Moses Creek Conservation Area

Land Management Plan
June 2009
Board Approved

Moses Creek Conservation Area

Land Management Plan Summary

Management Area Size: 2,173 acres
Date of Acquisition: Acquisition of parcels within Moses Creek Conservation Area began in 1994.
Date of Plan: May 2009
Basin: Northern Coastal **Basin Planning Unit:** Matanzas River
Moses Creek

Location: Moses Creek Conservation Area (MCCA or Conservation Area) is located in St. Johns County just north of State Road 206 along the west shore of the Matanzas River.

Funding Source: The acquisition funding sources for MCCA include Preservation 2000, Save Our Rivers, ad valorem, and mitigation donations.

Management Partners: The District serves as lead manager for the entire conservation area. Additionally, the District coordinates with the St. Johns County School Board in continuing environmental education programs and opportunities through the Legacy Program.

Key Resource Issues:

Resource Management Issues:

- WATER RESOURCES – Water resources are largely undisturbed, most protection was accomplished with acquisition.
- FIRE MANAGEMENT – Implementation of prescribed burns occur in accordance with annual burn plan and individual unit prescriptions.
- FOREST MANAGEMENT- Prior to acquisition, previous owners planted and seeded some of the acreage within the conservation area in sand pine (*Pinus clausa*) and slash pine (*P. elliottii*) with little subsequent management.
- WILDLIFE – The conservation area provides habitat for numerous wildlife species including many listed species. These species include the Florida gopher tortoise (*Gopherus polyphemus*) and bald eagle (*Haliaeetus leucocephalus*).
- EXOTICS – Invasive exotic pest plant and animal species occur on the property; including moderate populations of Chinese tallow trees (*Sapium sebiferum*). The District regularly monitors for the presence of invasive plants and animals and responds with appropriate control action.
- CULTURAL & ARCHEOLOGICAL RESOURCES – A review of the Department of State, Division of Historical Resources indicates the presence of ten (10) Florida master site locations within the boundaries of the conservation area.

Key Land Use/Recreation Issues: The entire conservation area is open to the public with recreational opportunities for hiking, biking, camping, equestrian activities, wildlife viewing, fishing, and photography. Paddling and boating are available via the Matanzas River.

Land Use Management Issues:

- ACCESS – Two public access points are located off State Road (SR) 206. Local access is provided to neighboring landowners on the north boundary.

- RECREATION USE – The entire conservation area is open for public recreation. The District has developed and implemented a marked trail system and camp sites and students, through the District's Legacy program constructed an outdoor amphitheater. A boat dock and access stairs enable public access to the property from the water.
- SECURITY – Maintenance of fence lines, parking areas, gates, and locks is conducted as necessary. The District will maintain contact with local law enforcement and a private security firm for any potential security needs.

Administration:

- ACQUISITION – The District may consider purchasing parcels near the MCCA that become available and that will aid in the conservation of water resources within the Matanzas River and Moses Creek basins. The District may pursue acquisition of small parcels or property exchanges with neighbors to improve and provide additional access to the conservation area.

- COOPERATIVE AGREEMENTS, LEASES, EASEMENTS AND SPECIAL USE AUTHORIZTIONS (SUA) –

    - An intergovernmental/Legacy agreement exists between the District and the St. Johns County School Board.
    - The District holds a residence agreement providing for security of the conservation area.
    - The District issued an SUA for the purposes of conducting exotic pest plant surveys.
    - The District issued an SUA for vehicular access to and use of the property in mosquito and arbovirus surveillance.

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INTRODUCTION

This document provides guidelines for land management activities to be implemented at Moses Creek Conservation Area (MCCA) over the next five years. This is a revision of the land management plan approved in October of 2001.

MCCA includes approximately 2,173 acres within the northern Coastal Basin. The property is located south of St. Augustine, east of U.S Highway 1 on the north side of State Road (SR) 206, along the west bank of the Matanzas River. The property is found within several Sections of Township 8 south, Range 30 East.

The acquisition of the parcels that comprise the MCCA provide for the protection of important water resources and ecological functions. This acquisition is consistent with the goals of the Northern Coastal Basin projects set forth in the District's Land Acquisition and Management Five Year Plan, and the District's Water Management Plan. These goals are to:

- Restore, maintain, and protect native natural communities and diversity.
- Improve water quality, maintain natural hydrologic regime, and maintain flood protection by preserving important wetland areas.
- Provide opportunities for recreation where compatible with the above listed goals.

CONSERVATION AREA OVERVIEW

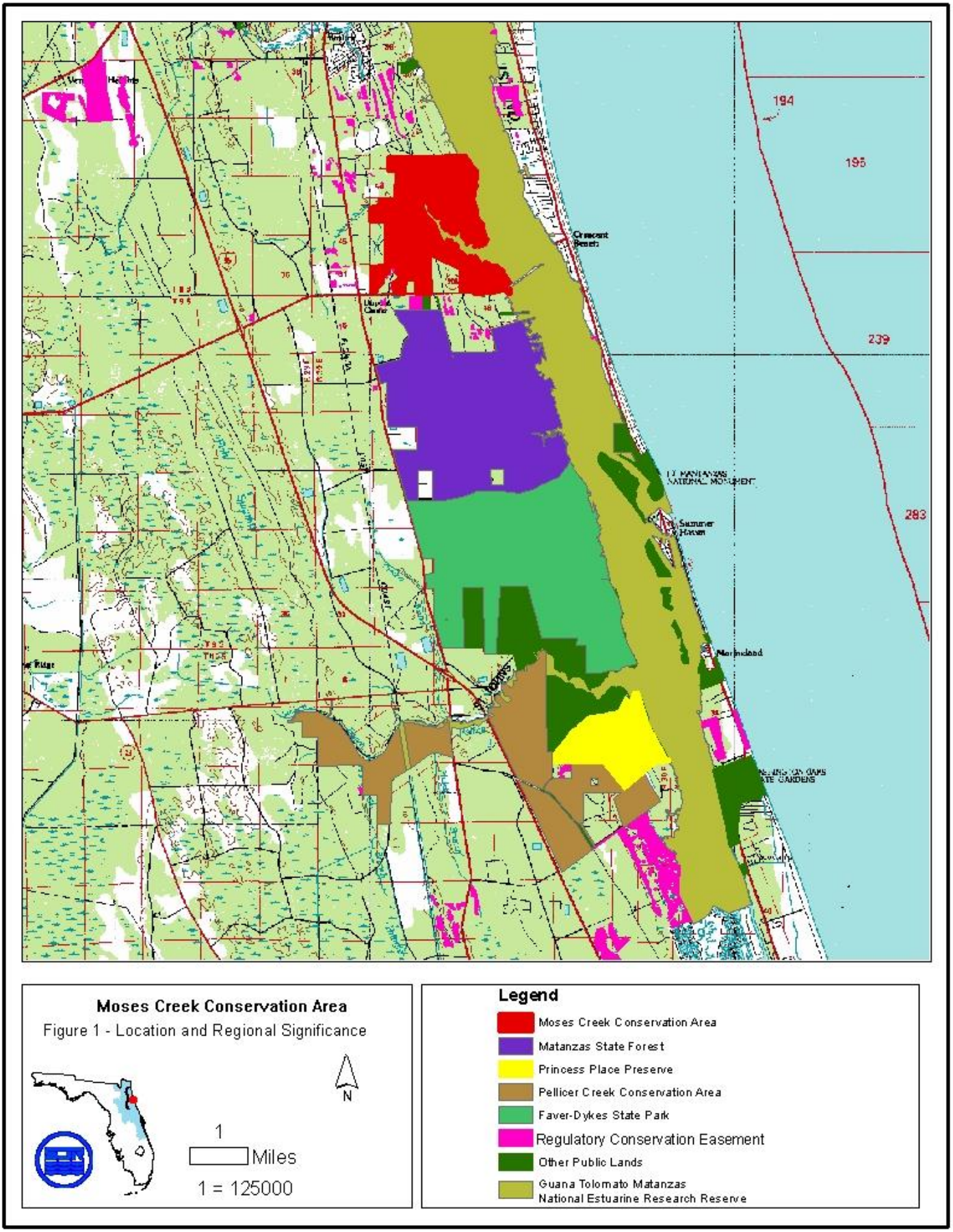
Regional Significance

The MCCA is a significant acquisition providing linkage within the Guana-Tolomato-Matanzas National Estuarine Research Reserve (GTM). GTM was established as a partnership between the Florida Department of Environmental Protection and the National Oceanic and Atmospheric Administration (NOAA) to provide long-term research of the estuarine systems within the reserve. GTM is further charged to provide public education and interpretation programs on estuarine communities.

