South Florida Water Management District
Land Stewardship Division
Save Our Rivers Program

DRAFT

DuPuis Management Area
General Management Plan
2003-2007

(Previous plans dated 1990 and 1995)

November, 2003

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AGENCY SIGNATURE PAGE

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General Management Plan
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November, 2003

This Five-year General Management Plan for the DuPuis Management Area, located in the South Florida Water Management District in Palm Beach and Martin Counties, was presented and approved by the District Governing Board on this _____day of _____ 2003.

_____ _____
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Chairperson, Governing Board
South Florida Water Management District

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Henry Dean **Date**
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South Florida Water Management District

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Director, Land Stewardship Division
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1. Executive Summary

This document compiles important management information concerning the DuPuis Management Area (DMA) and was written to comply with District policy 5.001 that requires development of general management plans for each designated Save Our Rivers (SOR) project. This plan lists management goals and objectives, provides historic and current site information, and describes specific management issues and activities relating to natural resources, public use, and project administration for the period 2003 through 2007.

The DuPuis Management Area was purchased by the District in 1986 through the SOR land acquisition program. Prior to District acquisition, the area was known as the White Belt Ranch and was operated as a livestock ranch. Area hydrology and vegetation had been significantly altered through ranch activities and from surrounding land developments. Initial District management involved the inventory and assessment of the area's vegetation and wildlife (David, 1991) and the subsequent implementation of a water resource protection and enhancement plan. In 1989 the area was opened to public use with the advent of a limited hunting program.

The management guidelines listed in this plan adhere to founding SOR legislation and District Land Stewardship Program (LSP) policy 05.001 that directs management to conserve and protect water resources, protect or restore the natural state and condition of natural and historic resources, and provide compatible public use. The South Florida Water Management District (District) cooperatively manages DuPuis with the Florida Fish and Wildlife Conservation Commission (FWC). Past management has included the District, the FWC and, from 1990-1995, the Florida Division of Forestry.

Natural resource management on the DMA includes the maintenance of natural vegetative communities; wildlife management; and the protection of rare, threatened, and endangered species. Prescribed fire, vegetation management, and forest management are used to preserve, protect or enhance natural resources. Past District management projects concentrated on the area-wide restoration of an improved seasonal hydroperiod, the initiation of an exotic vegetation control program, and the reintroduction of fire to unburned native habitats. Current natural resource management focuses on maintenance and monitoring of the area's restored hydroperiod, the restoration of natural structure to impacted forest communities through shrub control and limited timber thinning, the maintenance of a regular fire regime and exotic plant control program, and the reintroduction of the federally endangered red-cockaded woodpecker.

Cultural resource protection and management is an important goal of District stewardship on the DMA. The Land Stewardship Program has assisted the Florida Division of Historical Resources to complete investigations of the DMA historical sites as required by Chapter 276, Florida Statues. The DMA contains several important Native American habitual sites that are documented in state records and protected through management activities.

Wildlife management on the DMA is coordinated between the District and the FWC through a contractual agreement (Contract C-2111). FWC management includes wildlife inventories and monitoring, game harvests, law enforcement, habitat improvement measures, and listed species protection. Resource protection is accomplished through regular FWC law enforcement patrols, controlled public access through specified gated entrances, and maintenance of complete perimeter fencing. Boundary posting and public information signage is used to encourage proper public use.

A public use program was initiated shortly after property acquisition and includes a variety of recreational activities. The property provides extensive hiking, equestrian, hunting, camping, and day use opportunities to a growing regional population. A daily-use fee is required to use the DMA. A visitor's center is being developed at the DuPuis office to provide educational programs and information to the public. The District publishes and distributes a *Public Use Guide to Land Management Areas* for property users that defines rules and regulations, location of facilities, and recreational opportunities. Rules pertinent to the DMA including hunting activities are identified in the *DuPuis Regulations Summary and Area Map* published and distributed by the FWC.

The DMA provides a field office for nine LSP staff, one Vegetation Management representative, one FWC biologist, and one part-time contracted education specialist assigned to the property. Staff is supplemented through the use of area volunteers and through contractual agreements with other entities. Planning and budgeting of management activities are conducted annually and produce a written budget and annual work plan. DuPuis infrastructure includes 20 miles of graded roads, public campgrounds, trails, public entrances, an office, and an equipment compound. DuPuis also serves as the District-wide base for land stewardship operation and the main storage facility for the majority of LSP equipment.

2. Management Plan Purpose

The purpose of this general management plan is to consolidate relevant information about the DMA including goals and objectives, past and present land uses, resource data, restoration and management needs, public use programs, and administrative duties to guide management actions for the period 2003 to 2007. Management activities described in this plan are based on requirements and directives of legislative statutes and established District policies. District policy 05.001 requires that general management plans be developed for each designated Save Our Rivers project. General management plans are scheduled for review and revision every five years by the District and the Florida Fish and Wildlife Conservation Commission (FWC). The original DuPuis plan was authored in 1990 by the Florida Division of Forestry in cooperation with the District and FWC. The plan was updated in 1995 by the District and FWC.

District policy 05.0011 states that the Land Stewardship Program's (LSP) mission is to provide natural resource protection and management while allowing appropriate recreational use on designated public lands. This mission statement together with requirements set forth in Florida Statutes 373.139 and 373.1391 provide three primary goals for the LSP:

- Conserve and protect water resources
- Protect and/or restore land to its natural state and condition
- Provide public use

To accomplish these goals, the LSP performs six major functions:
- Strategic, project, and management planning
- Operation and maintenance of land resources
- Development of public use programs
- Development of restoration projects
- Evaluation of management activities
- Administration of land management service contracts

2.1 DuPuis Management Area Goals and Objectives

LSP functions are incorporated in specific DMA goals and objectives for the period of this management plan:

Goal 1: Manage natural communities and modified habitats to protect and enhance water, floral, and faunal resources.

Objectives:

- Maintain an appropriate hydroperiod through maintenance and modification of area water control structures as needed.
- Continue the regular application of fire through a well-planned and documented prescribed burning program. Prescribe burn 7,000 acres per year with at least 50% burned during the months of May through August.
- Continue an aggressive, integrated exotic plant management program. At least 10,000 acres will be surveyed per year and exotics treated as necessary. Treatments will be documented and coordinated with other management activities.
- Continue understory restoration by using heavy-duty shredding and mowing equipment to open up areas of overgrown saw palmetto and wax myrtle. District staff and contractors will treat 500 acres each year.
- Continue appropriate forest management activities to enhance natural communities. Contract the thinning of 1000 acres of over-dense pine in FY 2004 using established forest management guidelines. Evaluate the need for additional forest thinning (including cabbage palms) and develop appropriate plans for FY's 2005-06.
- Continue to reforest deteriorated areas of the old citrus grove and cleared sections north of SR76 with slash pine.
- Continue and enhance the monitoring and evaluation of restoration activities on area vegetation and wildlife.
- Work with the FWC to manage and enhance area wildlife. Continue to work toward the reintroduction of the federally endangered red-cockaded woodpecker. In FY 2003, request birds for translocation from the Fish and Wildlife Service.
- Provide resource protection through partnership with the FWC. Review enhanced patrol activities biweekly and review program annually.

Goal 2: Provide resource-based public use opportunities.

Objectives:

- Maintain public use program focus and direction through continued coordination with the FWC and through quarterly meetings with the DuPuis Public Use Advisory Council.
- Maintain present public-use improvements (roads, signs, entrances, campgrounds, structures) using a combination of District maintenance, construction contracts, and user group involvement.
- Complete a self guided auto tour on the main grade in FY2003.
- Complete assessment and planning, and begin equestrian campground improvements in FY2004.
- Complete the DuPuis Visitor Center in FY 2003 and coordinate educational program development with the Center for Environmental Studies.
- Develop a short trail with boardwalk off DuPuis Grade in FY 2005.

3. Introduction and Site History

In 1981, the Florida Legislature established the Save Our Rivers (SOR) Program for the five water management districts to acquire environmentally sensitive land. The legislation (373.59 F.S.) produced the Water Management Lands Trust Fund and empowered the water management districts to acquire lands needed to manage, protect, and conserve the state's water resources.

The District manages over 250,000 acres through the LSP. As steward of District natural areas, the LSP provides natural resource protection and management while allowing compatible recreational use. Management and use of land acquired by the District under SOR and Preservation 2000 must satisfy several requirements in Florida statutes. The most significant of these is set forth in Section 373.59(4) (a) stating that money from the Water Management Lands Trust Fund should be used to acquire lands for water management, water supply, and the conservation and protection of water resources. Once lands are acquired, they are to be managed and maintained in an environmentally acceptable manner and in such a way as to restore and protect their natural state and condition. Districts may make certain capital improvements such as fencing, signs, fire lanes, access roads and trails, and provide minimum public accommodations such as primitive campsites, garbage receptacles, and toilets. In addition, habitat management such as control of exotic species, controlled burning, habitat inventory and restoration, and law enforcement may be conducted. All lands acquired under these provisions are to be used for general recreational purposes, unless such activities are incompatible with the purposes for which the land was acquired. The District is also encouraged to use volunteers and enter agreements with other governmental agencies to provide cost-effective land management.

The District purchased the DMA in 1986 through the SOR program. The DMA comprises 8,830 ha (21,875 acres) located in northwest Palm Beach and southwest Martin counties (Figures 1 and 2). Prior to acquisition, the property was managed as the White Belt Ranch for the production of beef cattle, sheep, and goats. Ranch improvements included the construction of an extensive interior network of drainage ditches and the planting of exotic pasture grasses. As part of the initial environmental assessment, the District completed a wetland and hydroperiod restoration plan. Subsequently, a hydrologic restoration program was initiated to seasonally re-flood historic wetland areas. The LSP also developed a burn program to reintroduce regular fire to the property including those portions where fire had been suppressed. The District initiated exotic plant control, forest management, upland restoration, and development of an environmental education center.

Lead management responsibility for the DMA has changed over the course of public ownership. From acquisition until 1990, the District managed the DMA jointly with the Florida Fish and Wildlife Conservation Commission (FWC). During this time, initial resource management, restoration activities, and public use programs were started. In 1990, the Florida Division of Forestry (DOF) began a 5-year contract as lead manager of the area with the FWC and the District as cooperative managers. During this time the area was operated as the DuPuis State Forest. Continuation of this arrangement was contingent upon the Florida Legislature authorizing the necessary funds for DOF to conduct management beyond the contract expiration. With the Legislature's failure to authorize funding in 1995, the District solicited proposals to manage the property from the public/private sector. A cooperative management proposal submitted by the LSP and FWC was selected by the review committee and is currently in place.

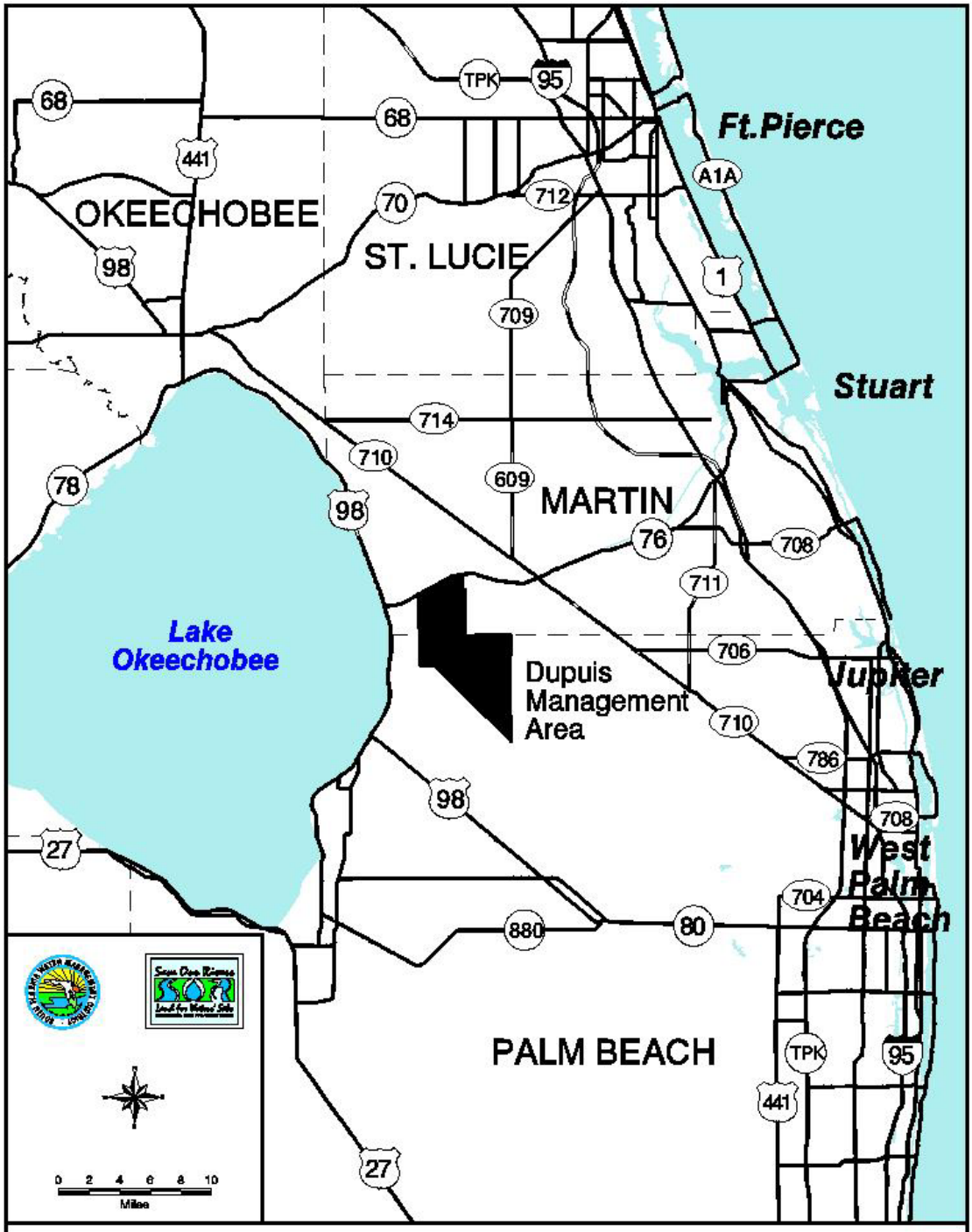

Figure 1. General Location of the DuPuis Management Area

Drawn by P.S.Ellis - 03/11/98
Revised by P.S.Ellis - 09/04/03

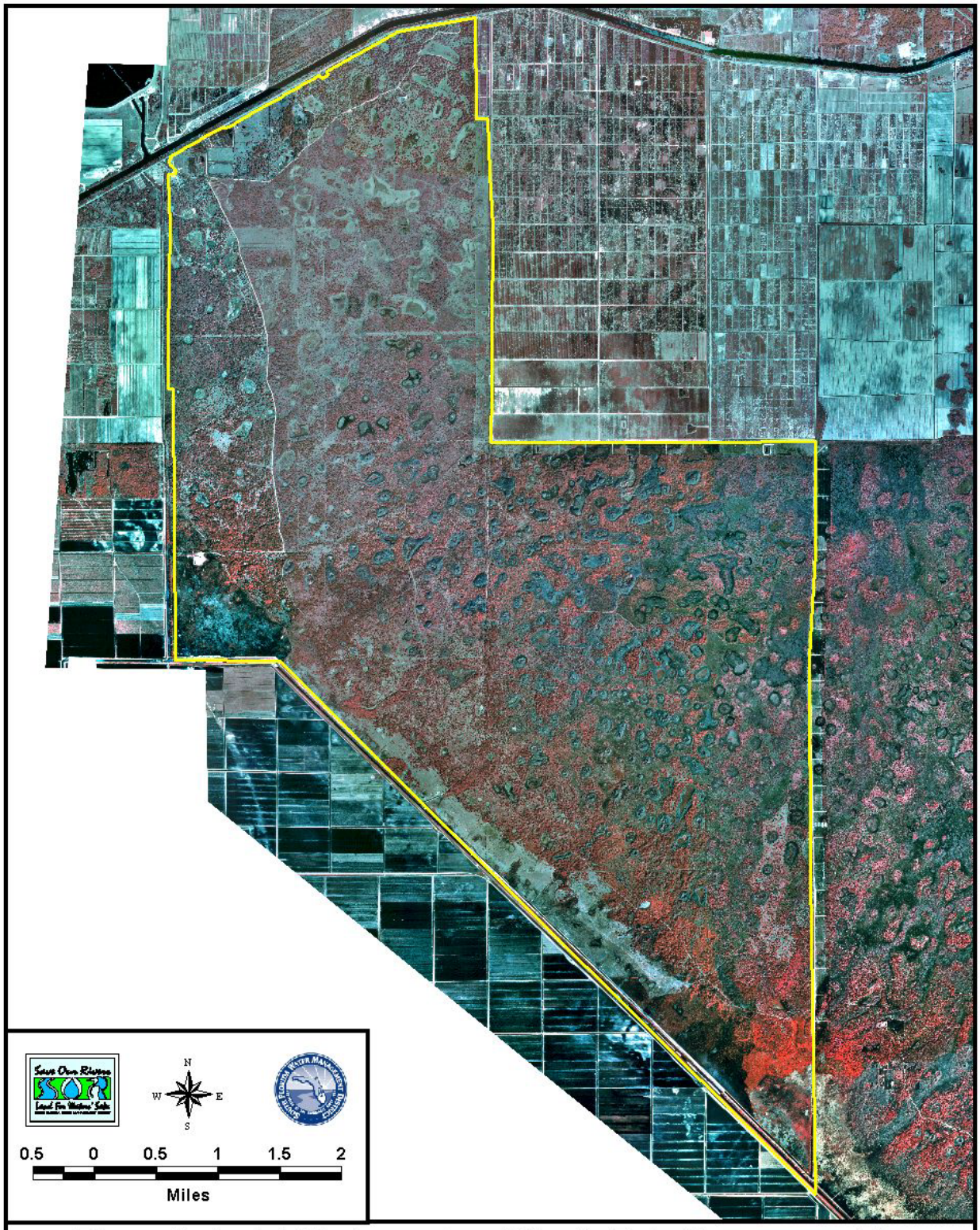

Figure 2. Aerial Photography of the DuPuis Management Area
(With 1994-95 USGS National Aerial Photography Program Infrared Photography)

4. Resource Inventory

Policy 05.00113.6 Inventories of natural and historic resources shall be performed to provide information for effective land management planning, natural community maintenance, and ecological restoration.

Vegetation and vertebrate species are inventoried and natural communities are mapped by either LSP personnel or contracted specialists (Figure 3). This data is made available to land managers for planning purposes. Archaeological and historic sites considered significant are subject to inventories by contracted archeologists. Inventory data is on file within the Planning Section of the LSP and non-sensitive data available for review on the District's computer network server. LSP shares natural areas and species data with the Florida Natural Areas Inventory (FNAI) through a Memorandum of Understanding (MOU).

Floral and faunal inventories of the DMA were included in the environmental assessment initiated shortly after acquisition (David, 1991). Additional surveys have been completed with species' lists being updated regularly (Appendices AA-EE). Archaeological inventories were conducted by the Department of State, Division of Historical Resources and described in subsequent reports (section 4.5).

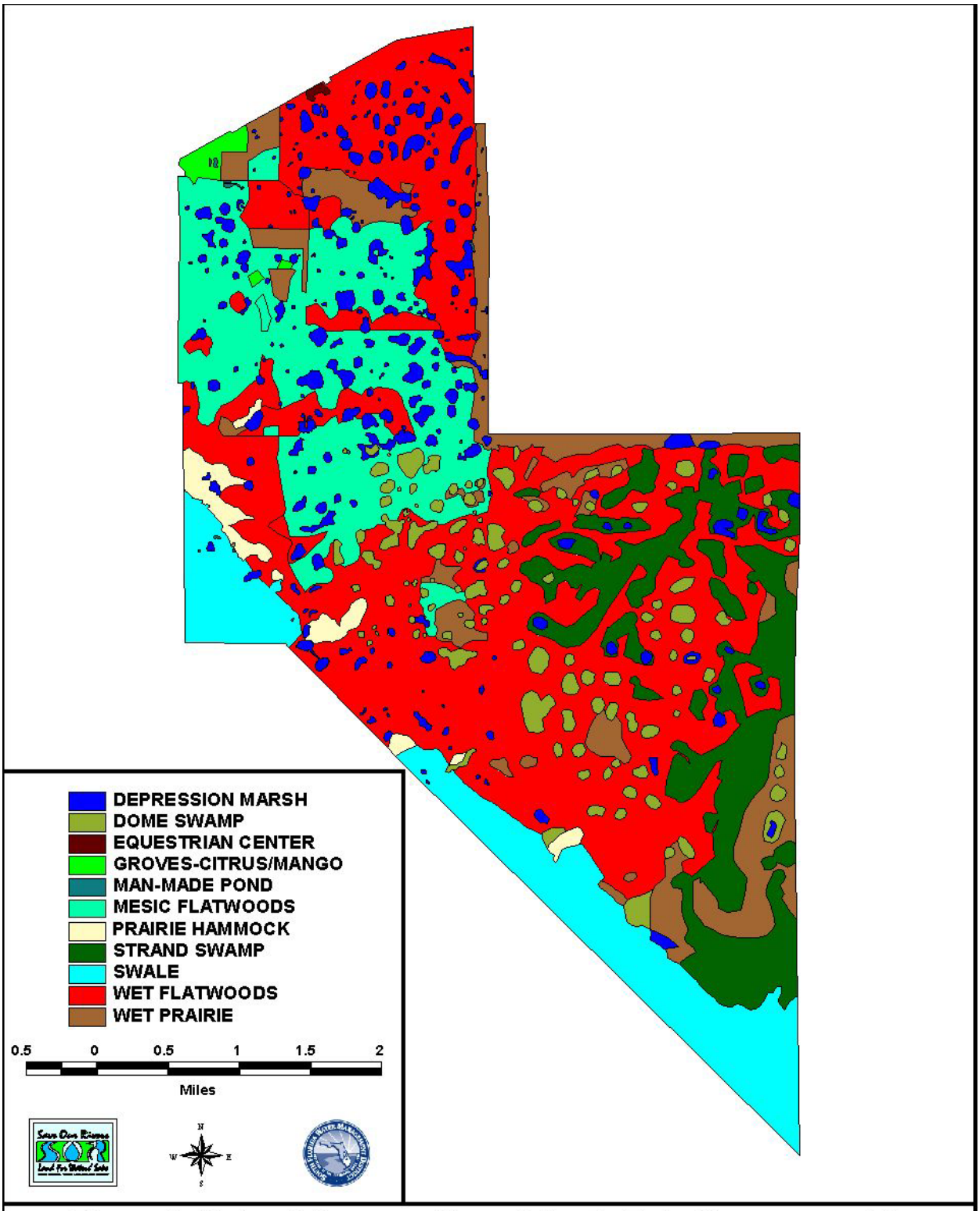

Figure 3. Natural Communities of the DuPuis Management Area (Per Florida Natural Areas Inventory Classification System)

4.1 Hydrology

Policy 05.00111 The basis for the LSP is the protection and management of natural hydrologic resources.

In general, relief on the DMA is slight with ground elevations ranging between 23 and 25 feet National Geodetic Vertical Datum (NGVD) over most of the property. Elevation gradually declines from northeast to southwest (Figure 4). Overland sheet flow on the property occurs in a south-southwest direction through a connected series of wet prairie, marsh and cypress wetlands (Figure 5). Wetlands may be inundated for long periods, beginning with the wet season. The greatest change in elevation occurs in the L-8 marsh where elevation declines from 20 ft at the treeline to less than 15 ft at several locations near the canal levee. From the treeline, elevation increases gradually reaching 24 to 25 ft in the north and northeast sections of the property.

Elevations of pine flatwood communities in the Martin County portion approximate 25 ft with slight declines to 23-24 ft at the west property boundary. Broad leaf marsh and wet prairie depressions occur between the elevations of 20-23 ft, with the cypress dome centers representing the lowest elevations (20-21 ft). In the Palm Beach County portion, pine flatwoods and wet prairie communities fluctuate between 24 and 25 ft with cypress domes and strands occurring at elevations between 20 and 23 ft. Elevations decline to the southwest towards the L-8 marsh where elevations range from 15 ft to 19 ft.

Over the years, three off-site developments had major impacts on area hydrology (Figure 6). In the 1920s, the St. Lucie Canal (C-44) was dredged parallel to the property's northern boundary completely severing historic inflows from the north while providing a means of increased offsite drainage. Along the southern boundary, the L-8 canal was completed in the early 1950s facilitating additional drainage. In the 1970s a canal and elevated road along the east boundary stopped historic inflows from the Corbett Management Area. During ranch development, an extensive network of interior canals and ditches was constructed that significantly decreased surface water retention and increased drainage offsite. One of the District's primary goals was to complete a hydroperiod restoration plan to reverse overdrainage and re-establish wetland structure and function.

4.2 Soils and Minerals

Soil Types

There are four distinct soil categories within the DMA as defined by the Natural Soil Landscape Positions (NSLP) soil classification system: flatwoods soils, flat soils, sand depression soils, and muck depression soils (Figure 7). The NSLP is a classification of 909 map units from 16 counties within District boundaries. The soil classification system was developed cooperatively by the District and the Natural Resources Conservation Service, formerly known as the Soil Conservation Service. The NSLP groups South Florida soils into 12 categories based on hydrology and soil morphology that reflect the local relative topography, hydrology, and vegetation of the area. Soil classification descriptions, vegetation associations, soils classification map and data files of NSLP can be accessed from http://glacier.sfwmd.gov:80/org/pld/proj/wetcons/nslp/nslp_data.htm

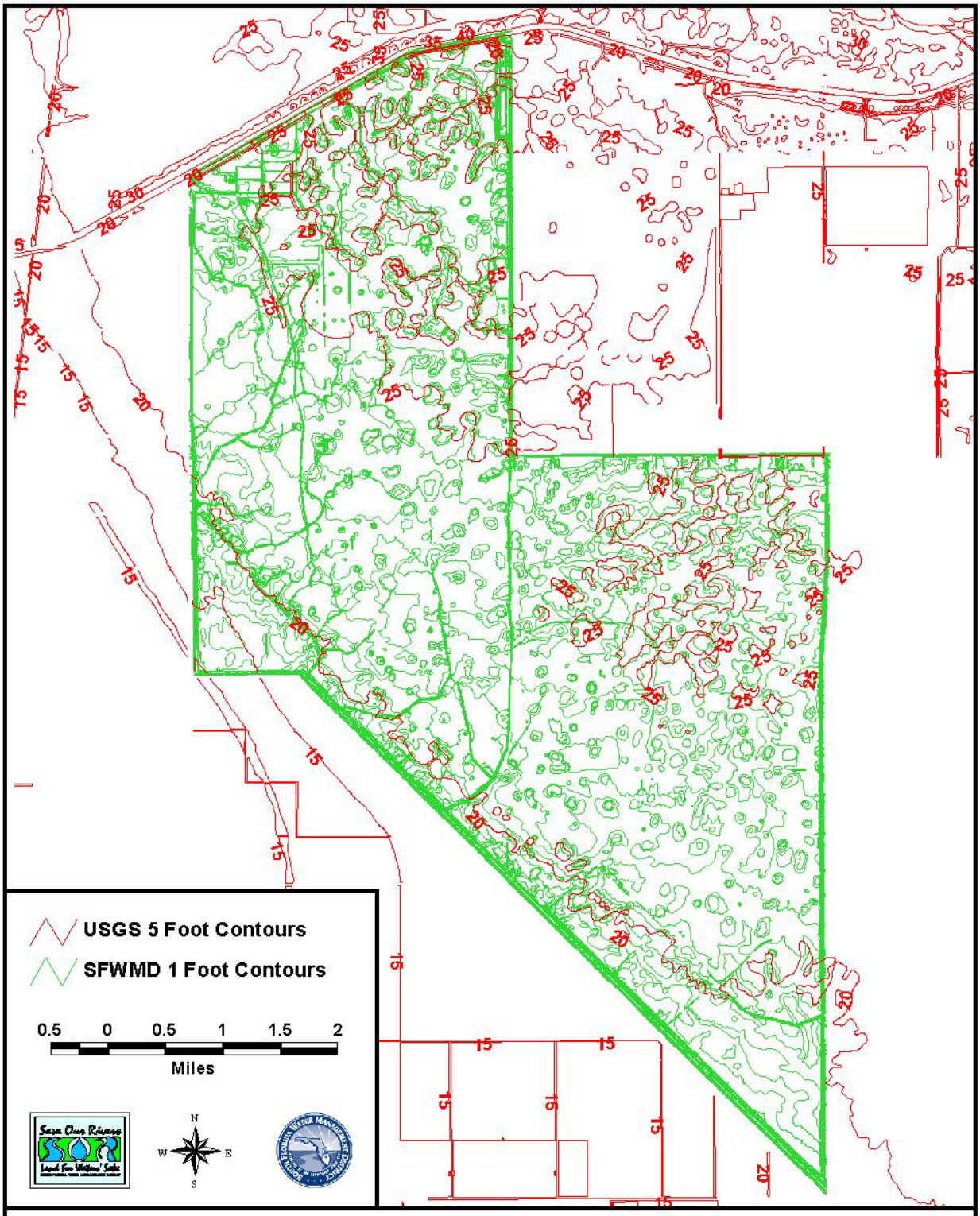

Figure 4. Topography of the DuPuis Management Area

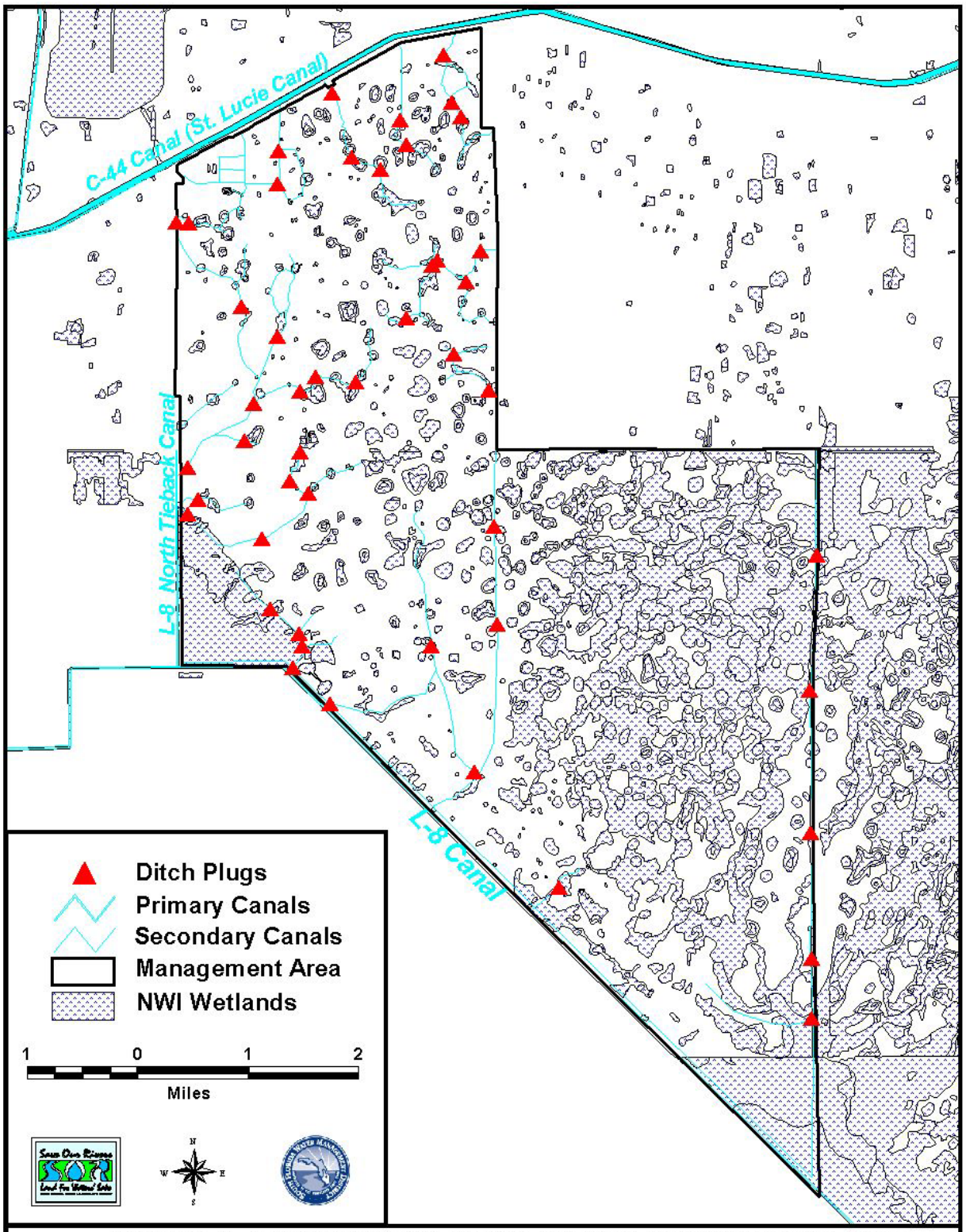

Figure 5. Hydrography of the DuPuis Management Area
(Per 1990 National Wetland Inventory Data)

