation and Open Space** and **Chapter VII – Conservation and Coastal Management**.

Chapter II, Policy 1.4.6 states that Conservation Lands includes uplands and wetlands that are owned and used for long range conservation purposes. Upland and wetland conservation lands will be shown as separate categories on the FLUM. Upland conservation lands will be subject to the provisions of this policy. Wetland conservation lands will be subject to the provisions of both the Wetlands category described in Objective 1.5 and the Conservation Lands category described in this policy. The most stringent provisions of either category will apply to wetland conservation lands. Conservation lands will include all public lands required to be used for conservation purposes by some type of legal mechanism such as statutory requirements, funding and/or grant conditions, and mitigation preserve areas required for land development approvals. Conservation Lands may include such uses as wildlife preserves; wetland and upland mitigation areas and banks; natural resource based parks; ancillary uses for environmental research and education, historic and cultural preservation, and natural resource based parks (such as signage, parking facilities, caretaker quarters, interpretive kiosks, research centers, and quarters and other associated support services); and water conservation lands such as aquifer recharge areas, flow ways, flood prone areas, and well fields. 2020 lands

designated as conservation are also subject to more stringent use provisions of the 2020 Program or the 2020 ordinances. (Added by Ordinance No. 98-09, Amended by Ordinance No. 02-02)

Chapter IV, Policy 59.1.5 provides the county will, through appropriate land use and engineering regulations, continue to control the introduction of obstructions or impediments within floodways. (Amended by Ordinance No. 94-30, 00-22)

Chapter IV, Policy 59.1.6 provides that the county will, through appropriate regulations, continue to provide standards for construction of artificial drainage ways compatible with natural flow ways and otherwise provide for the reduction of the risk of flood damage to new development. (Amended by Ordinance No. 94-30, 00-22)

Chapter IV, Policy 60.1.4 provides that the county will examine steps necessary to restore principal flow-way systems, if feasible, to assure the continued environmental function, value, and use of natural surface water flow-ways and associated wetland systems. (Amended by Ordinance No. 00-22)

Chapter V provides that Land Stewardship staff will ensure that any public use facilities and recreational opportunities will comply with **Goal 85: Park Planning and Design**, which requires that parks and recreation sites are planned, designed, and constructed to comply with the best professional standards of design, landscaping, planning, and environmental concern. Staff will also work to to meet **Goal 86: Environmental and Historic Programs, Objective 86.1** to provide information and education programs regarding its cultural history and its environment at appropriate facilities. (Amended by Ordinance No. 94-30, 00- 22)

Chapter VII, Objective 104.1: ENVIRONMENTALLY CRITICAL AREAS provides that within the coastal planning area, the county will manage and regulate, on an ongoing basis, environmentally critical areas to conserve and enhance their natural functions. Environmentally critical areas include wetlands (as defined in Goal 114) and Rare and Unique upland habitats. Rare and Unique upland habitats include, but are not limited to: sand scrub (320); coastal scrub (322); those pine flatwoods (411) which can be categorized as "mature" due to the absence of severe impacts caused by logging, drainage, and exotic infestation; slash pine/midstory oak (412); tropical hardwood (426); live oak hammock (427); and cabbage palm hammock (428). The numbered references are to the Florida Land Use Cover and Forms Classification System (FLUCFCS) Level III (FDOT, 1985). (See also Policy 113.1.4.) The digitization of the 1989 baseline coastal vegetation mapping (including wetlands and rare and unique uplands, as defined above) will be completed by 1996. (Amended by Ordinance No. 94-30, 00-22)

Chapter VII, Goal 107: RESOURCE PROTECTION provides to manage the county's wetland and upland ecosystems so as to maintain and enhance native habitats, floral and faunal species diversity, water quality, and natural surface

water characteristics. **Objective 107.1: RESOURCE MANAGEMENT PLAN** provides the county will continue to implement a resource management program that ensures the long-term protection and enhancement of the natural upland and wetland habitats through the retention of interconnected, functioning, and maintainable hydroecological systems where the remaining wetlands and uplands function as a productive unit resembling the original landscape. (Amended by Ordinance No. 94-30, 00-22) Under **Policy 107.1.1.4e** the county (or other appropriate agency) will prepare a management plan for each acquired site for the long term maintenance and enhancement of its health and environmental integrity.

Chapter VII, Objective 107.3: WILDLIFE provides the county will maintain and enhance the fish and wildlife diversity and distribution within Lee County for the benefit of a balanced ecological system. (Amended by Ordinance No. 94-30) **Policy 107.3.1:** encourages upland preservation in and around preserved wetlands to provide habitat diversity, enhance edge effect, and promote wildlife conservation. Initiating a prescribed fire regime and removing invasive exotics will follow this policy.

Chapter VII, Objective 107.4: ENDANGERED AND THREATENED SPECIES IN GENERAL provides Lee County will continue to protect habitats of endangered and threatened species and species of special concern in order to maintain or enhance existing population numbers and distributions of listed species. **Policy 107.4.1** states to identify, inventory, and protect flora and fauna indicated as endangered, threatened, or species of special concern in the "Official Lists of Endangered and Potentially Endangered Fauna and Flora of Florida," Florida Fish and Wildlife Conservation Commission (FWC), as periodically updated. Lee County's Protected Species regulations will be enforced to protect habitat of those listed species found in Lee County that are vulnerable to development.

Chapter VII, Objective 107.8: GOPHER TORTOISES provides that the county will protect gopher tortoises through the enforcement of the protected species regulations and by operating and maintaining, in coordination with the FWC, the Hickey Creek Mitigation Park. (Amended by Ordinance No. 94-30) **Policy 107.8.1** provides that the county policy is to protect gopher tortoise burrows wherever they are found. However, if unavoidable conflicts make on-site protection infeasible, then off-site relocation may be provided in accordance with FWC requirements. (Amended by Ordinance No. 94-30)

Chapter VII, Goal 114: WETLANDS provides that the county maintains and enforces a regulatory program for development in wetlands that is cost-effective, complements federal and state permitting processes, and protects the fragile ecological characteristics of wetland systems. (Amended by Ordinance No. 94-30) **Objective 114.1** provides that the natural functions of wetlands and wetland systems will be protected and conserved through the enforcement of the county's

wetland protection regulations and the goals, objectives, and policies in this plan. "Wetlands" include all of those lands, whether shown on the Future Land Use Map or not, that are identified as wetlands in accordance with F.S. 373.019(17) through the use of the unified state delineation methodology described in FAC Chapter 17-340, as ratified and amended by F.S. 373.4211. (Amended by Ordinance No. 94-30, 00-22)

E. Management Constraints

The principle stewardship constraints for PCP include limited funding, exotic control, and proximity to neighbors. Although the site is small, the amount of exotic vegetation present is fairly high. It will be very time and cost intensive to control the exotics present on the Preserve. There are twenty-nine (29) FLEPPC Category I and eleven (11) FLEPPC Category II exotic invasive plant species on the Preserve that have been identified. Category I plants are invasive exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. Category II plants are invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. In particular, air potato has become so extensive that control will be very labor intensive to remove the tubers and vines.

There are mobile home communities to the north, east and south that will make prescribed fire difficult. Creation of firelines on the south and east side have decreased risk to these homes, but smoke management will be difficult. There is also a native grape vine that has become very prominent throughout the understory and into the canopy that increases the risk of crown scorch to the trees. Neighboring residential properties have exotic plants on their properties, which are a seeds source to the Preserve. Land Stewardship staff will encourage neighbors to control their exotic plants to limit new introductions to the Preserve.

F. Public Access and Resource-Based Recreation

The majority of the historic recreation that occurred at the current Powell Creek Preserve was from unlawful trespassers. In decades past, the Preserve was utilized for dairy farming and cattle ranching and the associated fencing prevented most of the general public from entering. Since Lee County has purchased the Preserve, evidence of both hunting and ORV use has been documented. The Parks and Recreation Ordinance, 02-12 (http://www.lee-county.com/ordinances/PDF/2002/02-12.pdf) prohibits both of these activities.

In early 2005, the existing old fence was replaced with new fencing that was installed around portions of the boundary for added protection. As an

economical consideration, when the maintenance gate was installed off Hart Road, a public access point and trailhead was created for visitors to use.

In accordance with the Land Stewardship Operations Manual (LSOM), PCP is classified as a Category 3 Limited Use Preserve. Since the Preserve is relatively small, staff does not recommend any additional recreational activities beyond hiking, bird watching, nature photography and nature study that are allowed at all Conservation 20/20 Preserves.

The proposed primitive nature trail will be marked and at least ¾ mile long. This trail will be created within a highly disturbed plant community and will utilize portions of the existing trails on the eastern portions of the Preserve. The proposed new segment of the trail will only require mowing tall grasses on a biannual basis. Staff will explore avenues for providing reasonable accessibility for visitors with disabilities. Several environmental, financial and safety concerns limit the trail system to the east side of Powell Creek:

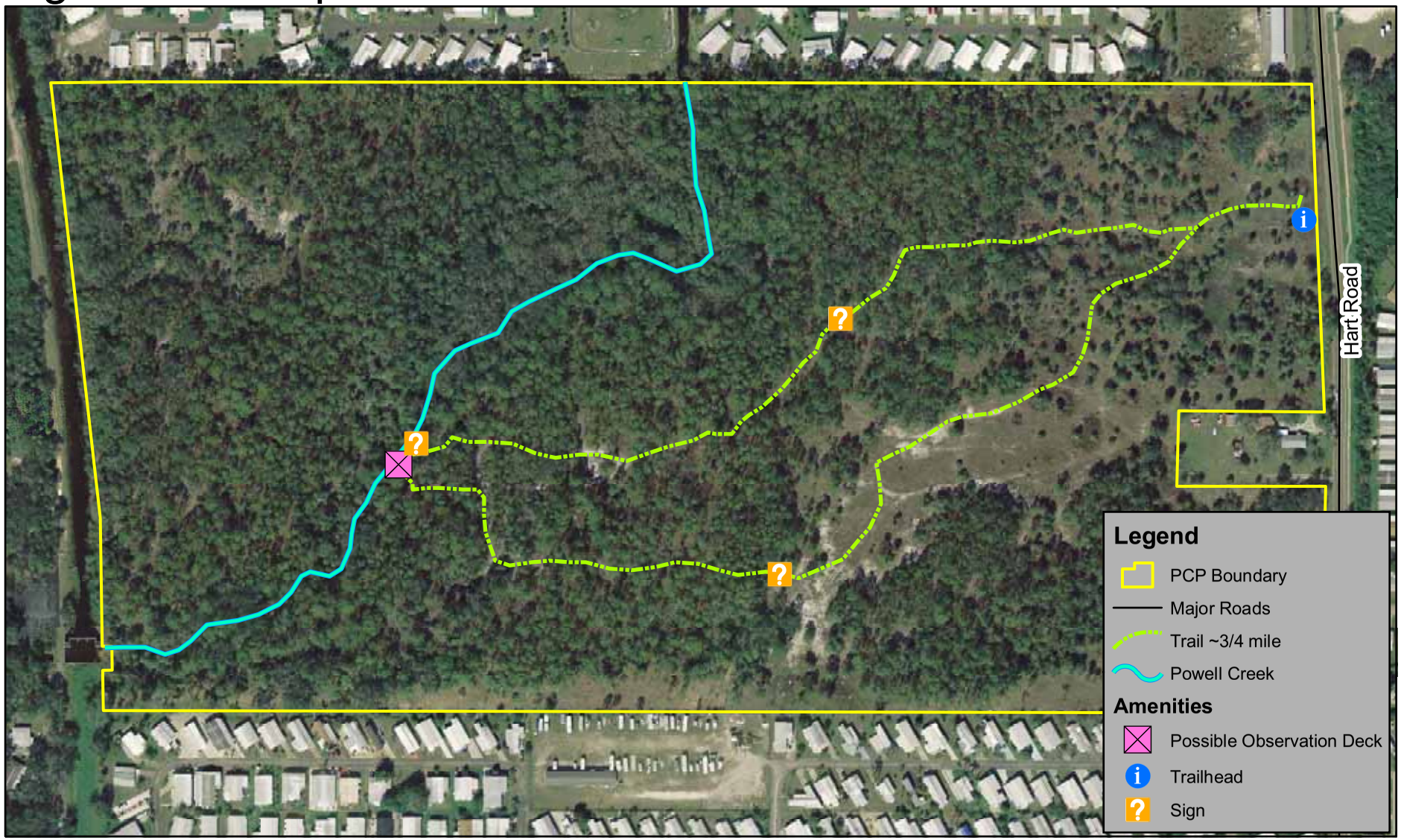
1) to prevent soil erosion in the creek and man-made drainage canal,
2) a foot bridge over the creek would be required and funding is extremely limited,
3) the canal bank is steep, the water is deep during wet season, and the weir structure may generate a strong current.