The conservation area is an integral component of a larger network of publicly owned lands in St. Johns County. Figure 1 depicts the location and regional significance of the conservation area. These lands include Matanzas State Forest, Princess Place Preserve, Pellicer Creek Conservation Area, and Faver-Dykes State Park. The 2,173 acres combined in these publicly owned and managed lands provide for the protection of water quality and storage, indigenous floral and faunal species, numerous cultural resources and natural resource-based recreational opportunities.

Acquisition History

MCCA is comprised of five (5) contiguous parcels totaling 2,173 acres (Figure 2.) The following properties were purchased by the District using funding sources as indicated and were incorporated in the conservation area as they were acquired.


194
195
239
283
Crescent Beach
Summer Haven
Marineland
Moses Creek Conservation Area
Figure 1 - Location and Regional Significance
N
1
Miles
1 = 125000
Legend
Moses Creek Conservation Area
Matanzas State Forest
Princess Place Preserve
Pellicer Creek Conservation Area
Faver-Dykes State Park
Regulatory Conservation Easement
Other Public Lands
Guana Tolomato Matanzas
National Estuarine Research Reserve

Moses Creek Conservation Area

Figure 2 - Acquisition Map

N

0.5

Miles

1 = 20000

Legend

- Brewster 1994-053
- St. Augustine Development, Inc 1994-083
- Nelson 1995-008
- Zak 1995-060
- Morgan 1999-014
- Moses Creek Conservation Area

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Brewster (1,671 acres) Land Acquisition number 1994-053

The Moses Creek property totals 1,671 acres acquired by the District through a single purchase on March 16, 1995 using Preservation 2000 funds. The total purchase price was $5,019,632.50.

St. Augustine Development (51 acres) Land Acquisition number 1994-083

The St. Augustine Development property totals 51 acres acquired by the District through a single purchase on November 12, 1996 using Save Our River funds. The total purchase price was $213,722.30.

Nelson (64 acres) Land Acquisition number 1995-008

The Nelson property totals 64 acres acquired by the District through a single purchase on November 12, 1996 using Save Our River funds. The total purchase price was $145,909.61.

Peterkin/Zak (243 acres) Land Acquisition number 1995-060

The Peterkin/Zak property totals 243 acres acquired by the District through a single purchase on February 19, 1997 using mitigation donations and Ad valorem. The total purchase price was $605.051.54 ($149.051.54 Ad Valorem and $456,000.00 mitigation donation.)

Morgan property (141 acres) Land Acquisition number 1999-014

The Morgan property totals 141 acres acquired by the District through a single purchase on June 1, 2001 using Preservation 2000 funds. The total purchase price was $375,626.18.

Local Government Land Use Designation

According to the St. Johns County 2015 Comprehensive Plan, the future land use designation for the MCCA is Parks and Open Space. This designation allows for active and passive recreation areas or lands permanently maintained as open space.

The future land use designation for property immediately adjacent to the conservation area to the north , west, and south is Residential B and C, which allows for neighborhood commercial and community commercial uses, approved pursuant to the Planned Development land development regulations, and on a size and scale compatible with the surrounding residential area.

NATURAL RESOURCES OVERVIEW

Topography and Hydrology

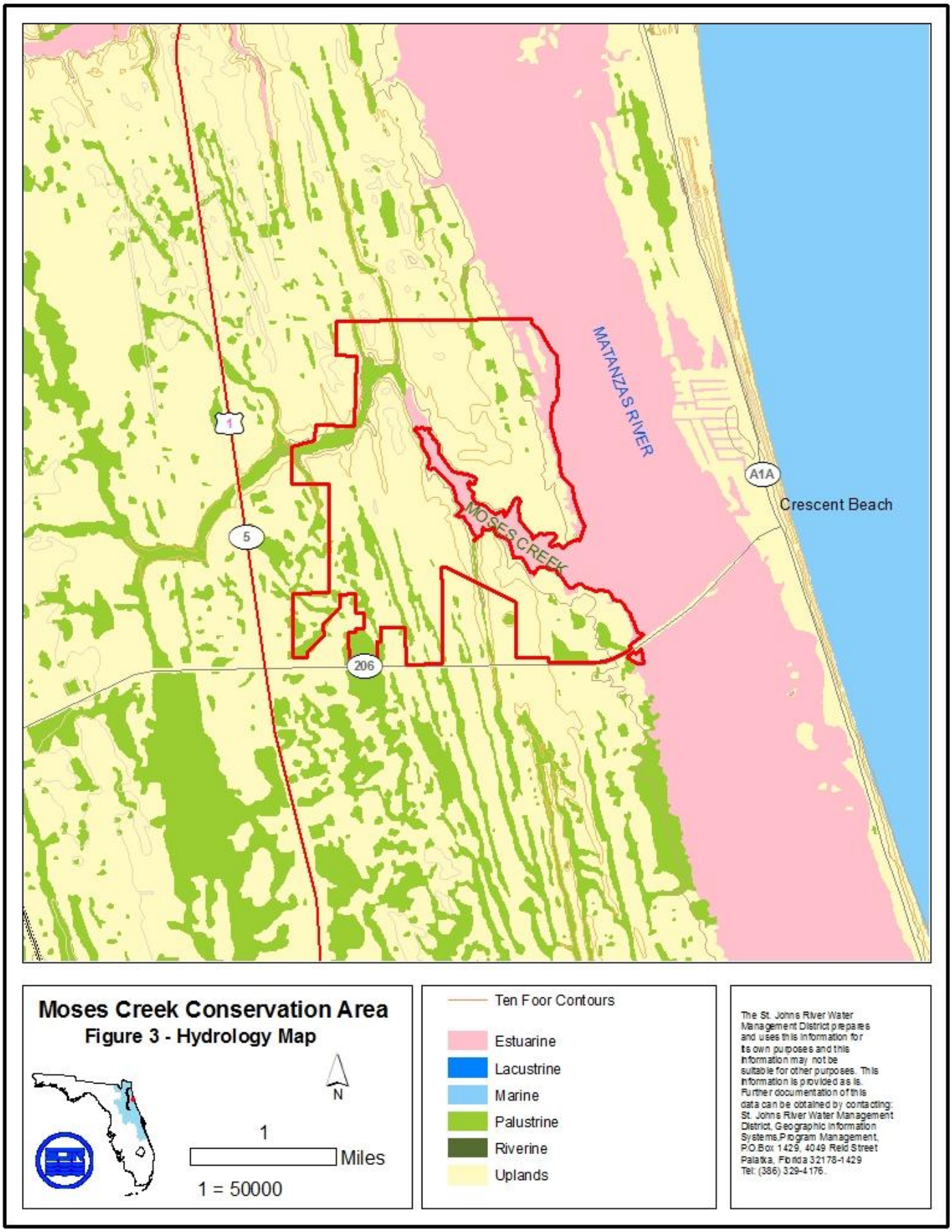
Moses Creek Conservation Area is located within the St. Augustine Ridge Sets and the Central Atlantic Coastal Strip, physiographic subdistricts of the Eastern Flatwoods District. The elevations of the conservation area range from sea level to 30 feet above sea level; however, the majority of the property is within 20 to 30 feet above sea level.

The most significant surface hydrological features of the conservation area are Moses Creek and the Matanzas River (Figure 3). The property protects approximately 2.5 miles of the Matanzas River shoreline and surrounds most of the distance of Moses Creek. Both water bodies support large areas of undisturbed tidal marsh systems and are designated Class II shellfish waters by the Florida Department of Environmental Protection. Moses Creek receives water from swamps and wet flatwoods to the west and north of the conservation area. As the creek forms, just west of the property, it flows east, entering the conservation area near the northwest corner of the property. The creek flows southeast across the conservation area to the confluence with the Matanzas River. MCCA lies within the Matanzas River Basin, a sub-basin of the Northern Coastal Basin.

Natural Communities

The 2,173 acres that comprise the MCCA consist primarily of upland mixed forest, mesic and scrubby flatwoods, sandhills, and scrub in the uplands, and tidal marsh and floodplain and basin swamps at lower elevations (Figure 4). Information relative to the natural communities within the conservation area is derived from several sources including timber stand assessments and personal observations of District staff. The general natural community descriptions are characterized using descriptions published in the Florida Natural Areas Inventory's (FNAI) *Guide to the Natural Communities of Florida.* Additionally, information specific to the tidal marsh and scrub systems are further characterized referencing editors Ronald L. Myers and John J. Ewel's *Ecosystems of Florida.* Natural community and species ranking definitions are listed in Addendum 1.