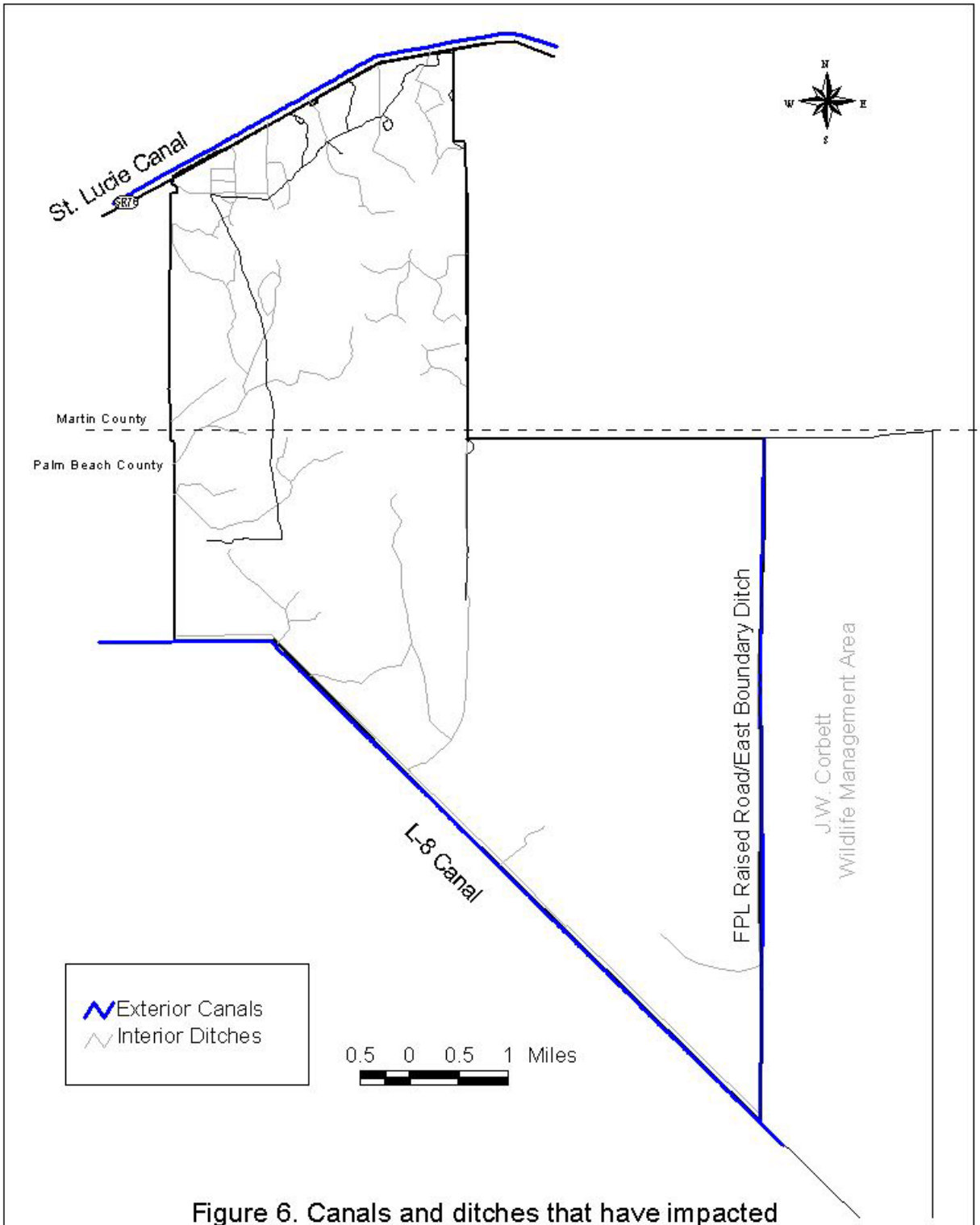

Figure 6. Canals and ditches that have impacted hydrology on the DuPuis Management Area.

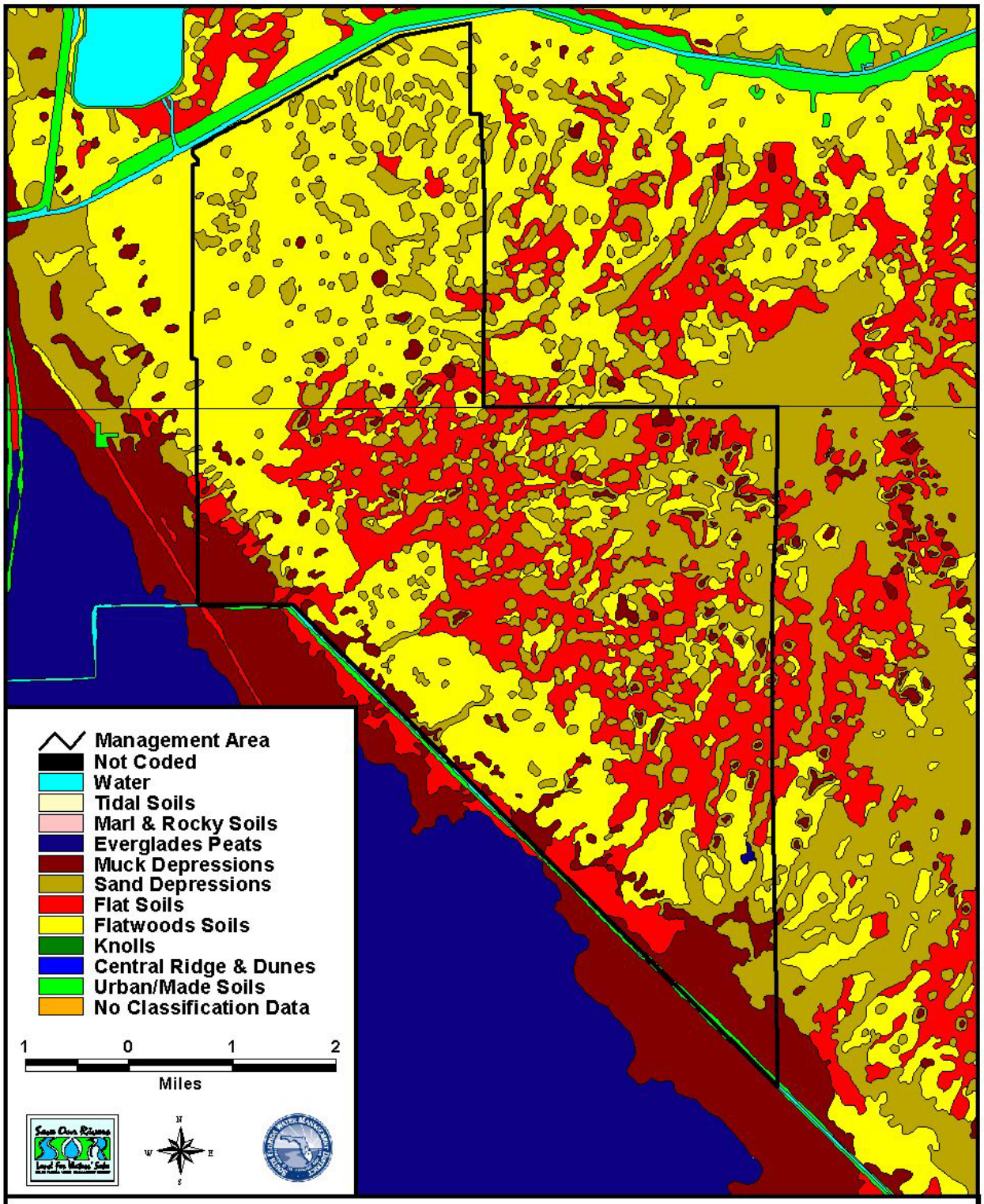

Figure 7. Soils of the DuPuis Management Area
(With SFWMD Natural Soil Landscape Positions Data)

Flatwoods Soils

Flatwood soils are poorly drained non-hydric, upland soils with sandy marine sediments throughout the profile. Most of the soil series have a subsurface spodic horizon, some of which may have loamy sand substrates. The seasonal high water table can range from six to 18 inches below the soil surface for three to six months annually. Some areas may become inundated for short periods during the wet season or during large storm events. Examples of these soils include Immokalee, Malabar, and Wabasso. Natural communities typical of flatwood soils on the DMA are mesic flatwoods. The landscape position of these communities affects plant-water relationships and causes slight differences in plant composition from wet to dry areas. Typical natural vegetation of flatwood soils is scattered south Florida slash pine (*Pinus elliotti densa*) with an understory dominated by saw palmetto (*Serenoa repens*) and grasses.

Flat Soils

Flat (previously referred to as slough) soils are poorly drained hydric soils with sandy marine sediments throughout the profile, or more rarely with loamy sand or sandy loam. Some areas within this unit are frequently flooded alluvial areas that have a sandy surface for the majority of the area. Flats are located between the flatwoods and topographic depressions and are generally regarded as transition areas. In most years, the seasonal high water table begins in June and ends from September to March (typically by February) with inundation periods dependent upon seasonal rainfall and/or large storm events. Examples of these soils include Boca, Felda and Riviera.

One of the ecological communities most typical of the flats landscape is the slough. Slough soils are nearly level and very poorly drained with organic surfaces underlain by sand. Representative soils include Hontoon, Sanibel and Okeelanta. Most sloughs serve as drainage ways for water during periods of heavy and prolonged rainfall. Most sloughs are relatively long and narrow and slightly lower in elevation than the surrounding flatwoods and hammocks. Vegetation within the slough may be open expanses of grasses, sedges, and rushes with cypress or scattered pines.

Sand Depression Soils

Sand depression soils are very poorly drained hydric soils that typically have sandy marine sediments throughout the profile. A few areas may have mucky sand, or sandy loam surfaces with sandy or loamy subsurface. Often, these areas are depressions adjacent to flatwoods. The seasonal high water table can range from one foot below to two feet above the soil surface for seven to 10 months annually. In most years, the seasonal high water table begins in June and ends from October to March. Soils commonly associated with this community are nearly level and very poorly drained with organic surfaces underlain by sand. Representative soils include Hontoon, Sanibel and Okeelanta. Examples of Sand Depression soils include Basinger, Boca, Chobee, Felda and Riviera.

Wetland communities dominate this landscape position. Natural communities often found in this landscape are swale and depression marsh. Vegetation varies widely within marshes but typically includes pickerelweed (*Pontederia cordata*), maidencane (*Panicum hemotomon*) or sawgrass (*Cladium jamaicense*).

Muck Depression Soils
Muck depression soils are very poorly drained hydric soils that have an organic surface layer underlain by sandy marine sediments. This category includes the transitional area between the Everglades pure organic soils and the coastal sandy marine sediments. These areas are often depressions adjacent to Flatwood soil-types. The seasonal high water table can range from six inches below to two feet above the soil surface for seven to eleven months annually. In most years, the seasonal high water table begins in June and ends between December and April. Examples of these soils include Gator, Hontoon, and Sanibel. A few areas may have a thin organic surface layer less than a few inches thick.

Wetland communities dominate this soil type. Examples of this type on the DMA are found in the L-8 marsh and swamps characterized by bald cypress (*Taxodium distichum*), pond cypress (*Taxodium ascendens*), coastal plain willow (*Salix caroliniana*), or red maple (*Acer rubrum).*

Soil Contamination and Excavation Sites
A cattle dipping area that was located at the present Gate 3 equestrian area was removed by the District in the late 1980's. This chemical treatment area was one of the 3,200 cattle dipping vats constructed statewide between 1906 and1961 for a tick fever eradication program that was mandated by state law. At these locations, soils became polluted with insecticides as cattle were either lead through in-ground dipping vats or sprayed in holding pens. Shortly after acquisition, the District began appropriate corrective actions on the DMA cattle dipping vat that led to a closure status.

Five other DMA soil contamination sites were identified. These sites were used for petroleum or chemical storage or equipment maintenance areas. The District had these contaminated sites chemically and physically analyzed as the first phase of a two-part remedial strategy that developed site-specific, risk-based action levels. The second phase of this process determined the appropriate degree of corrective actions. The Florida Department of Environmental Protection (DEP) Waste Cleanup Section staff assisted in decision-making with regard to the appropriate land use classification and required corrective actions. In the early 1990s, a remediation plan was designed and implemented at the DMA's five contaminated sites. In June 2001 a final site rehabilitation order was issued by DEP to complete the site's clean-up responsibilities.

Four small inactive borrow pits exist on the DMA that were used to supply fill for road building and repair. The largest pit is about 3 acres in size and located at the south end of the DuPuis Grade. This pit was re-contoured and re-planted with native vegetation in 2001. A fishing pier was also constructed on site. There are no current plans for mining additional shell rock from the other pits; however limited mining may be an option for future road improvements.

4.3 Natural Communities

Eight natural community types, as classified by the Florida Natural Areas Inventory (FNAI), are present on the DMA (Figure 3). In addition, the property includes 60 acres of citrus grove and five acres of disturbed areas containing administrative facilities. Habitat condition varies widely, depending on degree of past hydrologic alteration, current management activities, and exotic plant infestation.
Mesic Flatwoods (3,689 ha; 9,138 ac)
This is the dominant plant community on the DMA and is distinguished by the south Florida slash pine overstory and an open or dense understory, depending on degree of drainage and fire frequency.

Where drainage and fire suppression has been most severe, the understory consists of dense saw palmetto and to a lesser extent live oak. Use of mechanical shrub control in conjunction with increased prescribed fire has been instrumental in enhancing native plant communities that include saw palmetto, gallberry (*Ilex glabra*), St. Johns-wort (*Hypericum myrtifolium*), shiny blueberry (*Vaccinium myrsinites*), beautyberry (*Callicarpa americana*), bog buttons (*Lachnocaulon anceps*), yellow-eyed grass (*Xyris* spp.), wire grass (*Aristida beryichiana*), and numerous other native wildflowers.

This community occurs on similar soils as dry prairies and wet flatwoods, with minor changes in topography determining plant species composition. Acidic sandy soil overlays hardpan that reduces water exchange between the soil surface and subsurface. Native plants of this community have adapted to long intervals of inundation and desiccation combined with periodic fire.

An important physical factor in mesic flatwoods is fire, which probably occurred every one to eight years in pre-Columbian times. Nearly all plants and animals inhabiting this community are adapted to periodic fires; several species depend on fire for their continued existence. Without relatively frequent fires, mesic flatwoods succeed into hardwood-dominated forests whose closed canopy can essentially eliminate the herbaceous ground cover.

Wet Flatwoods (1,552 ha; 3,844 ac)
Wet flatwoods are characterized as relatively open-canopy forests of scattered pine trees or cabbage palms with variations of hydrophytic herbs and shrubs in the understory (FNAI, 1990). These flatwoods were influenced primarily by fire, which occurred naturally every 3 to 10 years (FNAI, 1990). Without frequent fires, wet flatwoods succeed to hardwood dominated forests. Flatwood community variation is probably associated with fire frequency and hydroperiod. These flatwoods develop on poorly drained acidic, low nutrient sands underlain by hardpan. During the rainy season, water frequently stands on the surface, inundating the flatwoods for 1 or more months per year. Past overdrainage resulted in the conversion of wet flatwoods to mesic flatwoods. Typical plants include south Florida slash pine, rushes, sedges, wax myrtle (*Myrica cerifera*), gallberry (*Ilex glabra*), saw palmetto, and native grasses and wildflowers.

Strand Swamp (1,106 ha; 2,740 ac)
Strand swamps are shallow, forested, usually elongated depressions or channels dominated by bald cypress. They are generally situated in troughs in a flat limestone plain. Other typical plants include red maple, laurel oak (*Quercus laurifolia*), cabbage palm (*Sabal palmetto*), pond apple (*Annona glabra*), sweet bay (*Magnolia virginiana*), coastal plain willow, wax myrtle, myrsine (*Myrsine guianesis*), buttonbush (*Cephalanthus occidentalis*), poison ivy (*Toxicodendron radicans*), leather fern (*Acrostichum danaeifolium*), swamp fern (*Blechnum serrulatum*), sawgrass, swamp primrose (*Ludwigia palustris*), smartweed (P*olygonum* sp.). Strand swamp soils are peat and sand over limestone with normal hydroperiods of 200 to 300 days per year. Periodic water flow is an integral component of strand swamps. Natural fire is infrequent in strand swamps, occurring on a cycle of 30 to 200 years. Fire, however, is essential for reduction of hardwood encroachment and reduction of peat accumulation that would convert this community to a bottomland forest. Strand swamps are extremely vulnerable to local and regional hydrologic modifications.

Swale (945 ha; 2,341 ac)
Swales are marshes situated in broad shallow channels and characterized by emergent grasses, sedges and herbs up to 10 feet in height. The dominant species are sawgrass, pickerelweed, and maidencane.

Swale soils are peat or sands and are generally located over linear depressions in the underlying limestone. Swales typically have long hydroperiods and are valuable ecologically because they serve as water storage and recharge areas, water transportation corridors, nutrient filters, and saltwater intrusion barriers. Threats to this natural community are disruption of natural hydrologic flow and fire cycles, conversion to agriculture and invasion of exotics in disturbed areas.

Light ground fires occur every one to five years in swales, and may occur any time of the year, as sawgrass can carry fire over the water's surface. Fire during dry seasons may result in peat fire that lowers the ground surface, converting the swale into a slough. Lack of fire results in dominance of coastal plain willow and buttonbush thickets.

Wet Prairie (509 ha; 1,261 ac)
Wet prairie is characterized as a treeless plain with a sparse to dense ground cover of grasses, sedges, rushes, and herbs, including wiregrass, toothache grass (*Ctenium aromaticum*), maidencane, spikerush (*Eleocharis* sp.), and beakrush (*Rhynchospora* sp.). Other typical plants include hatpins (*Lachnocaulon* sp.), marsh pinks (*Rhexia* sp.), corkwood (*Stillingia aquatica*) wax myrtle, St. John's-wort (*Hypericum* sp.), and Panicums.

Wet prairies occur on low, flat, poorly drained terrain and are inundated from 50 to 100 days per year. Wet prairie species have adapted to long periods of drought conditions due to the rainfall seasonality. Soils typically are sands with a major organic component. Fire plays an integral role in wet prairie ecology burning every two to four years with sufficient fuel accumulation. Without fire, these grass-dominated flatlands succumb to shrub encroachment especially from wax myrtle.

Depression Marsh (498 ha; 1,234 ac)
Depression marsh, also known as a flatwoods pond, is characterized as a shallow, usually rounded depression in sand substrate with herbaceous vegetation often occurring in concentric bands (FNAI 1990). Typical plants include St. John's-wort, spikerush, yellow-eyed grass, maidencane, wax myrtle, buttonbush, pickerelweed, arrowhead (*Sagittaria* sp.), and bladderwort (*Utricularia cornuta*).

Depression marshes are typically small in size and hydrologically isolated from other surface water bodies. Water is received by runoff, seepage or direct rainfall. Hydroperiods range widely from as few as 50 days or less to more than 200 days per year (FNAI, 1990). Bottom soils are generally acidic peat, resulting from accumulation of decayed plant material. This community frequently grades into wet or mesic flatwoods.

Natural fire occurs in depression marshes every one to five years, depending on a combination of weather conditions and fuel accumulation. Fire preserves these plant communities by limiting invasion of woody vegetation, promoting herbaceous growth, and slowing succession by deepening the marsh with an occasional peat fire. The LSP coordinates fire schedules to insure depression marshes burn at natural frequencies and during periods of adequate ground moisture.

Dome Swamp (386 ha; 956 ac)
Dome swamps are characterized as shallow, forested, usually circular depressions that generally present a domed profile because smaller trees grow in the shallower soil at the perimeter, while larger trees grow in the deeper interior soil. This community usually forms around sinkholes or depressions in flatwoods caused by solution activity. Cypress trees grow in the sand that fills these depressions. From above, dome swamps may resemble a "doughnut", with open ponds or depression marshes in the center of the dome. Other common plants include pond apple, chain fern (*Woodwardia* sp.),

Spanish moss (*Tillandsia usneoides*), wild pine (*Tillandsia* sp.), royal fern, cinnamon fern (*Osmunda cinamomea*), coastal plain willow, wax myrtle, St. John's-wort, lizard's tail, buttonbush, sawgrass and maidencane.

Dome soils are composed of peat, which become thickest toward the center of the dome, and are generally underlain with acidic sands and then limestone. Some domes have a clay lens that helps retain water levels. Dome swamps often derive much of their water through runoff from surrounding uplands and may function as reservoirs that recharge the aquifer when adjacent water tables drop during drought. The normal hydroperiod is 200 to 300 days per year with water being deepest and remaining longest near the center of the dome.

Fire is essential for the maintenance of a cypress dome community to prevent hardwood invasion and peat accumulation. Fire frequency is greatest at the periphery of the dome and least in the interior where long hydroperiods and deep peat maintain high moisture levels for most of the year. The normal fire cycle might be as short as three to five years along the outer edge, and as long as 100 to 150 years towards the center. The dome's profile is largely attributable to this fire regime. Cypress is very tolerant of light surface fires, but muck fires that penetrate the peat layer can cause cypress mortality. Prescribed fire is applied to surrounding natural communities at the DMA when soils within the domes are saturated.

Alteration of natural hydroperiods can be detrimental to cypress domes by changing their vegetative character. Extended deep water levels will limit cypress growth and prevent reproduction. Shortened hydroperiods permit the invasion of mesophytic plant species. Dome swamps may also be degraded by pollution, and the invasion of *Melaleuca* and *Lygodium* contribute to devastating wildfires that kill cypress trees.

<u>Prairie Hammock</u> (145 ha; 359 ac)
Prairie hammock is characterized as a clump of tall cabbage palms and live oaks in the midst of prairie or marsh communities (FNAI, 1990). Prairie hammocks occur on slightly elevated soils and generally have a very open understory. Typical plants found in the hammocks at the DMA include wax myrtle, persimmon (*Diaspyros virginiana*), wild coffee (*Psychotria nervosa*), beautyberry, red bay (*Persia borbonia*), myrsine and various ferns. These hammocks flood only for a short duration during the highest water levels. Naturally occurring fires are rare in these hammocks, due mainly to a lack of under-story fuel.

LSP management strives to minimize soil disturbance and eradicate non-native invasive species within hammock areas. Years of livestock grazing may have eliminated or reduced many native hammock species (David, personal communication) and recent observations have noted the return of many native plant species typical of ungrazed hammocks like those on the adjacent Corbett Wildlife Management Area.

4.4 Wildlife

Initial wildlife inventories on the DMA were conducted from 1987-1989 (David, 1991). Regular surveys are ongoing by the FFWCC and species lists are updated accordingly. Wildlife species observed utilizing the property include 105 bird, 22 mammal, 16 reptile, and 8 amphibian species (Appendices BB, CC, and DD). At least 18 species considered rare, endangered, threatened, or of special concern have been noted.

4.5 Cultural Resources

Policy 05.00113.10 Archaeological and historic resources are protected by site identification and inter-agency coordination with the Florida Department of Historical Resources (FDHR). Land management planning shall include an analysis of archaeological data accompanied by appropriate public education opportunities.

As a state agency responsible for management of publicly owned lands, the District is required by law to preserve historical and cultural resources located on District properties. The District's management goal is historic preservation by identification, evaluation, documentation, protection, and stabilization of known historic or prehistoric sites. Under Chapter 267 F.S., each state agency of the executive branch is under obligation to consider the effect of management actions on historical resources. This statute, along with Rule 1A-32 (research permitting process), Rule 1A-46 (archaeological report standards), and Chapter 872, F.S. (protection of gravesites) are the primary laws pertaining to historic sites and archaeological resources. The District complies with these regulations by inter-agency coordination with the FDHR through their project review process (Rule 1A-46, archaeological report standards). LSP maintains a database of all known archeological and historical sites on District properties that is periodically updated through the FDHR Site File. Due to its sensitive nature, site-specific data may not be made available to the general public.

Four archaeological sites of Native American earthworks are present on the DMA and are registered in the Florida Master Site File as sites of archaeological significance. The FDHR has visited the sites to conduct mapping and sampling. Research assistance has been provided by the Southeast Florida Archaeological Society and Florida Museum of Natural History. Information was summarized in "Cultural Resource Assessment of Four Archaeological Sites at Dupuis Reserve, Palm Beach County," (Wheeler, 2000) and subsequent reports (Wheeler, 2001; Rich, 2001). Studies concluded that the 4 Dupuis sites represented important examples of Lake Okeechobee Area site types and were mostly well preserved. Management recommendations included keeping the area in public ownership, prohibiting grazing or agricultural activities, prohibiting vehicle traffic at mound sites, and monitoring sites for feral hog rooting and vandalism (Wheeler, 2000). Management activities on the DMA will continue to promote research on these sites and continue to safeguard site integrity. Management activities planned for these areas are the treatment of invasive exotic vegetation and the periodic application of prescribed burns. No ground disturbing activities are permitted. Staff from FDHR may revisit these sites at times to conduct additional investigations.

In 2002, District staff contracted local historian, Steve Farnsworth, to research the history of the DuPuis property (Farnsworth, 2003; Appendix HH). Mr. Farnsworth summarized his research:

"Most of the land in the DuPuis Reserve was purchased from the State of Florida by Southern States Lands and Timber Company in 1902. The Hungryland Trail, which traverses the reserve, appeared in the 1910s. The St. Lucie Canal was constructed on the northern border in 1915, and Kanner Highway was built south of the canal in the 1920s. Selective logging of the reserve occurred in the 1930s, and it was purchased by Robert Chastain in the mid 1940s. The Chastain Ranch created much of the basic infrastructure at the reserve, including the DuPuis and Jim Lake Grades, and some of the drainage ditch systems. White Belt Dairy Farm, which was controlled by the DuPuis family, purchased the western portion of the reserve in 1955 and the eastern portion in 1972. The L-8 Canal was constructed along the southern border of the reserve in 1954, and additional drainage systems leading to the canal were built in subsequent years.

The fruit tree groves around the reserve office were planted in the late 1950s, and many new firebreaks were established along section lines. In the late 1960s, many new buildings were built at the reserve, including Mound House, Governor's House, the sheep shearers structures, and the maintenance compound. Many of the cattle watering holes were dug at this time and the landing strip was created. The DuPuis family bought the eastern portion of the reserve from U.S. Sugar in 1972. New ditches were dug at this time along the southern and eastern borders of the reserve, and new management roads that followed section lines were created. The buildings in the equestrian complex were built in the mid-1970s and the high voltage electrical lines on the eastern edge of the reserve were constructed in the late 1970s.

John G. DuPuis, Jr. died in 1984. His wife, Susan DuPuis sold the Reserve to the South Florida Water Management District in December 1986. The reserve was managed as the DuPuis State Forest from 1990 to 1996. It is now managed by the South Florida Water Management District in cooperation with the Florida Wildlife and Conservation Commission.