A brochure box with trail maps, wildlife information and other environmental educational literature will be available at the Preserve and introduce as well as orient visitors to PCP. The trail map will illustrate the different communities, the length of the nature trail and land stewardship activities that have occurred to assist restoration of the ecosystem. Gopher tortoise educational signage will be located along the trail before approaching a dense population to inform visitors of their life history and habitat requirements and not to “harass” them by *feeding, touching or chasing* them. Lastly, an observation deck may need to be constructed at a point where the trail nears the creek’s edge. A decision will be made after hydrologic improvements to Powell Creek are completed and/or damaging effects are noted from visitor usage along the banks of the creek. See Figure 11 for the proposed Master Site Plan.

Periodically, small portions of the trail may have standing water throughout the wet season, but the trail may remain open for visitors to make the effort if they choose. The entire Preserve will be closed during certain restoration activities or prescribed fires. There will be a kiosk at the entrance to the Preserve that will alert visitors of any current or upcoming trail closures.

Staff will attempt to provide for the needs of the public, keeping in consideration the lack of daily staff to protect and maintain public use amenities. A strong volunteer group will be encouraged to form to assist staff with trail maintenance, wildlife monitoring and other land stewardship projects.

Figure 11: Proposed Master Site Plan



G. Acquisition

Powell Creek Preserve was purchased through C20/20 in August 2003 for $618,000 after being nominated to the program in the spring of 2002 by Royal Palm Estates LLC.

There are no additional undeveloped parcels of land in the vicinity of PCP that would be beneficial to pursue for acquisition. Both the South Florida Water Management District and Lee County Division of Natural Resources supported the acquisition of this site for its regional potential for water quality enhancements and flood protection. Prior to acquisition, during the secondary site review process, it was stated that the wetlands were considered to be non-functional.

Currently, the future land use for the 77-acre Preserve is “Central Urban,” while it is still zoned as mobile home planned development “MHPD” for 325 units (See Figures 12 & 13). The STRAP number for the parcel is 36-43-24-00-00002.0000. Land Stewardship staff recommends that the future land use be changed to “Conservation Lands” and the zoning category be changed to “Environmentally Critical.”

Figure 12: Future Land Use Map

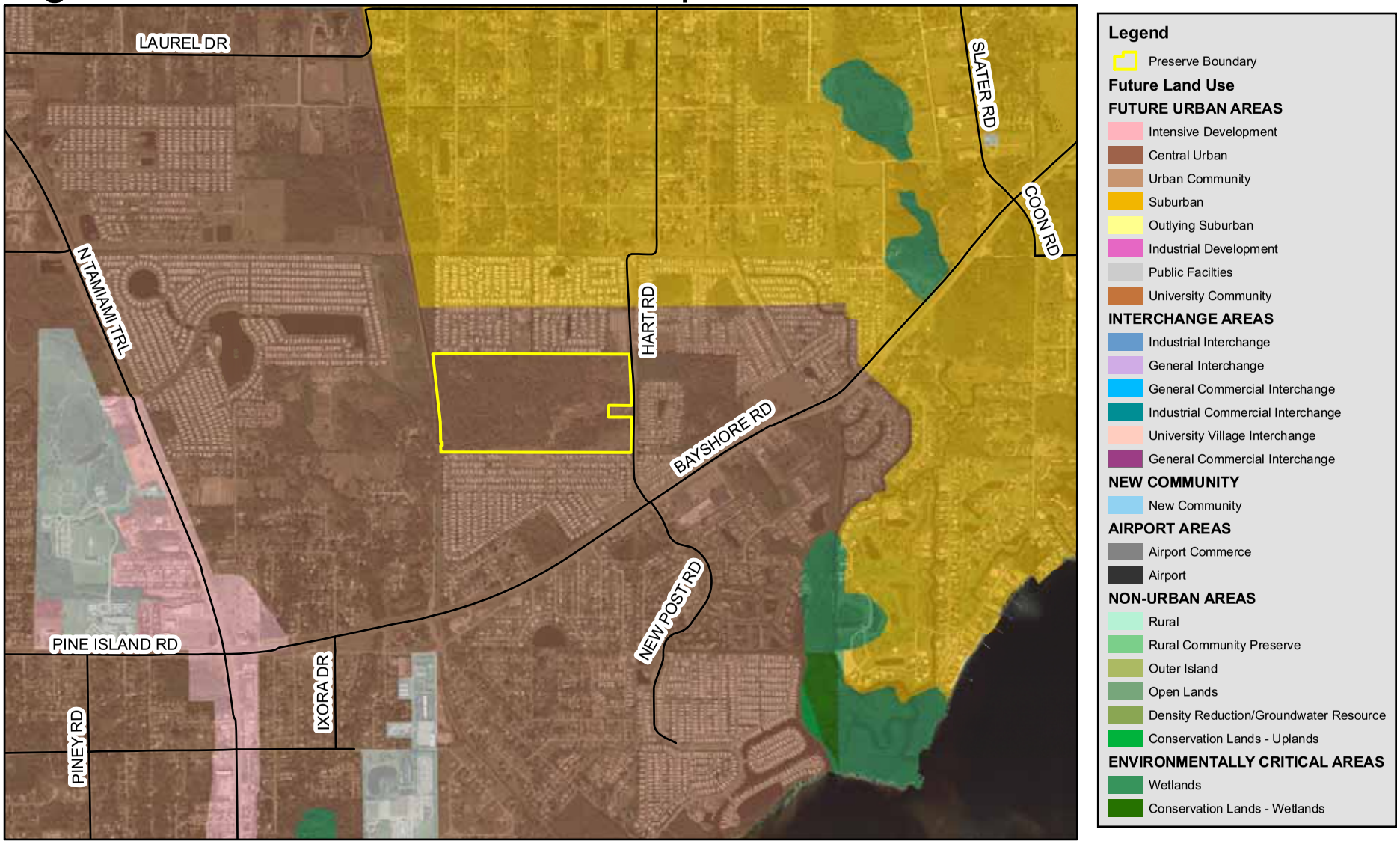
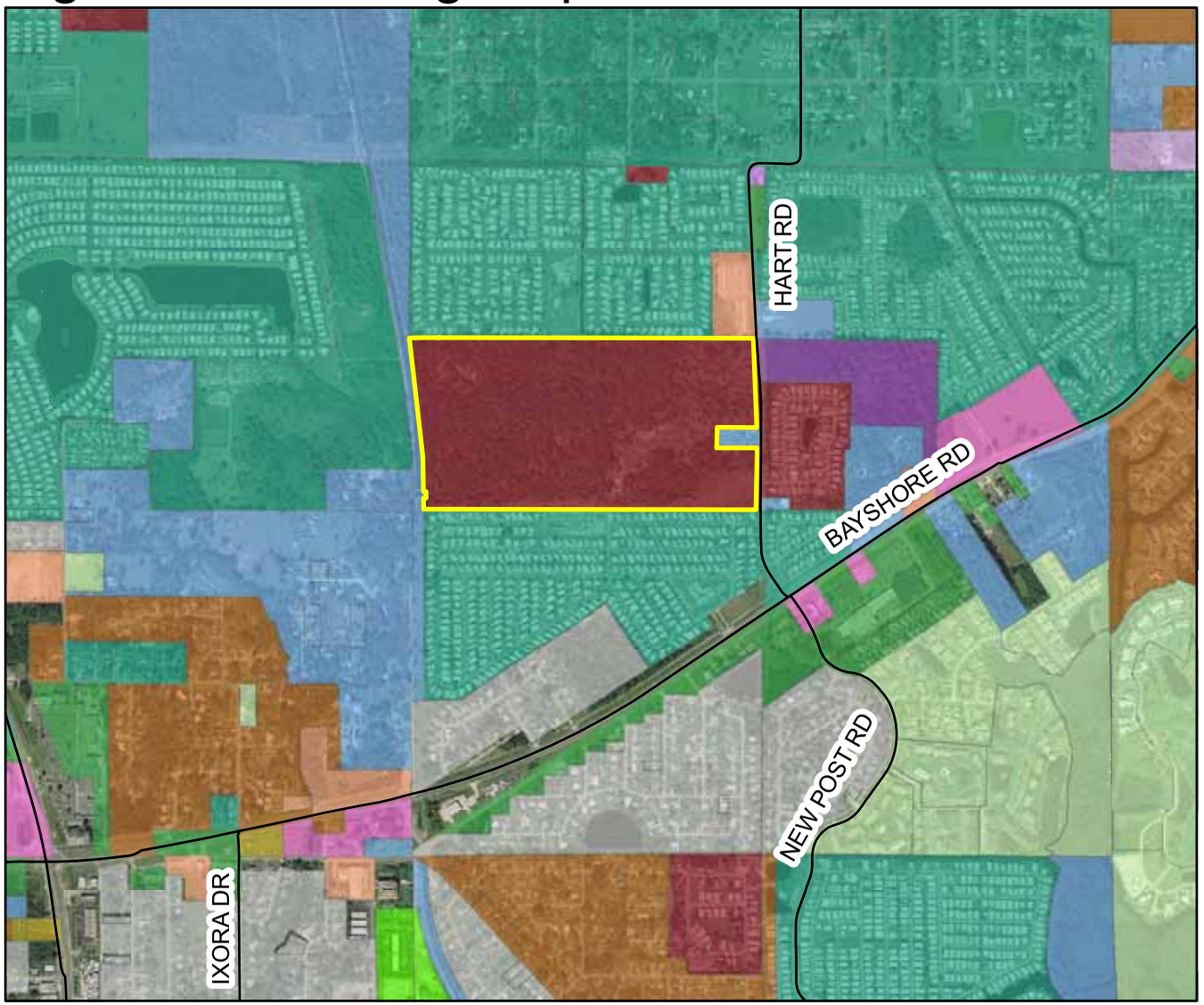


Figure 13: Zoning Map



Legend

- PCP Boundary
- Major Roads

Zoning Category

- Agriculture
- Commercial
- Community Commercial
- Community Facilities
- General Commercial
- Neighborhood Commercial
- Commercial Planned Development
- Special Commercial Office
- Light Industrial
- Mobile Home Residential
- Mobile Home Planned Development
- Residential Multiple Family
- Residential Planned Development
- Residential Single Family
- Two Family Conversion

N
W E
S

Powell Creek Preserve

0 800 1,600 3,200 4,800 6,400 Feet

S:\esri\C2020 ArcView\Powell Creek Preserve\PCP_management_plan\PCP_zoning.mxd

Map Prepared On: 08/10/05 by lboyd@leegov.com

This is not a survey. Land Stewardship Staff has prepared this map for informational and planning purposes.