Prior to acquisition and documented in the previous plan, sand pine (*Pinus clausa*) a natural component of relict dune systems such as those found at MCCA established dominance in portions of the sandhill, scrub, and flatwoods natural communities. By 2003, the prolonged absence of fire caused much of the acreage within those natural communities to be heavily encroached by sand pine, resulting in suppressed ground cover assemblages in many areas. Since 2003 restorative management activities have been focused on the harvesting of sand pine and mechanical management of overgrown shrub layers.


MATANZAS RIVER
MOSES CREEK
A1A
Crescent Beach
1
5
206
Moses Creek Conservation Area
Figure 3 - Hydrology Map
N
1
Miles
1 = 50000
Ten Foor Contours
Estuarine
Lacustrine
Marine
Palustrine
Riverine
Uplands
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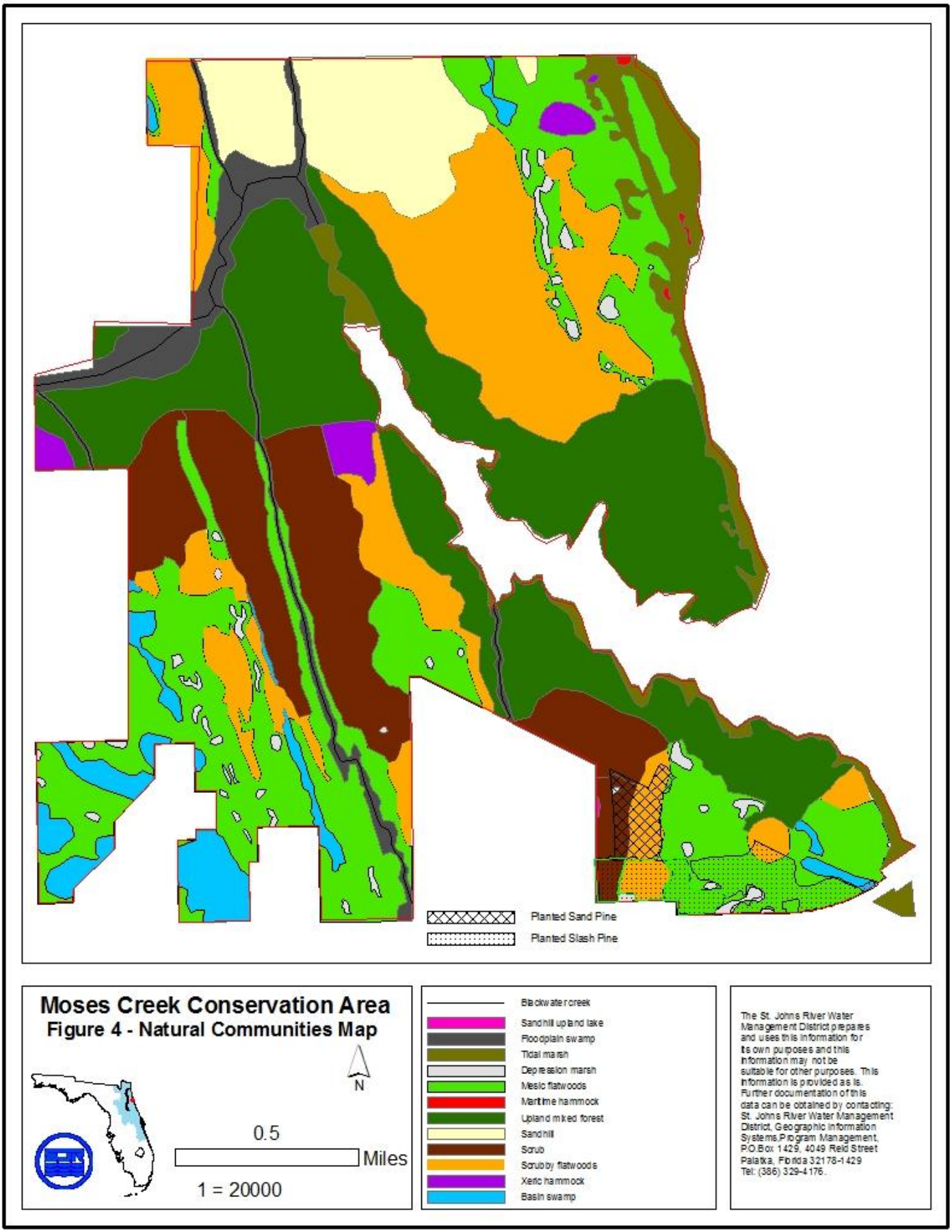
Planted Sand Pine
Planted Slash Pine
Moses Creek Conservation Area
Figure 4 - Natural Communities Map
N
0.5
Miles
1 = 20000
Blackwater creek
Sandhill upland lake
Floodplain swamp
Tidal marsh
Depression marsh
Mesic flatwoods
Maritime hammock
Upland mixed forest
Sandhill
Scrub
Scrubby flatwoods
Xeric hammock
Basin swamp
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Natural community refinement and reclassification will likely occur throughout the conservation area as restoration and fire management activities within the conservation area progress.

Flatwoods

Flatwoods communities are distinguished by very flat, level topography, and include wet, mesic, and scrubby forms. Areas within the MCCA identified broadly as flatwoods in the previous management plan have been further delineated in this plan to either mesic or scrubby flatwoods. These natural communities have varying species compositions and distinctly different hydrologic regimes and fire return intervals and as such may have differing management needs.

The mesic and scrubby flatwoods communities vary in levels of disturbance across the conservation area. Primary sources of disturbance include prolonged fire exclusion and encroachment by sand pines. Both groundcover and shrub layers are disturbed, with the most degraded examples of this community type in areas of sand pine encroachment.

The topographic relief associated with the historic dune systems results in rapid changes in natural plant communities with poorly defined transitions. Wet flatwoods likely occur within the MCCA, forming transitions between mesic flatwoods and swamps and hammock edges. For the purposes of this plan, these difficult to delineate flatwoods are included in the acreage for mesic flatwoods.

Mesic Flatwoods (505 acres, 23%)
Mesic flatwoods are characterized as an open canopy forest of widely spaced pine trees with little or no understory but a dense groundcover of herbs and shrubs. Some variations of recognized mesic flatwoods include a saw palmetto (*Serenoa repens*) understory.

Plants and animals of this community type, documented within the conservation area, include longleaf pine (*Pinus palustris),* slash pine (*Pinus elliottii*), wiregrass (*Aristida stricta var. beyrichiana*), tarflower (*Befaria racemosa*), saw palmetto, white-tailed deer (*Odocoileus virginianus*), pine warbler (*Dendroica pinus*), oak toad (*Bufo quercicus*), and southern black racer (*Coluber constrictor priapus*).

Fire and seasonal hydroperiods are important physical factors associated with the shaping and maintenance of this community type. Mesic flatwoods is a dominant natural plant community within the conservation area, much of which is in good condition. Many of the mesic flatwoods areas have received fire or a fire mimicking disturbance within the average natural fire return interval of every one to eight years. Additionally approximately 35 acres are planted in slash pine.

Scrubby Flatwoods (378 acres, 17%)
Scrubby flatwoods are characterized as an open canopy forest of widely scattered pine trees with a sparse shrubby understory and numerous areas of barren white sand. The

vegetation is a combination of mesic flatwoods and scrub species; scrubby flatwoods often occur on broad transitions or ecotones between these communities.

Plants and animals of this community type, documented within the conservation area, include longleaf pine, slash pine, myrtle oak (*Quercus myrtifolia*), saw palmetto, tarflower (*Befaria racemosa*), rusty lyonia (*Lyonia ferruginea*) and runner oak (*Quercus pumila*).

Fire is an integral component in the perpetuation of this community type. The open areas of bare sand, sparse groundcover vegetation and coverage of largely incombustible oak leaf litter typical of most scrubby flatwoods results in a fire return interval of between 8 and 25 years. Examples of scrubby flatwoods with a higher herbaceous or saw palmetto component may burn at a lower fire return frequency.

Between 2003 and 2008 much of the scrubby flatwoods within the conservation area were harvested of all overstory sand pine. Approximately 129 acres of this community type has received restorative mechanical and herbicide treatments.