5. Natural Resource Management

Policy 05.0011. The LSP mission is to provide natural resource management and protection while allowing appropriate recreational use on designated public lands.

Natural resource management responsibilities of the District are defined by statute and District land stewardship policy. Many properties owned and managed by the District contain natural communities whose structure and function have been altered by previous land uses. The District manages and maintains these lands in an environmentally acceptable manner and, to the extent practicable, restores them to a more natural state and condition. Land managers attempt to accomplish this by using a variety of management techniques.

To manage natural communities at the DMA, LSP activities have included the implementation of a large scale project to restore a more natural hydrologic regime, the application of vegetation control activities to restore natural forest structure and composition, the continuation of an aggressive exotic plant control program, the application of a prescribed burn program to appropriate landscapes, and coordination with FWC to implement a wildlife management program.

5.1 Restoration Projects

Policy 05.00111. The basis for the Land Stewardship Program is the protection and management of natural hydrologic resources.

Policy 05.00111.3. Where feasible, an attempt shall be made to restore a more natural hydroperiod on tracts where the drainage patterns have been altered.

An environmental assessment completed for the property shortly after acquisition included a wetland and hydroperiod restoration plan as a primary management goal (David 1991). The plan recognized that severe overdrainage of the property had occurred through the construction of a major network of swales and canals built to facilitate the drainage of water north to the St. Lucie Canal and south to the L-8 canal (Figure 6). The plan outlined a three-phase restoration project targeting restoration of both the interior wetlands and 945 hectare (2,341 acres) of historic Everglades referred to as the L-8 marsh. In 1990 and 1991, 41 earthen ditchplugs were installed at strategic locations along Dupuis' network of interior ditches to re-hydrate isolated wetlands and reestablish sheetflow across the

property interior (Figure 5). Approximately 1,615 hectare (4,000 acres) of wetlands was restored with varying degrees of success. Monitoring has demonstrated that re-flooding resulted in native wetland plant species replacing upland species. However, exotic wetland plants such as torpedo grass have also invaded some re-created wetlands (David, 1999).

The second phase of the restoration project entailed the construction of an eight-mile levee separating the DMA from the L-8 canal and the Everglades Agricultural Area. This project included installation of three water control structures that became operational in December 1996. The District costs of this project were completely reimbursed by mitigation funds. Restoration success is being evaluated (David and Black, 2000)

The final restoration phase consisted of re-establishing the hydrologic connection between the DMA L-8 marsh and similar habitat on the adjacent Corbett Area. In 1992, two sections in the roadway separating the DMA and Corbett Wildlife Management Area were degraded and stabilized with geo-web swales to reconnect historic water pathways. In 2001, installation of six culverts with adjustable control gates was completed to increase flow to the DMA and help relieve underdrainage on the adjacent Corbett Area.

In the mid 1990's, managers began additional work to restore DuPuis' upland areas (section 5.2). Prescribed burning had been initiated shortly after property acquisition to reintroduce the beneficial effects of fire to the area; however, fire alone could not effectively reduce the overgrown structure of some upland areas. This overgrown condition negatively affected the diversity of native vegetation and wildlife, and was a probable contributor to the extirpation of the indigenous red-cockaded woodpecker from the area (section 5.4.3). Managers began heavy-duty mowing of overgrown shrubby understory and selective thinning of pines and cabbage palms to restore open forest structure. Frequent prescribed burning and the control of invasive exotic vegetation would maintain this structure. To date, most upland restoration has been conducted on the more overgrown west portion of DuPuis (figures 8 and 10), however, future work will include additional areas.

The LSP initiated an effort to restore native plant communities representative of the DMA on a three-acre site immediately east of the main administration office that will become part of the DMA visitor's center (section 6.4). The previous landowner had planted the area with imported exotic trees and the area subsequently became infested with other invasive shrubs. A small cement pond on the site had also become choked with invasive aquatic plants. In 1999, the LSP cleared the exotic trees and shrubs from the site, cleaned out the cement pond, and re-shaped the contours around the pond to simulate a cypress dome. The LSP planted 35 nursery grown mature cypress trees, and over 100 slash pines and live oaks that were relocated from other sites on the property. In 2001, a new pump system was installed in the pond to control water levels. The pond was filled with a gravel base and topped with soil. LSP planted over 20 native aquatic plant species to re-create various wetland plant communities that occur on the property. Future efforts will focus on re-establishing native pine flatwood and hammock understory vegetation in preparation for opening the visitor's center.

Work will continue on restoration of a 3 acre borrow pit located at the end of DuPuis Grade that was enlarged in the early 1990's to provide shell material for construction of a portion of the area's public roads. After the pit was closed in 1995, the shoreline and adjacent disturbed areas became heavily infested with cattails and exotics. Work began in 2001 to remove undesirable plants, re-contour a portion of the pond, and plant a variety of native vegetation to create a more natural landscape. A large berm of overburden material along one side of the pond was lowered and contoured to create areas where cypress, native shoreline plants, and marsh vegetation was planted. The top of the re-

contoured berm was planted with cabbage palms, oaks, and native ground vegetation to create a small hammock. Cabbage palms were also planted in spots around the pond perimeter. A hydrological connection to the surrounding marsh was established by lowering another berm to permit seasonal inundation and water exchange. Future plans include additional plantings of native vegetation and the addition of picnic sites for public use.

5.1.1 Mitigation

The District receives mitigation funds that are used for the acquisition, preservation, restoration, and management of several LSP lands in accordance with Section 373.414 (1)(b), F.S. LSP staff develops detailed plans for the use of these funds for specific activities and areas. The DMA was the recipient of mitigation funds from 1993 through 1997 from several offsite development projects and permitees. Mitigation money was used to offset the costs of restoration projects to rehydrate the L-8 marsh and to restore a portion of the historic hydrological connection with the adjacent Corbett area. This restoration was singularly important to the establishment of natural hydrological cycles and the restoration of native vegetation and wildlife on the DMA. In addition, these mitigation projects significantly decreased seasonal offsite water flows thereby lessening the burden on regional stormwater conveyance systems. Since 1997, there has been no new mitigation money for the DMA, but small annual management allotments continue from the accumulated interest on principal. These allotments will continue to be used for management projects to maintain and enhance the DMA L-8 marsh.

5.1.2 Monitoring

Policy 05.00113.6b. Monitoring shall be conducted to identify landscape changes resulting from management activities.

Tracking environmental response to restoration projects provides valuable information on progress toward restoration objectives. Information obtained by monitoring specific sites assists land managers in making sound ecological choices for each unique parcel in the LSP.

DMA monitoring has focused on documenting vegetative changes from restoration of the area's hydroperiod. In May 1988, the District established a monitoring program to determine the progress of hydrologic restoration in the L-8 marsh and in re-flooded interior marshes. Digital recorders were installed at four locations to record changes in water levels. Vegetation monitoring consisted of repeated counts along transects at varying elevations both before and after completion of the restoration project. In addition, photomonitoring was conducted at marked plots in the marsh. Results of the restoration/monitoring program were discussed by David (1999) and included in unpublished annual monitoring reports completed in 1997-2001. Reports indicated a positive vegetative shift occurred in the direction of more obligate wetland species as a result of increased inundation. Periodic monitoring will continue in the L-8 marsh to evaluate the influence of increased hydroperiod and also evaluate the effects of the additional water flows through the connection with the Corbett Area marsh constructed in 2001 (section 5.1).

Management Objective:

- *Maintain an appropriate hydroperiod through maintenance and modification of area water control structures as needed.*

- *Continue and enhance the monitoring and evaluation of restoration activities on area vegetation and wildlife.*

5.2 Vegetation Management

Policy 05.00112.4. Where practicable, an attempt shall be made to restore and maintain desirable vegetation to promote habitat diversity in areas where exotic/invasive vegetation or improved land uses have substantially altered the historic landscape.

Policy 05.00113.12. Mechanical equipment may be used in conjunction with prescribed burning and other management tools to control vegetation and restore habitat structure.

Historically, the DMA was comprised of flatwoods that were open landscapes of scattered south Florida slash pines with low shrub vegetation and herbaceous ground cover. These landscapes were maintained by frequent natural fires and seasonal flooding. Subsequent land uses that overdrained the area and suppressed fires allowed an unchecked growth of vegetation creating denser tree canopies and an understory layer of overgrown shrubs. These changes permitted less light to reach the forest floor, limiting ground cover diversity. One of the LSP's initial priorities was to introduce prescribed fire to help reduce understory vegetation and open forest structure. However, the accumulation of heavy fuels made prescribed burning difficult and drought years brought devastating wildfires. In addition, burning alone did not reduce the physical dimension of the overgrown shrub understory that was necessary to restore the forest's natural structure and function. Consequently, in 1995 the LSP began mechanical control of vegetation with the use of tractor pulled drum choppers. These choppers mechanically crushed overgrown saw palmetto and other shrubs leaving a reduced and open understory. However, drum choppers were difficult to navigate in dense stands of trees, they could damage tree surface roots, and could be very disruptive to the soil surface. In 1999, the program purchased a hydraulically operated Alamo shredding implement that attached to a bi-directional tractor. This equipment proved to be more maneuverable than the drum choppers and was extremely effective in reducing vegetative fuel and restoring habitat structure, without impacting surface soils. To date, several thousand acres of DMA understory have been restored using roller choppers or by shredding (Figure 8). Understory restoration will continue in overgrown areas of the DMA that would benefit from this work.

Past fire suppression has also allowed the growth of unnaturally dense stands of slash pine. This unnatural density reduced stand health and increased the stand's susceptibility to attacks from bark beetles and disease (Dixon, 1984). Where appropriate, dense areas of slash pine are thinned through selective harvest to more natural stocking rates (section 5.2.4). These projects are planned and conducted with sensitivity to surrounding environmental conditions and in coordination with public use schedules. These stands may also have locally heavy concentrations of cabbage palms in the midstory. Cabbage palms are thinned or eliminated through cutting or extraction in select areas such as those being managed for red-cockaded woodpeckers. Through upland management, the DMA's extensive pine flatwoods can be restored to a more open natural condition that can be maintained through restored seasonal flooding and recurring prescribed fire.

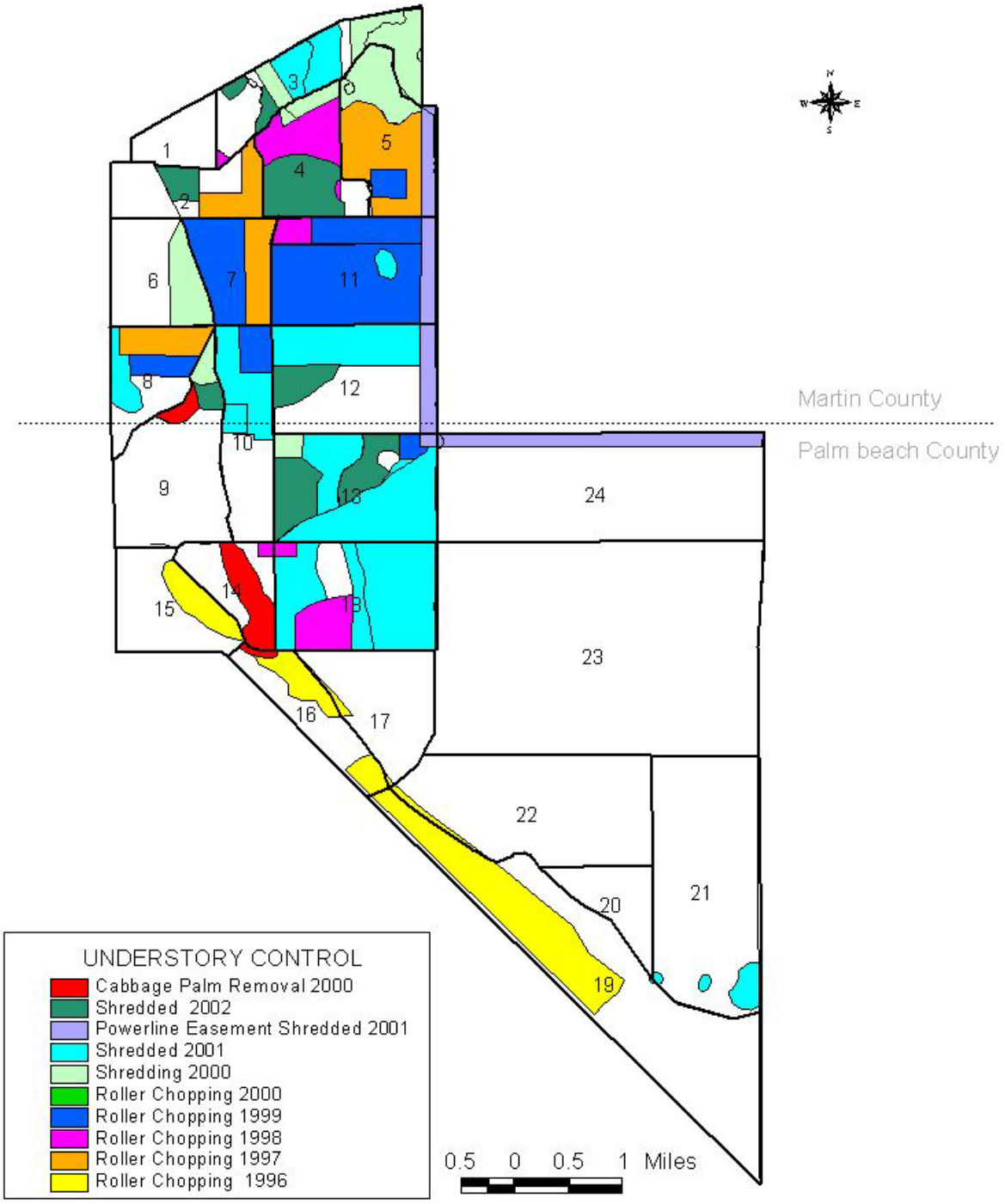

Figure 8. Location of completed understory control on the DuPuis Management Area.

Management Objective:

- *Continue understory restoration by using heavy-duty shredding and mowing equipment to open up areas of overgrown saw palmetto and wax myrtle. District staff and contractors will treat 500 acres each year.*
- *Continue appropriate forest management activities to enhance natural communities. Contract the thinning of 1000 acres of over-dense pine in FY 2004 using established forest management guidelines. Evaluate the need for additional forest thinning (including cabbage palms) and develop appropriate plans for FY's 2005-2006.*

5.2.1 Vegetation Control and Maintenance

Vegetation control and maintenance is executed by the LSP field technicians or through contracts. Roller choppers, a tractor-mounted Alamo shredder, and heavy-duty mowers are stationed at the DMA.

5.2.2 Exotic/Invasive Plants

Policy 05.001122.3. Management practices will strive to identify existing infestations of exotic/invasive plants and implement appropriate control or eradication measures.

Policy 05.00113.2. Exotic plant control in all management areas shall attain a level of success where periodic maintenance eliminates the infestation or reduces the spread of exotic plants.

South Florida's subtropical climate provides an excellent growth environment for the rapid spread of exotic plants that can cause extensive alterations to an area's natural ecosystems. Environmental changes caused by extensive hydroperiod alterations have been an important factor in exotic plant invasion. Exotic plant invasion can result in partial or total displacement of native plants, loss of wildlife habitat, and the degradation of public use areas.

The LSP targets category I and II non-native plant species as identified on the Exotic Pest Plant Council's annually updated list of *Florida's Most Invasive Species*. Category I species include non-native plants that invade and disrupt Florida native plant communities. Category II plants have the potential to invade and disrupt natural successional processes. Both Category I and II exotics are considered invasive and a threat to the function and ecological stability of Florida's natural communities.

The LSP's invasive exotic plant control measures include a combination of herbicide application, prescribed fire, roller chopping, mowing, and physical removal. Selection of control measures is dependent upon species type, environmental factors and natural communities impacted. Private contractors, the lead management agency, or LSP staff conduct exotic plant control activities in cooperation with the District's Vegetation Management Division.

Melaleuca (*Melaleuca quinquenervia)* and Brazilian pepper (*Schinus terebinthifolius*) have received the most control efforts on the DMA since property acquisition. Most areas of Melaleuca have been eliminated, though scattered young infestations continue to be found and treated. Brazilian pepper, however, remains more prevalent and continues to require more control effort. In the last few years, Old World climbing fern (*Lygodium microphyllum*) has spread at an alarming rate and requires increasing attention (Figure 9). Lygodium is now present in most DMA units and has been found in

all habitat types, though heavy infestations are small. This species poses the most significant threat to native plant communities and an aggressive herbicide program using contractors has been implemented.

Other terrestrial species such as cogon grass (*Imperata cylindrica*) and napier grass (*Pennisetum purpureum*) are controlled by regular herbicide applications. Waterhyacinth (*Eichhornia crassipes*) and waterlettuce (*Pistia stratiotes*) are present in canals located near the DuPuis marsh and require regular treatment. Smaller localized infestations of West Indian marsh grass (*Hymenachne amplexicaulis*), shoebutton ardisia (*Ardisia elliptica*), Indian laurel fig (*Ficus microcarpa*), bladder pod (*Sesbania sp*.), and primrose willow (*Ludwigia peruviana*) require spot treatments and increased monitoring.

Exotic plant control at the DMA is conducted primarily by a contracted crew of applicators, hired and audited through the Vegetation Management Division. District field technicians also provide supplemental support especially on small or sporadically distributed infestations. Generally, treatments on the DMA are scheduled so that each unit is covered bi-annually (Table 1), however schedules are adjusted based on current conditions. Areas of treatment are scheduled based on groundwater conditions, time since last treatment, virulence of infestation, public use, and in accordance with other management operations. All treatments follow herbicide BMP's and use the best available science. Treatment dates, locations, and herbicide are noted and recorded in a GIS database. Additional procedures are being developed to provide more specific plant locations and herbicide use data so that treatment efficacy may be better estimated.

Management Objective:

- *Continue an aggressive, integrated exotic plant management program. At least 10,000 acres will be surveyed per year and exotics treated as necessary. Treatments will be documented and coordinated with other management activities.*

5.2.3 Rare, Threatened and Endangered Species

Policy 05.00112.2. Particular emphasis shall be placed on the identification, protection and management of rare, threatened and endangered species.

Listed species are those plants and animals considered rare within a specific geographic area by the U.S. Fish and Wildlife Service, the FWC, the FNAI, and the Florida Department of Agriculture and consumer Services (DACS). A list of these species is annually updated and published by the FWC. The plant list of the DMA (Appendix AA) contains several listed species (Table 2).

The LSP establishes appropriate fire and hydrologic regimes, and controls invasive exotics in natural communities with the intent of perpetuating listed plant species. District Public Use Rules aid in the protection of native habitat and specifically prohibit destroying, defacing, or removing

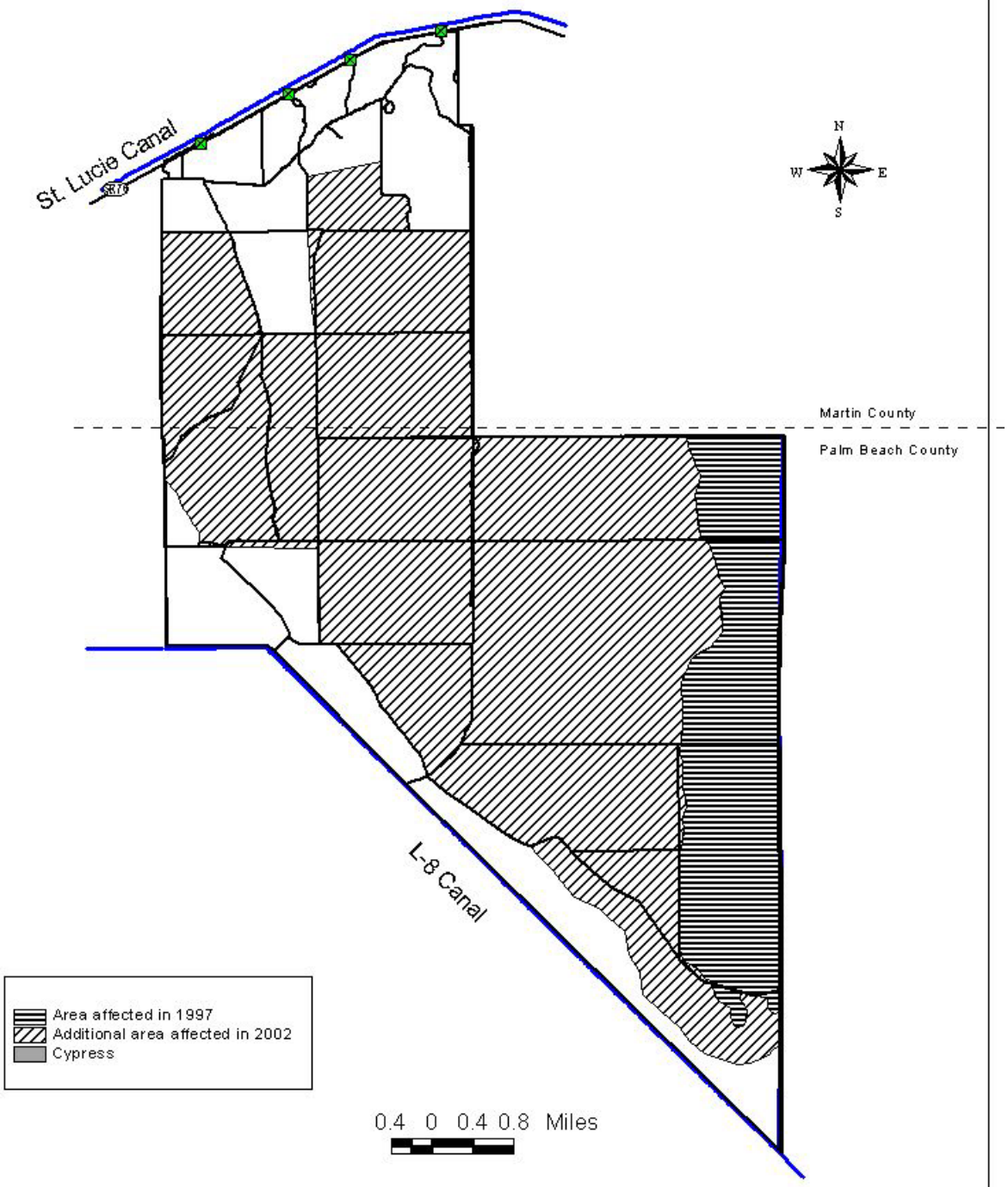

Figure 9. Occurence of Lygodium microphyllum in 1997 and 2002 on the DuPuis Management Area.

Table 1. Five-year invasive plant treatment schedule for the DuPuis Management Area. FY 2003 - 2007.

	Fiscal Year				
Unit	**2003**	**2004**	**2005**	**2006**	**2007**
1	X	X	X	X	X
2	X		X		
3	X	X	X	X	X
4	X		X	X	X
5		X		X	X
6		X		X	X
7		X		X	
8		X		X	X
9		X		X	
10	X		X		
11		X		X	X
12			X	X	X
13		X		X	
14	X				
15	X		X		
16	X		X		
17	X		X		
18		X		X	X
19	X	X	X	X	
20	X		X		
21	X		X		X
22	X		X		
23	X	X	X	X	X
24	X		X		

X = denotes that all or part of the unit will be covered. Actual coverages are detailed in year-end GIS maps. Treatment schedule will be adjusted based on prevailing conditions.

any natural feature or native plant on District lands (40E-7.537 General Prohibitions.) In this manner, listed plants are given lawful protection and environmental conditions suitable for their growth and reproduction.

In 1999, a population of state-designated endangered celestial lily, *Nemastylis floridana,* was found in Unit 23 in numbers not previously reported in Florida (Black, 1999). This population was observed following a prescribed burn in this unit the previous summer. Management efforts to protect this species will include prescribed burning every 2-4 years, control of exotic vegetation within

Table 2. Plants Occurring on the DuPuis Management Area That Are Listed by the Florida Department of Agriculture and Consumer Services as Threatened (T), Endangered (E), or Commercially Exploited (C), as of October, 2002

Common Name	Scientific Name	Designation	
Giant Leather Fern	*Acrostichum danaeifolium*	C	
Pinepink	*Bletia purpurea*		T
Bearded Grasspink	*Calopogon barbatus*	T	
Manyflowered Grasspink	*Calopogon multiflorus*	E	
Strap Fern	*Campyloneurum phyllitidis*	E	
Satinleaf	*Chrysophyllum oliviforme*	E	
Florida Butterfly Orchid	*Encyclia tampensis*	C	
Wild Coco	*Eulophia alta*	T	
Threadroot Orchid	*Harrisella filiformis*	T	
Drysand Pinweed	*Lechea divaricata*	E	
Catesby's Lily	*Lilium catesbaei*	T	
Nodding Club-Moss	*Lycopodiella cernua*	C	
Celestial-lily	*Nemastylus floridana*	E	
Giant Sword Fern	*Nephrolepis biserrata*	T	
Cinnamom Fern	*Osmunda cinnamomea*	C	
Royal Fern	*Osmunda regalis*	C	
Blue Butterwort	*Pinguicula caerulea*	T	
Yellow Butterwort	*Pinguicula lutea*	T	
Snowy Orchid	*Platanthera nivea*	T	
Rose Pogonia	*Pogonia ophioglossoides*	T	
Giant Orchid	*Pteroglossaspis ecristata*	T	
Longlip Lady's-tresses	*Spiranthes longilabris*	T	
Southern Lady's-tresses	*Spiranthes torta*		E
Reflexed Wild-pine	*Tillandsia balbisiana*		T
Cardinal Wild-pine	*Tillandsia fasciculata*	E	
Twisted Wild-pine	*Tillandsia flexuosa*	E	
Giant Wild-pine	*Tillandsia utriculata*	E	
Simpson's Rainlily	*Zephyranthes simpsonii*		T

the area, and continued limited public access (foot travel only). Periodic surveys will be conducted to evaluate the species status and determine the effects of management efforts.

Several listed bromeliad species occurring on the DMA may be threatened by the exotic Mexican weevil, *Metamasius callizona* that has caused destruction of native bromeliads in other south Florida locations. Two species of once abundant bromeliads, *Tillandsia utriculata* and *Tillandsia fasciculata*, have been place on the state's list of endangered plant species as a direct result of this weevil. The DMA will assist the Florida Council of Bromeliad Society's efforts to control this weevil by setting up monitoring of weevil presence in DMA bromeliads and, if needed, assist in the collection of seeds for off-site germination.

5.2.4 Forest Resources

Policy 05.00113.8. Sustainable use of forest resources shall be conducted where these activities adhere to a series of environmental criteria that meet LSP goals. Timber contractors will be required to meet silvicultural best management practices (BMP) developed for Florida forests.

Policy 05.00113.6c. Timber sales will be conducted to improve forest health or support specific forest management goals.

LSP properties are designated multiple-use, thus renewable resource utilization, including timber harvesting, is considered a viable land management option. However, resource utilization must be compatible with other LSP goals and objectives. In 1997, the LSP contracted the expertise of Natural Resource Planning Services, Inc. to provide site evaluations and management/harvest recommendations for existing stands. An SOR Forest Management Plan (FMP), completed in 1998, identified sites managed by the LSP that could be improved by thinning to a more natural tree density and could generate short-term revenues to supplement land management costs. Sites were also identified that could be planted for future revenue generation and ultimately restore slash pine forests. Sites that qualified for forest management had to be consistent with LSP policy by meeting strict environmental criteria:

- The area planned for silvicultural rotation is currently in an improved or disturbed state (i.e. bahia pasture, existing pine plantation).
- The site to be planted is not scheduled for future hydrologic restoration, or the site to be harvested is scheduled for hydrologic restoration and existing timber will be lost as a result of flooding.
- The area does not contain any valuable resources (e.g. endangered species) that may be harmed by changes in land use.
- Forest operations would not require major road construction or improvement for accessing and processing timber, particularly within or across wetlands or other sensitive plant communities.
- The area to be managed currently requires maintenance (i.e., burning, mowing).
- District costs would be reduced as a result of inclusion in the forest management plan.
- The area contains timber that requires salvage following fire and/or insect or disease damage, and could be subject to a sanitation harvest with minimal environmental impact.
- The area provides special needs for endangered species (i.e., red-cockaded woodpecker) management that requires timber stand improvement.
- Harvest or planting will not create an aesthetically unpleasant scene or an impediment to public use.
- Timber harvests will return forests to a more natural structure and improve forest health.

Several sites on the DMA met the FMP criteria and in 1999, approximately 485 hectares (1200 acres) of timber were harvested to salvage bark beetle-killed trees and thin overly-dense stands (Figure 10). Thinning also helped to promote and protect potential red-cockaded woodpecker nesting areas. In FY02, 180 acres of beetle-impacted former forest and areas of open pasture were planted with slash pine seedlings germinated from DuPuis seed stock. Future plans may include planting portions of the 60-acre citrus grove that have been cleared (section 5.2.5).

Additional areas remain on the DMA that meet forest management criteria and their restoration to a more appropriate tree density would be beneficial (Figure 10). The thinning of dense stands adjacent

to past beetle infestations would improve stand health and lessen the chances of additional beetle expansion. Any forest management activities will be consistent with good forest management practices and red-cockaded woodpecker recovery plans. There are also scattered areas that contain overly dense stands of young (10-25 years old) even-age pines that have established because of past overdrainage and fire exclusion. These thick areas of "fence-post" size trees could be thinned to improve remaining tree health and to maintain a more appropriate forest structure.

Cabbage palms are also included in forest management planning. There are several areas on the DMA that contain an over abundance of cabbage palms due to past fire exclusion and over-drainage. These palms provide an unnaturally dense mid-story layer that shades out native vegetation and allows fires to reach pine canopies, often with catastrophic results. In 2000, a revenue contract was awarded to a local nursery to selectively remove cabbage palms from a 200 acre area in units 14 and 16 (Figure 10). Palms were individually spaded and the resulting holes were back-filled to required specifications. The area was burned and, at a later date, will be evaluated to determine the level of environmental impact and the appropriateness of future removal projects.