VI. MANAGEMENT ACTION PLAN

A. Management Unit Descriptions

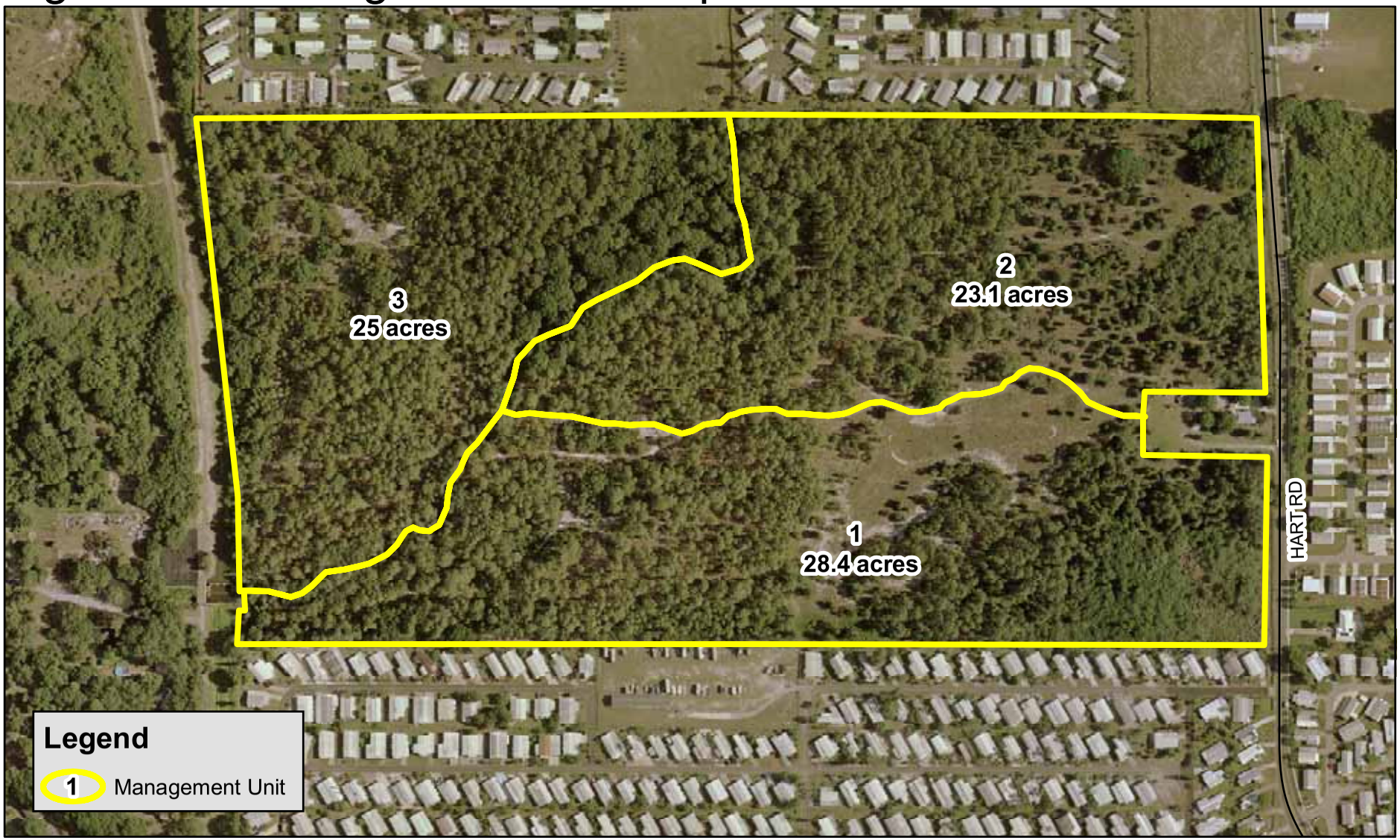
Powell Creek Preserve has been divided into three (3) management units (MU) to better organized and achieve management goals. Figure 14 delineates the management units that were created based on existing trails, the creek and plant communities.

- Management Unit 1 – 28.4 acres
  Management Unit 1 is located in the southeast corner of the Preserve. It is bordered to the north by MU 2, the west by Powell Creek, the south by the property boundary and the east by Hart Road. The majority of this unit is mesic flatwoods with a small (2 acre) wetland in the southeast corner. The northern part of the unit contains some disturbed areas that were once grazed and used as an all-terrain vehicle (ATV) racetrack. The Brazilian pepper in the southeast corner has been removed and exotics along the south and east boundaries have been sprayed with herbicide for control. Other exotics present in this unit include Caesar weed, queen palm and *Schefflera* in less than 25% cover. A portion of the hiking trail system will be in this unit. Management activities will focus on exotic control and debris removal.

- Management Unit 2 – 23.1 acres
  Management Unit 2 is located in the northeast corner. It is bordered to the north by the property boundary, the west by Powell Creek, the south by MU 1 and the east by Hart Road. About half of the unit is disturbed land that was once grazed. The other half consists mainly of mesic flatwoods and small areas of hydric hammock (2 acres) and slough. Exotic plant species present include silk oak, Caesar weed, queen palm and Surinam cherry in less than 25% cover. The maintenance gate, public access point, and portions of the hiking trail system are in this unit. Management activities will focus on exotic control, grapevine control, debris removal and prescribed fire or other brush control strategies.

- Management Unit 3 – 25 acres
  Management Unit 3 is located in the western part of the Preserve. This unit is bordered to the north by the property boundary, the west by a drainage canal, and the south and east by Powell Creek. This unit contains scrubby flatwoods (6 acres), mesic flatwoods, hydric hammock (1 acre) and a slough area of the creek. Exotic plant species present include Brazilian pepper, twoleaf nightshade and bishopwood (*Bischofia javanica*). Management activities will focus on exotic control, grapevine control, prescribed fire or other brush control strategies and trash clean up in the creek and slough.

Figure 14: Management Unit Map



B. Goals and Strategies

While the following are long-term goals for the Preserve, funding is currently not available to conduct all of these activities. Grants and/or monies budgeted for mitigation of any governmental infrastructure projects in Lee County will be used to supplement our operations budget to meet the goals in a timely manner.

The primary management objectives for Powell Creek Preserve are invasive exotic plant control and hydrological improvements. Additional stewardship activities at Powell Creek Preserve will focus on the following and will be prioritized in order of importance and ease of accomplishment:

Natural Resource Management

- ✓ Exotic plant control and maintenance
- ✓ Hydrologic improvements
- ✓ Prescribed fire management
- ✓ Photo point installation and monitoring
- ✓ Brush reduction
- ✓ Monitor and protect listed species
- ✓ Targeted exotic animal removal
- ✓ Compile results from monitoring wells

Overall Protection

- ✓ Debris removal and prevent dumping
- ✓ Boundary fence installation
- ✓ Boundary sign installation
- ✓ Change future land use and zoning categories

Public Use

- ✓ Facilities construction
- ✓ Educational sign installation

Volunteers

- ✓ Assist volunteer group

The following is a description of how each of these goals will be carried out, the success criteria used to measure the accomplishment of each goal and a projected timetable outlining when and in which units each activity will take place.

Natural Resource Management

Exotic plant control and maintenance

Although the dominant upland invasive exotic plants at PCP are Brazilian pepper, air potato and Caesar's weed, there are more than thirty-five (35) others. The

wetlands on this Preserve are also disturbed and have additional invasive exotic plants such as Britton's wild petunia (a.k.a. Mexican petunia), West Indian marsh grass (*Hymenachne amplexicaulis*) and water lettuce (*Pistia stratiotes*). The 2005 Florida Exotic Pest Plant Council's List of Invasive Species (FLEPPC 2005) will be consulted in determining the invasive exotic plants to be controlled in each management unit. The goal is to remove and then control these plants and other targeted invasive exotic species, followed with semi-annual or as needed treatments of resprouts and new seedlings. This goal will be implemented on a per management unit basis, where each unit will be brought to a maintenance level, defined as less than 5% invasive exotic plant coverage.

Prior to each invasive exotic plant control project at PCP, a Prescription Form (located in the LSOM) will be filled out by Land Stewardship staff and reviewed by the contractor(s). All contractors involved in these projects will be required to fill out the Daily Report Control Form (located in the LSOM).

- Uplands with light to moderate infestations:

  With the exception of one large patch of air potato, there are no areas where invasive exotics are greater than 25% of the vegetation cover. Therefore, areas where invasive exotics are sporadic and below 25% of the vegetation cover, handwork will be utilized for control. Specific methodology will depend on stem size, plant type and seasonality but generally the stem will be cut near ground and the stump sprayed with appropriate herbicide. Other appropriate application techniques may include basal bark, frill, girdle or a foliar application made to entire plant. Hand pulling should be utilized when possible and with appropriate species to minimize herbicide use. Cut stems will be piled as necessary to facilitate future potential burning, chipping or removal from site. No replanting will be needed in these areas due to significant presence of native vegetation and native seed bank.

- Wetlands with light to moderate infestations:

  Hand crews will need to hike in on foot and either foliar, girdle, or cut-stump treat the exotics with the appropriate herbicide. Hand pulling should be utilized when possible and used on the appropriate species to minimize herbicide use. Follow-up treatments will need to be done on an annual basis and may eventually decrease to every two (2) years. Where feasible or necessary, biomass may be removed from wetland sites to be piled & burned and/or mulched.

- Air potato:

  A couple of patches of air potato have been observed in several areas throughout the Preserve, but most are concentrated along the boundary

lines. The largest infestation is within Management Unit 3 on the northern boundary, an approximate 4 acre patch that is climbing into slash pines and cabbage palms and overtaking native shrubs. For this reason, Land Stewardship staff recommends exploring another exotic removal technique utilizing goats as a biological control agent. "The role of goats as biological control agents is becoming ever more important due to environmental concerns and elevated costs of other control methods such as mechanical cutting and herbicide application" (NCSU 1998). Land Stewardship staff learned from a Bureau of Invasive Plant Management (BIPM) manager that, "Sheep are being used in Tallahassee, almost exclusively on kudzu. Great for biomass reduction prior to herbiciding significantly reduced volume of herbicide. An added benefit was that the sheep took the plant down to the ground so the applicator could see exactly where the main stem was. This allowed the plants to grow for a bit so there was sufficient root/shoot ratios and then herbicided them. Collateral damage was a bit much, but probably was a wash when you factor in the reduction of herbicide as a result of the grazing" (Jubinsky 2005). There are no known listed plant species in this area.

In areas with smaller infestation, hand pulling should be utilized when possible. Hand crews should hand pull vines from trees and bag the potatoes (tubers) during the dormant winter period when the stems die back to the ground and the tubers are easier to find. Otherwise hand crews will need to foliar or poodle cut vines and treat with the appropriate herbicide. It is important to dig up/remove the tubers from the ground or they will resprout unless an herbicide that translocates to the tubers is used. Follow-up treatments will need to be done on an annual basis and may eventually decrease to every two (2) years. If staff observes a dramatic increase in the presence of this species, additional workdays will be scheduled.

- Cogon grass (*Imperata cylindrica*) and Guinea grass (*Panicum maximum*) infestations:

  Because of the potential for these invasive grasses to take over large areas in a short amount of time, staff will be taking a proactive approach to controlling these species as soon as possible. The methodologies described are what are currently working at Caloosahatchee Regional Park. Land Stewardship staff may adjust this recommended treatment depending on results at PCP or new methods discovered by other land managers. Large grass patches (both species) will be mowed or weed-whacked monthly. Herbicide will be applied three (3) times a year, when the grass has grown approximately six (6) inches after a mowing. The timing of the spraying will be at the beginning and the end of the wet season and once during the dry season after several days of cold weather. The scattered small clumps of these grasses will be dug up by

hand, utilizing Department of Corrections (DOC) crews, day laborers, volunteers or Land Stewardship staff during workdays. Currently, most of the areas with these grasses are along the boundary fence line.

- Old World climbing fern:

  Small patches of Old World climbing fern have been observed and appear to be concentrated along areas of Powell Creek. Staff recommends a staff workday to be scheduled during fall 2005 or spring 2006, before a larger infestation level occurs. Land Stewardship staff will ensure that during one of the quarterly site inspections they bring herbicide and search for patches of Old World climbing fern, which will be treated with a foliar method. Any remaining patches will be treated during the scheduled exotic treatments on the Preserve.