Sandhill (148 acres, 7%)
Sandhills are characterized as a forest of widely spaced pine trees with a sparse understory of deciduous oaks and a fairly dense groundcover of grasses and herbs on rolling hills of sand. The most typical associations are dominated by longleaf pine, turkey oak (*Quercus laevis*), and wire grass.

Typical plants and animals of this community type, documented within the conservation area, include longleaf pine, bracken fern (*Pteridium aquilinum var. pseudocaudatum*), eastern towhee (*Pipilo erythrophthalmus*), pocket gopher (*Geomys pinetis*), barking treefrog (*Hyla gratiosa*), eastern diamondback rattle snake (*Crotalus adamantues*), and gopher tortoise (*Gopherus polyphemus*).

The sandhill plant community is a fire climax community. Fire is a dominant factor in the ecology of this community and frequent fires are necessary to reduce hardwood competition and to perpetuate pines and grasses. Fire return intervals within sandhill communities range from two to five years. Sandhills are imperiled in the state; and are ranked by FNAI as G3/S2

Harvest operations between the years 2003 and 2008 removed much of the offsite overstory sand pine from the sandhill natural community. Additionally, approximately 44 acres were treated with herbicide to reduce oak coverage. Restorative activities undertaken in the sandhills since the 2001 plan have resulted in favorable increases in herbaceous components, including lopsided indiangrass (*Sorghastrum secundum*) and skyblue lupine (*Lupinus diffuses*).

Scrub (258 acres, 12%)
Scrub is characterized as a closed to open canopy forest of sand pines with dense clumps or vast thickets of scrub oaks and other shrubs dominating the understory. The groundcover is generally very sparse, being dominated by ground lichens or rarely, herbs. Open patches of barren sand are common. Where the overstory of sand pines is widely scattered or absent altogether, the understory and barren sands are exposed to more intense sunlight.

Typical plants and animals of this community type, documented within the conservation area include, sand pine (*Pinus clausa*), sand live oak (*Quercus geminata*), rosemary (*Ceratiola ericoides*).

Scrub communities are fire maintained and generally burn catastrophically every 20 to 80 years. The high variability of fire intervals within scrub systems is relative to the productivity of the site (Myers, 1990). Highly productive sites, such as those within MCCA, will have a lower return interval. Maintaining the lower fire return interval will result in an oak scrub system with fewer sand pines. A longer fire return interval will allow for a sand pine dominated system in areas where sand pine is present. Scrub is globally imperiled; and ranked by FNAI as G2/S2 due to the relative rarity of occurrence and vulnerability of extinction.

Restoration harvest operations between the years 2003 and 2008 removed much of the overstory sand pine from approximately 156 acres of scrub within the conservation area. Approximately 140 acres received mechanical treatments to aid in the reduction of oak heights. Post mechanical manipulation observations indicate the remnant presence of herbaceous scrub components, including rosemary.

Upland Mixed Forest (565 acres, 26%)
Upland mixed forests are characterized as well-developed, closed canopied forests of upland hardwoods on rolling hills in northern and central peninsula Florida. This community type is often associated with and grades into xeric hammock and maritime hammock. The upland mixed forest is a climax community and rarely burns.

Typical plants and animals of this community type, documented within the conservation area include, southern magnolia (*Magnolia grandiflora*), pignut hickory (*Carya glabra*), American holly (*Ilex opaca*), wild olive (*Osmanthus americana*), eastern glass lizard (*Ophisaurus ventralis*), broadhead skink (*Eumeces laticeps*), and pileated woodpecker (*Dryocopus pileatus*).

Basin Swamp (78 acres, 4%)
Basin swamps are large irregularly shaped basins not associated with rivers. Basin swamps are thought to have developed in oxbows of former rivers or in ancient coastal swales and lagoons that existed during higher sea levels. Species compositions of this natural community type at the MCCA are similar to those of the floodplain swamp.

The basin swamps within the MCCA are either dominated by or include a heavy component of cypress and have a typical hydroperiod of approximately 200-300 days. Though infrequent, fire is essential for the maintenance of these natural communities. Fire return intervals in basin swamps may range from 5 to 150 years, with lower return intervals occurring on the edges.

Floodplain Swamp (97 acres, 4%)
Floodplain swamps occur on flooded soils along stream channels and in low spots and oxbows within river floodplains. This plant community is generally characterized by the presence of buttressed and hydrophytic trees such as cypress and tupelo and a sparse understory and groundcover.

This community type is maintained by hydrologic regimes and is not fire dependant. Floodplain swamp communities within the conservation area appear relatively undisturbed.

Depression Marsh (27 acres, 1%)
A depression marsh or ephemeral pond is characterized as a shallow, usually rounded depression in sand substrate with herbaceous vegetation. Depression marsh communities provide important foraging and breeding habitat for many species of reptiles and amphibians found within the conservation area. Natural hydrologic conditions vary with most depression marshes drying in most years. Hydroperiods cans range from 50 to 200 days per year.

Fire is important in maintaining this community type by restricting the invasion of shrubs and trees and the formation of peat. Fire return intervals for this plant community are generally determined by the fire frequency of surrounding uplands.

Estuarine Tidal Marsh (108 acres, 5%)
Estuarine tidal marshes are floral based (as opposed to faunal or mineral) natural communities characterized as expanses of grasses, rushes, and sedges along the coastlines of low wave energy and river mouths, exhibiting characteristics of both terrestrial and marine environments. These areas are highly biologically productive providing breeding and feeding grounds for a vast array of wildlife.

Species composition and assemblages in the tidal marsh environment are influenced by both soil salinity and flood frequency. Plant species typically associated with tidal marshes are non-woody; however, mangrove and saltbush (*Baccharis halimifolia*) are known to occur. Prominent plant species found within this plant community at the MCCA include black needle rush (*Juncus roemerianus*), saltmeadow cordgrass (*Spartina patens*), and smooth cordgrass (*S. alterniflora*). These plants are distributed throughout the marsh in zones where one of the species will dominate. In addition to soils conditions, these visible zones may be dictated by slight changes in elevation, which influences frequency and duration of exposure to salt water.

Embedded within the salt marshes on the MCCA are areas of high marsh salt flats. These areas occur when the slope near the shoreline is gradual. These areas have exceedingly high soil salinity and are barren of vegetation. These areas are important winter foraging and loafing habitat for a wide array of migratory birds.

Other typical plants and animals of the salt marsh, documented within the conservation area include saltwort (*Batis maritima*), black mangrove (*Avicennia germinans*), Atlantic blue crab (*Callinectes sapidus*), sand fiddler crab (Ocypoda pugilator), and numerous shore and wading birds.

Xeric Hammock
Xeric hammock is characterized as either a scrubby, dense, low canopy forest with little understory plants other than palmetto, or a multi-storied forest of tall trees with an open or closed canopy. Several gradations between these extremes may occur.

Typical plants and animals of this community type, documented within the conservation area include, sand live oak, laurel oak (*Quercus laurifolia*), American beautyberry (*Callicarpa americana*), and wild turkey (*Meleagris gallopavo*).

The xeric hammock natural community is typically an advanced successional stage of scrub or sandhill. It is a climax community, having been protected from fire for 30 or more years. When fire does occur in the xeric hammock, it is under extreme conditions, burns catastrophically and it may revert the community back to an earlier successional stage.

The xeric hammocks within the MCAA are typical as described by FNAI in that they are isolated patches covering small areas.

Maritime Hammock
Maritime hammocks are characterized as a narrow band of hardwood forest lying just inland of the coastal strand community. Live oak, cabbage palm (*Sabal palmetto*), and red bay (*Persea borbonia*) generally combine to form a dense, wind-pruned canopy whose streamlined profile deflects winds and generally prevents hurricanes from uprooting the trees.

Other typical plants and animals of this community type, documented within the conservation area include coontie (*Zamia pumila*), wild coffee (*Psychotria nervosa*), squirrel treefrog (*Hyla squirella*), southern ringneck snake (*Diadophis punctatus punctatus*), and a host of migratory bird species.

The maritime hammock natural community is the terminal stage of succession in coastal areas with a fire return interval of no more than 26-100 years. Nutrient cycling is achieved through detrital organisms rather than fire. This community type is ranked G3/S2.

Three examples of maritime hammocks occur within the MCAA. They are imbedded within tidal marsh systems on the north and east boundaries of the property along the Matanzas River.