Management Objective:

- *Continue appropriate forest management activities to enhance natural communities. Contract the thinning of over-dense pine in FY 2004 using established forest management guidelines. Evaluate the need for additional forest thinning (including cabbage palms) and develop appropriate plans for FY's 2005-2006.*

5.2.5 Agricultural and Range Resources

Policy 05.00113.9. Range management and grazing will be considered on improved or native ranges when the introduction of cattle will not conflict with other natural resource management and public use goals.

Prior to District acquisition, the DMA was managed as the White Belt Ranch where livestock grazing was the primary land use. Approximately 2500 head of cattle and 2000 sheep and goats were removed shortly after District acquisition and have not been reintroduced. There are no plans to reintroduce livestock to the DMA at this time.

The LSP has acquired property with active agricultural activity. When this occurs, each property is assessed to determine whether agricultural production should continue. In cases where temporary farming is continued, criteria for land use, defined in the *Guidelines and Criteria for Interim Use of District Owned Land*, (Dames and Moore 1998) are followed. The goal of these guidelines is to reduce contamination to ground and surface waters from agricultural activities by complying with best management practices. Citrus production is considered a more permanent agricultural activity and follows a defined set of guidelines regarding pesticide and fertilizer applications, and irrigation systems.

When the District purchased the DMA it contained a 60-acre citrus grove maintained by the previous owner for personal use. The District contracted the maintenance and operation of the grove from 1990 to 1998, with local operator Owens Groves. After Owens was unable to continue the contract, the District began discussions with several private and government groups for grove management. In 1999, a five-year renewable management contract was entered with St. Lucie County Cooperative

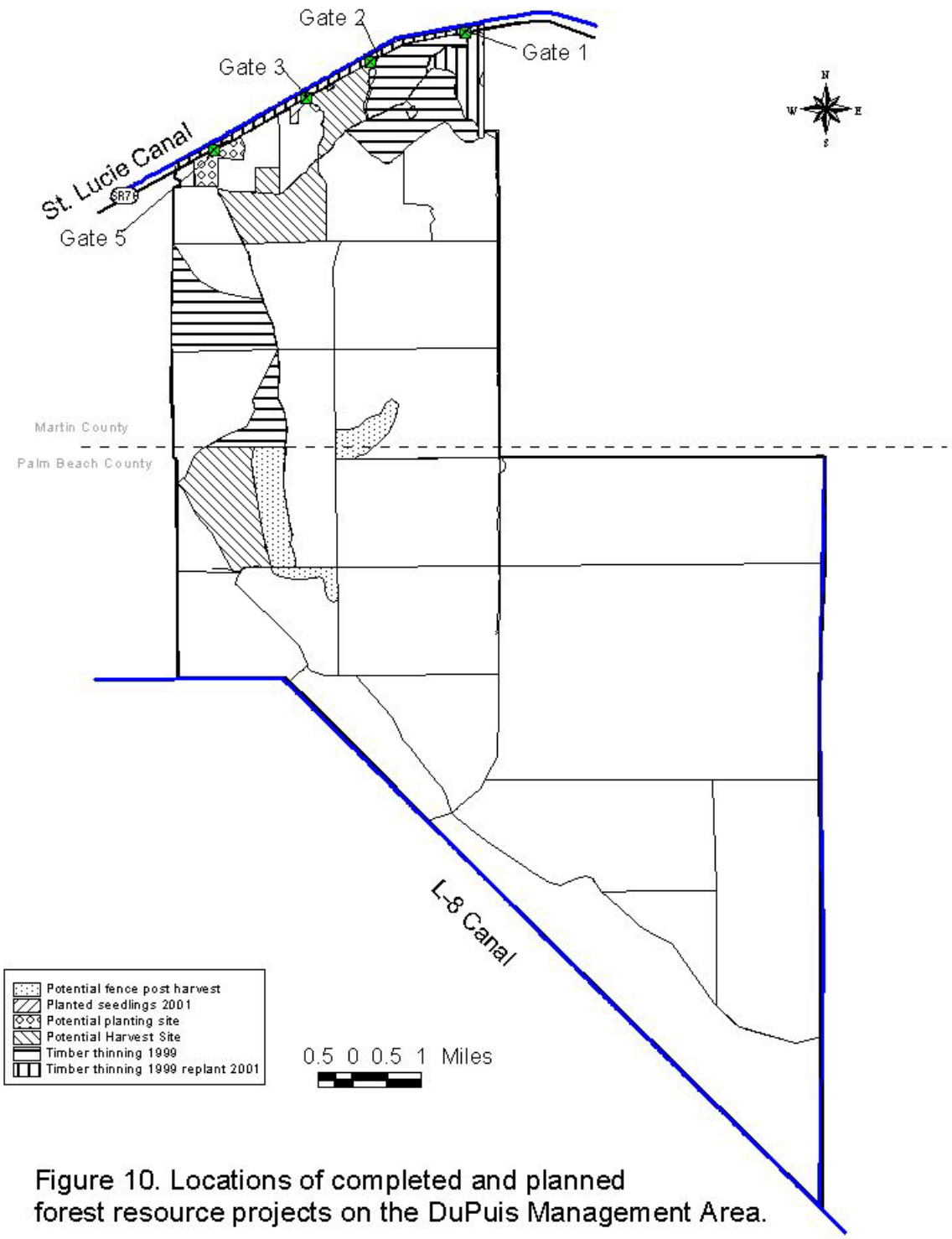

Figure 10. Locations of completed and planned forest resource projects on the DuPuis Management Area.

Extension Service to maintain and enhance the grove by utilizing sustainable agricultural practices. The intent was to use the grove to demonstrate best management practices in the operation of sustainable citrus production. Plans included renovation and improvement of irrigation, tree-stocking modifications, and grove soil structure enhancement using recycled organic materials. Approximately half of the grove trees were removed to eliminate diseased and dying stock, and prepare for new tree planting. Subsequently, however, Extension Service managers came under administrative constraints that precluded there involvement at DuPuis and they withdrew from grove management. In July 2002, at District request, citrus scientists from the University of Florida toured the DMA grove to evaluate its condition. Noting the low number and poor condition of remaining trees, they recommended that grove renovation was not practical without major site improvement and tree replacement. Because of this situation, District and DMA managers are now considering other uses of the grove area (section 5.2.4).

Management Objective:

- *Continue to reforest deteriorated areas of the old citrus grove and cleared sections north of SR76 with slash pine.*

5.2.6 Monitoring

Controlling the spread of invasive exotic vegetation is an important focus of DMA management. The exotic vine, *Lygodium microphyllum*, has become increasingly prevalent (Figure 4) and has received more treatment effort in the last 3-4 years. In 1997, the District's Vegetation Management Division began field trials to evaluate the efficacy of different herbicides in ground applications. The University of Florida and Department of Environmental Protection were partners in this research. Additional plots were later established in heavily infested areas of cypress and emergent marsh to monitor the effects of aerial treatments begun in 1999 and repeated in 2000 and 2001. Results from these research trials showed that a combination of aerial and ground applications using glyphosate herbicide effectively controlled *Lygodium* with minimal non-target damage (Stocker, et al, 2002).

As *Lygodium* has dramatically increased over the DMA (Figure 9), infestations have spread into pine flatwood communities. These infestations were being treated with herbicide by ground crews. Information was needed to evaluate the timing of herbicide application relative to the application of other land management techniques to these areas. In 1999, plots were established in *Lygodium*-infested flatwoods where mechanical chopping and prescribed burning was conducted to evaluate the effectiveness of herbicide treatment relative to these management activities. This research is in progress and additional studies will be started in 2003 to evaluate whether techniques to reduce palmetto density and stature can help control *Lygodium* and restore other native vegetation.

Management Objective:

- *Continue and enhance the monitoring and evaluation of restoration activities on area vegetation and wildlife.*

5.3 Fire

Policy 05.00113.3. Prescribed fire will be a primary management tool on District lands and will be applied within fire maintained communities at appropriate intervals.

The majority of natural communities on District lands rely on frequent fire to maintain their vegetative characteristics and biodiversity. Wildfires no longer occur with historic frequency or extent and this has altered natural community structure and function. Prescribed fire attempts to mimic the benefits of natural wildfires that historically reduced fuel loads, recycled soil nutrients, and maintained natural communities by inhibiting hardwood encroachment and stimulating fire-adapted plant growth. The LSP recognizes the benefits of fire and has integrated prescribed fire planning and application into its land management strategy.

5.3.1 Fire History

Only limited fire history is available for the DMA prior to District acquisition in 1986.
From 1980 until 1986, most of the east portion of the DMA (east of Cooter Creek Grade) was burned annually each winter after hunting season. After securing the appropriate side of a grazing unit with a blackline, ranch hands would ride the interior jeep trails setting spot fires or dragging a burning torch. Fires were low intensity, slow moving, mainly grass fires (personal communication with former ranch manager). Burning was not allowed on the improved western portion of Dupuis or on the improved pasture in what is now the L-8 marsh area. From 1955 (date of acquisition by previous owner) until 1980, burning was conducted similarly except that those western portions of the DMA were also regularly burned prior to being improved. Pasture improvement began on the west portion in the late 1950's and was completed by about 1970 (personal communication). History before the mid 1950s is unknown; however, grazing practices for this region indicate native range areas were probably burned regularly to improve forage.

The LSP's prescribed fire program was initiated at the DMA in 1989. Fire data (prescribed and wild) is maintained in GIS to produce historic burn maps of the property (Figure 11).

5.3.2 Prescribed Fire Planning

A fire management plan is developed for each LSP management area. Each plan includes a description of location and natural community types, fire history, fire management objectives for each plant community,

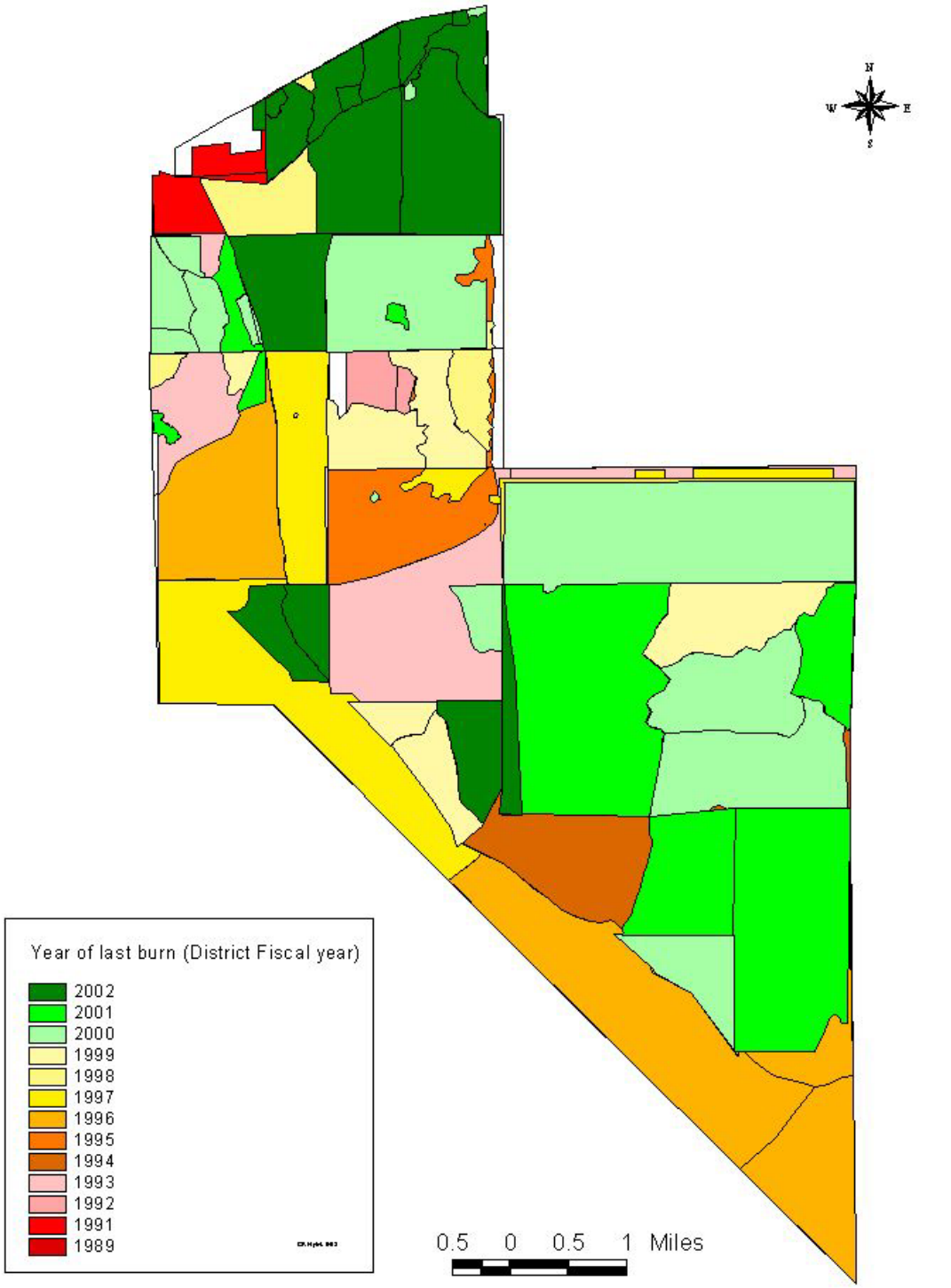

Figure 11. Burn History on the DuPuis Management Area.

fire constraints, and a burn prescription. The LSP bases all fire management plans on ecological research and professional experience. Fire frequency schedules for each natural community consider recommendations provided in *The Natural Communities of Florida* (FNAI, 1990). To mimic historic fire conditions, LSP emphasizes growing or lightning season burns (summer) where practical. Natural firebreaks are utilized where possible to promote historic fire patterns, avoid soil disturbance, and reduce hydrologic flow disruption created by fire lines. Listed species life requirements and welfare are elements of prescribed fire planning. Application of fire, with appropriately timed herbicide treatments, is utilized as a tool for control of invasive plants and is judiciously applied where fire-adapted exotics are present. Prescribed fire planning is critical when dealing with species such as Melaleuca and Old World climbing fern.

Burns are executed using proven safety measures as defined by the Prescribed Burning Act of 1990, 590.026 F.S. This legislation and associated administrative rules outlines accepted forestry burn practices and is administered through the Florida Division of Forestry (DOF). The LSP has a five man prescribed fire crew (Land Stewardship Field Crew) and may utilize other District staff (especially Okeechobee Service Center) or cooperating agency staff, such as DOF and FWC to conduct burns at the DMA. All LSP staff have completed the state certified burn course to insure fire safety and burning efficiency.

Prescribed fire is applied on the DMA at appropriate fire intervals for each natural community. The majority of DMA habitat is south Florida pine flatwoods with a natural burn frequency of approximately three years. This interval requires that about 7,000 acres be burned annually. During District ownership, burn efforts have concentrated on applying fire to each area of the property, reducing large accumulated fire fuel loads, and providing a safer basis for future burns of increased frequency and lower intensity. At the present time, all areas of the DMA have been burned since District acquisition, the majority has been burned more than once, and most have been burned in the last 5 years. During the next 5 years, planning will emphasize increasing yearly burn acreage to attain at least a 3-year rotation. Larger, aerial burns will be used to reduce the amount of burn preparation (and number of disked firelines), needed manpower, and cost associated with more numerous smaller burns. Larger growing season burns will also better simulate historic fire scenarios. A general prescribed burn schedule for the DMA for the 5-year period of this plan is provided in Table 3.

Management Objective:

- *Continue the regular application of fire through a well-planned and documented prescribed burning program. Prescribe burn 7,000 acres per year with at least 50% burned during the months of May through August.*

5.3.3 Wildfire Suppression

<u>Policy 05.00113.4</u>. The DOF will be notified of all wildfires on District lands. LSP will provide initial suppression when commensurate personnel and equipment are available.

Wildfires ignited by lightning are a common occurrence throughout Florida and the DMA receives numerous lightening strikes as indicated by the many past wildfires. It is District policy, and state law, that DOF be notified when a wildfire occurs on LSP-managed properties. The Land Stewardship Field Crew will respond to and, if appropriate, begin suppression of area wildfires when detected during working hours. If possible, a fire assessment will be made before calling DOF.

Table 3. Prescribed burn schedule for the DuPuis Management Area*
FY 2003 -2007

Fiscal Year Acreage					
Unit	**2003**	**2004**	**2005**	**2006**	**2007**
1		100 (S.E. 1/4)		200 (E. 1/2)	100 (N.E. 1/4)
2		495 (E. of grade)			200 (W. of grade)
3 (e)			750		750
4			538		538 (l)
5			652		652
6	547 (l)			547 (l)	
7			410 (l)		410
8 (e)		275 (S.1/2)	474 (l)		200 (N. 1/2) (l)
9 (e)		550 (S. 2/3)		815	265 (N. 1/3) (l)
10	270 (S.1/2) (l)		540		270 (N. 1/2) (l)
11		964			
12(e)	700 (l)		965 (l)		250 (N.W. 1/4) (l)
13		973 (l)			973 (l)
14		450 (l)			450
15			500 (l)		500 (l)
16			500 (l)		500 (l)
17	704				
18 (e)			966		966 (l)
19	2136 (l)			2136 (l)	
20	316 (l)			316	
21		1413 (l)			
22 (e)	850			1163 (l)	200 (l)
23		2000 (E.1/2) (l)	1300 (W. 1/2) (l)		
24	1769			1769	
Yearly Total	7292 3969 (l)	7220 4836 (l)	7595 4149 (l)	6946 3846 (l)	7224 4662 (l)

* this is a planning outline and actual burn chronology will depend on weather and other limiting factors. This schedule should be followed in concert with the information on individual burn units in the DuPuis Management Area Fire Management Plan.

(l) denotes *lightning* season burn (May - September)
(e) denotes an *eagle* nest in this unit

If LSP manpower is available and other conditions are favorable, a permit will be requested from DOF to incorporate the wildfire into a controlled burn. Although infrequent, allowing these wildfires to burn will help achieve needed burn totals and will prevent counterproductive and unnecessary suppression efforts. It is recognized that the best wildfire mitigation for the DMA is to maintain the area with frequent prescribed fires promoting a healthy open forest of light fire fuel loads.

5.4 Wildlife Management

A primary objective in the management of DMA is to maintain healthy fish and wildlife populations. The LSP accomplishes this in several ways:

- performing land management activities that maintain and/or improve native wildlife habitat
- conducting specific management beneficial to protected species
- monitoring wildlife management activities through review of quarterly reports provided by the FWC
- conducting wildlife inventories where management operations may negatively impact listed species
- following management guidelines for listed species protection as determined by the *Multi-species Recovery Plan for the Threatened and Endangered Species of South Florida, Volume 1,* (U.S. Fish and Wildlife Service. 1998)
- reducing non-native pest species populations where appropriate
- maintaining a master file of confirmed and potential wildlife species
- cooperating with the FWC on wildlife management issues

Following DMA acquisition, the District contracted with the FWC to manage fish and wildlife resources, conduct wildlife surveys, implement measures to protect threatened and endangered wildlife species, regulate public hunts, and enforce all wildlife resource related rules and regulations. DMA wildlife management is directed toward production of natural species diversity consistent with the biological community types present. Success of this program requires close communication and cooperation between the LSP and FWC.

Agency efforts have concentrated on the management of the DMA's wildlife resources because the area contains only limited, artificial deep water habitat to support fisheries management. However, some fishing opportunity does exist. Canals located along the property's east perimeter, adjacent to the Corbett Wildlife Management Area, and the borrow canal inside the south perimeter's L-8 levee contain sufficient water throughout the year to maintain fish populations (Figure 2). An old borrow pit at the end of the DuPuis Grade has been recontoured and planted (Section 5.1), and a 200 foot pier constructed to improve public access and fishing opportunity. This area should show increasing public use.

Management Objective:

- *Work with the FWC to manage and enhance area wildlife. Continue to work toward the reintroduction of the federally endangered red-cockaded woodpecker. In FY 2003, request birds for translocation from the Fish and Wildlife Service.*

5.4.1 Game Management

Policy 05.00114.2d. Hunting, in areas opened for such use, is governed by the FWC regulations.

The diversity of natural communities on the DMA provides an array of game species. The area's three most popular big game species are white-tailed deer, feral hog, and wild turkey. Small game includes quail, dove, rabbit, snipe, and gray squirrel. Waterfowl are hunted in the L-8 marsh.

The DMA's public hunting program began in 1989 under the direction of the FWC. Currently, there are twelve, 3-day quota hunts from September to early December for deer and feral hog. These hunts are divided into archery, muzzleloading gun, general gun, and special hog hunts. Three, 3-day quota hunts in March are for wild turkey. All quota hunts consist of a pre-determined number of hunters randomly selected from a pool of applicants. During quota hunts, the DMA is closed to other uses and hunters are checked in and out of the property. A non-quota small game season occurs in December and January. During small game season the property remains open to all users. All harvested game is recorded and hunts are monitored by FWC biologists and law enforcement patrols. Regulations governing hunting activities on the DMA are listed in the *Florida Wildlife Code Title 39*, distributed to the public in the FFWCC publication *Dupuis Wildlife and Environmental Area Regulation Summary and Map*, and listed on the FWC web site at www.floridaconservation.org.

The number of hunters and harvest level allowed each season is commensurate with the status of game populations and will be compatible with other management objectives. Quotas and regulations for each year's hunts are reviewed by both managing agencies and are established through a designated public review process.

5.4.2 Exotic/Invasive Species

Wildlife pest species are considered to be those non-native species that are harmful to native wildlife, that negatively impact native vegetation, or that seriously interfere with management objectives. The LSP's goal for wildlife pest management is to reduce populations to attain an acceptable level of impact to natural plant and animal communities. The DMA land manager uses personal knowledge of the problem and consultation with the FWC to define the acceptable level of impact. When population control measures are warranted, land managers consult with the FWC to determine an appropriate control technique that is cognizant of public safety and humane to the species. The effects of pest population control efforts are monitored by periodic site evaluations.

The feral hog is the predominant pest species on the DMA. Disturbance caused by these animals negatively impacts natural communities and interferes with land management operations. Their high fecundity, habitat adaptability, and incessant rooting behavior combine to make them a potent destructive force and significant environmental concern. Their disruption of soil and vegetation alter natural communities and can be especially damaging in sensitive habitats slow to recover. Hog disturbance has occurred over most of the DMA including wetland communities and hammocks. Land management objectives are affected when rooting disturbance disrupts prescribed burns by preventing the spread of fire. Areas of disturbed soil can also be more susceptible to exotic plant invasion. Rooting disruption can make perilous conditions on hiking and equestrian trails, and hog foraging can have a detrimental impact on reptile populations.

Feral hogs are considered a game species on the DMA and their harvest is regulated under FWC rules. Public quota hunts conducted in the fall by the FWC are the only method of hog population

control at this time. The number of permitted hog hunters has been increased over the years to further control hog numbers and provide additional public recreation. Public hog hunting will continue to be an important use of the area and will be looked upon as the preferred hog population control method. Presently, rooting disturbance is common on the DMA but is considered to be at an acceptable level. However, this situation will be continually evaluated. Any additional control methods will be determined in cooperation with the FWC.
Other exotic fish and wildlife have been identified on the DMA including the armadillo, brown anole, two-spotted cichlid, and cuban tree frog. Although these species appear to be common, no control programs have been implemented.

5.4.3 Rare, Threatened and Endangered Species

Policy 05.00112.2. Particular emphasis shall be placed on the identification, protection and management of rare, threatened and endangered species.

Several listed wildlife species are present or have been observed historically on the DMA (Appendices BB, CC, and DD). Impacts to these species from planned land management and recreational activities are of special concern. Activities that might jeopardize the well being of these species may be altered or cancelled. District land management activities including prescribed burning, hydrologic restoration, exotic vegetation eradication, understory control, and selective forest thinning improve natural environmental characteristics that benefit listed species as well as a variety of other indigenous wildlife. Special management attention is given to the area's bald eagle population and to reintroduction of the once resident red-cockaded woodpecker.

Bald eagle nesting success has been documented on the area since 1989 and the current DMA eagle population status is monitored by the FWC. All nest trees are located and updated maps are maintained. During the breeding season no disruptive land management activities are planned within a 1500' radius of nest sites (USFWS, 1987) and nearby prescribed burns are planned to keep smoke away from nest trees. When non-breeding season burns are conducted, nest trees are protected by cutting vegetation around the tree base to limit fire intensity.

Several old red-cockaded woodpecker (rcw) tree cavities scattered throughout the DMA indicate there was probably a sizeable resident population at one time. The last active rcw cavity was destroyed by wildfire in 1989 and birds have not been seen on the area since. A program is currently underway to reintroduce this species (see *Endangered Species Recovery Plan for the Reintroduction of the Red-cockaded Woodpecke*r *to the Dupuis Management Area, June 2002 revision*). In preparation, several land management activities are conducted to restore suitable rcw habitat and protect remaining old growth slash pine trees. Heavy-duty mowing of overgrown understory, and selective thinning of pines and cabbage palms restore the open forest structure preferred by these birds. Frequent prescribed burning and the control of invasive exotic vegetation maintain the open forest. Reintroduction sites have been identified and artificial cavities have been inserted into specific trees in predetermined number and arrangement. After translocation onto the area, birds will be monitored to document movements, survival, and nesting success. At the time of publication, all attempts to obtain juvenile birds for translocation onto DuPuis had been unsuccessful. However, other sources will be explored and the search will continue.

5.4.4 Monitoring

The FWC has been a DMA management partner since shortly after District purchase and has assigned a full time biologist to the area since 1992. The FWC biologist regularly monitors several wildlife species and ongoing results are detailed in quarterly and annual reports.

White-tailed deer
Deer have been monitored since 1988 through annual surveys, initially by spotlight counts and later from aerial flights. Annual counts provide a trend index to assess relative population levels and also provide data on sex ratios and annual productivity. Harvest totals from annual hunts provide additional information used to assess the population. Annual deer surveys will be continued to provide general population trend information and provide data for harvest management.
Bald eagle
Eagle nesting surveys have been conducted since 1989. During the breeding season (October to May), aerial surveys are flown to determine nesting activity and success. During the nesting season, bi-monthly flights are conducted from January-May to determine nest location, use, and productivity. Ground surveillance may also be used. Several eagle pairs return annually to nest on the DMA and monitoring has documented 100 fledglings since 1989.

Wading birds
Monthly ground surveys of wading bird use have been conducted since 1996 on a 30-mile route that covers interior ponds and the L-8 marsh. Monitoring provides information on seasonal use and data are used in the evaluation of the hydrological restoration efforts in the L-8 marsh. Bird numbers have usually increased each wet season and then declined as water levels dropped over the dry season. Surveys will be continued to evaluate the effects of continuing land management projects.

Bobwhite quail
Bobwhite quail have been surveyed each April and May since 1996 at stations along 3 transects. Surveys provide population trend information that can be compared with hunter harvest totals and also provide data on the effects of upland restoration projects on this upland species. However, data have fluctuated from year to year and, at this point, a population trend is not clear. Surveys will continue to assess future hunts and habitat restoration efforts.

Breeding bird surveys
Breeding bird surveys were conducted between 1988-1992 and every June since 1994. The current survey method records all birds seen or heard at fifty stations along a 25-mile route through the DMA. Approximately 60 species have been recorded since the surveys started.

Feral hogs
Annual spotlight counts of feral hogs were conducted simultaneous with deer surveys until the mid 1990's. Counts were then conducted from aerial surveys during deer monitoring flights. Counts varied greatly and were considered unreliable as a population index. However, data was used with hunter harvests, user reports, and rooting observations to give a general indication of relative hog abundance. Recently, a hog rooting survey was tried but provided only a paucity of data and was discontinued. The level of the DMA's hog population will continue to be an important management concern and improved monitoring techniques will be explored.

6. Public Use

Policy 05.00110. The LSP mission is to provide natural resource protection and management while allowing appropriate recreational use on designated public lands.

Section 373.1391 (1)(a) Florida statute states that wherever practical, lands acquired by the LSP shall be open to the general public for recreational uses. Public use of management areas for appropriate resource-based activities is encouraged where such use does not interfere with protection and management of environmental resources. Potential compatible uses are outlined in Section 373.1391(1)(b) F.S.

The determination of compatible public use will be based on the following criteria:

- consistency with the reason the lands were acquired
- restrictions and/or prohibitions imposed by easements, leases, reservations, adjacent land ownership, and other conditions of the purchase agreement
- infrastructure and support facility requirements, such as fences, gates, signage, entry design, stabilized off-road parking, trails, campsites, maintenance, and other operational and budgetary impacts
- opportunities for persons with disabilities
- limitations resulting from endangered species, other sensitive natural resources, archaeological resources, or land management practices
- public health, safety and welfare
- environmental education program opportunities

Several recreational activities are appropriate and encouraged on the DMA (Figure 12). Popular activities include hiking, horseback riding, camping, hunting, fishing, birding, and general nature appreciation. Approximately 20 miles of interior roadway, 22 miles of hiking trails, and over 40 miles of equestrian trails provide access for public use. Campsites available include two general use sites, one special use site, and three backcountry sites. A public visitor's center at the DuPuis office and a fishing pier site off DuPuis Grade are handicapped accessible. User information concerning recreational activities is located at the DMA and West Palm Beach offices, and at each DMA entrance. Information will also be available on the DuPuis website, when completed.

A short trail with boardwalk planned off the DuPuis Grade will provide access through a nearby cypress dome community and will enhance public use of this area. A self-guided auto tour along Jim Lake and DuPuis Grades will highlight points of interest and management activities.

Management Objective:

- *Develop a short trail with boardwalk off DuPuis Grade in FY 2005.*
- *Complete a self guided auto tour on the main grade in FY 2003.*

6.1 Regulation

Policy 05.00114.2a. Public use rules are set forth in 40E-7.511 F.A.C. to implement Florida statutes, sections 259.101, 373.016(2)(h), and 373.1391(1)(b). Accordingly, the District publishes and makes available a Public Use Guide for designated land management areas. The Public Use Guide is considered by the Governing Board at a public meeting advertised in accordance with Chapter 120, F.S.