Hydrologic improvements

As previously mentioned, Lee County DNR has contracted for the North Fort Myers Surface Water Master Plan to be conducted. Because of the Preserve's proximity to flood prone and dense urban surroundings, hydrologic restoration measures maybe recommended for PCP. Land Stewardship staff will be active with the development of this plan hoping to improve water flow through remnant sections of Powell Creek.

Prescribed fire management

It is uncertain if a prescribed fire program will be implemented at this Preserve, because of its' close proximity to dense urban areas and major roadways (U.S. 41 and S.R. 78 (Bayshore Road) are less than one mile from PCP). If a prescribed fire program appears feasible, it will be implemented to closely mimic the natural fire regimes for the different plant communities to increase plant diversity and insure the canopies remain open. Once restoration projects are completed in management units that contain fire dependent communities, a prescribed fire management program should be implemented after the creation of appropriate fire lines/breaks. Firebreaks are complete around all but Management Unit 3. The timing of prescribed burning will be influenced by seasonal rain and wind patterns. The Conservation 20/20 Burn Team Coordinator is coordinating with the DOF and FWC to develop a C20/20-wide Fire Management Plan that will apply to all preserves. If prescribed fire cannot be utilized, then an on-going brush reduction plan should be implemented to maintain fuel load levels to a minimum in case of wildfires.

Photo point installation

Land Stewardship staff recommends installing one photo point in MU 3, if goats will be used to target air potato or the problematic wild grape vine. A pre-

restoration photo will be taken, followed by post restoration photos. Additional follow up restoration photos will be taken during the growing season for five (5) years from completion of the project to document transformations, with photos taken as needed from then on.

Brush reduction

Regardless of whether or not prescribed fire can be utilized at this Preserve, fuel loads must be reduced and maintained at minimal levels. Several methods can be used to achieve this goal, such as mechanical, biological and/or herbicides. Also pines, in some areas, may need to be thinned mechanically to achieve desired habitat results, so that a crown fire does not occur during a wildfire or prescribed fire.

Monitor and protect listed species

The Preserve will be managed in a manner that protects and enhances habitat for listed wildlife species that utilize or could potentially utilize the project site. As discussed in the Designated Species section, there are only a few listed species that have been documented utilizing the Preserve. For the most part, these species will benefit from restoration activities, such as hydrologic improvements and the removal of invasive exotic plants. During restoration activities, efforts will be made to minimize any negative impact to listed species. Specific examples of this will be using heavy equipment in the cooler months near gopher tortoise burrows when tortoises are less active and avoid listed plant species found on the Preserve.

PCP is part of a countywide quarterly site inspection program conducted for all Conservation 20/20 Preserves. A copy of the site inspection form is available in the Land Stewardship Operations Manual. These inspections allow staff to monitor for any impacts and/or changes to each preserve and includes lists of all animal sightings and new plant species that are found. If, during these inspections, staff finds FNAI listed species, they will be reported using the appropriate forms.

Targeted exotic animal removal

- Feral hogs

Currently the only acceptable method of hog removal on Conservation 20/20 Preserves is trapping. An active hog-trapping program will be implemented for the Preserve. Removing all hogs is an unreasonable goal; therefore a removal program will need to be continuous on a long-term basis.

- Exotic amphibians and reptiles

Further research needs to be done to determine if it is necessary or feasible to control these animals (i.e. Cuban treefrog, brown anole) on the Preserve. Methodology will be determined at that time.

Compile results from monitoring wells

There are five abandoned wells located on the Preserve. In 2005, Land Stewardship staff declined to renew the existing SFWMD permits for these wells. A Lee County DNR representative had expressed an interest to utilize a couple of the wells for monitoring water table levels. On an annual basis, Land Stewardship staff will coordinate with DNR to obtain these data if any of the wells are included in their monitoring program.

Overall Protection

Debris removal and Prevent dumping

Debris removal will be an ongoing project at PCP. During quarterly site inspections, small objects that are encountered will be removed. There is existing debris present in Management Unit 1 that will need to be removed with heavy equipment such as concrete blocks, poles, mobile home parts (Hurricane Charley), couple of tree stands/forts, discarded fencing and miscellaneous household items. If necessary, additional debris clean-ups will be organized with the Parks and Recreation Land Stewardship staff and volunteers.

Land Stewardship staff recognizes that new debris may be dumped in the Preserve periodically and depending on the nature of this debris it will be dealt with accordingly.

Boundary fence installation

Currently, most of the Preserve is fenced to prevent activities such as dumping and use of motorized vehicles on the Preserve. Additional boundary fencing and signage will be added along the western edge to further protect the Preserve from illegal human access and feral hogs. Overgrown vegetation needs to be removed before additional or replacement fencing can be installed along the western boundary line.

Boundary sign installation

Boundary signs will be installed to further protect the Preserve. Missing or damaged signs will be replaced. Per LSOM, to make our boundary posting legally enforceable, signs will be placed every 200-300' along roadways and every 500' elsewhere and the lettering size of the word "BOUNDARY" will be 2 inches.

Change future land use and zoning categories

Staff will coordinate with Lee County Division of Planning representatives to change the existing land use category from "Central Urban" to "Conservation Lands" and the zoning category from "MHPD" to "Environmentally Critical." At this time, PCP is not as high a priority for category changes as other C20/20 Preserves.

Public Use

Facilities construction

Currently, PCP has a public access point and trailhead area. Additional amenities will include a marked hiking trail, brochure box and informational kiosk all of which will be located in the vicinity of the entrance trailhead area. The final outcome from hydrologic improvements to Powell Creek and/or the affects from visitor usage on the banks of the creek will determine whether or not an observation deck will need to be constructed at the point where the trail nears the creek.

Educational sign installation

At the entrance, a sign will be installed that welcomes visitors to the Preserve, shows the shape of the Preserve, a trail map, some of the plants and animals found on the Preserve and lists the general rules of the Preserve. Gopher tortoise educational signage will be installed along the trail before hikers approach densely populated areas. Additional educational signs may be installed along the hiking trail where appropriate.

Volunteers

Assist volunteer group

The LSOM identifies the Land Stewardship Volunteer Program's mission statement as:

> *To aid in the management and preservation of Lee County resource-based public parks and preserves and to provide volunteers with rewarding experiences in nature.*

If there is interest from the community to form a volunteer group, staff will work with them to assist with the many diverse stewardship activities that will be associated with this Preserve, such as trail maintenance, wildlife monitoring, maintaining the brochure box with pamphlets and other land stewardship projects.

The following “Prioritized Projected Timetable for Implementation” outlines the goals and strategies listed above. It is based on obtaining necessary funding for numerous land stewardship projects. Implementation of these goals may be delayed due to changes in staff, extreme weather conditions or a change in priorities on properties managed by Lee County.

VII. PROJECTED TIMETABLE FOR IMPLEMENTATION

Prioritized Projected Timetable for Implementation of the Management Action Plan (Dec 2005–Sept 2010)

Management Activity	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06	Mar-07	Jun-07	Sep-07	Dec-07	Mar-08	Jun-08	Sep-08	Dec-08	Mar-09	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10
Natural Resource Management																				
Exotic Plants																				
Initial exotic plant control							X													
Fire																				
Create Prescribed Fire Management Plan	X																			
Brush reduction								X												
Implementation of Rx FMP														X						
Hydrologic Components																				
Hydrologic Restoration																	X			
Results from Wells			X				X				X				X				X	
Maintenance (On-going/Annual)																				
Follow up exotic plant control									X		X				X				X	
Exotic animal removal																				
Fire break mow/disk		X				X				X				X				X		
Install photo point station						X														
Photo point monitoring surveys								X		X				X				X		
Overall Protection																				
Large debris removal							X													
Fence western boundary						X														
Boundary sign installation						X														
Change Zoning or Land Use categories											X									
Public Use																				
Create & mark trail								X												
Install kiosk & entrance sign									X											
Educational sign installation									X											
Volunteers																				
Assist volunteer group										X										

Timetable based on obtaining necessary funding for numerous land stewardship projects. Implementation of these goals may be delayed due to changes in staff, extreme weather conditions or a change in priorities on properties managed by Lee County.

VIII. FINANCIAL CONSIDERATIONS

There is a management fund established in perpetuity for all Conservation 20/20 preserves. Monies from this fund primarily serve to meet the operational needs of the Management section of the C20/20 Program, but a certain amount of this fund will be set aside for planned restoration projects. There is currently no outside funding available for this preserve. Possible funding for these projects may be requested through grants from agencies such as SFWMD, FDEP and USFWS as well as mitigation opportunities. Projected costs and funding sources are listed in Appendix G.

IX. LITERATURE CITED

Carter, S. 2005, Cattle Rancher and life-long area resident.

Cook, R.E. 1945. "Geology of Florida." *In* Ecosystems of Florida (Myers & Ewel eds.). Orlando: University of Central Florida Press.

[FCC] Florida Climate Center [Internet]. Tallahassee (FL): The Center for Ocean-Atmospheric Predictions Studies; 2005 [cited 2005 Aug 2]. Available from: http://www.coaps.fsu.edu/climate_center/nav.php.

[FDOT] Florida Department of Transportation. 1999 January. Florida Land Use, Cover and Forms Classification System. (3rd ed). Tallahassee: DOT, Surveying and Mapping Office.

[FLEPPC] Florida Exotic Pest Plant Council [Internet]. Ft. Lauderdale (FL): 2005 List of Florida's Invasive Species; 2005 [cited 2005 Oct 11]. Available from: http://www.fleppc.org/05list.htm

[FNAI & FDNR] Florida Natural Areas Inventory and Florida Department of Natural Resources. 1990. Guide to the Natural Communities of Florida. Tallahassee: FNAI & FDNR.

Gann, G.D., K.A. Bradley, and S.W. Woodmansee. 2002. Rare Plants of South Florida: Their History, Conservation, and Restoration. Institute for Regional Conservation. Miami, Florida.

Henderson, W.G. Jr. 1984. Soil Survey of Lee County, Florida. USDA Soil Conservation Service.

Hipes, D., Jackson D.R., NeSmith, K., Printiss D. and Brandt K. 2001. Field Guide to the Rare Animals of Florida. Tallahassee: Florida Natural Areas Inventory. 122 p.

[JEI] Johnson Engineering, Inc., (CDM) Camp Dresser & McKee, Inc., (HOA) Hole, Montes & Associates, (BA) W. Dexter Bender & Associates. 1991. Surface Water Management Plan. Fort Myers (FL): Lee County BOCC. Powell Creek; p 7.

Jubinsky, G. 2005, Environmental Program Manager, FDEP Bureau of Invasive Plant Management.

(Lee County) Lee County Community Development. The Lee Plan 2004 Codification As Amended through December 2004 [Internet]. [cited 2005 September 7]. Available from: http://www.lee-county.com/dcd1/Leeplan/Leeplan.pdf

(Lee County) Lee County Greenways Planning Group. 2005. Lee County Greenways Master Plan Summer 2005. Fort Myers, FL. 85p.

(Lee County) Lee County Parks and Recreation. Parks and Recreation Ordinance 02-12. 2002 [Internet]. [cited 2005 September 14]. Available from: http://www.lee-county.com/ordinances/PDF/2002/02-12.pdf

Missimer, T.M. and Thomas, S.M., editors. 2001. Geology and hydrology of Lee County, Florida. 9th Annual Southwest Florida Water Resources Conference; 1999 Nov 18 & 19; Ft. Myers (FL). Tallahassee: Florida Geological Survey. 230 p.

[NCSU] North Carolina State University [Internet]. Raleigh (NC); [updated 1998 Oct; cited 2005 Oct 4]. Use of Goats as Biological Agents for the Control of Unwanted Vegetation. Available from: http://www.cals.ncsu.edu/an_sci/extension/animal/meatgoat/MGVeget.htm

Printiss, David. 2003. "Fire and Isolated Wetlands". Amphibians of Southeastern Ephemeral Wetlands, Gopher Tortoise Council Annual Meeting. Wekiwa Springs State Park, Apopka, Florida.