Sandhill Upland Lake
Sandhill upland lakes are characterized as shallow rounded solution depressions occurring in sandy upland communities. They are generally permanent water bodies, although water levels may fluctuate substantially, occasionally drying entirely. They are typically lentic water bodies without significant inflows or outflows; water is largely derived from lateral ground water seepage or artesian connections with the underlying limestone aquifer.

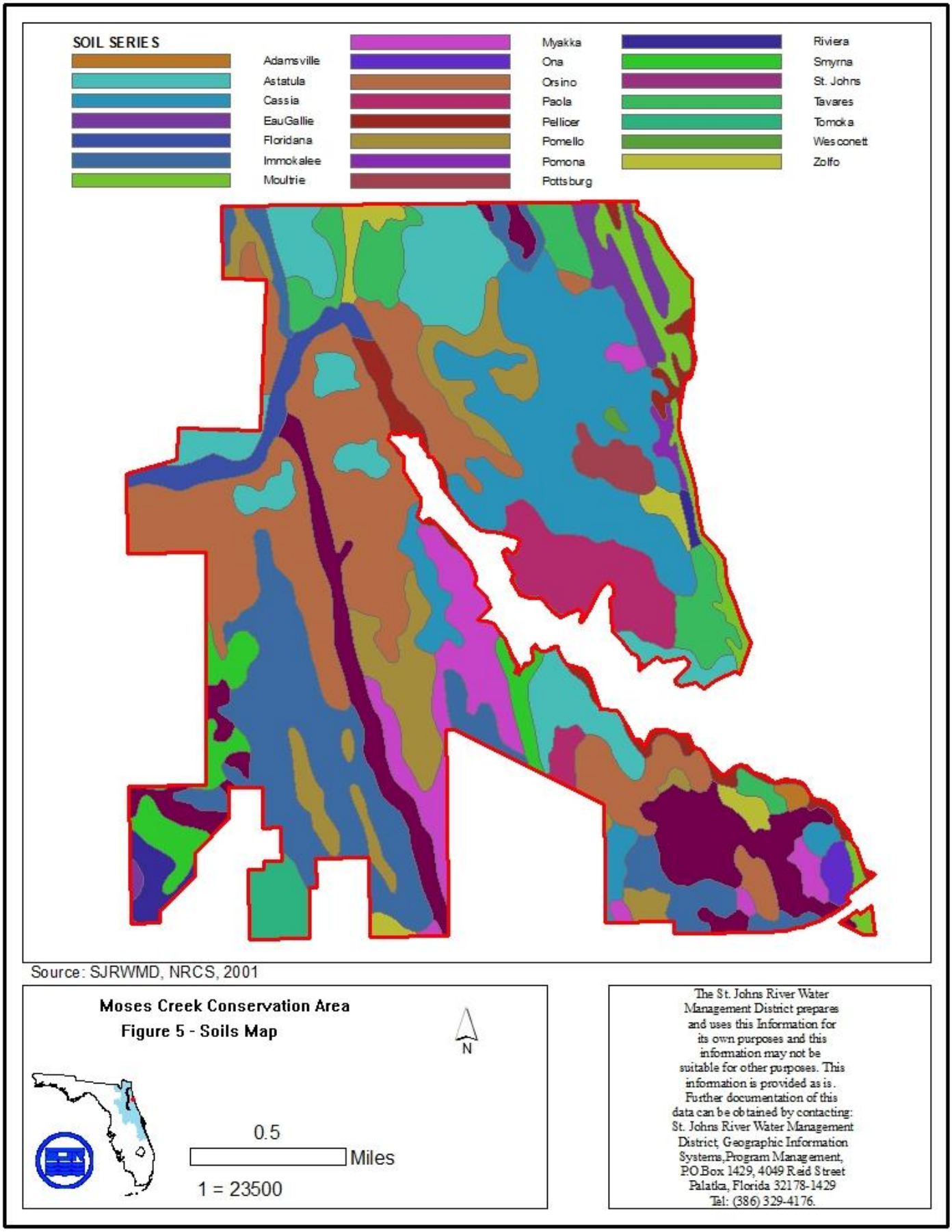
Vegetation within the sandhill upland lake community is usually confined to a narrow band along the shore and consists of various species of hydrophitic grasses, herbs, or shrubs. Emergent vegetation may be found in a wider band along the sloping shoreline and may include submerged aquatic vegetation throughout the water column. Additionally, floating plants may cover much of the surface area of the water. The sandhill upland lake is an important breeding area for numerous amphibian species.

The sandhill upland lake is not a fire dependant plant community; however, fire may burn into the grassy shoreline.

A single example of the sandhill upland lake is found partially within the MCCA along the boundary with Hidden Creek neighborhoods.

Soils

According to data produced by the United States Department of Agriculture, Soil and Conservation Service, 23different soil types are within MCCA. Figure 5 contains a soils map of the Conservation area. The St. Johns County Soil Survey provided information used to develop descriptions of the predominant soil series found within the conservation area. The soil descriptions are located in Addendum 2.


SOIL SERIES
Adamsville
Astatula
Cassia
EauGallie
Floridana
Immokalee
Moultrie
Myakka
Ona
Orsino
Paola
Pellicer
Pomello
Pomona
Pottsburg
Riviera
Smyrna
St. Johns
Tavares
Tomoka
Wesconett
Zolfo
Source: SJRWMD, NRCS, 2001
Moses Creek Conservation Area
Figure 5 - Soils Map
N
0.5
Miles
1 = 23500
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PAST MANAGEMENT SUMMARY

This section describes management strategies outlined in the 2001 land management plan and provides the status of each item.

Water Resources 2001 Plan Strategy	Status
Include small marshes in prescribed fire plans.	Herbaceous wetlands are burned in conjunction with surrounding natural communities when site and weather conditions permit.
Monitor slopes at creek crossings for erosion and stabilize as necessary.	Creek crossings along the power line and the north boundary east of the power line are stabilized with rock.

Fire Management 2001 Plan Strategy	Status
Incorporate fire management plan into land management plan.	The fire management plan is incorporated into the 2009 land management plan.
Develop annual burn plans	District staff developed burn plans annually by September 30th.

Timber Management 2001 Plan Strategy	Status
Determine feasibility of timber operation at Moses Creek.	Timber operations at Moses Creek were determined to be feasible and implemented.
Develop sand pine thinning strategy for sandhill community.	District staff deemed thinning operations in sand pine inappropriate and implemented sand pine removal operations.
Continue to permit Division of Forestry chainsaw training onsite.	The conservation area is available to the Division of Forestry for chainsaw training; however, no training has been conducted recently.

Exotic Species 2001 Plan Strategy	Status
Continue to monitor for invasive species and treat as necessary.	District staff located camphor trees (*Cinnamomum camphora*), Chinese tallow (*Sapium sebiferum*), and Brazilian pepper (*Schinus terebinthifolius*) and have applied herbicide treatments. The location of these plant populations is recorded and these sites are treated as necessary.

Cultural Resources 2001 Plan Strategy	Status
Document and report any new sites to Florida Division of Historical Resources.	No new cultural sites have been identified.
Evaluate all land management activities to minimize disturbance to sites.	Consideration is given to cultural resources in the planning and implementation of all land management activities.
Continue to cooperate with County in response to a County wide survey completed in 2001.	The District is available to cooperate with St. Johns County, although no specific requests have been made of the District to date regarding archeological surveys.

Access 2001 Plan Strategy	Status
Continue regular maintenance of trailhead parking areas and marked trails.	Parking areas, trailheads, and trails are regularly maintained.
Continue regular interior road maintenance as necessary.	Interior road maintenance is conducted as necessary.

Recreation 2001 Plan Strategy	Status
Maintain mowing contract.	The mowing contract is current.
Maintain trail contractor.	The trail contract is current.
Install access point for Gamble Rogers Middle School.	This access point was determined to be unnecessary and was not installed.

Education 2001 Plan Strategy	Status
Continue Legacy Program onsite.	The Legacy Program with gamble Rogers Middle School is being renewed during the scope of this plan.
Cooperate with Legacy in maintaining structures.	District staff have maintained contact and cooperated with Legacy Program volunteers.

Security 2001 Plan Strategy	Status
Maintain trailheads.	District staff maintains all trailheads.
Maintain District boundary signs, fencing around the perimeter, and all gates.	District staff maintains boundary signage, fencing, and gates.
Maintain caretaker residence agreement.	The caretaker residence agreement is current.
Maintain private security contract.	The private security contract is maintained and District staff communicates regularly with contract security officers as well as local law enforcement officers.