Regulations in the District's *Public Use Guide* that govern activities on the DMA are supplemental to those public use regulations established by the FWC. Complete FWC regulations are listed in the *Florida Wildlife Code, Title 39* and those specific to the DMA are published in the *Dupuis Wildlife and Environmental Area Regulations Summary and Area Map*. FWC regulations are updated annually through a review cycle that provides scheduled opportunities for public input and comment. The District's *Public Use Guide* and the FWC's *Dupuis Regulations Summary and Area Map* are available at the DuPuis office and at both agency headquarters in West Palm Beach.

Through the cooperative management agreement with the District, the FWC is responsible for enforcement of all laws, rules, and regulations applicable to the operation of the DMA including those relating to hunting, wildlife resources, and fresh water aquatic life (Contract C91-2111). In addition, Florida Statutes (Chapter 375) states that the FWC shall manage vehicle use on lands owned or leased by the state and used by the general public for recreational purposes.

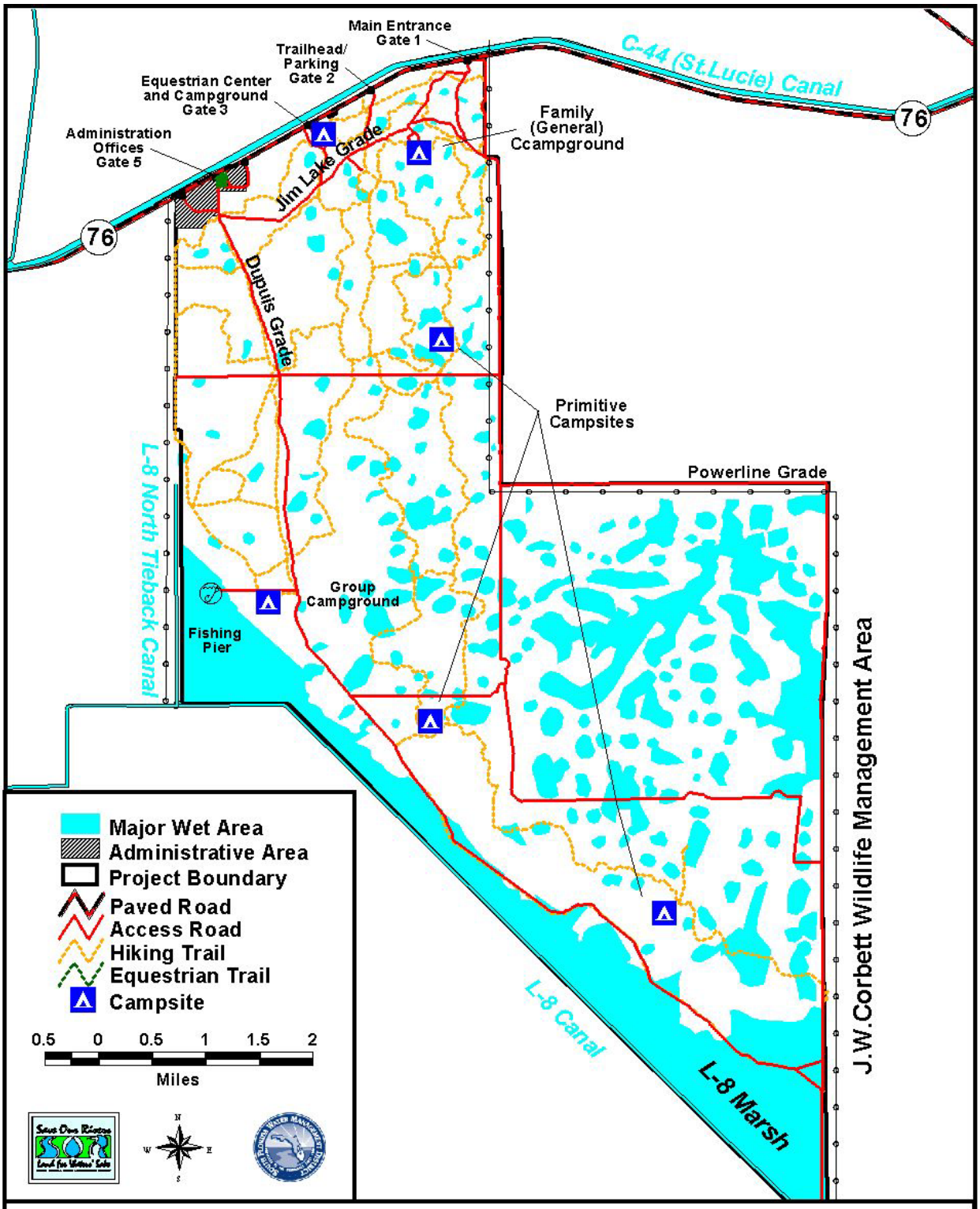

Figure 12. Public Use Facilities on the DuPuis Management Area

6.2 Resource Protection

Policy 05.00111.4. Public use shall not result in detrimental impacts to water resources. When a public use activity produces detrimental effects on water resources, it shall be discontinued until an evaluation determines that such use is compatible.

Policy 05.00113.7. Security and resource protection shall be provided by professional law enforcement services through contractual and non-contractual agreements, to safeguard the public and protect natural and cultural resources on District-managed natural areas.

Management of public activities on District lands requires a strong commitment to resource protection while simultaneously promoting all appropriate public uses. The LSP emphasizes the enforcement of pertinent rules and regulations to protect natural resources and also provide a safe recreational opportunity. The resource protection program integrates contractual law enforcement and on-site caretakers to protect the natural resources and District assets. As part of the DMA's cooperative management agreement, FWC law enforcement officers conduct regular patrols throughout the year, increasing their presence during hunting seasons and at other times when public use is high. Law enforcement surveillance protects natural and cultural resources, deters illegal activity, and safeguards the public. Patrols are conducted with 4-wheeled drive vehicles and often include swamp buggies, ATV's, and aircraft.

Supplemental "enhanced" patrols are provided at the DMA through a separate contract with the FWC for District-wide wildlife law enforcement. The District's resource protection coordinator and the DMA manager review biweekly reports and meet with officers to structure patrols based on resource needs.

In addition to the FWC, Martin and Palm Beach County Sheriff's deputies occasionally patrol the area. In September 2001, a Martin County Sheriff's deputy moved into on-site District housing located near Gate 5. This arrangement will provide an immediate law enforcement presence and additional security for area.

During the 2002-2003 camping "season," a volunteer campground host lived at the equestrian campground to supervise campground activites and provide users an on-site contact. This arrangement proved very helpful to campground operation, provided another level of security, and was well received by users. Another host will be sought for the upcoming 2003-2004 season. Management will evaluate this program each season.

Resource protection is also greatly enhanced by the presence and maintenance of continuous, posted boundary fencing that unambiguously delineates SOR property perimeters. The DMA perimeter is entirely fenced and posted, and its maintenance and repair will be an ongoing management concern. Future fencing will be associated with delineating internal public use areas (dove fields, campgrounds, administrative areas, etc.) and new construction projects.

Management Objective:

- *Provide resource protection through partnership with the FWC. Review enhanced patrol activities biweekly and review program annually.*

6.3 Revenue Generation

Policy 05.00115.33b. Entrance and user fees, permits, licenses and/or advance reservations may be required for use of District lands where considered necessary by the managing agency.

Entrance and user fees are collected at the DMA to supplement operating expenses and public facilities maintenance. Fees vary depending on the activity type and are collected at self-pay stations located at each public entrance. Fee structure signs are also posted at each entrance. Fees are collected weekly, collection amounts are recorded, and all fees are deposited into an account dedicated to DMA land management activities. Records of monthly deposits are available from the DMA administrative office. Future changes to the fee structure will be made through consultation with the DuPuis Advisory Council.

Policy 05.00115.3a. Private concessions and/or agreements with non-profit organizations will be considered to implement needed services through concession contracts.

Where appropriate, consideration will be given to the provision of needed facilities and services through concession contracts and/or agreements with private organizations. Currently there are no DMA concessions and none are planned. However, proposals will be evaluated individually and through consultation with the DuPuis Advisory Council.

6.4 Environmental Education and Community Extension

Educational programs are developed and implemented on select management areas by cooperators interested in promoting increased visitor awareness and appreciation of area natural and cultural resources. A central theme to these programs is the vital role of water management in maintaining resource viability and productivity. The LSP encourages educational partnerships through memorandums of understanding, lease, and contract agreements.

A section of the DMA office building and part of the surrounding grounds are being developed into a visitor's center and environmental education area (section 5.1). Additional parking areas are being constructed to accommodate school buses for larger visitor groups. The District is working through a contractual agreement with Florida Atlantic University's Center for Environmental Studies to develop physical site improvements and provide educational programs. An indoor exhibit room and lobby will contain interpretive information as well as diorama-like displays of native communities and animals. Outdoor areas will contain interpretive signage along a short trail through planted natural communities representative of those found on the DMA. The visitor's center will be open daily to area users and will be able to accommodate specialized programs for larger school groups. Interpretive staff will be hired to provide weekend support.

The DuPuis Advisory Council is a group composed of representatives from area recreation and conservation organizations, and agency managers that was organized to provide regular communication between staff and user groups. The council meets quarterly to discuss DMA operational activities and plans, and also member's activities and concerns as they relate to DMA operations. The District will solicit the council's advice and support of area plans that affect DMA user groups.

Management Objective:

- *Maintain public use program focus and direction through continued coordination with the FWC and through quarterly meetings with the DuPuis Public Use Advisory Council.*
- *Complete the DuPuis Visitor Center in FY 2003 and coordinate educational program development with the Center for Environmental Studies.*

7. Administration

Administration of LSP lands is directed through the Land Stewardship Division. Policy decisions, planning and budgeting, procurement of personnel and equipment, contract administration, and issues of program development are administrative tasks coordinated through the Division. Input is provided from regional land managers located at District service centers over the 16-county area. Regional land managers handle regular administrative duties from their field locations to assure quick response to local concerns and management issues. DMA administrative activities are handled through a LSP field office located at Gate 5. The primary contact for information is the DMA land manager (Appendix GG).

7.1 Planning and Budgeting

Planning is a major function of the LSP mission and is critical to maintain proper program focus, direction, and coordination with other agencies. LSP planning is accomplished by division planning staff and in coordination with individual land managers. Division level planning develops land acquisition strategy and project evaluation, produces the SOR Land Acquisition and Management Plan, and coordinates acquisition planning with other District and outside agency personnel.

Policy 05.00117.2. General management plans provide a description of recommended management and is required for each Land Stewardship Management Area. The GMP follows a designated format and is updated every five years.

General Management Plans (GMP) are developed that detail strategies to guide management activities on individual project areas. The GMP defines goals and objectives, identifies major management issues, and describes management activities. Each plan is subject to a draft revision period where public comment and professional review is requested prior to plan approval. Each plan is revised on a five-year cycle by planning team staff.

Policy 05.00117.4. Annual work plans summarize activities corresponding with annual budget development and are prepared by the Operations Section of the LSP.

Annual work plans are developed each fiscal year for budget preparation and to address activities and projects targeted for completion within the up-coming fiscal year on individual properties. The annual work plan includes performance objectives for exotic plant control, vegetation management, prescribed burning, fencing, infrastructure maintenance, forest management, resource protection, public use development, environmental monitoring, and contract administration.
Annual DMA work plans and budgets are developed in concert with program-wide operational priorities and budgetary cycle. Current year DMA annual plans are available at West Palm Beach headquarters and the DMA office.

Policy 05.001157.5. Summaries of management activities for each management area will be reported quarterly within the District and annually as part of the Florida Forever Work Plan.

Each quarter, land managers submit regional management reports to document progress toward achieving annual work plan objectives. The DMA quarterly reports are kept on file at District headquarters and the DMA office. LSP quarterly meetings address management problems and plan for future management operations.

Policy 05.00115. The District will secure dedicated funding sources, personnel and other resources to support program goals and objectives. Project funding needs and sources for cooperative management agreements with government and non-government entities will be identified during acquisition. A cooperative management agreement will designate a lead manager and identify whether District funding is required.

The principle source of funding for the Land Stewardship Program is the Water Management Lands Trust Fund, administered by the Florida Department of Environmental Protection. Money for this dedicated fund is generated from the sale of state documentary tax stamps and is used for property acquisition and management. Additional funding and support may be obtained from the harvest of renewable resources, land use leases, in-kind management services from cooperating management partners, no-cost services from user groups and volunteers, and funding through mitigation banking. The DMA is the only LSP project area where user fees are collected to support property management. DMA users deposit fees at entrance collection stations according to their activity and length of stay. Fee schedules are established through coordination with the DuPuis Advisory Council and are posted at each public entrance.

Budget planning begins in March during the work planning process for the following fiscal year (October-September). Overall budget availability generally determines management activities. Budget distribution among the District's five land management regions is based on a programmatic prioritization of management activities. Operational funds are distributed to most effectively accomplish the management objectives of each management area.

7.2 Infrastructure

Policy 05.00113.11. Infrastructure support shall be developed and maintained to provide safe access for responsible management and public use on District lands. Such infrastructure includes access points, roads, trails, utilities, and minimal public facilities.

The development of adequate infrastructure for DMA public use and management activities has received extensive LSP support combined with efforts of the DOF, the FWC, and volunteer organizations. Current DMA infrastructure includes an office building and visitor's center, two employee residences, a leased residence (trailer), several outbuildings, an equipment compound, five entrances, three campgrounds, perimeter fencing, firelines, hiking and equestrian trails, a fishing pond with pier, and 20 miles of public road.

The DMA hiking and equestrian trails, campgrounds, and public roads require regular maintenance (Figure 12). The District has entered into agreements with the Florida Trail Association and the DuPuis Horsemen's Association (DHA) for hiking and equestrian trail maintenance, respectively. The DHA is also responsible for maintenance of the equestrian campground. The District maintains

the family and group campgrounds and also the 20-mile DMA public road system. A one-mile section of the Powerline Grade was widened and capped in 2002 and additional improvements are planned for this Grade in coming years. The DMA fishing pier and pond requires periodic maintenance and future improvements are planned (section 5.1).

Management Objective:

- *Complete assessment and planning, and begin equestrian campground improvements in FY 2004.*

The DMA field office is located at Gate 5 in the old ranch house that has been converted into an administrative center. Office space and equipment, and a computer link with District headquarters in West Palm Beach is maintained. At this time, construction work is almost complete to improve office parking and restroom facilities as part of the Dupuis visitor's center improvement project (section 6.4).

A maintenance shop and equipment storage compound are located in the northwest section of the property and are accessed through Gate 6. Recent improvements have upgraded this area's security and have included the installation of a hurricane protection area for equipment, security fencing around the compound yard, and motion sensors in storage buildings. Construction plans are underway for a needed shop and storage building that will replace the existing old facility. Future plans for the compound area will involve the gradual replacement of other ageing storage buildings.

A District-owned mobile home is located across from Gate 5 and is leased to a Martin County Sheriff's deputy who provides additional on-site security. The District supplies utilities, water system maintenance, and is responsible for larger repairs.

There are three unimproved buildings located on the DMA that need infrequent low level maintenance. These buildings are local landmarks and will be maintained in their current condition (Governor's House, Mound House and Sheep Shearer's Shack).

Management Objective:

- *Maintain present public-use improvements (roads, signs, entrances, campgrounds, structures) using a combination of District maintenance, construction contracts, and user group involvement.*

7.3 Personnel and Equipment

The LSP is separated into five geographic regions each staffed with professional land managers directed by the supervising land manager. Highly trained land management technicians are based at the DMA, the West Coast Field Office, and at the Orlando Service Center. The Land Stewardship Division director and additional planning staff are headquartered at the main West Palm Beach office.

Management of the DMA is the responsibility of the east-coast region land manager. Besides the regional land manager, the DMA is headquarters for equipment and personnel critical for proper stewardship in all five regions, including a 4-person crew of land management technicians and their supervisor that form the primary prescribed burn team. Current DMA staff also includes the

supervising land manager, a program botanist, an administrative assistant, and a member of the Vegetation Management Division. A FWC biologist is assigned to the DMA and has an office on site. Additional management input and support comes from District planning and field station personnel.

The DuPuis area contains storage facilities for the majority of LSP's specialized heavy equipment used for earthmoving, fire suppression, all-terrain access, mowing, disking, and other stewardship activities. Equipment is stored in a fenced and secured compound area containing storage barns, a small shop, and fuel pumps. A complete equipment inventory is kept on file and is available at the DMA office.

7.4 Volunteers and Alternative Work Force

Policy 05.00115.4a. Volunteers, interns and alternative work forces will be used when possible to supplement existing staff and services.

Section 373.1391(3) F.S. encourages the District to use volunteers for land management and other services. The District recognizes the merits of volunteerism and welcomes participation in activities appropriate for public involvement. Selection of appropriate management activities is at the discretion of the land manager and may fall under the general guidance of the supervising land manager. Volunteers have contributed many hours to DMA maintenance and improvement. Recreational clubs have conducted workdays to construct needed improvements to campgrounds, and provide campground and trail maintenance. Student volunteers from Roosevelt and Indiantown Middle Schools, Pahokee High School, and other student groups have planted and maintained much of the office and visitor center landscaping. In conjunction with area campouts, scout troops have painted gates and cleaned campgrounds and trails. All volunteer activities help accomplish management objectives, promote citizen involvement, and allow area staff to focus on other needs.

Student interns are also hired on a project-specific, time-limited basis to conduct fieldwork. Interns have been acquired through contracts with the Student Conservation Association (SCA) and the Center for Environmental Studies (CES) to conduct field sampling and develop visitor's center displays.

Land management objectives are also met by seeking alternative work forces. Alternative work forces can be used for projects that demand abundant manual labor and have low technical skill requirements. The DMA coordinates with other land management staff for the use of Florida Department of Correction inmates for brush clearing, trash pick up, and other maintenance activities.

7.5 Contractual Management

Policy 05.00115.1. The private sector may be solicited to furnish certain management-related facilities and services through the execution of leases and agreements. These leases/agreements will assure mutual benefits to both the District and private parties and be consistent with the program management objectives.

Effective operation and management of LSP properties requires the services and cooperation of private organizations, other governmental agencies, and volunteers. Contractual management is

legalized through a management agreement signed by both the District and contracting entity with the document defining responsibilities of each party.

The District has established and maintains several contractual management agreements to assist with DMA management:

Florida Fish and Wildlife Conservation Commission MOA
In June 1991, a Memorandum of Agreement (MOA, Contract-C91-2111), was formalized between the FWC and District to establish a cooperative program for the management and protection of DMA fish and wildlife, and the regulation of compatible public use. The most recent contract amendment (C91-2111-A06) extended the contractual period through September 2004.

More specifically, the agreement states that the FWC shall:
- oversee management of fish and wildlife resources in consultation with SFWMD
- undertake population surveys and research related to game and non-game species
- design, implement and regulate public hunts
- cooperate with SFWMD to increase visitor awareness and appreciation of DMA wildlife resources, native plant communities, and cultural resources through interpretive programs
- enforce all laws, rules, and regulations relating to wildlife resources and freshwater aquatic life

The agreement states that the SFWMD shall:
- appoint a lead coordinator and planning team to develop a GMP
- restore and maintain natural communities by establishing appropriate hydroperiods, control exotic plants, and conduct prescribed burns in consultation with the FWC
- review annual work plan and budget submitted annually by the FWC
- consider annual funding to the FWC
- construct and maintain all structures needed for District management activities
- provide timely notification to the FWC on actions that could impact management activities
- provide agreed upon office and equipment storage space

MOU, Florida Trail Association
The District entered into an agreement with the Florida Trail Association in 1989 for the planning, development, and maintenance of a hiking trail system on the area. The District and the FTA agreed to coordinate all activities and programs related to the trail system and the District agreed to furnish tools and specialized equipment consistent with work schedules and budgetary constraints. The trail system was installed (appendix G) and work now concentrates on maintenance and repair.

DuPuis Horsemen's Association
In 1998, The District renewed an agreement with the DuPuis Horsemen's Association (DHA) to develop and maintain the equestrian trail system and campground facilities. The agreement stated that the District would furnish tools and specialized equipment, and assist the DHA in carrying out certain trail responsibilities beyond the DHA's capability. The agreement term was for five years with three, five-year renewal periods.

FWC Resource Protection Contract
The District contracted with the FWC for additional resource protection services, (Contract C-10162). These services cover areas throughout the District and include supplemental patrols on the

DMA during times of higher public use. The District's resource protection coordinator schedules patrols with input from the DMA land manager and FWC.

Florida Atlantic University, Center for Environmental Studies
The District entered into a cooperative agreement (C-12559) in April, 2000 with FAU's Center for Environmental Studies to develop a public use and education program at the DMA visitor center. The agreement included interpretive trail and sign development, supervision of volunteers, conducting service learning projects, site maintenance, and providing a qualified weekend attendant. Future contract extensions will depend on needs and budget allotments.

Florida Natural Areas Inventory MOU
The District finalized an MOU with the FNAI to facilitate exchange of listed species data on SOR lands. New data on DMA listed species are provided to FNAI.

7.6 Management Review

Policy 05.00113c. Legislative-mandated management review (H.B. 1119) will provide input from professional peers.

Each District project area has a land management review team comprised of state, county, and private entities that periodically reviews management activities to assure they are consistent with acquisition intent and SOR objectives. Management assessments are conducted in light of the goals and objectives defined in the area's general management plan. If the review team determines that management is not in accordance with the management plan, the lead management agency provides a written explanation to the review team.

The DMA has had two management reviews. In 1998, after reviewing the current management plan and touring on-site activities, an 8-person review team concluded that DMA management was consistent with acquisition intent. However, the team recommended that prescribed burning be increased, that more acreage be burned in the growing season, that the exotic plant control program be intensified, that a timber management plan be developed, that efforts to control feral hogs be increased, and that the management plan be updated. DuPuis managers incorporated these recommendations in subsequent management objectives and activities. Goals for prescribed burning were increased and included a higher percentage of growing season burns, exotic plant control was intensified, a timber management plan was developed and implemented, and hunting quotas for feral hogs were increased.

In 2003, a team reviewed an updated management plan and toured on-site management activities. DMA management was again deemed consistent with acquisition intent and was judged mainly to meet or exceed team expectations. Only the frequency of exotic plant control did not meet expectations. The team considered a 2-year return frequency inadequate to effectively control DuPuis' exotic vegetation problem. Though DuPuis managers currently change treatment frequency in response to a number of factors (section 5.2.2), management will review the general 2-year treatment strategy.

Results of management reviews as well as District responses to management team recommendations are available at the DMA and West Palm Beach offices.

Appendix AA: Plants
(This list of Dupuis plants was compiled by D. Black (SFWMD) from lists by P. David, R. Woodbury, and The Institute for Regional Conservation.)

Trees, Shrubs, and Vines

Earleaf Acacia	*Acacia auriculiformis*
Red Maple	*Acer rubrum*
Woman's Tongue	*Albizia lebbeck*
Golden Trumpet	*Allamanda cathartica*
Pepper Vine	*Ampelopsis arborea*
Bastard Indigobush	*Amorpha fruticosa*
Pond Apple	*Annona glabra*
Coralvine	*Antigonon leptopus*
Groundnut	*Apios americana*
Northfolk Island Pine	*Araucaria excelsa*
Shoebutton Ardisia	*Ardisia elliptica*
Sprenger's Asparagus	*Asparagus aethiopicus*
Common Asparagus-fern	*Asparagus setaceus*
Pawpaw	*Asimina reticulata*
Saltbush	*Baccharis halmifolia*
Silverling	*Baccharis glomeruliflora*
Bamboo	*Bambusa vulgaris*
Orchid Tree	*Bauhinia variegata*
Tarflower	*Befaria racemosa*
Gumbo-limbo	*Bursera simaruba*
Beauty Berry	*Callicarpa americana*
Hedge False Bindweed	*Calystegia sepium limnophila*
Love Vine	*Cassytha filiformis*
Gray Sheoak	*Casuarina glauca*
Sugarberry	*Celtis laevigata*
Buttonbush	*Cephalanthus occidentalis*
Cocoplum	*Chrysobalanus icaco*
Satinleaf	*Chrysophyllum oliviforme*
Orange	*Citrus aurantium*
Lemon	*Citrus limon*
Citron	*Citrus medica*
Tangerine	*Citrus reticulata*
Sweet Orange	*Citrus sinensis*
Grapefruit	*Citrus Xparadisi*
Cockspur Hawthorn	*Crataegus crus-galli*
Colombian Waxweed	*Cuphea carthagenensis*
Indian Rosewood	*Dalbergia sissoo*
Common Persimmon	*Diaspyros virginiana*
Air-potato	*Dioscorea bulbifera*
Eucalyptus	*Eucalyptus sp.*
Surinam Cherry	*Eugenia uniflora*
Florida Strangler Fig	*Ficus aurea*
Indian Laurel	*Ficus microcarpa*
Pop Ash	*Fraxinus caroliniana*

Trees, Shrubs, and Vines (cont.)

Dwarf Huckleberry	*Gaylussacia dumosa*
Firebush	*Hamelia patens*
Lindenleaf Rosemallow	*Hibiscus furcellatus*
Swamp Rosemallow	*Hibiscus grandiflorus*
Sandweed	*Hypericum fasciculatum*
St. Johnswort	*Hypericum cistifolium*
St. Andrew's-cross	*Hypericum hypericoides*
Dwarf St. John's-wort	*Hypericum mutilum*
Four petal St. John's-wort	*Hypericum tetrapetalum*
Atlantic St. John'- wort	*Hypericum reductum*
Dahoon	*Ilex cassine*
Gallberry	*Ilex glabra*
Hairy Indigo	*Indigofera hirsuta*
Moonflower	*Ipomoea alba*
Morning-glory	*Ipomoea indica* var.*acuminata*
Arrowleaf morning-glory	*Ipomoea sagittata*
Virginia Willow	*Itea virginica*
Southern Red Cedar	*Juniperus silicicola*
Lantana	*Lantana camara*
White Leadtree	*Leucaena leucocephala*
Gopher Apple	*Licania michauxii*
Rusty Lyonia	*Lyonia fruticosa*
Fetterbush	*Lyonia lucida*
Winged Loosestrife	*Lythrum alatum*
Florida Loosestrife	*Lythrum flagellare*
Sweetbay	*Magnolia virginiana*
Mango	*Mangifera indica*
Cajeput Tree	*Melaleuca quinquenervia*
Chinaberry Tree	*Melia azedarach*
Creeping Cucumber	*Melothria pendula*
Florida Keys Hempvine	*Mikania cordifolia*
Climbing Hempweed	*Mikania scandens*
Balsam-pear	*Momordica charantia*
Red Mulberry	*Morus rubra*
Wax Myrtle	*Myrica cerifera*
Mexican Palo Verde	*Parkinsonia aculeata*
Corkystem Passionflower	*Passiflora suberosa*
Virginia Creeper	*Parthenocissus quinquefolia*
Avocado	*Persea americana*
Red Bay	*Persea borbonia*
Swamp Bay	*Persea palustris*
Date Palm	*Phoenix reclinata*
Slash Pine	*Pinus elliotti*
Strawberry Guava	*Psidium cattleianum*
Common Guava	*Psidium guajava*
Wild Coffee	*Psychotria sulzneri*
Flamevine	*Pyrostegia venusta*

Trees, Shrubs, and Vines (cont.)

Laurel Oak	*Quercus laurifolia*
Dwarf Live Oak	*Quercus minima*
Myrtle Oak	*Quercus myrtifolia*
Live Oak	*Quercus virginiana*
Myrsine	*Rapanea punctata*
White Indigoberry	*Randia aculeata*
Rose Myrtle	*Rhodomyrtus tomentosa*
Winged Sumac	*Rhus copallinum*
Southern Dewberry	*Rubus trivialis*
Cabbage Palm	*Sabal palmetto*
Coastal Plain Willow	*Salix caroliniana*
Southern Elderberry	*Sambucus canadensis*
White-Vine	*Sarcostemma clausum*
Brazilian Pepper	*Schinus terebinthifolius*
Graytwig	*Schoepfia chrysophylloides*
Privet Wild Sensitive Plant	*Senna ligustrina*
Coffeeweed	*Senna obtusifolia*
Septicweed	*Senna occidentalis*
Saw Palmetto	*Serenoa repens*
Common Wireweed	*Sida acuta*
Llima	*Sida cordifolia*
Cuban Jute	*Sida rhombifolia*
Florida Bully	*Sideroxylon reclinatum*
Earleaf Greenbrier	*Smilax auriculata*
Saw Greenbrier	*Smilax bona-nox*
Catbrier	*Smilax laurifolia*
Shrubby False Buttonweed	*Spermacoce verticillata*
Blue Porterweed	*Stachytarpheta jamaicensis*
Corkwood	*Stillingia aquatica*
Queen's Delight	*Stillingia sylvatica*
Java-Plum	*Syzygium cumini*
Rose-Apple	*Syzygium jambos*
Pond Cypress	*Taxodium ascendens*
Bald Cypress	*Taxodium distichum*
Yellow Elder	*Tecoma stans*
West Indian Almond	*Terminalia catappa*
Blackeyed Susan Vine	*Thunbergia alata*
Poison Oak	*Toxicodendron radicans*
Nettletree	*Trema micranthum*
Virginia Marsh St. John's-wort	*Triadenum virginicum*
Forked Bluecurls	*Trichostema dichotomum*
Sacramento Burrbark	*Triumfetta semitriloba*
Shiney Blueberry	*Vaccinium myrsinites*
Black Haw	*Viburnum obovatum*
Fourleaf Vetch	*Vicia acutifolia*
Hairypod Cowpea	*Vigna luteola*
Simpleleaf Chaste Tree	*Vitex trifolia*

Trees, Shrubs, and Vines (cont.)