Save Florida's Native Bromeliads: Conservation of Endangered Airplants Through Biological Control and Seed Collection [Internet]. Gainesville (FL): University of Florida Institute of Food and Agriculture Sciences. [cited 2004 Nov 8]. Available from: http://savebromeliads.ifas.ufl.edu.

Schmitt, C. 2005, Retired, long-time resident and adjacent neighbor.

Secondary Review – Nomination 217 Powell Creek, CLASAC Meeting, 09/12/02.

[SFWMDa] South Florida Water Management District. Caloosahatchee Water Management Plan, Planning Document; April 2000 [cited 2005 Aug 15]. Available from: http://www.sfwmd.gov/org/exo/cwmp/final/cplan.pdf

[SFWMDb] South Florida Water Management District. District Water Management Plan 2000 (DWMP) [Internet]. [cited 2005 October 12]. Figure 8. Physiographic Regions within the SFWMD (Fernald and Purdam, 1998); p.17. Available from: http://www.sfwmd.gov/org/wrm/dwmp/dwmp_2000/dwmp1.pdf

Smith, B. 2005, Supervisor, Lee County Mosquito Control District.

Southeast Regional Climate Center [Internet]. Columbia (SC); [updated 2005 July 19; cited 2005 Aug 2]. Available from: sercc@dnr.state.sc.us.

Stubbs, S.A. 1940. “Solution a dominant factor in the geomorphology of peninsular Florida.” *In* Ecosystems of Florida (Myers & Ewel eds.). Orlando: University of Central Florida Press.

White, W.A. 1970. The Geomorphology of the Florida Peninsula, Geological Bulletin No. 51 [Internet]. Tallahassee (FL): State of Florida, Department of Natural Resources, Bureau of Geology. [cited 2005 March 22]. Available from: http://fulltext10.fcla.edu/DLData/UF/UF00000149/immokalee_rise.pdf

[WRS] Water Resource Solutions, Inc. Phase I Environmental Site Assessment Report for the Conservation 2020 – Parcel 217. June 2003. Cape Coral, FL. Project Number LC-04502.E1.

Wunderlin, Richard P. and Hansen, Bruce F. 2003. Guide to the Vascular Plants of Florida. Second Edition. Gainesville, FL: University Press of Florida.

X. APPENDICES

Appendix A: 2004 Tropical Systems

Appendix B: Plant Sightings

Appendix C: Wildlife Sightings

Appendix D: Photographs of Powell Creek

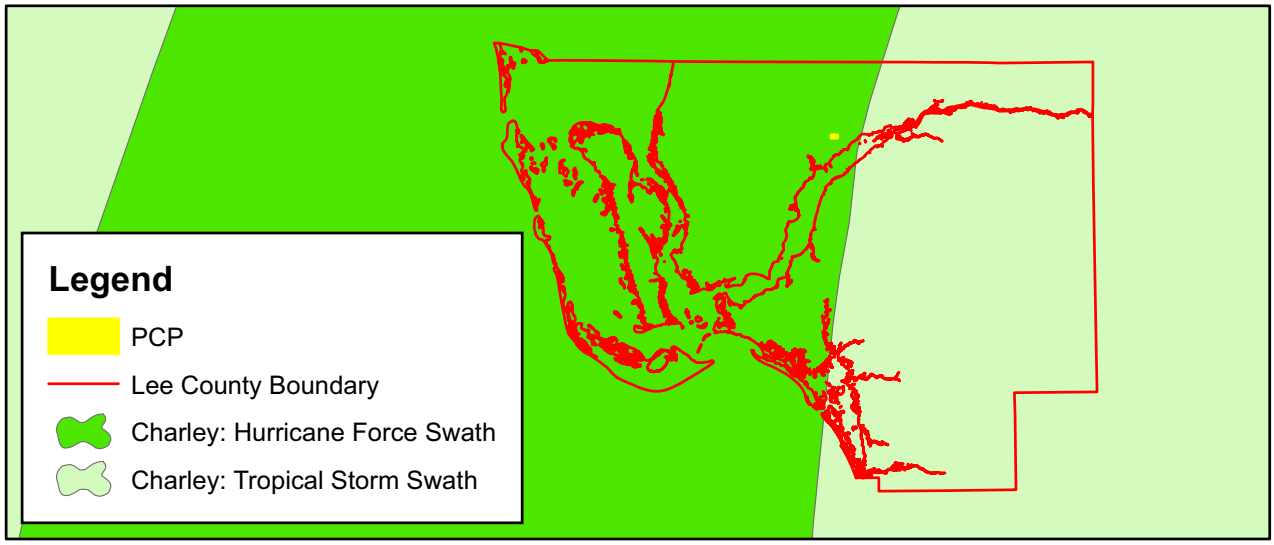
Appendix E: Proposed Wetland Erosion and Maintenance Plans

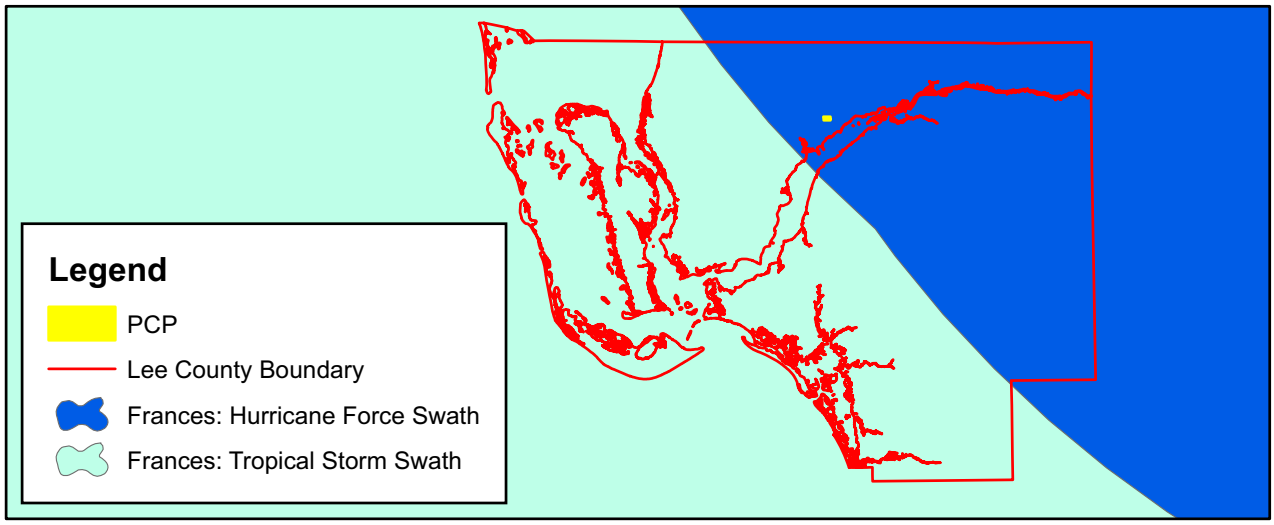
Appendix F: Conservation Easement

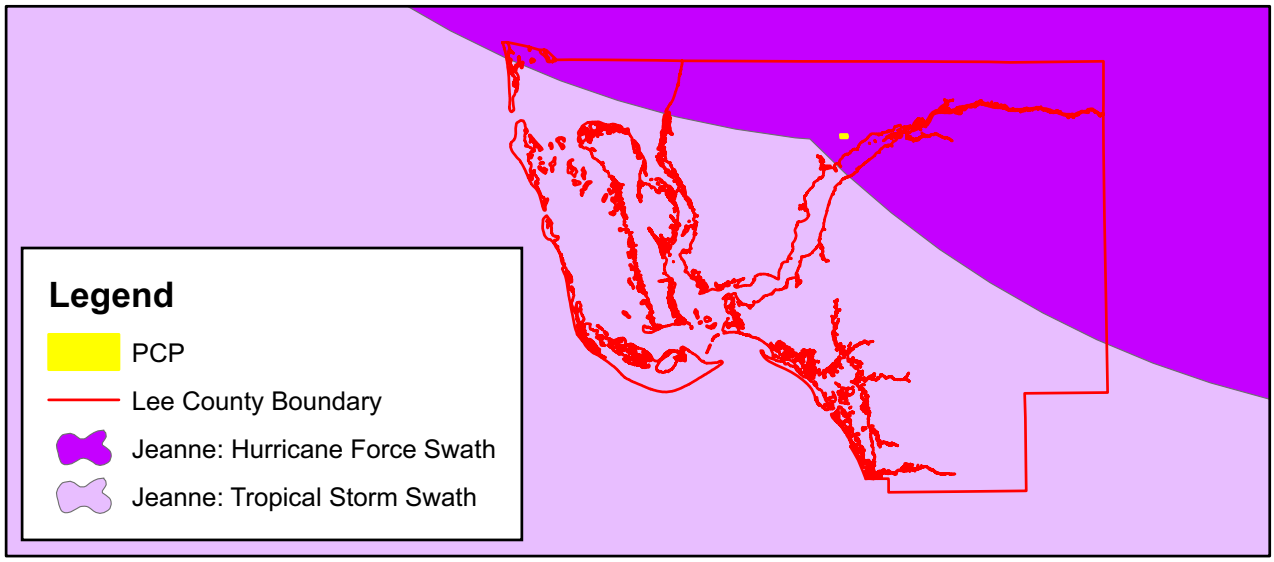
Appendix G: Projected Costs and Funding Sources

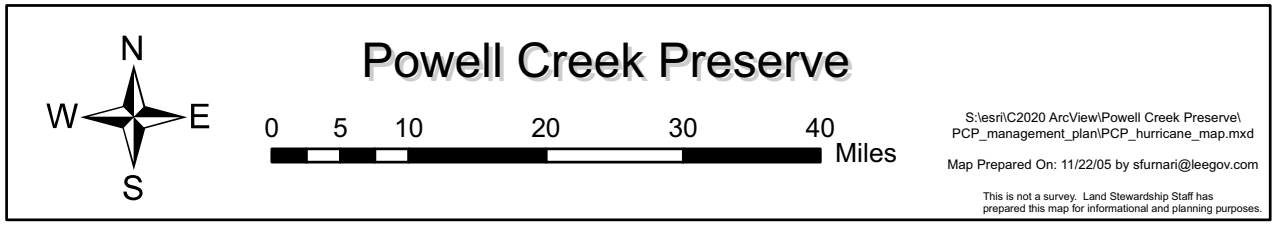
Appendix A: 2004 Tropical Systems

Appendix A: 2004 Tropical Systems









Appendix B: Plant Sightings

Appendix B: Plant Sightings at Powell Creek Preserve

Scientific and Common names from this list were obtained from Wunderlin 2003.