Cooperative Agreements 2001 Plan Strategy	Status
Coordinate with GTM.	District staff coordinated with GTM regarding security and signage.

IMPLEMENTATION

The following sections outline land management strategies for resource protection, land use, and administration on the Conservation Area for the next five years.

RESOURCE PROTECTION AND MANAGEMENT

Water Resource Protection

Water resource protection within the conservation area will continue to focus on Moses Creek and the associated tidal marshes and swamps. Tidal marshes are important for storm surge protection and pollutant filtering and are highly biologically productive. Tidal marshes support an array of wildlife from invertebrates, to game fish and fish eating birds.

While many tidal marsh systems in Florida are lost or degraded, Moses Creek's marsh system is intact. Most water resource protection of Moses Creek was accomplished through acquisition. Appropriate management of small tributaries and wetlands across the conservation area will further enhance and maintain the water quality in Moses Creek. Depression marshes and other wetland edges will be included in prescribed fire activities conducted in associated fire management units.

Roads and associated ditches exist within the MCCA, providing access for both management and recreation. The District has made improvements to roads within the conservation area, helping to reduce the potential for erosion. Additionally, District staff has installed low water crossings, water bars, access stairs, and a new boat dock to mitigate erosion problems and provide for reliable access across the property. District staff will continue to inspect roads, trails, low water crossings, water bars, and structures for erosion problems and maintenance and repair needs.

Water Resource Strategies

- Include depression marsh and other wetland edges in fire management activities.
- Regularly inspect roads, trails, low water crossings, water bars and structures for erosion problems and maintenance and repair needs.

Flora and Fauna

The Moses Creek Conservation Area has a diverse assemblage of natural communities providing significant habitat for a variety of floral and faunal species. The 2001 management plan for this property lacked plant and animal lists. District staff and volunteers have since developed species lists (Addendum 3).

Detailed below are some of the notable species detected on the conservation area, as well as those listed species known to occur within the MCCA. The scientific names are hyper-linked for electronic viewing (press ctrl and click to follow link) of species descriptions including listing status and distribution. This detail is also available at www.fnai.org and http://florida.plantatlas.usf.edu.

- Florida rosemary (*Ceratiola ericoides*)
- sky-blue lupine (*Lupinus diffusus*)
- black mangrove (*Avicennia germinans*)
- Florida gopher tortoise (*Gopherus polyphemus*)
- American alligator (*Alligator mississippiensis*)
- little blue heron (*Egretta caerulea*)
- white ibis (*Eudocimus albus*)
- osprey (*Pandion halaetus*)
- bald eagle (*Haliaeetus leucocephalus*)
- sandhill crane (*Grus canadensis*)

According to information gathered from the Florida Fish and Wildlife Conservation Commission (FWC) and District staff observations, the conservation area is a bald eagle nesting site (Figure 6). One nest has been observed within the conservation area boundaries and is currently active. The District will adhere to the guidelines established in the February 2006 U.S. Fish and Wildlife Service (FWS) *Draft National Bald Eagle Guidelines*. This document is effective following the delisting of the species from the Endangered Species list. The bald eagle continues to receive protection through the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The District will consult with the FWC and/or the FWS prior to conducting management activities within the established management zones that may impact bald eagle nesting between the dates of October 1 to May 15. An additional known bald eagle nest site occurs just north of the conservation area.

Ospreys are large birds of prey that are distinguishable from bald eagles by their white underparts and black eye stripe. They are almost exclusively fish eaters. Florida has year round residents, but it also receives an influx of migrating ospreys in the winter. Nesting ospreys are abundant on the property and are visible atop many trees and manmade structures including power poles and nesting platforms. While not a state listed species in St. Johns County, protection is afforded through numerous acts including the Migratory Bird Treaty Act.

Florida rosemary is a notable occurrence within the conservation area. This allelopathic plant grows on the well drained soils of the scrub natural communities. Rosemary drupes are an important food source for wildlife and the plant provides nesting sites for numerous bird species including the northern cardinal (*Cardinalis cardinalis*).

Another plant found within the conservation area is the sky blue lupine. This lupine thrives in sandy soils of the sandhills. The generic name lupinus "of wolves" can be dated to the Romans, when the plants where thought to create conditions inhospitable to other plants. The lupines are able to grow in nutrient poor sites through their ability to fix nitrogen from the air. Lupine seeds contain alkaloid compounds rendering them bitter tasting and sometimes toxic; and are not a common food source, nor are they widely dispersed by animals. Periodic fire is an important factor in the continued survival of this plant species within the conservation area. The blue flowers of the lupine are evident late


Moses Creek Conservation Area
Figure 6 - Bald Eagle Nest Buffer Zones
N
0.5
Miles
1 = 30000
Legend
Eagle Nest Buffer Areas
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winter through spring and are observable from many of the trails that traverse the sandhills of the MCCA.

Floral and Faunal Strategies

- Conduct floral and faunal surveys and further develop species lists.
- Continue to monitor for the presence of listed species.
- Continue to monitor bald eagle nesting sites.
- Continue to follow national bald eagle guidelines.

Fire Management

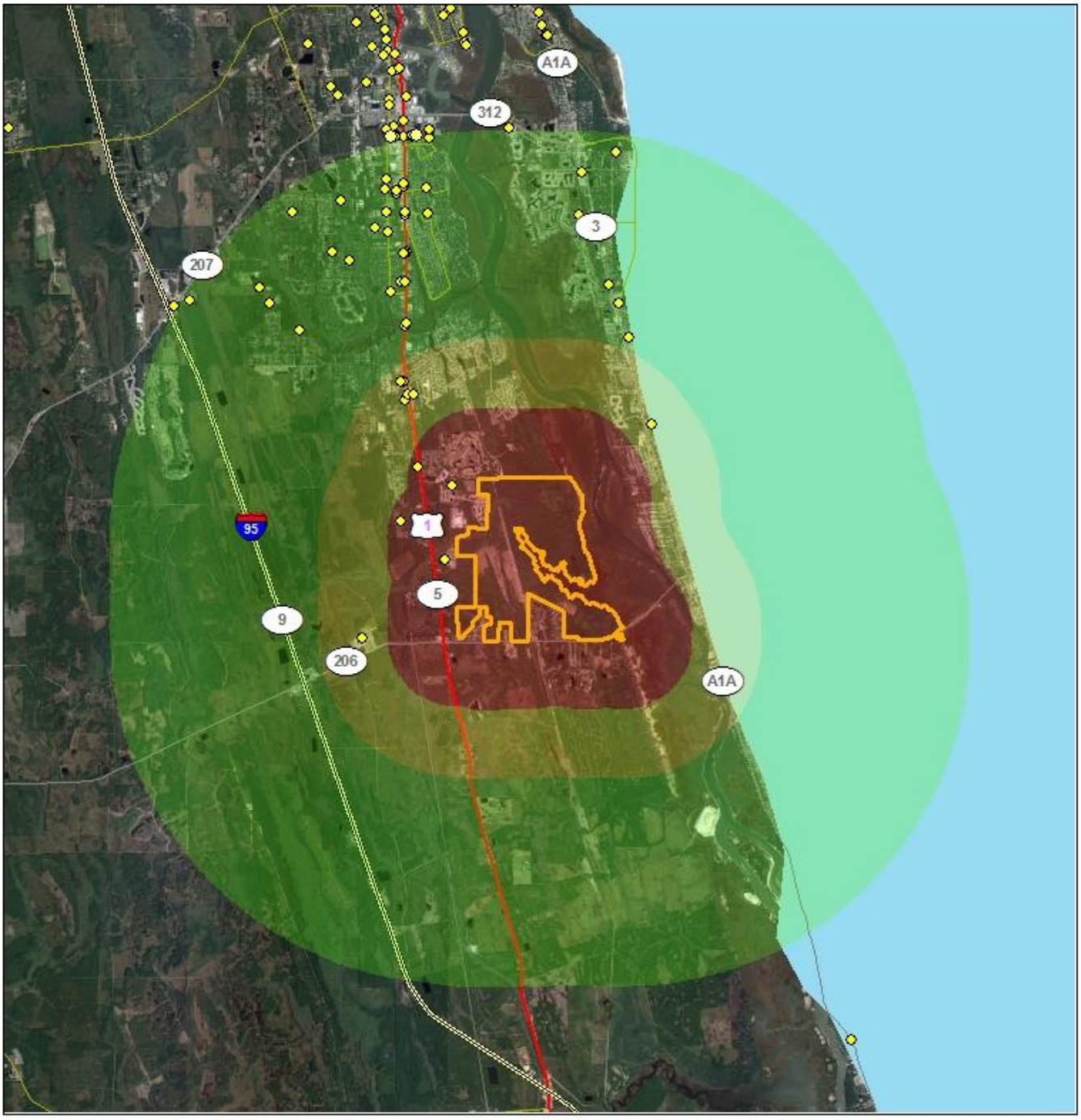
Fire is a significant factor in managing the character and composition of vegetation in Florida. The District's primary use of fire is to mimic natural fire regimes to encourage the amelioration of native pyric plant communities and dependant wildlife. Additionally, the application of fire aids in the reduction of fuels and minimizes the potential for catastrophic wildfires. Many of the natural communities at the MCCA are fire adapted, making prescribed fire an important tool for use in the restoration and maintenance of upland plant communities within the conservation area.