Summer Grape	*Vitis aestivalis*
Muscadine	*Vitis rotundifolia*
Calloose Grape	*Vitis shuttleworthii*
Creeping Oxeye	*Wedelia trilobata*
Arrowleaf Elephantear	*Xanthosoma sagittifolium*
Tallow Wood	*Ximenia americana*
Hercules' Club	*Zanthoxylum clava-herculis*

Herbaceous

Slender Threeseed Mercury	*Acalypha gracilens*
Shyleaf	*Aeschynomene americana*
Flaxleaf False Foxglove	*Agalinis linifolia*
Saltmarsh False Foxglove	*Agalinis maritima*
Purple False Foxglove	*Agalinis purpurea*
Sisal Hemp	*Agave sisalana*
Hammock Snakeroot	*Ageratina jucunda*
Tropical Whiteweed	*Ageratum conyzoides*
Colic root	*Aletris lutea*
Alligatorweed	*Alternanthera philoxeroides*
Sessile Joyweed	*Altenanthera sessilis*
White Moneywort	*Alysicarpus vaginalis*
Ragweed	*Ambrosia artemisiifolia*
Pink Redstem	*Ammannia latifolia*
Nodding Nixie	*Apteria aphylla*
Mexican poppy	*Argemone mexicana*
Jack-in-the-pulpit	*Arisaema triphyllum*
Ovateleaf Indian Plantain	*Arnoglossum ovatum*
Scarlet Milkweed	*Asclepias curassavica*
Swamp Milkweed	*Asclepias incarnata*
Lanceolate Milkweed	*Asclepias lanceolata*
Longleaf Milkweed	*Asclepias longifolia*
Savannah Milkweed	*Asclepias pedicellata*
Whorled Milkweed	*Asclepias verticillata*
Green Antelopehorn	*Asclepias viridis*
Butterfly-weed	*Asclepias tuberosa*
Scale-leaf Aster	*Aster adnatus*
Climbing Aster	*Aster carolinianus*
Rice Button Aster	*Aster dumosus*
Annual Marsh Aster	*Aster subulatus*
Lemon Bacopa	*Bacopa caroliniana*
Tropical Waterhyssop	*Bacopa innominata*
Bacopa	*Bacopa monnieri*
Honeycomb Head	*Balduina angustifolia*
White Screwstem	*Bartonia verna*
Beggarticks	*Bidens alba var. radiata*
Smooth Beggarticks	*Bidens laevis*
Smallfruit Beggarticks	*Bidens mitis*

Herbaceous (cont.)

Pineland Rayless Goldenrod	*Bigelowia nudata subsp.australis*
Browne's Blechum	*Blechum pyramidatum*
Pinepink	*Bletia purpurea*
False Nettle	*Boehmeria cylindrica*
Wineflower	*Boerhavia diffusa*
Leaf Mustard	*Brassica juncea*
American Bluehearts	*Buchnera americana*
Bluethread	*Burmannia biflora*
Southern Bluethread	*Burmannia capitata*
Bearded Grasspink	*Calopogon barbatus*
Manyflowered Grasspink	*Calopogon multiflorus*
Tuberous Grasspink	*Calopogon tuberosus*
Bandana-of-the-Everglades	*Canna flaccida*
Pineland Chaffhead	*Carphephorus carnosus*
Florida Paintbrush	*Carphephorus corymbosus*
Vanillaleaf	*Carphephorus odoratissimus*
Hairy Chaffhead	*Carphephorus paniculatus*
Periwinkle	*Catharanthus roseus*
Coinwort	*Centella asiatica*
Butterfly Pea	*Centrosema virginianum*
Coontail	*Ceratophyllum demersum*
Partridge Pea	*Chamaecrista fasciculata*
Sensitive Pea	*Chamaecrista nictitans var.aspera*
Pillpod Sandmat	*Chamaesyce hirta*
Graceful Sandmat	*Chamaesyce hypericifolia*
Spotted Sandmat	*Chamaesyce maculata*
Prostrate Sandmat	*Chamaesyce prostrata*
Pineland Daisy	*Chaptalia tomentosa*
Pigweed	*Chenopodium ambrosioides*
Jack-in-the-bush	*Chromolaena odorata*
Coastalplain Goldenaster	*Chrysopsis scabrella*
Spotted Water Hemlock	*Cicuta maculata*
Thistle	*Cirsium horridulum*
Nuttall's Thistle	*Cirsium nuttallii*
Seasonvine	*Cissus verticillata*
Pine Hyacinth	*Clematis baldwinii*
Finger-Rot	*Cnidoscolus stimulosus*
Wild Taro	*Colocasia esculenta*
Common Dayflower	*Commelina diffusa*
Whitemouth Dayflower	*Commelina erecta*
Blue Mistflower	*Conoclinium coelestinum*
Canadian Horseweed	*Conyza canadensis*
Florid Tickseed	*Coreopsis floridana*
Tickseed	*Coreopsis gladiata*
Leavenworth's Tickseed	*Coreopsis leavenworthii*
Swamp Lily	*Crinum americanum*
Shakeshake	*Crotalaria incana*

Herbaceous (cont.)

Lanceleaf Rattlebox	*Crotalaria lanceolata*
Low Rattlebox	*Crotalaria pumila*
Rattleweed	*Crotalaria retusa*
Rabbitbells	*Crotalaria rotundifolia*
Showy Rattlebox	*Crotalaria spectabilis*
Vente Conmigo	*Croton glandulosus*
Pineland Croton	*Croton linearis*
Florida Scrub Roseling	*Cuthbertia ornata*
Ticktrefoil	*Desmodium incanum*
Threeflower Ticktrefoil	*Desmodium triflorum*
Carolina Ponysfoot	*Dichondra carolinensis*
Poor Joe	*Diodia teres*
Virginia Buttonweed	*Diodia virginiana*
Dwarf Sundew	*Drosera brevifolia*
Pink Sundew	*Drosera capillaris*
Drymary	*Drymaria cordata*
Pineland Twinflower	*Dyschoriste angusta*
Water Hyacinth	*Eichhornia crassipes*
Tall Elephants Foot	*Elephantopus elatus*
Florida Tasselflower	*Emilia fosbergii*
Lilac Tasselflower	*Emilia sonchifolia*
Florida Butterfly Orchid	*Encyclia tampensis*
Fireweed	*Erechtites hieracifolia*
Oakleaf Fleabane	*Erigeron quercifolius*
Early Whitetop Fleabane	*Erigeron vernus*
Flattened Pipewort	*Eriocaulon compressum*
Hatpins	*Eriocaulon decangulare*
Rarenel's Pipewort	*Eriocaulon ravenelii*
Michaux's Cupgrass	*Eriochloa michauxii*
Dogtongue Wild Buckwheat	*Eriogonum tomentosum*
Button Snakeroot	*Eryngium aquaticum*
Baldwin's Eryngo	*Eryngium baldwinii*
Button Rattlesnakemaster	*Eryngium yuccifolium*
Wild Coco	*Eulophia alta*
Dog-fennel	*Eupatorium capillifolium*
False Fennel	*Eupatorium leptophyllum*
Semaphore Thoroughwort	*Eupatorium mikanioides*
Mohr's Thoroughwort	*Eupatorium mohrii*
Lesser Florida Spurge	*Euphorbia polyphylla*
Flat-topped Goldenrod	*Euthamia grominifolia*
Narrowleaf Yellowtops	*Flaveria linearis*
Cottonweed	*Froelichia floridana*
Elliott's Milkpea	*Galactia elliottii*
Eastern Milkpea	*Galactia regularis*
Downy Milkpea	*Galactia volubilis*
Bluntleaf Bedstraw	*Galium hispidulum*
Bedstraw	*Galium obtusum*

Herbaceous (cont.)

Stiff Marsh Bedstraw	*Galium tinctorium*
Oneflower Bedstraw	*Galium uniflorum*
Southern Beeblossom	*Gaura angustifolia*
Narrowleaf Purple Everlasting	*Gnaphalium falcatum*
Rabbit Tobacco	*Gnaphalium obtusifolium*
Pennsylvania Everlasting	*Gnaphalium pensylvanicum*
Spoonleaf Purple Everlasting	*Gnaphalium purpureum*
Arrasa Con Todo	*Gomphrena serrata*
Rough Hedgehyssop	*Gratiola hispida*
Hedge Hyssop	*Gratiola pilosa*
Branched Hedgehyssop	*Gratiola ramosa*
Longhorn False Reinorchid	*Habenaria quinqueseta*
Waterspider False Reinorchid	*Habenaria repens*
Threadroot Orchid	*Harrisella filiformis*
Flatop Mille Graines	*Hedyotis corymbosa*
Clustered Mille Graines	*Hedyotis uniflora*
Southeastern Sneezeweed	*Helenium pinnatifidum*
Pinebarren Frostweed	*Helianthemum corymbosum*
Florida Scrub Frostweed	*Helianthemum nashii*
Scorpion's Tail	*Heliotropium angiospermum*
Pineland Heliotrope	*Heliotropium polyphyllum*
Camphorweed	*Heterotheca subaxillaris*
Queen-devil	*Hieracium gronovii*
Coastalplain Hawkweed	*Hieracium megacephalon*
Waterthyme	*Hydrilla verticillata*
Manyflower Marshpennywort	*Hydrocotyle umbellata*
Whorled Pennywort	*Hydrocotyle verticillata*
Skyflower	*Hydrolea corymbosa*
Alligator Lily	*Hymenocallis palmeri*
Fringed Yellow Stargrass	*Hypoxis juncea*
Bristleseed Yellow Stargrass	*Hypoxis wrightii*
Musky Mint	*Hyptis alata*
John Charles	*Hyptis verticillata*
Juba's Bush	*Iresine diffusa*
Southern Blue Flag	*Iris hexagona var. savannarum*
Piedmont Marshelder	*Iva microcephala*
Water Willow	*Justica crassifolia*
Cathedral Bells	*Kalanchoe pinnata*
Marsh Mallow	*Kosteletzkya virginica*
Red Root	*Lachnanthes caroliniana*
Engler's Bogbutton	*Lachnocaulon engleri*
Small's Bogbutton	*Lachnocaulon minus*
Grassleaf Lettuce	*Lactuca graminifolia*
Drysand Pinweed	*Lechea divaricata*
Piedmont Pinweed	*Lechea torreyi*
Valdivia Duckweed	*Lemna valdiviana*
Virginia Pepperweed	*Lepidium virginicum*

Herbaceous (cont.)

Chapman's Gayfeather	*Liatris chapmanii*
Garber's Gayfeather	*Liatris garberi*
Slender Gayfeather	*Liatris gracilis*
Dense Gayfeather	*Liatris spicata*
Shortleaf Gayfeather	*Liatris tenuifolia*
Catesby's Lily	*Lilium catesbaei*
Frog's Bit	*Limnobium spongia*
Asian Marshweed	*Limnophila sessiliflora*
Canada Toad Flax	*Linaria canadensis*
Apalachicola Toad Flax	*Linaria floridana*
Yellowseed False Pimpernel	*Lindernia anagallidea*
Malaysian False Pimpernel	*Lindernia crustacea*
Savannah False Pimpernel	*Lindernia grandiflora*
Stiff Yellow Flax	*Linum medium var. texanum*
Bay Lobelia	*Lobelia feayana*
Glade Lobelia	*Lobelia glandulosa*
White Lobelia	*Lobelia paludosa*
Seedbox	*Ludwigia alternifolia*
Piedmont Primrosewillow	*Ludwigia arcuata*
Curtiss' Primrosewillow	*Ludwigia curtissii*
Yerba De Jicotea	*Ludwigia erecta*
Lanceleaf Primrosewillow	*Ludwigia lanceolata*
Anglestem Primrosewillow	*Ludwigia leptocarpa*
Southeastern Primrosewillow	*Ludwigia linifolia*
Seaside Primrosewillow	*Ludwigia maritima*
Mexican Primrosewillow	*Ludwigia octovalvis*
Marsh Seedbox	*Ludwigia palustris*
Peruvian Primrosewillow	*Ludwigia peruviana*
Hairy Primrosewillow	*Ludwigia pilosa*
Creeping Primrosewillow	*Ludwigia repens*
Shrubby Primrosewillow	*Ludwigia suffruticosa*
Savannah Primrosewillow	*Ludwigia virgata*
Sky Blue Lupine	*Lupinus diffusus*
Garden Tomato	*Lycopersicon esculentum*
Taperleaf Waterhorehound	*Lycopus rubellus*
Rose-Rush	*Lygodesmia aphylla*
Wild Bushbean	*Macroptilium lathyroides*
Grassleaf Barbara's Buttons	*Marshallia tenuifolia*
Axilflower	*Mecardonia acuminata*
Snow Squarestem	*Melanthera nivea*
White Sweetclover	*Melilotus albus*
Indian Sweetclover	*Melilotus indicus*
Manatee Mudflower	*Micranthemum glomeratum*
Lax Hornpod	*Mitreola petiolata*
Swamp Hornpod	*Mitreola sessilifolia*
Indian Chickweed	*Mollugo verticillata*
Nakedstem Dewflower	*Murdannia nudiflora*

Herbaceous (cont.)

Celestial-lily	*Nemastylus floridana*
American White Waterlily	*Nymphaea odorata*
Big Floatingheart	*Nymphoides aquatica*
Cut-leaf Evening-primrose	*Oenothera laciniata*
Exotic Prickly-pear	*Opuntia ficus-indica*
Prickley-pear	*Opuntia humifusa*
Lady's sorrel	*Oxalis corniculata*
Violet Wood-sorrel	*Oxalis debilis var. corymbosa*
Water Dropwort	*Oxypolis filiformis*
Florida Pellitory	*Parietaria floridana*
Santa Maria	*Parthenium hysterophorus*
Spreading Cinchweed	*Pectis prostrata*
Greed Arum	*Peltandra virginica*
Frog-fruit	*Phyla nodiflora*
Drummond's Leaf-flower	*Phyllanthus abnormis*
Carry-me-seed	*Phyllanthus amarus*
Mascarene Island Leaf-flower	*Phyllanthus tenellus*
Cutleaf Groundcherry	*Physalis angulata*
Cypresshead Groundcherry	*Physalis arenicola*
Husk Tomato	*Physalis pubescens*
Pokeberry	*Phytolacca americana*
Pennyroyal	*Piloblephis rigida*
Artillery Plant	*Pilea microphylla*
Blue Butterwort	*Pinguicula caerulea*
Yellow Butterwort	*Pinguicula lutea*
Small Butterwort	*Pinguicula pumila*
Pitted Stripeseed	*Piriqueta caroliniana*
Water-lettuce	*Pistia stratiotes*
Narrowleaf Silkgrass	*Pityopsis graminifolia*
Lance-leaf Plantain	*Plantago lanceolata*
Large Plantain	*Plantago major*
Virginia Plantain	*Plantago virginica*
Snowy Orchid	*Platanthera nivea*
Stinking Camphorweed	*Pluchea foetida*
Sweetscent	*Pluchea odorata*
Rosy Camphorweed	*Pluchea rosea*
Paintedleaf	*Poinsettia cyathophora*
Fiddler's Spurge	*Poinsettia heterophylla*
Rose Pogonia	*Pogonia ophioglossoides*
Slenderleaf Chlammyweed	*Polanisia tenuifolia*
White Bachelor Button	*Polygala baldwinii*
Drumheads	*Polygala cruciata*
Tall Pinebarren Milkwort	*Polygala cymosa*
Candyweed	*Polygala grandiflora*
Procession Flower	*Polygala incarnata*
Yellow Milkwort	*Polygala lutea*
Candyroot	*Polygala nana*

Herbaceous (cont.)

Milkwort	*Polygala ramosa*
Bachelor Button	*Polygala rugellii*
Coastalplain Milkwort	*Polygala setacea*
Denseflower Knotweed	*Polygonum densiflorum*
Mild Waterpepper	*Polygonum hydropiperoides*
Dotted Smartweed	*Polygonum punctatum*
Rustweed	*Polypremum procumbens*
Pickerelweed	*Pontederia cordata*
Purslane	*Portulaca oleracea*
Pink Purslane	*Portulaca pilosa*
Marsh Mermaidweed	*Proserpinaca palustris*
Combleaf Mermaidweed	*Proserpinaca pectinata*
Blackroot	*Pterocaulon pycnostachyum*
Giant Orchid	*Pteroglossaspis ecristata*
Mock Bishop Weed	*Ptilimnium capillaceum*
West Indian Meadowbeauty	*Rhexia cubensis*
Pale Meadowbeauty	*Rhexia mariana*
Meadowbeauty	*Rhexia nashii*
Nuttall's Meadowbeauty	*Rhexia nuttallii*
Least Snoutbean	*Rhynchosia minima*
Tropical Mexican-clover	*Richardia brasiliensis*
Large Flower Mexican-clover	*Richardia grandiflora*
Rough Mexican-clover	*Richardia scabra*
Castor Bean	*Ricinus communis*
Rougeplant	*Rivina humilis*
Toothcup	*Rotala ramosior*
Black-eyed Susan	*Rudbeckia hirta*
Ruellia	*Ruellia caroliniensis*
Swamp Dock	*Rumex verticillatus*
Marsh-pink	*Sabatia bartramii*
Slender Marsh-pink	*Sabatia calycina*
Large-flower Rose-gentian	*Sabatia grandiflora*
Rose-of-Plymouth	*Sabatia stellaris*
Lizard's tail	*Saururus cernuus*
Arrowhead	*Sagittaria lancifolia*
River Sage	*Salvia riparia*
Water Spangles	*Salvinia minima*
Limewater Brookweed	*Samolus ebracteatus*
Pineland Pimpernel	*Samolus valerandi subsp. parviflorus*
Florida Feathershank	*Schoenocaulon dubium*
Sunnybells	*Schoenolirion albiflorum*
Black Bogrush	*Schoenus nigricans*
Sweetbroom	*Scoparia dulcis*
Rough Skullcap	*Scutellaria integrifolia*
Golden Ragwort	*Senecio glabellus*
Danglepod	*Sesbania herbacea*
Bladderpod	*Sesbania vesicaria*

Herbaceous (cont.)

Blue-eyed-grass	*Sisyrinchium atlanticum*
Common Nightshade	*Solanum americanum*
Twoleaf Nightshade	*Solanum diphyllum*
Potato-tree	*Solanum erianthum*
Climbing Nightshade	*Solanum seaforthianum*
Turkeyberry	*Solanum torvum*
Tropical Soda Apple	*Solanum viarum*
Pinebarren Goldenrod	*Solidago fistulosa*
Chapman's Goldenrod	*Solidago odora var. chapmanii*
Narrow-leaved Goldenrod	*Solidago stricta*
Spiney Sowthistle	*Sonchus asper*
Common Sowthistle	*Sonchus oleraceus*
Woodland False Buttonweed	*Spermacoce assurgens*
Longlip Lady's-tresses	*Spiranthes longilabris*
Fragrant Lady's-tresses	*Spiranthes odorata*
Greenvein Lady's-tresses	*Spiranthes praecox*
Southern Lady's-tresses	*Spiranthes torta*
Spring Lady's-tresses	*Spiranthes vernalis*
Florida Hedgenettle	*Stachys floridana*
Pineland Scaleypink	*Stipulicida setacea*
Yellow Hatpins	*Syngonanthus flavidulus*
Wood Sage	*Teucrium canadense*
Fire Flag	*Thalia geniculata*
Reflexed Wild-pine	*Tillandsia balbisiana*
PotbelliedWild-pine	*Tillandsia paucifolia*
Cardinal Wild-pine	*Tillandsia fasciculata*
Ball-moss	*Tillandsia recurvata*
Thin-leavedWild-pine	*Tillandsia setacea*
Spanish Moss	*Tillandsia usneoides*
Giant Wild-pine	*Tillandsia utriculata*
Oysterplant	*Tradescantia spathacea*
Inchplant	*Tradescantia zebrina*
Brittleweed	*Tridax procumbens*
White Clover	*Trifolium repens*
Southern Cattail	*Typha domingensis*
Common Cattail	*Typha latifolia*
Caesar-weed	*Urena lobata*
Horned Bladderwort	*Utricularia cornuta*
Leafy Bladderwort	*Utricularia foliosa*
Humped Bladderwort	*Utricularia inflata*
Southern Bladderwort	*Utricularia juncea*
Eastern Purple Bladderwort	*Utricularia purpurea*
Small Purple Bladderwort	*Utricularia resupinata*
Fringed Bladderwort	*Utricularia simulans*
Zig-zag Bladderwort	*Utricularia subulata*
Harsh Verbena	*Verbena scabra*
Frostweed	*Verbesina virginica*

Herbaceous (cont.)

Florida Ironweed	*Vernonia blodgettii*
Little Ironweed	*Vernonia cinerea*
Long-leaf Violet	*Viola lanceolata*
Sleepy Morning	*Waltheria indica*
Rocketweed	*Youngia japonica*
Simpson's Rainlily	*Zephyranthes simpsonii*

Ferns

Lawn Orchid	*Zeuxine strateumatica*
Carolina Mosquito Fern	*Azolla caroliniana*
Giant Leather Fern	*Acrostichum danaeifolium*
Swamp Fern	*Blechnum serrulatum*
Strap Fern	*Campyloneurum phyllitidis*
Watersprite	*Ceratopteris thalictroides*
Southern Club-Moss	*Lycopodiella appressa*
Nodding Club-Moss	*Lycopodiella cernua*
Japanese Climbing Fern	*Lygodium microphyllum*
Tuberous Sword Fern	*Nephrolepis cordifolia*
Boston Fern	*Nephrolepis exaltata*
Asian Sword Fern	*Nephrolepis multiflora*
Cinnamom Fern	*Osmunda cinnamomea*
Royal Fern	*Osmunda regalis*
Royal Fern	*Osmunda regalis var. spectabilis*
Golden Polybody	*Phlebodium aureum*
Resurrection Fern	*Polypodium polypodioides var. michauxiam*
Whisk-fern	*Psilotum nudum*
Bracken Fern	*Pteridium aquilinumvar. caudatum*
Giant Brake	*Pteris tripartita*
Chinese Ladder Brake	*Pteris vittata*
Downy Maiden Fern	*Thelypteris dentata*
Hottentot Fern	*Thelypteris interrupta*
Widespread Maiden Fern	*Thelypteris kunthii*
Marsh Fern	*Thelypteris palustris var. pubescens*
Shoestring Fern	*Vittaria lineata*
Netted Chain Fern	*Woodwardia areolata*
Virginia Chain Fern	*Woodwardia virginica*

Graminoids

Flatspike Sedge	*Abildgaardia ovata*
Blue Maidencane	*Amphicarpum muhlenbergianum*
Bushybeard Bluestem	*Andropogon glomeratus*
Purple Bluestem	*Andropogon glomeratus var. glaucopsis*
Elliott's Bluestem	*Andropogon gyrans*
Hairy Bluestem	*Andropogon longiberbis*
Splitbeard Bluestem	*Andropogon ternarius*
Broomsedge Bluestem	*Andropogon virginicus*
Chalky Bluestem	*Andropogon virginicus var. glaucus*

Graminoids (cont.)

Wiregrass	*Aristida stricta var. beyrichiana*
Longleaf Threeawn	*Aristida palustris*
Tall Threeawn	*Aristida patula*
Florida Threeawn	*Aristida rhizomophora*
Bottlebrush Threeawn	*Aristida spiciformis*
Common Carpetgrass	*Axonopus fissifolius*
Big Carpetgrass	*Axonopus furcatus*
Tropical Carpetgrass	*Axonopus compressus*
Bearded Hairsedge	*Bulbostylis barbata*
Capillary Hairsedge	*Bulbostylis ciliatifolia*
Sandy Field Hairsedge	*Bulbostylis stenophylla*
Clustered Sedge	*Carex glaucescens*
Long's Sedge	*Carex longii*
Hop Sedge	*Carex lupulina*
Florida Hammock Sedge	*Carex vexans*
Papaya	*Carica papaya*
Coastal Sandbur	*Cenchrus incertus*
Souther Sandbur	*Cenchrus echinatus*
Sawgrass	*Cladium jamaicense*
Wrinkled Jointtailgrass	*Coelorachis rugosa*
Toothache Grass	*Ctenium aromaticum*
Bermuda Grass	*Cynodon dactylon*
Jointed Flatsedge	*Cyperus articulatus*
Poorland Flatsedge	*Cyperus compressus*
Baldwin's Flatsedge	*Cyperus croceus*
Variable Flatsedge	*Cyperus difformis*
Swamp Flatsedge	*Cyperus distinctus*
Chufa Flatsedge	*Cyperus esculentus*
Yellow Flatsedge	*Cyperus flavescens*
Haspan Flatsedge	*Cyperus haspan*
Epiphytic Flatsedge	*Cyperus lanceolatus*
Leconte's Flatsedge	*Cyperus lecontei*
Swamp Flatsedge	*Cyperus ligularis*
Fragrant Flatsedge	*Cyperus odoratus*
Many-spiked Flatsedge	*Cyperus polystachyos*
Low Flatsedge	*Cyperus pumilus*
Pinebarren Flatsedge	*Cyperus retrorsus*
Tropical Flatsedge	*Cyperus surinamensis*
Durban Crowfootgrass	*Dactyloctenium aegyptium*
Summer Farewell	*Dalea pinnata*
Needleleaf Witchgrass	*Dichanthelium aciculare*
Variable Witchgrass	*Dichanthelium commutatum*
Cypress Witchgrass	Dichanthelium dichotomum
Dwarf Cypress Witchgrass	*Dichanthelium ensifolium*
Erectleaf Witchgrass	*Dichanthelium erectifolium*
Openflower Witchgrass	*Dichanthelium laxiflorum*
Wooly Witchgrass	*Dichantheliumscabriusculum*

Graminoids (cont.)

Roughhair Witchgrass	*Dichanthelium strigosumvar.glabrescens*
Southern Crabgrass	*Digitaria ciliaris*
Pangola Grass	*Digitaria pentzii*
Florida Crabgrass	*Digitaria floridana*
Jamaican Crabgrass	*Digitaria horizontalis*
Indian Crabgrass	*Digitaria longiflora*
Slender Crabgrass	*Digitaria villosa*
Jungle Rice	*Echinochloa colona*
Barnyard Grass	*Echinochloa crusgalli*
Coast Cockspur	*Echinochloa walteri*
Purple Spikerush	*Eleocharis atropurpurea*
Baldwin's Spikerush	*Eleocharis baldwinii*
Canada Spikerush	*Eleocharis geniculata*
Knotted Spikerush	*Eleocharis interstincta*
Black Spikerush	*Eleocharis nigrescens*
Spikerush	*Eleocharis vivipara*
Goose Grass	*Eleusine indica*
Thalia Lovegrass	*Eragrostis atrovirens*
Gophertail Lovegrass	*Eragrostis ciliaris*
Elliott's Lovegrass	*Eragrostis elliotti*
Teal Lovegrass	*Eragrostis hypnoides*
Tufted Lovegrass	*Eragrostis pectinacea*
Purple Lovegrass	*Eragrostis spectabilis*
Coastal Lovegrass	*Eragrostis virginica*
Centipede Grass	*Eremochloa ophiuroides*
Saltmarsh Fingergrass	*Eustachys glauca*
Pinewoods Fingergrass	*Eustachys petraea*
Slender Fimbry	*Fimbrystylis autumnalis*
Forked Fimbry	*Fimbristylis dichotoma*
Hairy Fimbry	*Fimbristylis puberula*
Ditch Fimbry	*Fimbristylis schoenoides*
Saltmarsh Umbrellasedge	*Fuirena breviseta*
Dwarf Umbrellasedge	*Fuirena pumila*
Southern Umbrellasedge	*Fuirena scirpoidea*
Hairy Umbrellasedge	*Fuirena squarrosa*
Cogan Grass	*Imperata brasiliensis*
Soft Rush	*Juncus effusus subsp. sodutus*
Shore Rush	*Juncus marginatus*
Bighead Rush	*Juncus megacephalus*
Many-headed Rush	*Juncus polycephalus*
Lesser Creeping Rush	*Juncus repens*
Needlepod Rush	*Juncus scirpoides*
Shortleaf Spikesedge	*Kyllinga brevifolia*
Southern Cutgrass	*Leersia hexandra*
Molasses Grass	*Melinis minutiflora*
Hair-awn Muhly	*Muhlenbergia capillaris*
Woods Grass	*Oplismenus hirtellus*

Graminoids (cont.)

Beaked Panicum	*Panicum anceps*
Fall Panicgrass	*Panicum dichotomiflorum*
Hairy Fall Panicgrass	*Panicum dichotomiflorum var. bartowense*
Maidencane	*Panicum hemitomon*
Gaping Panicum	*Panicum hians*
Long-leaf Panicum	*Panicum longifolium*
Guinea Grass	*Panicum maximum*
Torpedo grass	*Panicum repens*
Red-top Panicum	*Panicum rigidulum*
Bluejoint Panicum	*Panicum tenerum*
Warty Panicum	*Panicum verrucosum*
Switch Grass	*Panicum virgatum*
Egyptian Paspalidium	*Paspalidium geminatum*
Coral Paspalum	*Paspalum blodgettii*
Bull Crowngrass	*Paspalum boscianum*
Blue Crowngrass	*Paspalum caespitosum*
Sour Paspalum	*Paspalum conjugatum*
Dallis Grass	*Paspalum dilatatum*
Mudbank Paspalum	*Paspalum dissectum*
Florida Paspalum	*Paspalum floridanum*
Field Paspalum	*Paspalum laeve*
Gulfdume Paspalum	*Paspalum monostachyum*
Bahia Grass	*Paspalum notatum*
Brownseed Paspalum	*Paspalum plicatulum*
Early Paspalum	*Paspalum praecox*
Water Paspalum	*Paspalum repens*
Thin Paspalum	*Paspalum setaceum*
Vasey Grass	*Paspalum urvellei*
Seashore Paspalum	*Paspalum vaginatum*
Napier Grass	*Pennisetum purpureum*
Common Reed	*Phragmites australis*
Short-beaked Baldrush	*Psilocarya nitens*
Natal Grass	*Rhynchelytrum repens*
Shortbristle Beaksedge	*Rhynchospora breviseta*
Anglestem Beaksedge	*Rhynchospora caduca*
Bunched Beaksedge	*Rhynchospora cephalantha*
Chapman's Beaksedge	*Rhynchospora chapmanii*
Fringed Beaksedge	*Rhynchospora ciliaris*
White-tops	*Rhyncospora colorata*
Short-bristle Horned Beaksedge	*Rhynchospora corniculata*
Spreading Beaksedge	*Rhynchospora divergens*
Fascicled Beaksedge	*Rhynchospora fascicularis*
Threadleaf Beaksedge	*Rhynchospora filifolia*
Grass-like beaked-rush	*Rhynchospora globularis*
Pinebarren Beaksedge	*Rhynchospora intermedia*
Beaked-rush	*Rhynchospora inundata*
Giant White-tops	*Rhyncospora latifolia*

Graminoids (cont.)