Scientific Name	Common Name	Native Status	EPPC	FDA	IRC
Family: Blechnaceae (midsorus fern)					
Blechnum serrulatum	swamp fern	native			
Woodwardia virginica	Virginia chain fern	native			
Family: Nephrolepidaceae (sword fern)					
Nephrolepis cordifolia	tuberous sword fern	exotic	I		
Neprholepis falcata	fishtail swordfern	exotic			
Family: Polypodiaceae (polypody)					
Phlebodium aureum	golden polypody	native			
Pleopeltis polypodioides	resurrection fern	native			
Family: Psilotaceae (whisk-fern)					
Psilotum nudum	whisk-fern	native			
Family: Salviniaceae (floating ferns)					
Salvinia minima	water spangles	exotic			
Family: Selaginellaceae (curly-grass)					
Lygodium microphyllum	Old World climbing fern	exotic	I		
Family: Vittariaceae (shoestring fern)					
Vittaria lineata	shoestring fern	native			
Family: Cupressaceae (cedar)					
Taxodium distichum	bald cypress	native			
Family: Pinaceae (pine)					
Pinus elliottii	slash pine	native			
Family: Zamiaceae (zamia)					
Zamia pumila	coontie	native			
Family: Agavaceae (agave)					
Yucca aloifolia	Spanish bayonet	native			
Family: Alismataceae (water plantain)					
Sagittaria latifolia	duck potato	native			
Family: Araceae (arum)					
Caryota urens	fishtail palm	exotic			
Colocasia esculenta	wild taro	exotic	I		
Epipremnum pinnatum	golden pothos	exotic	II		
Lemna ssp.	duckweed	native			
Monstera deliciosa	swiss cheese plant	exotic			
Philodendron selloum	philodendron	exotic			
Pistia stratiotes	water lettuce	exotic	I		
Syngonium podophyllum	American evergreen	exotic	I		
Xanthosoma sagittifolium	elephant ear	exotic	II		
Family: Arecaceae (palm)					
Roystonea regia	royal palm	native			
Sabal palmetto	cabbage palm	native			
Serenoa repens	saw palmetto	native			
Syagrus romanzoffiana	queen palm	exotic	II		
Family: Asparagaceae (asparagus)					
Asparagus setaceeus	common asparagus-fern	exotic			
Family: Bromeliaceae (pineapple)					
Tillandsia fasciculata	cardinal airplant	native		E	
Tillandsia recurvata	ballmoss	native			

Appendix B: Plant Sightings at Powell Creek Preserve (continued)

Scientific Name	Common Name	Native Status	EPPC	FDA	IRC
Family: Bromeliaceae (pineapple)					
Tillandsia usneoides	Spanish moss	native			
Tillandsia utriculata	giant airplant	native		E	
Family: Commelinaceae (spiderwort)					
Commelina diffusa	common dayflower	exotic			
Commelina erecta	whitemouth dayflower	native			
Tradescantia fluminensis	small-leaf spiderwort	exotic	I		
Tradescantia spathacea	oyster plant	exotic	I		
Family: Cyperaceae (sedge)					
Carex lupuliformis	false hop sedge	native			I
Cladium jamaicense	saw grass	native			
Cyperus retrorsus	pinebarren flatsedge	native			R
Rhynchospora latifolia	giant whitetop	native			
Family: Dioscoreaceae (yam)					
Dioscorea bulbifera	air-potato	exotic	I		
Family: Orchidaceae (orchid)					
Encyclia tampensis	Florida butterfly orchid	native			
Habenaria quinqueseta	longhorn false reinorchid	native			R
Family: Poaceae (grass)					
Andropogon glomeratus	bushy bluestem	native			
Andropogon virginicus var. glaucus	chalky bluestem	native			R
Aristida spiciformis	bottlebrush threeawn	native			R
Aristida stricta	wiregrass	native			
Dichanthelium ssp.	witchgrass	native			
Hymanchne amopexicaulis	West Indian marsh grass	exotic	I		
Imperata cylindrica	cogongrass	exotic	I		
Panicum maximum	Guineagrass	exotic	I		
Panicum repens	torpedograss	exotic	I		
Panicum rigidulum	redtop panicum	native			
Rhynchelytrum repens	rose natalgrass	exotic	I		
Sporobolus indicus	smutgrass	exotic			
Stenotaphrum secundatum	St. Augustinegrass	native			
Urochloa mutica	paragrass	exotic	I		
Zea mays subsp. *Mays*	corn	exotic			
Family: Pontederiaceae (pickerelweed)					
Pontederiaceae cordata	pickerelweed	native			
Family: Ruscaceae (butcher's broom)					
Sansevieria hyacinthoides	bowstring hemp	exotic	II		
Family: Smilacaceae (smilax)					
Smilax auriculata	earleaf greenbrier	native			
Family: Typhaceae (cattail)					
Typha latifolia	broadleaf cattail	native			
Family: Acanthaceae (acanthus)					
Ruellia tweediana	Britton's wild petunia	exotic	II		
Family: Adoxaceae (moschatel)					
Viburnum obovatum	Walter's viburnum	native			I
Family: Amaranthaceae (anaranth)					
Atriplex pentandra	crested saltbush	native			

Appendix B: Plant Sightings at Powell Creek Preserve (continued)

Scientific Name	Common Name	Native Status	EPPC	FDA	IRC
Family: Anacardiaceae (cashew)					
Rhus copallinum	winged sumac	native			
Schinus terebinthifolius	Brazilian pepper	exotic	I		
Toxicodendron radicans	eastern poison ivy	native			
Family: Annonaceae (custard-apple)					
Annona glabra	pond apple	native			
Asimina reticulata	netted pawpaw	native			
Family: Araliaceae (ginseng)					
Schefflera actinophylla	Australian umbrella tree	exotic	I		
Family: Apocynaceae (dogbane)					
Allamanda cathartica	golden trumpet	exotic			
Asclepias tuberosa	butterfly weed	native			R
Catharanthus roseus	Madagascar periwinkle	exotic			
Family: Asteraceae (aster)					
Ambrosia artemisiifolia	common ragweed	native			
Balduina angustifolia	coastalplain honeycombhead	native			R
Bidens alba	beggarticks	native			
Elephantopus elatus	tall elephantsfoot	native			R
Emilia fosbergii	Florida tasselflower	exotic			
Eupatorium capillifolium	dogfennel	native			
Helenium amarum	Spanish daisy	native			
Pityopsis graminifolia	silkgrass	native			
Pluchea odorata	camphorweed	native			
Pterocaulon pycnostachyum	blackroot	native			
Solidago fistulosa	pinebarren goldenrod	native			
Sphagneticola trilobata	creeping oxeye	exotic	II		
Family: Bignoniaceae (trumpet creeper)					
Campsis radicans	trumpet creeper	native			
Family: Cactaceae (cactus)					
Opuntia humifusa	pricklypear	native			
Family: Ceratophyllaceae (hornwort)					
Ceratophyllum demersum	coontail	native			
Family: Clusiaceae (mangosteen)					
Hypericum tetrapetalum	fourpetal St. John's-wort	native			
Family: Crassulaceae (orpine)					
Kalanchoe daigremontiana	devil's backbone	exotic			
Family: Cucurbitaceae (gourd)					
Momordica charantia	balsampear	exotic			
Family: Ebonaceae (ebony)					
Diosporus virginiana	persimmon	native			
Family: Ericaceae (heath)					
Lyonia fruticosa	staggerbush	native			
Vaccinium myrsinites	shiny blueberry	native			
Family: Euphorbiaceae (spurge)					
Bischofia javanica	Javanese bishopwood	exotic	I		
Family: Fabaceae (pea)					
Abrus precatorius	rosary pea	exotic	I		
Acacia auriculiformis	earleaf acacia	exotic	I		
Albizia lebbeck	woman's tongue	exotic	I		

Appendix B: Plant Sightings at Powell Creek Preserve (continued)

Scientific Name	Common Name	Native Status	EPPC	FDA	IRC
Family: Fabaceae (pea)					
Chamaecrista fasciculata	partridge pea	native			
Crotalaria ssp.	rattlebox	unknown			
Galactia elliottii	Elliot's milk pea	native			
Indigofera hirsuta	hairy indigo	exotic	I		
Leucaena leucocephala	white leadtree	exotic	II		
Sesbania punicea	rattlebox	exotic	II		
Family: Fagaceae (beech)					
Enterolobium cyclocarpum	monkey pod	exotic			
Quercus laurifolia	laurel oak	native			
Quercus minima	dwarf live oak	native			R
Quercus myrtifolia	myrtle oak	native			
Quercus virginiana	live oak	native			
Family: Lamiaceae (mint)					
Callicarpa americana	American beautyberry	native			
Clerodendrum indicum	skyrocket	exotic			
Family: Lauraceae (laurel)					
Cassytha filiformis	love vine	native			
Persea palustris	swamp bay	native			
Family: Lentibulariaceae (bladderwort)					
Utricularia subulata	zigzag bladderwort	native			
Family: Malvaceae (mallow)					
Malvaviscus penduliflorus	turkscap mallow	exotic			
Melochia corchorifolia	chocolateweed	exotic			
Urena lobata	Caesar's weed	exotic	II		
Family: Melastomataceae (melastome)					
Rhexia mariana	pale meadowbeauty	native			
Family: Moraceae (mulberry)					
Ficus aurea	strangler fig	native			
Family: Myricaceae (bayberry)					
Myrica cerifera	wax myrtle	native			
Family: Myrtaceae (myrtle)					
Eugenia uniflora	Surinam cherry	exotic	I		
Melaleuca quinquenervia	punktree	exotic	I		
Psidium guajava	strawberry guava	exotic	I		
Syzygium cumini	Java plum	exotic	I		
Family: Oleaceae (olive)					
Fraxinus caroliniana	pop ash	native			
Family: Onagraceae (eveningprimrose)					
Ludwigia octovalvis	Mexican primrosewillow	native			
Ludwigia peruviana	Peruvian primrosewillow	exotic			
Family: Passifloraceae (passionflower)					
Passiflora incarnata	purple passionflower	native			
Family: Phytolaccaceae (pokeweed)					
Phytolacca americana	American pokeweed	native			
Family: Polygonaceae (buckwheat)					
Antigonon leptopus	coral vine	exotic	II		
Polygonella polygama var. brachystachya	October flower	native			I

Appendix B: Plant Sightings at Powell Creek Preserve (continued)

Scientific Name	Common Name	Native Status	EPPC	FDA	IRC
Family: Proteaceae (protea)					
Grevillea robusta	silkoak	exotic			
Family: Rosaceae (rose)					
Eriobotrya japonica	loquat	exotic			
Family: Rubiaceae (madder)					
Cephalanthus occidentalis	buttonbush	native			
Psychotria nervosa	wild coffee	native			
Psychotria sulzneri	shortleaf wild coffee	native			
Family: Rutaceae (citrus)					
Citrus sinensis	orange tree	exotic			
Family: Salicaceae (willow)					
Salix caroliniana	Carolina willow	native			
Family: Sapindaceae (soapberry)					
Acer rubrum	red maple	native			
Cupaniopsis anacardioides	carrotwood	exotic	I		
Family: Solanaceae (nightshade)					
Solanum capsicoides	soda apple	native			
Solanum diphyllum	twoleaf nightshade	exotic	II		
Solanum tampicense	aquatic soda apple	exotic	I		
Solanum viarum	tropical soda apple	exotic	I		
Family: Umbelliferae					
Hydrocotyle spp.	dollarweed	exotic			
Family: Urticaceae (nettle)					
Boehmeria cylindrica	false nettle	native			
Family: Verbenaceae (vervain)					
Lantana camara	lantana	exotic	I		
Phyla ssp.	fogfruit	unknown			
Family: Veronicaceae (speedwell)					
Bacopa monnieri	smooth water-hyssops	native			
Family: Vitaceae (grape)					
Parthenocissus quinquefolia	Virginia creeper	native			
Vitis aestivalis	summer grape	native			
Vitis rotundifolia	wild grape vine, muscadine	native			

Florida EPPC Status (Exotic Pest Plant Council)
I = species that are invading and disrupting native plant communities
II = species that have shown a potential to disrupt native plant communities

FDA (Florida Department of Agriculture and Consumer Services)
E = Endangered

IRC (Institute for Regional Conservation)
I = Imperiled
R = Rare

Appendix C: Wildlife Sightings

Appendix C: Wildlife Sightings at Powell Creek Preserve

Scientific Name	Common Name	Designated Status FWC	FWS
BIRDS			
Family: Ardeidae (herons, egrets, bitterns)			
Ardea herodius	great blue heron		
Butorides virescens	green heron		
Family: Cathartidae (new world vultures)			
Cathartes aura	turkey vulture		
Family: Columbidae (pigeons and doves)			
Zenaida macroura	mourning dove		
Family: Picidae (woodpeckers)			
Melanerpes carolinus	red-bellied woodpecker		
Family: Tyrannidae (tryant flycatchers)			
Sayornis phoebe	eastern phoebe		
Family: Sylviidae			
Subfamily: Polioptilinae (gnatcatchers)			
Poloiptila caerulea	blue-gray gnatcatcher		
Family: Turdidae (thrushes)			
Turdus migratorius	American robin		
Catharus guttatus	hermit thrush		
Family: Mimidae (mockingbirds and thrashers)			
Dumetella carolinensis	gray catbird		
Mimus polyglottos	northern mockingbird		
Family: Corvidae (crows, jays, etc.)			
Cyanocitta cristata	blue jay		
Family: Vireonidae (vireos)			
Vireo olivaceus	red-eyed vireo		
Family: Parulidae (wood-warblers)			
Dendroica dominica	yellow-throated warbler		
Dendroica coronata	yellow-rumped warbler		
Dendroica discolor	prairie warbler		
Family: Picideae (woodpeckers)			
Dryocopus pileatus	pileated woodpecker		
Family: Thraupidae (tanagers)			
Piranga rubra	summer tanger		
Families: Fringillidae, Emberizidae, Cardinalidae (grosbeaks, finches, sparrows, buntings)			
Cardinalis cardinalis	northern cardinal		
REPTILES			
Family: Testudinidae (gopher tortoises)			
Gopherus polyphemus	gopher tortoise	SSC	
Family: Hylidae (treefrogs)			
Osteopilus septentrionalis	Cuban treefrog *		
Family: Polychrotidae (anoles)			
Anolis carolinensis	green anole		
Anolis sagrei	brown anole *		
Family: Colubridae (colubrids)			
Coluber constrictor priapus	southern black racer		