Historically, the majority of fires occurring on what is now the MCCA would have been ignited by lightning during the growing season and would burn across the landscape until they encountered natural barriers (wetlands or water) or they were extinguished by rain. The District aims to reintroduce growing season fires, particularly in areas of sand pine harvest and mechanical treatments, when feasible, understanding that constraints such as high fuel loading and urban interface issues may predicate the use of dormant season burning.

A significant limiting factor narrowing the window of opportunity for the application of prescribed fire on the portions of the MCCA is the close proximity to critical smoke sensitive areas. These areas include suburban residential development, Gamble Rogers Middle School, Hartley Elementary School, U.S. Highway 1 and S.R. 206, making smoke management is paramount. Any potential burns will be conducted to minimize off-site impacts, by maneuvering smoke plumes away from smoke sensitive areas and by ensuring adequate smoke dispersal. Consideration will also be given to the smoke management concerns posed by the potential down drainage effects of the Matanzas River. Figure 7 illustrates smoke management concerns for the conservation area.

Weather parameters necessary for burning within the MCCA are limited to only those with wind directions including a westerly component. The close proximity to the ocean and the strong influence of afternoon easterly sea breezes further restrict opportunities for burning, particularly in the growing season. Unless in advance of a frontal system, prescribed burns of greater than fifty (50) acres immediately adjacent to developed areas are not likely to occur.

District land management staff with the assistance of the Florida Division of Forestry (FDOF) has established relationships with local homeowners, homeowners associations,



Moses Creek Conservation Area
Figure 7 - Smoke Map

N

2
Miles
1 = 125000

Legend

Schools and Healthcare Facilities
1 Mile Smoke Management
2 Miles Smoke Management
5 Miles Smoke Management

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and other parties. These relationships were developed in a concerted effort to improve and maintain public awareness of prescribed fire needs within the conservation area. The District will continue to foster these relationships by providing educational literature and signage and by communicating directly with homeowners and homeowners associations.

While prescribed fire is the preferred tool for restoration and maintenance within the conservation area, it will at times, and in certain areas, be necessary to implement alternative methods. During periods of extended drought conditions or in areas where implementing prescribed fire safely is not feasible, the District will employ management methods such as selective herbicide treatments, mowing, roller chopping, and overstory manipulation. Firelines are maintained a minimum of once annually and are disced to mineral soil.

All implementation of prescribed fire within the MCCA will be conducted in accordance with the District's Fire Management Plan, the Moses Creek Fire Management Plan (Addendum 4), and the annual burn plan for the property.

Fire Management Strategies

- Introduce growing season burns where applicable.
- In the absence of fire, conduct mechanical treatments to mimic fire effects.
- Continue communication with FDOF, St. Johns County, neighboring homeowners and homeowners associations regarding prescribed fire program within the conservation area.
- Maintain prescribed fire signage.
- Maintain firelines annually.
- Prepare annual burn plans.
- Implement prescribed fire activities in accordance with the Districts draft Fire Management Plan and the Moses Creek Fire Management Plan.

Forest Management

Chapter 253.036, Florida Statutes requires the lead agency of state lands to prepare a forest resource analysis, "…which shall contain a component or section…which assesses the feasibility of managing timber resources on the parcel for resource conservation and revenue generation purposes through a stewardship ethic that embraces sustainable forest management practices if the lead management agency determines that the timber resource management is not in conflict with the primary management objectives of the parcel." The management objectives of this property will likely require continued pine harvesting and additional oak management. Primary objectives of harvesting on the MCCA are restorative in nature and are to improve species diversity and the overall natural community health and vigor. All revenue generated through these forest management activities is applied towards the District's land management division budget to offset management costs for the property.

Sand Pine Management

Sand pine is a natural component of many upland plant communities in Florida. Under appropriate fire return intervals the natural distribution of this pine species is low in areas like the MCCA, restricted largely to scrub and scrubby flatwoods communities with varying densities. Sand pine occurrence in scrubby flatwoods is typically sparse. Scrub communities may occur as either an oak dominated system with no pine overstory or a sand pine dominated system with a dense sand pine canopy. Factors including prolonged fire exclusion and artificial regeneration can cause sand pine to occur in areas and have densities that far exceed those conditions found in a natural stand.

Sand pines can produce several cone crops each year, retaining most of the serotinous cones in the upper layers of the canopy. The stored cones may be retained for several years, until a disturbance, such as fire causes them to open. When the disturbance occurs, the cones open, disseminating the tremendous seed source held within the canopy. A survey in the Ocala National Forest (ONF) recorded the post fire release of one million seeds per acre (Fowells). Sand pine is naturally perpetuated by moderate to severe disturbance every 20 to 40 years, with the main disturbance being fire. In the absence of fire, mechanical intrusion mimics stand replacement fires that would have occurred naturally. Fires in mature sand pine stands are catastrophic and difficult to control.

While the majority of cones are serotinous, approximately 15% will open without the disturbance of fire. The sand pine is fast growing and able to produce viable cones at an early age. "Mature cones have been documented on five (5) year old trees" (Fowells). Sand pines are slightly more shade tolerant than other pine species and will often outcompete other pines establishing dominance early.

Once sand pine has established in an area, it is difficult to remove because as an early successional species or pioneer species, it is disturbance adapted. Management efforts aimed at the removal or control of these pines will, at least in the early stages, perpetuate the stand. Sand pine will eventually create full canopy closure suppressing, and in many cases eradicating desirable groundcover through the effects of shading. As groundcover vegetation is lost, biological productivity decreases.

Prior to public acquisition, portions of the scrubby flatwoods, scrub, and sandhill natural communities were heavily encroached with sand pine primarily a result of the prolonged absence of fire across the property. The upland communities of MCCA at the time of acquisition were dense stands of decadent sand pine. Aerial imagery reveals dense pine stands as early as the 1940s. Many of the older sand pines were suffering from root rot and succumbing to heavy winds. Additionally, the sand pine encroached scrubby flatwoods and sandhill areas exhibited degraded ecological values and the potential for catastrophic wildfires across the conservation area was significant. Figure 8 illustrates the location of sand pine stands on the MCCA at the time of acquisition. Table 1 provides information relative to management techniques and acreage employed within the conservation area since 1998.