Millet Beaksedge	*Rhynchospora miliacea*
Littleseed Beaked-rush	*Rhynchospora microcarpa*
Fragrant Beaksedge	*Rhynchospora odorata*
Plumed Beaksedge	*Rhynchospora plumosa*
Fewflower Beaksedge	*Rhynchospora rariflora*
Narrow-leaf Beaksedge	*Rhynchospora stenophylla*
Tracy's Beaked-rush	*Rhynchospora tracyi*
Sugarcane Plumegrass	*Saccharum giganteum*
Indian Cupscale	*Sacciolepis indica*
American Cupscale	*Sacciolepis striata*
South Florida Bluestem	*Schizachyrium rhizomatum*
Creeping Bluestem (UR4)	*Schizachyriujm stoloniferum*
Three-square Bulrush	*Scirpus pungens*
Balwin's Nutrush	*Scleria baldwinii*
Slenderfruit Nutrush	*Scleria georgiana*
Netted Nutrush	*Scleria reticularis*
Whip Nutrush	*Scleria triglomerata*
Low Nutrush	*Scleria verticillata*
Knot root Bristlegrass	*Setaria geniculata*
Lopsided Indiangrass	*Sorghastrum secundum*
Sand Cordgrass	*Spartina bakeri*
Coral Dropseed	*Sporobolus domingensis*
Smutgrass	*Sporobolus indicus*
Pineywoods Dropseed	*Sporobolus junceus*
St. Augustine's Grass	*Stenotaphrum secundatum*
Eastern Gamagrass	*Tripsacum dactyloides*
Paragrass	*Urochloa mutica*
Signalgrass	*Urochloa subquadripara*

Appendix BB: Birds

Pied-billed grebe	*Podilymbus podiceps*	
American anhinga	*Anhinga anhinga*	
Mottled duck	*Anas fulvigula*	
American pigeon	*Anas americana*	
Green-winged teal	*Anas crecca*	
Wood duck	*Aix sponsa*	
American coot	*Fulica americana*	
Great blue heron	*Ardea herodias*	
Great white heron	*Ardea herodias*	
Little blue heron	*Egretta caerula*	(SSC*s*)
Tricolor heron	*Egretta tricolor*	(SSC*s*)
Snowy egret	*Egretta thula*	(SSC*s*)
Great egret	*Casmerodius albus*	
Cattle egret	*Bubulcus ibis*	
Black-crowned night heron	*Nycticorax nycticorax*	
Yellow-crowned night heron	*Nyctanassa violacea*	
Green-backed heron	*Butorides straitus*	
Least bittern	*Ixobrychus exilis*	
Woodstork	*Mycteria americana* (E*s*;E*f*)	
Sandhill crane	*Grus canadensis pratensis*(T*s*)	
Limpkin	*Aramus guarauna* (SSC*s*)	
Glossy ibis	*Plegadis falcinellus*	
White ibis	*Eudocimus a*lbus (SSC*s*)	
Common moorhen	*Gallinula chloropus*	
Black-necked stilt	*Hemantopus mexicanus*	
Killdeer	*Charadrius vociferus*	
Common snipe	*Gallinago gallinago*	
Short-billed dowitcher	*Limnodromus griseus*	
Greater yellowlegs	*Tringa melanoleuca*	
Lesser yellowlegs	*Tringa flavipes*	
Solitary sandpiper	*Tringa solitaria*	
Pectoral sandpiper	*Calidris melanotos*	
Western sandpiper	*Calidris mauri*	
Least sandpiper	*Calidris minutilla*	
Wild turkey	*Meleagris gallopavo*	
Northern bobwhite	*Colinus virginianus*	
Everglades snail kite	*Rostrahamus sociabilis(*E*s*;E*f*)	
Cooper's hawk	*Accipiter cooperii*	
Northern harrier	*Circus cyaneus*	
Red-shouldered hawk	*Buteo lineatus*	
Red-tailed hawk	*Buteo jamaicensis*	
Osprey	*Pandion haliaetus*	
Bald eagle	*Haliaeetus leucocephalus*(T*s*;T*f*)	
Black vulture	*Coragyps atratus*	
Turkey vulture	*Cathartes aura*	
American kestrel	*Falco sparverius*	

Birds (cont.)

Merlin	*Falco columbarius*	
Screech owl	*Otus asio*	
Barred owl	*Strix varia*	
Barn owl	*Tyto alba*	
Great horned owl	*Bubo virginianus*	
White-winged dove	*Zenaida asiatica*	
Mourning dove	*Zenaida macroura*	
Ground dove	*Columbina passerina*	
Yellow-billed cuckoo	*Coccyzus americanus*	
Smooth-billed ani	*Crotophaga ani*	
Common nighthawk	*Chordeiles minor*	
Chuck-wills-widow	*Caprimulgus carolinensis*	
Belted kingfisher	*Ceryle alcyon*	
Northern flicker	*Colaptes auratus*	
Red-bellied woodpecker	*Melanerpes carolinus*	
Red-cockaded woodpecker+	*Picoides borealis*	(T*s*;E*f*)
Downy woodpecker	*Picoides pubescens*	
Pileated woodpecker	*Dryocopus pileatus*	
Eastern kingbird	*Tyrannus tyrannus*	
Great crested flycatcher	*Myiarchus crinitus*	
Eastern phoebe	*Sayornis phoebe*	
Chimney swift	*Chaetura pelagica*	
Northern rough-winged swallow	*Stelgidopteryx serripennis*	
Barn swallow	*Hirundo rustica*	
Tree swallow	*Tachycineta bicolor*	
Fish crow	*Corvus ossifragus*	
Blue jay	*Cyanocitta cristata*	
Blue-gray gnatcatcher	*Polioptila melanura*	
Carolina wren	*Thryothorus ludovicianus*	
Brown thrasher	*Toxostoma rufum*	
Gray catbird	*Dumetella carolinesis*	
Northern Mockingbird	*Mimus polyglottos*	
Eastern bluebird	*Sialia sialis*	
Robin	*Turdus migratorius*	
Wood thrush	*Hylocichla mustelina*	
Loggerhead shrike	*Lanius ludovicianus*	
White-eyed vireo	*Vireo griseus*	
Prothonotary warbler	*Protonotaria citrea*	
Cape may warbler	*Dendroica tigrina*	
Pine warbler	*Dendroica pinus*	
Palm warbler	*Dedroica palmarum*	
Prairie warbler	*Dendroica discolor*	
Yellow-rumped warbler	*Dendroica conoata*	
Black-throated blue warbler	*Dendroica caerulescens*	
American redstart	*Setophaga ruticilla*	
Black and white warbler	*Mniotilta varia*	
Connecticut warbler	*Oporornis ogilis*	

Birds (cont.)

Common yellowthroat	*Geothlypis trichas*
Louisiana waterthrush	*Seiurus motacilla*
Red-winged blackbird	*Agelaius phoenicus*
Boat-tailed grackle	*Quiscalus major*
Common grackle	*Quiscalus quiscalus*
Eastern meadowlark	*Sturnella magna*
Northern cardinal	*Cardinalis cardinalis*
Rufous-sided towhee	*Pipilo erythrophthalmus*
Chipping sparrow	*Spizella passerina*
Grasshopper sparrow	*Ammodramus savannarum*
Bachman's sparrow	*Aimophila aestivalis*
Indigo bunting	*Passerina cyanea*
Florida scrub jay	*Aphelocoma coerulescens* (Ts,T*f*)

+	=	The last red-cockaded woodpecker cavity tree was destroyed in a 1989 wildfire. Plans are currently underway to reintroduce this species to Dupuis.
E	=	Endangered
T	=	Threatened
SSC	=	Species of Special Concern
f	=	federally designated
s	=	state designated

Appendix CC: Mammals

Florida panther*	*Felis concolor*	(E*f*;E*s*)
Bobcat	*Lynx rufus*	
White-tailed deer	*Odocoileus virginiana*	
Feral pig	*Sus scrofa*	
Gray fox	*Urocyon cinereoargenteus*	
Coyote	*Canis latrans*	
Raccoon	*Procyon lotor*	
Opossum	*Didelphis virginiana*	
River otter	*Lutra canadensis*	
Striped skunk	*Mephitis mephitis*	
Nine-banded armadillo	*Dasypus novemcinctus*	
Eastern cottontail	*Sylvilagus floridanus*	
Marsh rabbit	*Sylvilagus palustris*	
Southern flying squirrel	*Glaucomys volans*	
Eastern gray squirrel	*Sciurus carolinensis*	
Sherman's fox squirrel	*Sciurus niger*	(SSC*s*)
Oldfield mouse	*Peromyscus polionotus*	
Hispid cotton rat	*Sigmondon hispidus*	
Rice rat	*Oryzomys palustris*	
Round-tailed muskrat	*Neofiber alleni*	
Black rat	*Rattus rattus*	
Least shrew	*Cryptotis parva*	
Short-tailed shrew	*Blarina brevicauda*	
Evening bat	*Nycticeius humerdis*	
Yellow bat	*Lasiurus intermedius*	

* = Last documented sighting on Dupuis was in the 1980's.
E = Endangered
SSC = Species of Special Concern
f = federally designated
s = state designated

Appendix DD: Reptiles and Amphibians

Reptiles

American alligator	*Alligator mississippiensis*(SSC*s*; T*f*)
Florida red-bellied turtle	*Pseudemys nelsoni*
Peninsula cooter	*Pseudemys floridana*
Florida softshell	*Trionyx ferox*
Green anole	*Anolis carolinensis*
Brown anole	*Anolis sagrei*
Ground skink	*Scincella laterale*
Southeastern five-lined skink	*Eumeces inespectatus*
Island glass lizard	*Ophisaurus compressus*
Southern black racer	*Coluber constrictor*
Southern ringneck snake	*Diadophis punctatus*
Florida kingsnake	*Lampropeltis getulus*
Eastern garter snake	*Thamnophis sirtalis*
Peninsula ribbon snake	*Thamnophis sauritus*
Florida brown snake	*Storeria dekayi*
Rough green snake	*Opheodrys aestivus*
Eastern indigo snake	D*rymarchon corais*(T*s*; T*f*)
Eastern diamondback rattlesnake	*Crotalus adamanteus*

Amphibians

Greater siren	*Siren lacertina*
Oak toad	*Bufo quercicus*
Southern toad	*Bufo terrestris*
Green treefrog	*Hyla cinerea*
Squirrel treefrog	*Hyla squirella*
Greenhouse frog	*Eleutherodactylus planirostris*
Pig frog	*Rana grylio*
Southern leopard frog	*Rana utricularia*
Cuban treefrog	*Osteopilus septentrionalis*
Southern cricket frog	*Acris gryllus*

SSC = Species of Special Concern
T = Threatened
f = federally designated
s = state designated

Appendix EE: Fish

Everglades pygmy sunfish	*Elassoma evergladei*
Bluespotted sunfish	*Enneacanthus gloriosus*
Redear sunfish	*Lepomis microlophus*
Warmouth	*Lepomis gulosus*
Bluegill	*Lepomis machrochirus*
Brown bullhead	*Ictalurus nebulosus*
Channel catfish	*Ictalurus punctatus*
Brook silverside	*Labidesthes sicculus*
Bluefin killifish	*Lucania goodei*
Mosquitofish	*Gambusia affinis*
Flagfish	*Jordanella floridae*
Golden topminnow	*Fundulus chrysotus*
Two-spotted cichlid	*Cichlasoma bimaculatum*
Florida gar	*Lepisosteus plathyrhincus*
Sailfin molly	*Poecilia latipinna*
Largemouth bass	*Micropterus salmoides*

Appendix FF: DuPuis Management Area Contact List

Martin County Sheriff's Office
800 Monterey St.
Stuart, FL 34994
(561) 597-2101

Palm Beach County Sheriff's Office
3228 Gun Club Rd.
West Palm Beach, FL 33416
(561) 688-3400

Florida Department of State, Division of Historical Resources
Heather Percy, Florida Master Site File
R.A. Gray Building, 500 South Borough
Tallahassee, FL 32399-0250

Florida Division of Forestry
Okeechobee District
James Rath, District Manager
5200 Hwy. 441 N.,
Okeechobee, FL 34972-8697
Telephone: 863-462-5160
Fax: 863-462-5162

Florida Division of Forestry
Everglades District
Dave Utley, District Manager
3315 S.W. College Ave.
Davie, FL 33314
Telephone: 954-475-4120
Fax: 954-475-4126

Florida Fish and Wildlife Conservation Commission
Regional Wildlife Biologist
Steve Coughlin
8535 Northlake Boulevard
West Palm Beach, FL 33412

Florida Fish and Wildlife Conservation Commission
DuPuis Wildlife Biologist
Valerie Sparling
23500 SW Kanner Highway
Canal Point, FL 33438
Telephone: 561-924-1939
Fax: 561-924-5114

South Florida Water Management District
West Palm Beach Headquarters
Land Stewardship Division
3301 Gun Club Road
West Palm Beach, FL 33406
Telephone: 800-686-8800
Fax: 561-681-6233
Fred Davis, Division Director
Pete David, Sr. Supv. Environmental Analyst

South Florida Water Management District
DuPuis Management Area
23500 SW Kanner Highway
Canal Point, FL 33438
Telephone: 561-924-5310
Fax: 561-924-5114
Bert Trammell, Land Manager
David Black, Monitoring Coordinator
Casey Brown, Staff Administrative Resource Associate

DuPuis Advisory Council
Chairman
23500 SW Kanner Highway
Canal Point, FL 33438
Telephone: 561-924-5310
Fax: 561-924-5114

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Appendix HH: History of the DuPuis Property

History of the DuPuis property. Steve Farnsworth. Unpublished report to the SFWMD. 2003.

The DuPuis Reserve has a long history of human usage. The southern border of the reserve is part of a physiographical feature known as the Loxahatchee Scarp. Within a half mile distance, the sandy soils of the pine flatwoods at 20 to 25 feet in elevation drop down to the mucky soils of the Everglades sawgrass marshes at elevations below 15 feet (USGS 1971). Shallow wet prairies occupy the transitional areas. Upland areas in close proximity to large water bodies were attractive sites for early Americans, who would establish seasonal camps and permanent settlements in hammocks accessible by water. There are four known archeological sites, all located along the southern edge of the site (Wheeler 2000). Most of the sites are located in close proximity to sloughs that flow into the Everglades. These sites are associated with the Belle Glade culture and have the pottery, circular and linear earthworks, and the reliance on freshwater resources that characterize this culture. The presence of shark teeth, shell tools, sea turtle remains, and chert artifacts indicate that the inhabitants of these sites had trade networks with coastal areas and central Florida.

Site 1 contains a circular ditch feature nearly 900 feet in diameter. It is believed to have been constructed between 1000 B.C. and A.D. 200. Human habitation in the hammocks associated with the ditch appears to have continued until A.D.1100. Site 2 was a small crescent-shaped earthwork with a pair of linear earthworks extending southwards from the crescent. The earthworks have been obliterated by grazing sheep and cattle. Human habitation in the nearby hammock at this site was believed to be short-lived. Site 3 is in a large hammock and is believed to be a village or hamlet midden with a long period of occupation. There are no earthworks associated with this site and human habitation is believed to have ceased around A.D. 1100. Site 4 is a conical sand mound with outlying crescent-shaped earthworks. It is believed to be a burial mound and was in use into the Spanish contact period (Wheeler 2000).

The only historical account of the native Americans that lived near the reserve comes from Hernando d'Escalante Fonteneda, a Spanish shipwreck survivor taken captive as a young boy by the Calusa tribe in 1545 and rescued by Jean Ribault seventeen years later. He later wrote a account of his captivity, which was translated by True (1944). Fonteneda mentions a tribe called the Mayaimi which occupied the area north and east of the Lake of Mayaimi (present-day Lake Okeechobee). The Mayaimi had a major town called Guacata, which was located somewhere near present-day Pahokee, and numerous small settlements around the lake. The Mayaimi were probably the last users of the DuPuis Reserve burial mound.

The population of the Mayaimi declined rapidly in the early 1700s, as they were decimated by European diseases, slave raids, and warfare with other tribes. In the 1740s, a Spanish mission was

established near present-day Miami. Documents related to this mission indicate that the "Maymies, Santaluzos (St. Lucie), and Mayacas " had united and were living four days journey from the mission in the interior (Hann 1991). The Mayacas were originally from the upper St. John's River area in Volusia County, but may have been forced to move south because of raids from tribes to the north in the English colonies. The Mayaca tribe is believed to be the origin of the name of Port Mayaca.

The native American inhabitants of southern Florida are believed to have mostly disappeared by 1760s. The few survivors are believed to have traveled to Cuba with their Spanish allies in 1763 when Florida became a British colony, or have been absorbed into the Seminoles. In the early 1700s, native Americans from the Creek and Cherokee tribes in Georgia and Alabama began to move south into north Florida. This movement accelerated in the early 1800s. These native Americans were being pushed out by white settlers or were on the losing side of a civil war among the Creek tribes. They welcomed runaway black slaves, who joined them as freed allies, or became subject to the native Americans in a less onerous form of slavery. This agglomeration of tribes became known as the Seminoles which was derived from a word meaning "wild" in their language. Conflicts between white settlers in and the Seminoles and their black allies would lead to three periods of open warfare known as the Seminole Indian Wars after Florida became a U.S. Territory.

In the First Seminole Indian War in 1817-18, the Seminoles were forced out of North Florida. A disputed treaty confined them to a reservation in the interior of central and south Florida. After a drought and famine in 1825, the Seminoles and their black allies began to return to their old lands in central Florida and came into conflict with white settlers. In 1830, the U.S. Congress passed the Indian Removal Act, which gave the government the authority to forcibly remove native Americans in Florida and other states to the Indian Territory, which is present-day Oklahoma. Some of the Seminoles reluctantly moved, but were unhappy with the poor quality of the land and having to share a reservation with their old enemies in the Creek tribes. Others refused to leave and tensions mounted between the U.S. Army, white settlers and the Seminoles (Robison and Andrews 1995).

In late 1835, the Second Seminole Indian War began. The Seminoles ambushed and wiped out a column of U.S. Army soldiers under Major Dade, and attacked and burned sugar plantations along the east coast of Florida. The army retaliated by attacking and burning Seminole villages in central Florida, and building a series of forts. The Seminoles rarely attacked forts and large groups of soldiers, but engaged in guerrilla warfare with hit and run tactics, picking off a few soldiers here and there. The Army, with an enemy that would rarely stand and fight, concentrated on destroying Seminole villages and crops, and capturing women and children to send to Oklahoma and runaway slaves to return to their owners (Robison and Andrews 1995).

At first, the Seminoles and their allies outnumbered the troops sent to fight them, and the war went badly for the U.S. Nearly half of the small U.S. Army was sent to Florida, along with often

unreliable state militia units, and the tide of the war began to turn. By late 1837, virtually all of the remaining Seminoles had retreated to south Florida. The U.S. Army's commanding officer, General Thomas Jesup, divided his forces into four columns that moved southward from central Florida. A column under the command of future president Zachary Taylor encountered a large group of Seminoles at the north end of Lake Okeechobee and fought them in the Battle of Okeechobee on December 25, 1937. Colonel Taylor's men forced the Seminoles to retreat, but took far greater casualties (Hutchinson and Paige 1998).

General Joseph Hernandez's column came down the east coast of Florida, with a small naval force operating on the Indian River lagoon. The army column established Fort Pierce as a base of operations, while the naval forces explored the rivers and waterways. General Jesup's troops went to Fort Pierce for resupply, then moved west to join General Eustis' forces at Fort Lloyd. The combined columns moved southeast into northwestern Martin County, where they joined Col. Taylor's troops and constructed Fort Van Swearingen. General Eustis and Jesup continued southeast, and would fight the Battle of the Loxahatchee on January 24, 1938 (Hutchinson and Paige 1998). Col. Taylor's men moved south along the east shore of Lake Okeechobee and built Fort McRae on the north side of the mouth of the present-day St. Lucie Canal. It is believed that a small river entered the lake at that location, as such a river is present in an 1838 map (USDW 1838). Rifles dating to the Seminole Wars period were reportedly dredged up during the construction of the St. Lucie Canal, further supporting the location of Fort McRae. Fort McRae was little more than a rough cabbage palm trunk stockade designed to store supplies and house a small garrison to defend the supplies. It was used for only a short time, and was then abandoned.

After the Battles of Okeechobee and the Loxahatchee River, many of Seminoles displaced by these battles retreated to the area of the DuPuis Reserve, where they tried to live off the land. They quickly depleted the local game animal population, and there was no time to plant crops and little in the way of natural plant foods to gather. The area encompassing DuPuis and the adjacent J. W. Corbett Wildlife Management Area became known as the "Hungryland". The starving Seminoles were induced to camp near Ft. Jupiter under a flag of truce when General Jesup told them that he would try to obtain permission for them to stay in Florida on a reservation. They established a camp to about a mile from the fort under the flag of truce. In April, a letter arrived from Washington denying the request for a reservation. General Jesup ordered his men to quietly surround the Seminoles and take them captive. His reputation was already damaged from capturing the Seminole leader Osceola under a flag of truce, so he may not been concerned about additional damage. He feared the that there would be many more deaths of soldiers and Seminoles if he honored the flag of truce and allowed the Seminoles to leave. Over five hundred Seminoles were shipped out from Jupiter to Oklahoma (DuBois 1981).

In 1842, the Army declared the Second Seminole Indian War to be over and an uneasy truce was maintained between the white settlers, the Army and the Seminoles. In 1855, the Army began harassing the Seminoles again, and two more years of fighting ensued. A new Fort McRae was built as a base for patrols (Hutchinson and Paige 1998). In 1858, Billy Bowlegs, the Seminoles' main chief at that time, was induced to move to Oklahoma with his followers. Just before the Civil War started, the Army gave up on trying to capture the remaining 300 or so Seminoles (Robison and Andrews 1995). The network of wooden forts, including Fort McRae, was abandoned, and quickly disappeared under the twin attacks of termites and wildfire. The Seminole Indian Wars would be one of the longest and most costly native American conflicts in U.S. history.

After the Third Seminole Indian War ended, the Seminoles slowly emerged from their hideouts deep in the Everglades. A settlement was established near present-day Indiantown, and in 1898, Joe Bowers established a trading post where he would trade store goods for animal skins. He would later plant citrus and establish the Bowers Groves. That same year, Francis and Annie Platt established a cattle ranch near present-day Indiantown. Mr. Platt named the settlement "Annie" after his wife and it was granted a post office with him as postmaster in 1902. In 1902-3, Mr. Platt and his sons cut a wagon road from Annie to Stuart, which they called the Stuart-Annie Road. This road would eventually become today's State Road 76 or Kanner Highway. Annie became Indiantown in 1917 when the post office was renamed (Hutchinson and Paige 1998).

In 1902, a group of New Orleans investors, the Southern States Land and Timber Company, purchased approximately two million acres of land around Lake Okeechobee from the State of Florida for fifty cents an acre. The purchase included large areas of western present-day Palm Beach and Martin Counties, and virtually all of the DuPuis Reserve except for the low-lying areas along the present-day L-8 Canal. Southern States was primarily a real estate investment company. It did start cutting the old growth pine trees on its purchase, although in the absence of railroads, the sawmills had to be initially located on Lake Okeechobee, where water could be used to transport the logs (Hutchinson and Paige 1998).

The railroads, however, were apparently interested in serving the area. By 1911, the Indiantown area had enough white children (they were the only ones receiving public education at that time) to warrant a public school. Of the three families sending children to the school, two were listed as railroad engineers (Hutchinson and Paige 1998). It is not clear what the engineers were doing, but the railroads would not come to the area until the 1920s.

In 1914, the U.S. Army Corps of Engineers proposed a canal to link the St. Lucie River on the east coast of Florida with the Caloosahatchee River on the west coast, and connecting to Lake Okeechobee in the middle. There was heavy local lobbying in favor of the canal. This canal has been called various official names, such as the Cross-State Waterway, and the Okeechobee Waterway, but

for purposes of this history it will be referred to by its local name, the St. Lucie Canal. The dredging contract for the canal was signed on February 19, 1915, and the work began on May 28th (Hutchinson and Paige 1998), starting at the lake. It is believed that the western end of the canal at Lake Okeechobee was located in a natural small river that flowed into the lake. Some Seminole War-era military maps show a small river entering the lake in the vicinity of the canal (USDW 1838). Small tributaries that emptied into the lake were common and Will (1984) noted eight "dead rivers" between Clewiston and Belle Glade. 1940 aerial photographs of the reserve and vicinity (USDA 1940) show what clearly appears to be a creek leaving the canal and circling south of the Port Mayaca cemetery before petering out in the extreme northwest corner of the preserve. Another small creek is visible just east of the western reserve property line.

Spoil deposition patterns also support the river hypothesis. The spoil was deposited on the northern bank of the canal and the 1940 photographs shows very little spoil present until the western border of the reserve is reached. It is possible, however, that the spoil near the lake was removed for road or railroad building purposes. The path of the canal also supports a river route. The western end of the canal north of the reserve has a very convoluted route, as does the eastern end where it joins the South Fork of the St. Lucie River. The middle of the canal, where there were no streams to follow is very straight and linear. In any case, if the canal followed the route of some former "Mayaca" River, that river is now gone.

A small "dipper" dredge made the initial cut for the canal, creating a channel wide enough for a larger suction dredge to follow. The suction dredge "Northwood" was still digging the canal in 1916 (Hutchinson and Paige 1998), and a dam burst on the canal in November 1916, indicating that work was still ongoing. An event summary by the Stuart News (Hutchinson and Paige 1998) indicate that the first water flowed from Lake Okeechobee through the canal on June 13, 1923, and the authors state the canal was widened in 1923, although no other sources support this claim. The St. Lucie Canal was definitely widened in the mid-1930s, and was completed on March 22, 1937, with new lock construction in 1940 eliminating the island in the canal near the lake. The 1940 aerial photographs show fresh spoil has been deposited on the north side of the canal, but the island is still present. The great hurricane of 1928 drowned several thousand persons around Lake Okeechobee when the lake overtopped a low levee. The federal government's response to this was to build a huge dike around the lake, and widen the St. Lucie Canal and the Caloosahatchee River to dump water from the lake. The Stuart News reported that a contract to widen the canal again for $1,276,000 was let on June 11, 1948 (Hutchinson and Paige 1998). The final design specifications for the canal are believed to be 200 feet wide at the top, 160 feet wide at the bottom, and a minimum depth of twelve feet, although some maps show the depth as eight feet (USGS 1953).

World War II would prove to be the heyday of the St. Lucie Canal. Barges and small ships used the canal to avoid being exposed to German U-boat attacks if they rounded the southern tip of Florida in

the open ocean. After the war, commercial use declined, with recreational and fishing boats becoming the main users of the canal. The construction of the canal had major impacts to the hydrology of the northern portions of the reserve. The canal would have been controlled at or below the water level in the lake, which averages around 15 feet. According the topographic maps (USGS 1971, 1953), the historic wetland (and groundwater) elevation in the northern part of the reserve was 25 feet. Since the canal lowered the ground water elevation by at least 10 feet at the canal, and by decreasing amounts with distance from the canal, it is not surprising that the 1940 photographs show the wetlands within 3/4 of a mile of the canal as being partially dried up and suffering from a decreased hydroperiod. The groundwater drawdown continues today.

The construction of one form of transportation often stimulates the construction of another form, and that certainly happened near the DuPuis Reserve. According to Hutchinson and Paige (1998), a $120,000 bond issue was approved on August 12, 1919 for county roads between Stuart and Lake Okeechobee. A 1921 Palm Beach County road map (Carr and McFadden 1921) shows a dashed line paralleling the south side of the St Lucie Canal from Jupiter-Indiantown Road to the lake, but the map legend is not clear whether this is just a proposed road, instead of a real road. A 1923 road map (H.C. Fugate 1923) shows the road present as a graded dirt road. A 1926 Martin County road map (Associated Map Co. 1926) shows the road present as an improved road, which means it had been surfaced with shellrock. The 1926 map still shows the road as Stuart-Annie Highway, although it would be later renamed as Gaines Highway in honor of the Palm Beach County Commissioner Henry Gaines, who worked for its improvement.

The original 1920s road was built just south of the St. Lucie Canal, and may have been rendered unsafe by the 1930s canal widening. The State of Florida took over responsibility from maintaining the road in 1931, designating it State Road 76. The State built a new road farther south of the canal in the late 1930s (the present-day road) as a result of lobbying by A..O. Kanner, a Martin County legislator and judge. The road was renamed Kanner Highway after his death in 1976 (Hutchinson and Paige 1998). The 1940 aerial photograph shows both the old and new roads present. The older side roads connect to both roads, while the newer side roads only extend to the new road.

During this time, the Southern States Land and Timber Company had not been idle with its lands. It would sell land to anyone who met their price, and sold a large tract to the St. Lucie Land Company as early as 1904. (Hutchinson and Paige 1998). The secretary of the company, George Bensel, established an office in West Palm Beach and ran its south Florida operations for 48 years. The company is credited with laying the groundwork to drain the Everglades and pioneering the planting of sugar cane, cutting roads and trails on its lands, opening the area to ranchers, and introducing the first pure-bred cattle in Martin County. The Southern States Ranch was established by 1920 on the north side of the St. Lucie Canal in Section 13 west of the reserve. The ranch was located in the transitional area between the Everglades and the pine flatwoods, and shows up on the 1921 road map

(Carr and McFadden 1921). A road ran northeastward from the ranch for approximately five miles until it joined the old Indiantown to Okeechobee graded road. The 1940 aerial photograph shows several buildings where the ranch should be located, and a cleared pasture area to the west. The road leading to Indiantown appears to be falling into disuse, as there is another road leading south to the north bank of the St. Lucie Canal, and then westwards to Conners Highway.