Appendix C: Wildlife Sightings at Powell Creek Preserve (continued)

Scientific Name	Common Name	Designated Status FWC	FWS
Family: Viperaceae (vipers)			
Subfamily: Crotalinae (pit vipers)			
Crotalus adamanteus	eastern diamondback rattlesnake		
MAMMALS			
Family: Felidae (cats)			
Lynx rufus	bobcat		
Family: Suidae (pigs)			
Sus scrofa	feral pig *		
Family:Sciuridae (squirrels)			
Sciurus carolinensis	eastern gray squirrel		
Family: Leporidae (rabbits)			
Sylvilagus floridanus	eastern cottontail		
SNAILS			
Family: Ampullariidae (aka: Pillidae)			
Pomaceae canaliculata	channel apple snail *		

KEY:

FWC= Florida Fish & Wildlife Conservation Commission
FWS= U.S. Fish & Wildlife Service

E= Endangered
T= Threatened
SSC= Species of Special Concern

*** = Non-native**

Appendix D: Photographs of Powell Creek

Large oak tree in channel of Powell Creek (photo taken in 2001).

Powell Creek after removal of large oak (photo taken in 2001)

Appendix E: Proposed Wetland Erosion and Maintenance Plans

Powell Creek Preserve
Proposed Wetland Erosion and Maintenance

The small cattail wetland located in the southeast corner of the Preserve along Hart Rd. is in need of maintenance along its south bank. The problematic bank is contiguous to private property within the Carriage Village community; Mr. and Mrs. Myron Martin currently own the adjacent parcel.

The wetland bank is presently too steep and when water flows from the Martin's property north into the wetland and into the roadside ditch, it causes the Martin's yard to erode. According to the property's survey, the portion of their yard that is eroding is actually county property that they are slightly encroaching upon with their lawn and fence.

The following is proposed to resolve the erosion problem and at the same time rectify the fence encroachment:

1. Remove the existing chain like fence at the back of Martin's property,
2. Re-grade the eroding bank to a 6:1 or 8:1 slope towards the wetland and level the area where a new fence will be installed,
3. Sod this newly graded level area, and plant appropriate wetland plants on the sloped portion, such as *Spartina bakerii*, sand cord grass. See Table 1 below for a list of species to be planted.
4. Replace the section of chain like fence as close to the actual property boundary as possible with field fence and wooden posts connecting to the existing Preserve fence.
5. The intention of the level area is to be able to keep that area between the new fence and the wetland mowed as a firebreak.

Table 1: Species to be planted

Scientific Name	**Common Name**
Cephalanthus occidentalis	buttonbush
Viburnum obovatum	Walter's viburnum
Ilex cassine	dahoon holly
Sagittaria lancifolia	arrowhead
Pontederia cordata	pickerelweed
Spartina bakerii	cordgrass

Appendix F: Conservation Easement

37.50R

CONSERVATION EASEMENT

STATE OF FLORIDA

COUNTY OF LEE

2907893

KNOW ALL MEN BY THESE PRESENTS THAT for and in consideration of the issuance of State of Florida Department of Environmental Regulation permit number 361651385 to Manufactured Housing Associates II, a Florida Limited Partnership ("Grantor") on 12th of SEPTEMBER, 1990, Grantor has granted to the State of Florida Department of Environmental Regulation, 2269 Bay Street, Fort Myers, Florida ("Grantee"), a Conservation Easement in accordance with Section 704.06, Florida Statutes (1987), in and over the following described real property in Lee County, Florida:

OR2171 PG1079

RECORD VERIFIED - CHARLIE GREEN, CLERK
BY: G. SHERWOOD, D.C

ATTACHMENT "A"
INCORPORATED HEREIN BY REFERENCE
(Legal Description)

(The term Grantor as used herein shall include any successor or assignee of the Grantor, and the term Grantee as used herein shall include any successor or assignee of the Grantee.)

In accordance with Section 704.06, Florida Statutes (1987) and the terms of this easement, the following activities are prohibited on the above-described subject property:

1. Construction or placing of building, roads, signs, billboards or other advertising, utilities, or other structures on or above the ground;

2. Dumping or placing of soil or other substances or material as landfill, or dumping or placing of trash, waste, or unsightly or offensive materials;

3. Removal or destruction of trees, shrubs, or other significant vegetation with exception of nuisance and exotic plant species as required by Grantee;

4. Excavation, dredging, or removal of loam, peat, gravel, soil, rock or other material substance in such a manner as to adversely affect the surface;

5. Surface use except for purposes that permit the land or water area to remain predominantly in its natural condition;

6. Activities materially detrimental to drainage, flood control, water conservation, erosion control, soil conservation, or fish and wildlife habitat preservation;

7. Acts or uses materially detrimental to such retention of land or water areas; and

8. Acts or uses materially detrimental to the preservation of the structural integrity or physical appearance of sites or properties of historical, architectural, archaeological or cultural significance.

Provided, however, that this easement does not preclude specific activities from being undertaken on the subject property as authorized pursuant to Department of Environmental Regulation Permit No. 361651385.

It is understood that the granting of this Conservation Easement entitles the Grantee, its staff or its authorized representatives to enter the above-described land in a reasonable manner and at reasonable times to assure compliance.

OR2174 PG4080

It is the purpose of this easement to assure that the lands subject to the easement will be maintained forever predominantly in the present natural vegetative and hydrologic condition existing at the time of execution of this conveyance. The Grantor on behalf of itself and its successors or assigns hereby agrees to bear all costs and liability relating to the operation and maintenance of the lands subject to the easement and does hereby indemnify and hold harmless the Grantee from same.

The Conservation Easement hereby granted and the obligation to maintain the land forever predominantly in the natural vegetative and hydrologic condition existing at the time of execution of the Conservation Easement shall run with the land and shall be binding upon the Grantor and its successors and assigns, and shall inure to the benefit of the Grantee and its successors and assigns.

The terms and conditions of this Conservation Easement may be enforced by the Grantee by injunctive relief and other appropriate available remedies and Grantor consents that venue for such enforcement actions shall lie exclusively in the Circuit Court of the 20th Judicial Circuit, in Lee County, Florida. Any costs incurred by the Grantee in enforcing this Conservation Easement, including reasonable attorney's fees and costs of restoration necessitated by a violation, provided the Grantee prevails in the enforcement action, shall be borne by Grantor or its successor or assigns. Any forbearance on behalf of the Grantee to exercise its rights in the event of the failure to comply with the provisions of this Conservation Easement shall not be deemed or construed to be

OR2174 PG4081

a waiver of the Grantee's rights hereunder in the event of any subsequent failure of the Grantor to comply.

In signing this Conservation Easement, the Grantor hereby acknowledges that there is no mortgage nor outstanding liens nor encumbrances on the property described in Attachment "A" which would have a materially negative impact on the Conservation Easement granted herein.

Manufactured Housing Associates II,
a Florida Limited Partnership,
Grantor

By: _____
Sidney J. Brown, General Partner

OR2174 PG4082

State of Maryland

County of Prince George's

On this 12th day of SEPTEMBER, 1990 before me, the undersigned, a Notary Public in and for the State of Maryland duly commissioned and sworn, personally appeared Sidney J. Brown to me known to be the person who executed the within and foregoing instrument and acknowledged to me that such he executed the same.

IN WITNESS WHEREOF, I hereunto set my hand and affixed my official seal the day and year first above written.

_____
Notary Public in and for the
State of Maryland

my commission expires 7-1-95

ATTACHMENT "A"
LEGAL DESCRIPTION
Page 1 of 4

OR2171 PG1083

EXHIBIT "A"

LEGAL DESCRIPTION
CONSERVATION EASEMENT 1

A CONSERVATION EASEMENT IN AND OVER A PART OF THE SOUTH HALF (S 1/2) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 36, TOWNSHIP 43 SOUTH, RANGE 24 EAST, LEE COUNTY, FLORIDA, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER (NW 1/4) OF SAID SECTION 36; THENCE S89°51'24"E (BASIS OF BEARING BEING FLORIDA STATE PLANE COORDINATE SYSTEM, WEST ZONE) ALONG THE SOUTH LINE OF AFORESAID NORTHWEST QUARTER (NW 1/4) FOR 100.00 FEET TO THE POINT OF BEGINNING OF THE HEREIN DESCRIBED EASEMENT; THENCE N00°22'56"W LEAVING SAID SOUTH LINE FOR 85.00 FEET; THENCE N89°37'04"E FOR 20.00 FEET; THENCE N00°22'56"W FOR 50.00 FEET; THENCE S89°37'04"W FOR 20.00 FEET; THENCE N00°22'56"W FOR 34.42 FEET; THENCE S78°38'14"E FOR 135.00 FEET; THENCE N72°07'04"E FOR 126.91 FEET; THENCE N44°42'08"E FOR 177.69 FEET; THENCE N44°06'03"E FOR 260.33 FEET TO A NON-TANGENT CURVE; THENCE EASTERLY ALONG THE ARC OF THE CURVE CONCAVE TO THE NORTH (RADIUS = 823.92 FEET, INTERIOR ANGLE = 3°19'27", CHORD BEARING AND DISTANCE = S69°23'41"E, 47.80 FEET) FOR 47.80 FEET TO A NON-TANGENT LINE; THENCE S33°38'55"W FOR 108.14 FEET; THENCE S72°58'33"E FOR 119.75 FEET; THENCE S80°59'37"E FOR 134.96 FEET; THENCE S5°12'02"E FOR 94.39 FEET; THENCE N89°51'24"W FOR 313.04 FEET; THENCE N35°51'16"W FOR 23.78 FEET; THENCE N79°19'48"W FOR 79.77 FEET; THENCE S40°35'55"W FOR 96.19 FEET; THENCE S60°37'34"W FOR 149.11 FEET; THENCE S27°35'11"E FOR 143.66 FEET TO THE AFORESAID SOUTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 36; THENCE N89°51'24"W ALONG SAID SOUTH LINE FOR 267.98 FEET TO THE POINT OF BEGINNING. CONTAINING 2.26 ACRES, MORE OR LESS.

LEGAL DESCRIPTION WITH
ACCOMPANYING SKETCH
SEE SHEET 4 OF 4 FOR SKETCH
THIS IS NOT A FIELD SURVEY
9007003 · 7-6-90 · MW MORRIS & ASSOC.

SHEET 1 OF 4.