A number of trails appeared on the Southern States lands in the early 1920s, but it is not clear who constructed them. One trail, known as the Hungryland Trail, traversed the DuPuis Reserve from its northwest corner, at first running south and then turning southeasterly and running through the pine flatwoods just north of the edge of the Everglades. It exited the reserve at the southeast corner near Big Mound. At Big Mound, the trail was renamed the Big Mound Trail and continued southeasterly until it terminated at the intersection of present-day Okeechobee Road and "A" Road in Loxahatchee Groves. These trails appear to be little more than wagon roads. There is no evidence of actual road construction, such as the digging of shoulder ditches and the piling of fill in the middle to create an elevated roadway. It appears that the trails sought to traverse the highest open ground, and trees and palmettos were cut and removed only as necessary. The Hungryland Trail is first present on the 1921 road map (Carr and McFadden 1921), and is also present on the 1923 H. C. Fugate map and the 1926 Associated Map Company Map.

This trail appears on aerial photographs and topographic maps from 1940 to the present, and is still present on the reserve. The portions west of the DuPuis Grade are little-used and have become overgrown, but the portions east of the grade are still passable by four-wheel drive vehicles. The old trail is variously used as a management road, equestrian trail, or as part of the Florida Trail hiking trail in different portions of the reserve, although few persons are aware of its name or origin. The 1920s-era maps also show another trail crossing through the reserve. This unnamed trail departed from the Hungryland Trail about two miles west of Big Mound, and then arced northwestward through Sections 14, 10, 3, 4, and 33. It curved back northeastward towards Indiantown in Section 33 and then through the present-day citrus groves north of the reserve. Traces of this trail are visible in the 1940, 1957(USDA 1957) and 1965 (PBCPA 1965) aerial photographs and the 1971 topographical map (USGS 1971), with the most consistent trace in the eastern portion of Section 33, where the trail may be used today as a management road. Since construction of the Cooter Creek ditch in the 1940s would have severed the trail, the other portions of the trail may have fallen into disuse early and become overgrown.

It is not clear who made these trails or when they were cleared. The Hungryland Trail continued north of the reserve to connect to the old Indiantown to Okeechobee graded road. This seems to indicate that it predates the St. Lucie Canal which was dug in 1915, as there is no indication of a ferry or ford to cross the canal. This northern section appears to have fallen into disuse after the canal was constructed, although the construction of present-day Kanner and Connors Highways may

responsible for this. However, the Big Mound Trail connects to the roads in Loxahatchee Groves, which were not built until 1917. It does seem likely that the trails were created sometime in the 1910s. They do not show up on maps until the 1920s, but none of the 1910s maps showed any trails, including those known to be present prior to 1910.

Although the trails were largely on Southern States ' land, it is not believed that the company cleared them. The Hungryland Trail passes almost one mile east of the Southern States Ranch. If the company had built the trails, they would have presumably connected to the Southern States' facilities. The 1920s maps all show an agricultural settlement at Big Mound, where the land was divided into 40-acre tracts. It seems more likely that the trails were built by the residents of Big Mound for access to other population centers, possibly with the blessings of Southern States. They gradually fell into disuse when better roads were constructed nearby.

In 1923, William "Fingy" Conners bought large amounts of land around Lake Okeechobee, and began building a toll road to provide access to the land. Beginning at Twenty Mile Bend, the road followed the West Palm Beach Canal northwestward to Canal Point, and then northwards around the Lake to Okeechobee City. The road was hailed as an engineering marvel and was completed in 1925 at a cost of $1.8 million dollars. This road is located two miles west of the reserve along the lake shore, and is the present-day U.S. Highway 441/98. It is still known as Conners' Highway. Although the toll was 3 cents a mile, the road averaged $2,000 per day in tolls. The 1926 road map shows a toll station just south of the St. Lucie Canal (Associated Map Co. 1926). After Conners' death in 1929, Palm Beach County acquired the road, abolished the toll, and turned it over the State Road Department.

Also in 1925, the Florida East Coast Railroad was constructed 1.5 miles west of the reserve. This railroad had reached Okeechobee City in 1915 and was extended to Canal Point in 1925 and Belle Glade in 1928. The primary purpose of this railroad extension appears to be to haul produce from the Everglades Farming regions to northern markets. An examination of the 1940 aerial photographs shows no sidings or structures that appear to be sawmills, and it is not believed that this railroad played any role in the logging of the reserve.

A competing railroad was nearing Indiantown about the same time. Although sources vary on whether the Seaboard Airline Railroad reached Indiantown in 1924 or 1925, the railroad and associated companies were active in the area in 1924 (Hutchinson and Paige 1998). The Seaboard railroad was run by S. Davies Warfield, a Baltimore banker. In 1924, the Land Company of Florida, which was controlled by Warfield, bought 100,000 acres in the Indiantown area from Southern States, as well as the Platt cattle ranch. Warfield had grand plans for Indiantown. He planned to make it the southern headquarter for his railroad, with an elaborate passenger station and a roundhouse for turning around the engines. The railroad laid out the first streets, built houses and a

school, built the Seminole Inn as a social center for the new town, and converted a proposed sawmill building into railroad offices and apartments.

The Seaboard railroad abandoned Warfield's plans after his death in 1927. The Land Company of Florida ran into financial difficulties when the Florida land boom collapsed and announced that it was abandoning its $4 million dollar investment in Martin County in 1930 (Hutchinson and Paige 1998). It sold its remaining land to the Indiantown Development Company in 1937. Sometime in the late 1920s, Warfield Highway was constructed along the north side of the Seaboard tracks from just east of Okeechobee City to Indiantown. The State took over responsibility for the road in 1931 and designated it State Road 710 (Hutchinson and Paige 1998. The old Indiantown to Okeechobee graded road that ran south of the railroad tracks fell into disuse, and portions were eliminated by orange groves and the Martin Power Plant reservoir. Only a three mile segment west of Indiantown is present today and it used for access to the orange groves on the north side of the St. Lucie Canal.

Although Indiantown did not become the grand city envisioned by Warfield, it did become the focus of the logging activities in the area. Cut pine trees were brought to the sawmills at Indiantown where they were cut up and loaded on the train. Since the reserve was at least six miles from Indiantown, it was a lower priority for logging. Indications are that the reserve was not logged in a systematic or organized pattern, but on a kind of hit or miss fashion, with the easiest trees harvested. It is believed that the reserve was logged in the 1930s, although logging may have continued into the 1940s. The cut trees would have been hauled out by trucks via present-day Kanner Highway. Slash pines can be identified on the 1940 aerial photographs (USDA 1940), and the photographs do not show the virtual absence of trees seen in other areas of Palm Beach County that were logged in the 1930s.

In 1925, the Phipps family purchased 6,500 acres of with five miles of lake frontage from "Fingy" Conners. This land included the four-mile western border of the reserve, which is currently occupied by sugarcane fields, citrus groves and vacant land. The Phipps had big plans for a grandiose city at Port Mayaca, but the bank financing disappeared and the plans were dropped. Prior to 1925, Port Mayaca was just a wide place in the road where the St. Lucie Canal entered Lake Okeechobee. In 1927, the Phipps formed Bessemer Properties to develop their holdings, primarily as an agricultural enterprise. The land was divided into 20-acre blocks and windbreaks of Australian pines planted. Citrus was the main crop, and Bessemer was among the first to use pumps to control water levels with the groves (Hutchinson and Paige 1998). The operation was a financial success.

The headquarters for the agricultural operation was on present-day Kanner Highway, just west of the Florida East Coast railroad tracks. The 1940 aerial photograph shows several large buildings near the railroad track, a water tower, and numerous workers' houses lined up in neat rows. The rusting water tower is still present with Port Mayaca still readable on its side. The workers' housing is long gone. This agricultural complex formed the majority of Port Mayaca, with the rest being scattered

houses, a lodge, and a general store on the lakeshore ridge south of the St. Lucie Canal. Bessemer platted the Osceola Groves subdivision on the land west of Section 31 in the reserve in the mid 1940s. Perimeter dirt roads were built and the land divided into acre-plus lots. The subdivision was not successful, with most of the lots remaining unsold and no houses built. The perimeter roads for the subdivision are visible in the 1948 aerial photograph (USDA 1948).

The Port Mayaca cemetery on the northwestern corner of the reserve was reportedly established in the early 1920s. Approximately 1,600 victims of the 1928 hurricane are buried there in a mass grave (Hutchinson and Paige 1998). The City of Pahokee handles the administration of the cemetery, and it is the major burial site for residents of the Glades area, being the closest stable (non-muck) soil area. Some initial tree plantings and access roads are visible in the 1940 aerial photograph(USDA 1940) and increase in subsequent photographs.

Martin County was formed in 1925 out of the northern 17 miles of Palm Beach County and a small piece of coastal St. Lucie County. Stuart area voters were incensed when Palm Beach County announced a $6 million dollar road bond issue in early 1925, but planned to spend less than $250,000 of it in the Stuart area. They felt that they were continually getting less than their fair share of County benefits, and were tired of it. At first the legislation authorizing the new county was going nowhere, primarily because of opposition from West Palm Beach interests. The Stuart interests tried a new plan - proposing to name the new county after Governor John Martin. The plan worked, as the governor threw his support behind the legislation. Both Martin County and lndian River counties were created on May 19, 1925 (Hutchinson and Paige 1998). The northern four miles of the reserve were part of the new county. Stuart was named the interim county seat. The Seaboard railroad interests pushed to have Indiantown named the permanent county seat, but gave up on this after Mr. Warfield's death in 1927.

Very little happened in the vicinity of the DuPuis Reserve in the 1930s other than the widening of the St. Lucie Canal and the construction of a new State Road 76. A 1937 Dolph's land atlas shows the land ownership in the reserve in Palm Beach County. Chase National Bank owned almost all of the northern two miles of the reserve. The Glades Land Corporation owned the land all along the southern edge of the reserve, while Southern States only owned six sections in the east central portion. The State Board of Education owned Section 15. The section of land containing Big Mound is shown as being divided into 40-acre sections. Although Southern States had sold most of its ownership in the reserve at that time, it bought back many of its properties for delinquent taxes during the Depression (Hutchinson and Paige 1998), and regained ownership at a later date.

The 1940 aerial photographs give the first comprehensive look at the reserve and its vicinity. To the west, the Bessemer groves and buildings are well-developed, and what appears to be a landing strip is present just west of Section 30. The Hungryland Trail is clearly visible and heavily used, with a

few side trails branching off from it. Several large agricultural clearings are visible along the trail in the southern portions of the reserve, primarily west of Big Mound. Smaller clearings found in the central portion of the reserve appear to be associated with the unnamed trail to Indiantown, which is hard to distinguish on the photographs. The clearings appear to be associated with shallow wet prairie systems, and are probably a form of farming practiced at the time called "pothole" farming. Shallow wetlands would be planted with crops like tomatoes at the beginning of the dry season. These wetlands would be close enough to the water table to stay moist and keep the crops growing without irrigation, and were free from soil-borne diseases. By the time the wet season returned and water levels rose, the crops would have already been harvested. Pothole farming at the reserve seemed to stop shortly thereafter, possibly because World War II dried up the labor available.

Furrows, berms, and ditches are clearly visible in the 1940 aerial photographs, and remain visible on subsequent photographs and topographic maps into the 1970s. The farmed areas today appear to be densely vegetated with slash pine or pond cypress, who find the altered wet prairies favorable for colonization. This response is consistent with that seen on similarly-farmed areas in Palm Beach County. Along the northern edge of the reserve, the understory vegetation has been cleared in the area that would become the farmed fields around the reserve office building, and the wetlands appear partially dried up. Short trails radiate south and east from the cleared areas. A short entrance road extends southeast from SR 76, with a building present at the southern end. Another structure is visible nearer SR 76, by it is not clear whether this is a corral or some other building. This entrance road would become the main entrance to the reserve and the building was expanded into the first ranchhouse.

In November 1944, Southern States Land and Timber sold 20,439 acres of land to Robert Chastain of Canal Point. This land includes most of the northern and central portions of the reserve, and included the land that would become citrus groves east of the reserve. It did not include the southern portions of the reserve, or the northern two miles. In 1946, Chastain purchased the 610 acres containing the current reserve office and farmed fields from Malcolm and Beatrice Chace. This gave him access to SR 76 from the western portion of his property. Also in 1946, Chastain purchased Section 15 from the State Board of Education for $50 an acre. In 1942, U.S. Sugar Corporation purchased a large amount of land from Glades Land Corporation, including the southern portion of the reserve. In 1949, U.S. Sugar sold this land to Robert Chastain along with some other inholdings owned by U.S. Sugar in the land he had already purchased. As part of this purchase, Chastain acquired most of the four sections in the northeast corner of the reserve, almost all of the southern border, and five sections of muck land below the present-day L-8 Canal. After this last purchase, Chastain owned all of the reserve except the three sections in the southern tip.

By the end of 1948, Chastain had constructed most of the basic infrastructure on the reserve. The infrastructure is visible on aerial photographs from December 1948 (USDA 1948) and March 1949

(USDA 1949). The aerial photographs show that the ranchhouse building has been expanded, and a small building and tree plantings are present in the area of the present office building. Both the Jim Lake and DuPuis grades have been constructed, along with an extension of the DuPuis Grade that runs southeast along the edge of the Everglades south of the Hungryland Trail. At that time, the Jim Lake Grade ran past the eastern boundary of the reserve and then turned north and connected to SR 76 next to two houses (USGS 1953). Another road forks off the DuPuis Grade and runs south to the Mound House area. There is extensive understory clearing in the vicinity of Mound House, with windrows of debris visible in some areas. The Mound House road would fall into disuse in subsequent aerial photographs. The Hungryland Trail and its side trails are still visible and in active use at this time.

The current ditch and farm field system around the reserve office had been constructed by 1948, with spur ditches extending south and east into adjacent wetlands. This ditch system, which will be called the "Office" ditch system, empties into a small creek that flowed to the St. Lucie Canal in the northwest corner of the reserve. Another outfall for this system is visible under SR 76 approximately 1/4 mile east of the reserve office. Another ditch system is present in the northeastern portion of the reserve. This ditch system, which will be called the "Chastain" ditch system, linked wetlands for three miles south and 1.5 miles west of its main outfall just east of the reserve. Three additional smaller outfalls are present along SR 76 west of the main outfall. South of the Chastain ditch system, the Cooter Creek ditch ran south for four miles to a slough emptying into the Everglades. Wetlands near this ditch were also connected to it. On the west side of the reserve, a canal had been constructed southwards from the Osceola Groves subdivision to the West Palm Beach Canal. This canal is known today as the L-8 stub canal, or North Tieback canal. A ditch system, which will be called the "Osceola" ditch system, ran through the western portion of the reserve, connecting the stub canal and cutting across the Hungryland Trail.

The Chastain Ranch was apparently not a big proponent of digging cattle watering holes in wetlands. Only eight are visible in the 1948/49 aerial photographs and are scattered along southern edge of the reserve. The ranch apparently thought that mowing shallow wetlands improved the cattle forage quality. The 1949 aerial photograph shows that the shallow areas of wetlands in the northeastern portion of the reserve appear to have been mowed. The deeper areas were not mowed, probably either because of high water levels or soft muck soils. Whatever the reason for this practice, it apparently was not repeated and little effects from it can be seen in the 1957 aerial photographs (USDA 1957). According to Hutchinson and Paige (1998), the Sam Chastain Ranch raised registered quarterhorses and Brahma bulls in the early 1950s. It is not known who Sam Chastain was and what his relationship to Robert Chastain was.

A small spur road led south from the DuPuis Grade extension along the edge of the Everglades to a small hammock, and is visible in the 1949 photograph (USDA 1949). At the edge of the hammock

near the water is a small set of parallel brick foundations. Wheeler (2000) dated these as being pre-1955. The foundations were too small and too narrow to be any sort of dwelling place. Given that they are located near what may have been the easiest point on the ranch to get boat or airboat access to the Everglades, it is believed that they served some boating purpose, such as tie down or storage. Although the L-8 Canal was not present in 1949, a survey line for its construction is visible in the aerial photograph.

The western two miles of the L-8 Canal was constructed through the Bessemer lands in 1953, and the stretch bordering the reserve was dug in 1954. The L-8 Canal was generally controlled at 15 feet, which was lower that virtually all the land in the reserve, except for the extreme southwest corner. This canal created new opportunities for drainage systems along the southern border of the site, as drainage culverts were placed through the northern berm at intervals of a mile or so. Some new short drainage ditches along the L-8 are present in 1957 aerial photographs (USDA 1957). By 1953, the first citrus groves were being developed and planted on the north side of the St. Lucie Canal, just north of the northeast portion of the reserve (USGS 1953). In the 1950s, the Bessemer orange groves were sold to Ben Hill Griffin, Inc.

In August 1955, Robert Chastain sold almost all of the western three miles of the reserve to White Belt Dairy Farms, Inc., which was controlled by John G. DuPuis, Sr. The 1,586 acres in the northwestern portion of the reserve was sold directly to Mr. DuPuis. The White Belt purchase also included six sections of land below the L-8 Canal, including two that stretched to Lake Okeechobee. The 1957 aerial photographs of the reserve (USDA 1957) does not show that many changes, possibly because Mr. DuPuis, Sr. died in 1957. Most of the firebreaks that follow section lines were created at this time and are visible in the photographs, along with two new cattle watering holes.

The photographs show that additional understory clearing is visible extending eastward from Mound House and east of the farm field area in along SR 76. The western pond at Mound House has been dug, but it cannot be determined whether the house is present under the trees. A road with a causeway near the end has been extended to L-8 Canal in the southwestern portion of the reserve. A bridge crosses the canal at the end of the causeway - presumably to provide access to the White Belt lands south of the canal. Another bridge over the canal is present at the southwest corner of the reserve. A long linear clearing that may be a landing strip lies west of the causeway, although because of its connection to a L-8 Canal culvert, it could also be a clearing for a drainage ditch that was not constructed. In the southwest corner, there is evidence of some sort of agricultural activity, such as the mowing of rectangular blocks. Along the western border of the reserve, a new perimeter canal has been extended northward from the Bessemer lands through the Port Mayaca cemetery to the St. Lucie Canal. This new canal eliminated the old connection of the Hungryland Trail to SR 76, but by this time, the trail was only being used as an internal ranch road.

Control of the White Belt Dairy and the separate DuPuis tract passed to John G. DuPuis, Jr. in late 1957. Mr. DuPuis, Jr. was apparently a owner who wanted to experiment with a great many things. A series of aerial photographs was taken in early 1958 (USDA 1958). These photographs show that the first fruit trees have been planted in the trapezoidal field west of the ranchhouse and around the office building. Southern States sold the land bordering the southeastern edge of the reserve to the State in 1957 for the J.W. Corbett Wildlife Management Area. The Big Mound area was not part of this purchase and was not acquired by the State until the 1980s.

Another series of aerial photographs of the Palm Beach County and adjacent Martin County sections of the Reserve was made in 1965 (PBCPA 1965). These photographs indicate that not much was happening on the DuPuis-controlled lands except for the southwest corner. A new drainage system is present, which will be called the "Bamboo" ditch system after the bamboo plantings along the east side of the L-8 stub canal, which are visible for the first time in 1965. The Bamboo ditch system ran through the transitional area between the pine flatwoods and the Everglades muck soils in the southwest corner. This ditch system was not present in 1957 (USDA 1957), although its route appears to have been cleared. The ditches seemed to be designed to intercept surface and groundwater flows that were keeping the muck soils too wet for their intended use as pasture.

The southern leg of the Bamboo ditch appears to have been constructed first. It started near Mound House and ran southeastward, linking up with several short ditches created prior to 1957, and then emptied into the L-8 Canal. The northern leg appears to be newly constructed in 1965. It started at a pre-1957 short ditch, and then ran northwestward to empty into the L-8 Stub canal. Spur ditches from both legs were extended northwards for a mile or two to drain additional wetlands. The Hungryland Trail was severed without a crossing by a north Bamboo spur ditch, which lead to a further decline in the usage of the western portions of this trail. The Cooter Creek canal was extended southward to link to a L-8 Canal culvert. Elsewhere along the L-8 Canal in the reserve, culverts that are not connected to ditches show erosional channels radiating outwards from them. These channels may have been present in 1957, but could not been seen because of the small scale of the photographs. They do indicate that large amounts of water are flowing from the reserve into the L-8 Canal through the culverts. Only one new cattle watering hole is visible on the 1965 photograph on the White Belt lands.

In January 1964, Robert Chastain sold nine sections of land running north to south on the eastern edge of his land holdings to George Caulkins. The southernmost four sections of this sale form part of the present southeastern border of the reserve. Chastain passed away later in 1964, and his estate sold to Caulkins the remaining nine-plus sections of land between the White Belt dairy and the previous Caulkins purchase in March 1965. The 1965 aerial photographs show that Chastain had done little with the Palm Beach County portions of the reserve that he owned. Only one new cattle watering hole is visible, and the trails within his ownership appear to be falling into disuse.

Caulkins, on the other hand, was converting his land into citrus groves. By early 1965, he had already begun ditching and draining the land on the first five sections extending south from SR 76, preparing it for tree planting. He never developed groves more than five miles south of the St. Lucie Canal, even though he owned the land further south. It possible that he could not get adequate drainage at that distance from the canal, or could pump irrigation water that far. The 1965 photograph does show a small agricultural clearing in a shallow wet prairie in the middle of Section 36 on the northern border of the reserve. It is believe to be caused by some freelance pothole farming, possible by one of Caulkins' employees. The southern three sections of the reserve were still owned at this time by U.S. Sugar. The 1965 aerial photographs show numerous vehicle tracks through the marshlands along the L-8 Canal in these sections. It is believed that these tracks were caused by hunting vehicles. Just east of the U.S. Sugar lands, agricultural clearing in the Big Mound Area is still visible.

White Belt Dairy Farms signed a stumpage agreement with Heyden Newport Chemical Corp. to remove lighter pine stumps in 1961. Since it takes at least 20 years for slash pine stumps to rot enough that the resin-soaked cores can be easily removed, this dates the logging on the western portion of the reserve as prior to 1940. When White Belt and Mr. Caulkins exchanged quit claim deeds in 1967 to resolve a property line dispute, the stumpage agreement had to be released from the lands going to Caulkins. Since there was no stumpage agreement on the Caulkins lands, it raises the possibility that the eastern portions of the reserve were never logged.

The period 1965 to 1970 appears to be a period of very active development on the White Belt lands. The soil survey for Palm Beach County (USDA 1978) has 1970 aerial photographs, while the survey for Martin County (USDA 1981) has 1972 aerial photographs. These photographs allow the dating of the new development on the White Belt lands. In the Palm Beach County portion of the White Belt lands, numerous new cattle watering holes are present. The bridge crossing the L-8 canal from the causeway is not longer present. The eastern pond at Mound House has been recently dug, and it is believed that the house itself was constructed at this time. Although the aerial photographs are inconclusive, it is believed that the sheep shearers buildings were built at the same time because of similarities in construction. A new ditch system, which will be called the "South Fork" ditch system is present. It starts in Section 4, heading south, and then forks. The eastern fork continues southeast and joins the Cooter Creek canal, while the western fork heads southwest and then west and empties in the L-8 Canal. A peculiar kind of scarification is visible in 1972 on the shallow edges of wetlands in the northern half of Section 34 south of the citrus grove. This scarification appears to shallow ridges and furrows. The scarification is not present in 1970, but can still be seen in 1990 aerial photographs.

On the Martin County White Belt lands, numerous cattle watering holes and ditches have been constructed in wetlands. Spur ditches have been extended westward from the Cooter Creek canal to drain additional wetlands. The T-shaped landing strip has been constructed and there is extensive clearing in the east half of Section 20 east of the landing strip. Most of the buildings in the reserve maintenance compound appear to have been recently built, and a road extends from the compound to SR 76. The residences on the eastern and western borders of the office farm field area appear to be present. The reserve office building has been expanded, and new buildings are visible south of the ranchhouse. The entrance drive to the office and ranchhouse buildings, which previously had been to the east of the buildings, was now shifted to its present location west of the buildings.

The orange grove area south of the reserve office has been recently cleared, and the wetland there has been partially filed in. The wetland just south of the farm field area east of DuPuis Grade has been excavated to form parallel berms. The barn may be present at the equestrian area, but the aerial photograph is inconclusive. The planted hammock north of Governor's House is present, and the house itself appears to be visible. A comparison with the 1971 topographic map (USGS 1971) shows that the landing strip and the ditched wetland east of DuPuis Grade were present prior to 1971. East of the reserve, George Caulkins had almost finished development of this citrus groves, with only a few sections left unplanted. South of the groves, he was doing little with the land forming the eastern portion of the reserve. Five new cattle watering holes are visible in 1970, but otherwise there are no changes.

In January 1972, a complex series of land transactions resulted in White Belt Dairy Farms acquiring the eastern three miles of the reserve. In two separate transactions, George Caulkins sold most of the land that he owned south of the developed citrus groves to U.S. Sugar. U.S. Sugar then sold this land to White Belt Dairy Farms. U. S. Sugar also sold the southernmost three sections of land in the reserve to John G. DuPuis, Jr. It is believed that White Belt transferred its muck lands south of the L-8 Canal to U.S. Sugar at the same time, but it is not known whether this was a sale or a land swap. Finally, George Caulkins sold the last 2 1/2 sections of land south of the citrus groves to White Belt. This series of transactions brought the reserve into its final configuration with 100% ownership by the DuPuis family. This eastern section was much wetter than the rest of the reserve, and portions have been labeled on some old maps as a continuation of the Allapattah Flats (H.C. Fugate 1923).

White Belt moved quickly to develop the new lands in the eastern portion of the reserve. A parallel ditch was dug for three miles just north of the L-8 Canal and was extended northward seven miles along the eastern reserve boundary to the citrus groves. A new raised road with shoulder ditches was constructed through Section 25 to connect the canal berm road along the eastern border. As on the western portion of the site, the muck and transitional lands along the L-8 Canal appear to the most valuable agricultural area. Spur ditches were extended from the ditch along the L-8 Canal to drain this area. In the northwest corner of Section 14, a square nursery area was created in a shallow

wetland area to grow Limpopo grass. This grass was then planted in other wet areas to provide what was hoped to be improved cattle forage. Many of the management roads that follow section lines were also created at this time.

Three new cattle watering holes were created at this time in the eastern section near the L-8 Canal grazing areas. Elsewhere on the reserve, only two new watering holes were created and many of the older holes appear to be not maintained and falling into disuse. The South Fork ditch system was extended a half-mile farther north. Because of the gap between the aerial photographs of the early 1970s and those in the mid-1980s, it is difficult to date when the changes in the eastern section of the reserve occurred. Since the appearance of the changes in the 1980s photographs is that of something that happened many years earlier, it appears that the mid-1970s was the last period of major changes at the reserve. The buildings in the equestrian complex appear to have been built about this time, while a number of tree plantings along the DuPuis Grade that were probably made in the 1970s became visible in the 1980s.
A high-voltage power line that forms the main north-south backbone of the Florida electrical grid was constructed along the eastern border of the reserve in the late 1970s or early 1980s. It consists of three groups of electrical lines on towers lined up three abreast. The line runs just over the eastern reserve border in the Corbett WMA for the first seven miles, then turns west and runs on the northern edge of the reserve just below the citrus groves. It then turns northward and runs just inside the reserve for the next three miles, before crossing into the citrus grove for the last mile before it reaches the St. Lucie Canal. All woody vegetation was removed underneath the power lines, and is being prevented from reestablishing itself by cutting and herbicides. The towers were placed on raised beds placed approximately every 0.25 miles. There are a few pits underneath the power line that apparently were dug to provide fill for the raised beds. Another high-voltage power line was constructed just over the western edge of the reserve in the early 1990s. It consisted of only a single set of towers and connected to the new Martin Power Plant that had been built to the north of the reserve.

Very little appeared to happen at the reserve in the early 1980s, possibly because Mr. DuPuis was in declining health. John G. DuPuis, Jr. died in 1984 and control of the reserve passed to his widow Susan DuPuis. Mrs. DuPuis sold the reserve to the South Florida Water Management District (SFWMD) in December 1986. Very little change in the reserve can be noted between 1984 and 1986 except that the office building was expanded to its present configuration. After acquiring the reserve, SFWMD sought partners in managing the reserve. Florida Game and Fresh Water Fish Commission, which is now the Florida Fish and Wildlife Conservation Commission, has managed the hunting on the reserve since the beginning.

In 1990, the State Division of Forestry (DOF) took over management of the reserve and it was known as DuPuis State Forest until 1996. During their time managing DuPuis, DOF rebuilt the

DuPuis and Jim Lake Grades with shellrock excavated from a borrow pit in the southwest corner of the reserve. A new entrance road that connected to the Jim Lake Grade was established in the northeast corner of the reserve. A boardwalk has been recently constructed at the borrow pit. DOF may have also been responsible for the small borrow pits in the family camping area in the northeastern portion of the reserve . DOF also started prescribed burning at the reserve in 1990. Some of the initial burns were fairly hot because of excessive fuel buildups. The hot burns and sub-normal rainfall stressed the slash pines and left them vulnerable to pine bark beetle infestation. Selective logging was done in 1992 to try to control the infestation, but it continued to spread and led to the logging of almost 900 acres in 1995 and 1996. DOF was unable to secure permanent funding for the state forest and turned the management back over to SFWMD in 1996.

SFWMD went through a bidding process for the management of the reserve and decided that SFWMD staff had the best proposal. The District has been managing the non-hunting functions at the reserve since 1986. The ranchhouse south of the reserve office was demolished in the 1990s. This was the oldest building on the reserve, dating back to 1940. The foundation of this building was recently removed for construction of a new shellrock parking area. The fruit orchards around the reserve office are not being maintained and are slowly dying out. The citrus grove was recently removed to help contain the spread of citrus canker.

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