Deni Associates
6241 ARC WAY • FORT MYERS, FLORIDA 33912 • (813) 275-8875
GEODETIC & CADASTRAL SURVEYS • AERIAL MAPPING CONTROL • PRECISION & ENGINEERING SURVEYS

OR2174 PG1084

EXHIBIT "A"

LEGAL DESCRIPTION
CONSERVATION EASEMENT 2

A CONSERVATION EASEMENT IN AND OVER A PART OF THE SOUTH HALF (S 1/2) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 36, TOWNSHIP 43 SOUTH, RANGE 24 EAST, LEE COUNTY, FLORIDA, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER (NW 1/4) OF SAID SECTION 36; THENCE S89°51'24"E (BASIS OF BEARING BEING FLORIDA STATE PLANE COORDINATE SYSTEM, WEST ZONE) ALONG THE SOUTH LINE OF AFORESAID NORTHWEST QUARTER (NW 1/4) FOR 1406.36 FEET; THENCE N16°58'18"E LEAVING SAID SOUTH LINE FOR 115.05 FEET TO A POINT OF CURVATURE; THENCE NORTHWESTERLY ALONG THE ARC OF THE CURVE CONCAVE TO THE SOUTHWEST (RADIUS = 155.00 FEET, INTERIOR ANGLE = 91°40'23", CHORD BEARING AND DISTANCE = N28°51'54"W, 222.38 FEET) FOR 248.00 FEET TO THE POINT OF BEGINNING OF THE HEREIN DESCRIBED EASEMENT; THENCE CONTINUING WESTERLY ALONG THE ARC OF SAID CURVE (INTERIOR ANGLE = 41°04'35", CHORD BEARING AND DISTANCE = S84°45'37"W, 108.76 FEET) FOR 111.12 FEET TO A POINT OF TANGENCY; THENCE S64°13'19"W FOR 124.46 FEET; THENCE N89°51'24"W FOR 172.69 FEET; THENCE N5°12'02"W FOR 90.20 FEET; THENCE N85°20'49"E FOR 117.50 FEET TO A POINT OF CURVATURE; THENCE EASTERLY ALONG THE ARC OF THE CURVE CONCAVE TO THE NORTH (RADIUS = 1050.55 FEET, INTERIOR ANGLE = 14°45'31", CHORD BEARING AND DISTANCE = N78°58'04"E, 269.86 FEET) FOR 270.61 FEET TO A NON-TANGENT LINE; THENCE S12°37'07"E FOR 87.44 FEET TO THE POINT OF BEGINNING. CONTAINING 0.77 ACRE, MORE OR LESS.

LEGAL DESCRIPTION WITH
ACCOMPANYING SKETCH
SEE SHEET 4 OF 4 FOR SKETCH
THIS IS NOT A FIELD SURVEY

9007003 · 7-6-90 · MW MORRIS & ASSOC.

Deni Associates
6241 ARC WAY • FORT MYERS, FLORIDA 33912 • (813) 275-8875
GEODETIC & CADASTRAL SURVEYS • AERIAL MAPPING CONTROL • PRECISION & ENGINEERING SURVEYS

ORB 1714 Pg 1085

EXHIBIT "A"

LEGAL DESCRIPTION
CONSERVATION EASEMENT 3

A CONSERVATION EASEMENT IN AND OVER A PART OF THE SOUTH HALF (S 1/2) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 36, TOWNSHIP 43 SOUTH, RANGE 24 EAST, LEE COUNTY, FLORIDA, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER (NW 1/4) OF SAID SECTION 36; THENCE N00°22'56"W (BASIS OF BEARING BEING FLORIDA STATE PLANE COORDINATE SYSTEM, WEST ZONE) ALONG THE WEST LINE OF AFORESAID NORTHWEST QUARTER (NW 1/4) FOR 1320.26 FEET TO THE NORTH LINE OF THE SOUTH HALF (S 1/2) OF SAID NORTHWEST QUARTER (NW 1/4); THENCE S89°51'28"E ALONG AFORESAID NORTH LINE FOR 1045.38 FEET TO THE POINT OF BEGINNING OF THE HEREIN DESCRIBED EASEMENT; THENCE S89°51'28"E CONTINUING ALONG SAID NORTH LINE FOR 541.56 FEET; THENCE S2°36'15"W LEAVING SAID NORTH LINE FOR 24.79 FEET; THENCE S66°33'08"W FOR 33.07 FEET; THENCE S53°04'43"W FOR 90.38 FEET; THENCE S8°18'06"W FOR 91.55 FEET; THENCE S31°50'54"E FOR 88.99 FEET; THENCE S33°33'40"E FOR 93.82 FEET; THENCE S1°29'14"W FOR 69.00 FEET; THENCE S52°36'50"W FOR 212.39 FEET; THENCE N55°45'26"W FOR 208.88 FEET; THENCE S74°19'47"W FOR 141.73 FEET; THENCE S56°23'59"W FOR 67.00 FEET; THENCE S51°31'41"W FOR 214.81 FEET; THENCE S45°52'37"W FOR 71.70 FEET; THENCE S20°14'31"W FOR 72.58 FEET; THENCE S15°33'06"W FOR 62.94 FEET TO A NON-TANGENT CURVE; THENCE WESTERLY ALONG THE ARC OF THE CURVE CONCAVE TO THE NORTH (RADIUS = 773.92 FEET, INTERIOR ANGLE = 5°59'59", CHORD BEARING AND DISTANCE = N71°26'54"W, 81.01 FEET) FOR 81.04 FEET TO A NON-TANGENT LINE; THENCE N16°02'05"E FOR 296.64 FEET; THENCE N34°00'02"E FOR 249.82 FEET; THENCE N52°00'18"E FOR 145.81 FEET TO A POINT OF CURVATURE; THENCE NORTHEASTERLY ALONG THE ARC OF THE CURVE CONCAVE TO THE NORTHWEST (RADIUS = 55.00 FEET, INTERIOR ANGLE = 54°41'26", CHORD BEARING AND DISTANCE = N24°39'35"E, 50.53 FEET) FOR 52.50 FEET TO A POINT OF TANGENCY; THENCE N2°41'08"W FOR 152.47 FEET TO THE POINT OF BEGINNING. CONTAINING 7.15 ACRES, MORE OR LESS.

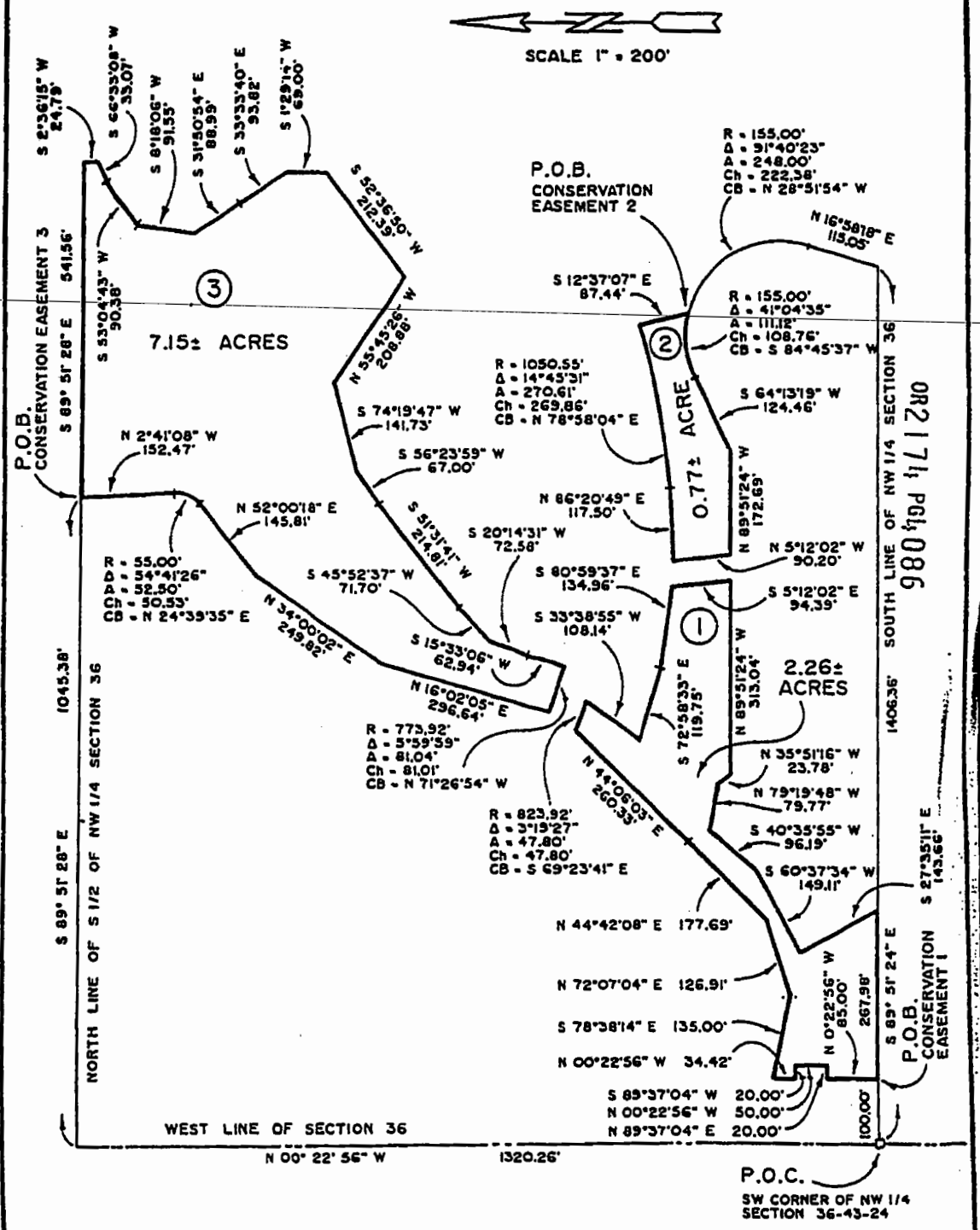
LEGAL DESCRIPTION WITH
ACCOMPANYING SKETCH
SEE SHEET 4 OF 4 FOR SKETCH
THIS IS NOT A FIELD SURVEY

9007003 · 7-6-90 · MW MORRIS & ASSOC.

Deni Associates
6241 ARC WAY • FORT MYERS, FLORIDA 33912 • (813) 275-8875
GEODETIC & CADASTRAL SURVEYS • AERIAL MAPPING CONTROL • PRECISION & ENGINEERING SURVEYS

ATTACHMENT "A"
LEGAL DESCRIPTION
Page 4 of 4

CHARLIE GR EE CTY FL
90 SEP 13 PM 4:45



SKETCH OF A LEGAL DESCRIPTION
THIS IS NOT A FIELD SURVEY

SHEET 4 OF 4

7-6-90 9007003 M. W. MORRIS & ASSOC.

CERTIFICATE

I HEREBY CERTIFY THAT THE ABOVE LEGAL DESCRIPTION WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT BOTH THE DESCRIPTION AND THE ACCOMPANYING SKETCH ARE ACCURATE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

Diane S Woods

DIANE S. WOODS
REGISTRATION No. 4214

PROFESSIONAL LAND SURVEYOR
STATE OF FLORIDA

VALID ONLY WITH EMBOSSED SEAL

Deni Associates
6241 ARC WAY • FORT MYERS, FLORIDA 33912 • (813) 275-8875

Appendix G: Projected Costs and Funding Sources

Appendix G: Projected Costs and Funding Sources Table

Resource Enhancement and Protection

Item	Possible Funding Source	Estimated Costs
Initial exotic plant control	C20/20, SFWMD	$104,000
Create fire breaks	C20/20, DOF	$2,000
Mechanical brush reduction		varies by method
Fence installation		$10,400
Wetland Enhancement		$26,000

Signage

Item	Possible Funding Source	Estimated Costs
Informational Kiosk	C20/20	$4,000
Educational Signs	C20/20	$510
Boundary Signs	C20/20	$350

TOTAL COST ESTIMATE **$147,260**

Site Management and Maintenance

Item	Possible Funding Source	Estimated Costs
Exotic Plant Control	LC DNR, C20/20	$15,000
Prescribed Fire Regime	LC P&R, C20/20	In-house
Mow trails	C20/20	In-house
Fence Repairs	C20/20	$500

Yearly Maintenance Estimate **$15,500**

All costs are rough estimates based on information currently available.
Every effort will be made to not exceed this budget by more than 10%.