Moses Creek Conservation Area

Figure 8 - Historic Sand Pine Coverage

N

0.5

Miles

1 = 20000

Legend

Historic Sand Pine Dominated Areas

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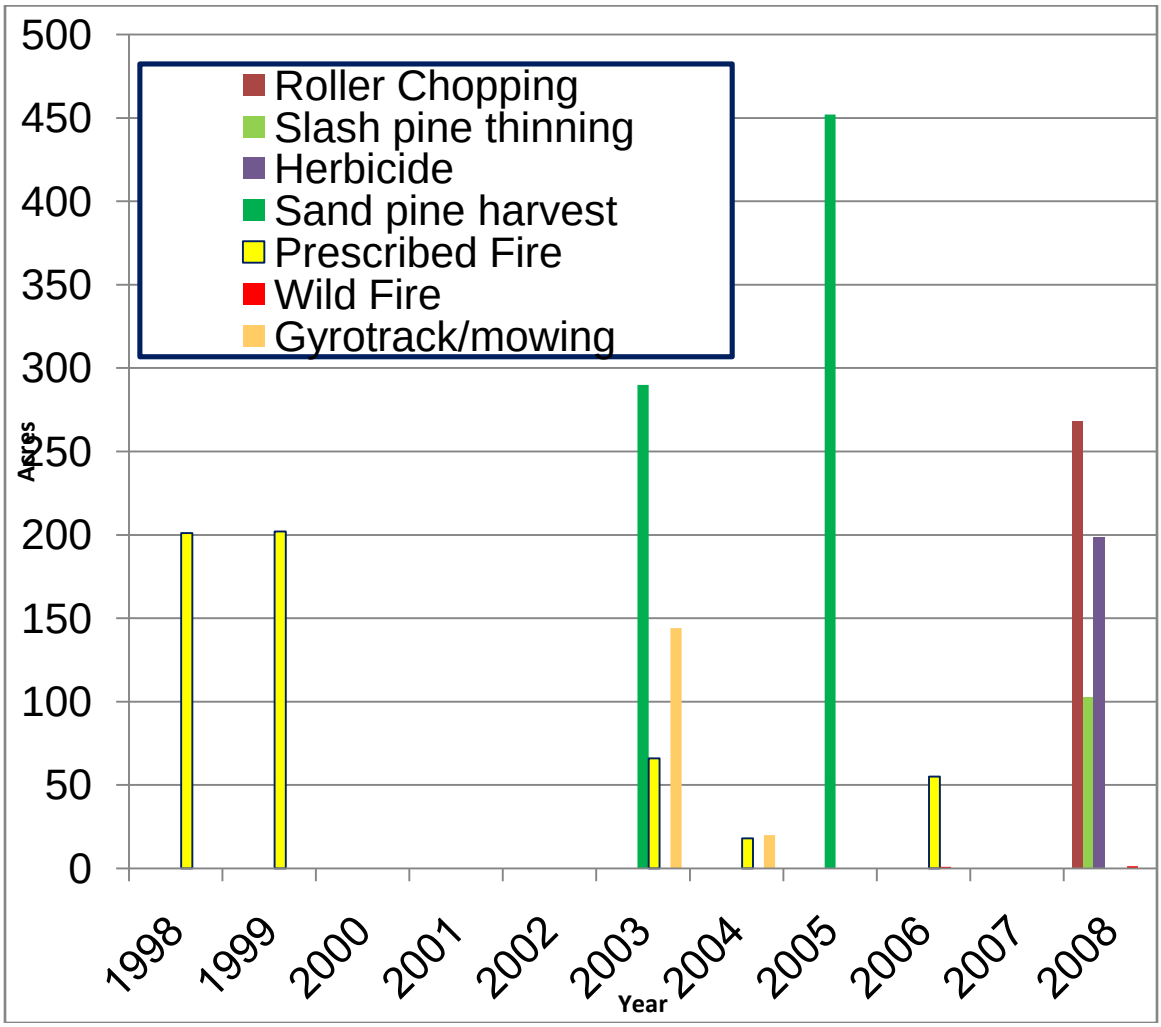
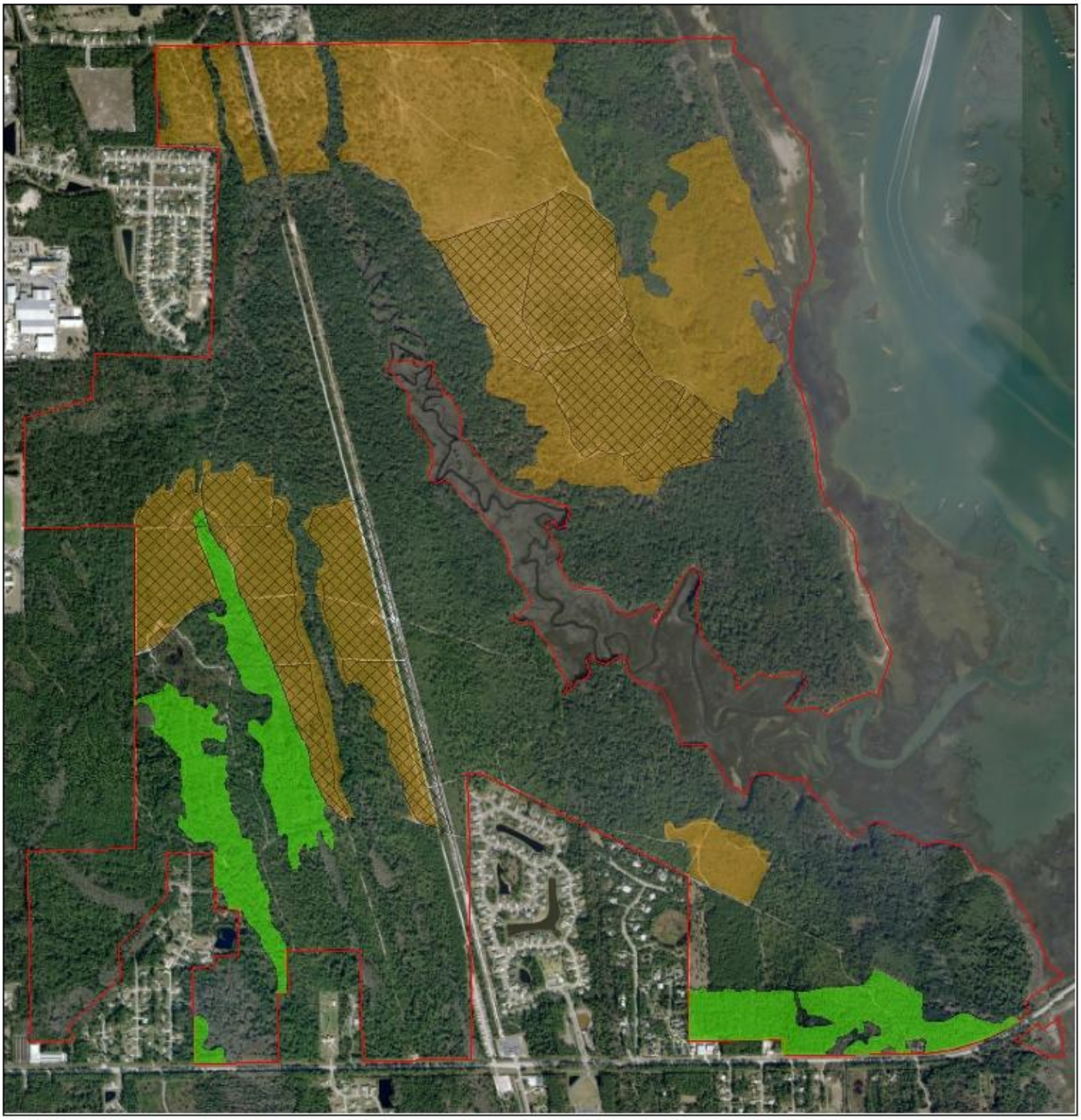
Table 1.



Sand pine management within the MCCA since acquisition first focused on the removal of overstory sand pine. Between 2003 and 2008, sand pine was removed from approximately 716 acres of sandhill, scrub, and scrubby flatwoods through clear cut harvesting. Approximately 268 of those acres have also been roller chopped. Roller chopping accomplished both a reduction in shrub heights and in the number of regenerating sand pines. Figure 9 depicts the extent of sand pine harvests and roller chopping activities.



Moses Creek Conservation Area

Figure 9 - Harvesting and Chopping Map

N

0.25

Miles

1 = 20000

Legend

- Roller Chopping Area
- Slash Pine Harvest Area
- Sand Pine Harvest Area

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A combination of prescribed fire and mechanical vegetation management will be implemented in the sandhill and scrubby flatwoods areas, excluding the regeneration of most sand pine in these areas. Since it is unclear as to the extent and densities that sand pine may have naturally occurred on the scrub sites, these areas will be monitored for sand pine regeneration. Those scrub areas where sand pine does not reestablish will be managed with both prescribed fire and mechanical treatments for an oak dominated system. Those scrub areas that do regenerate in sand pine will be managed accordingly with the stand replacement disturbance/harvest occurring beyond the scope of this plan.

Approximately twenty (20) acres of sand pine remain in a forest stand (Figure 10) near the southern end of the property. These trees are approximately nineteen (19) years old. Harvesting of these pines is not anticipated during the scope of this plan.

Selective harvesting of mature sand pines from adjacent hammocks and forested areas was conducted to remove hazard trees and to minimize the occurrence of sand pine within these systems. It is anticipated that selective harvesting of sand pine will continue as necessary during the scope of this plan.

District land management staff developed interpretive literature and signage relative to sand pine management within the MCCA. Information provided includes sand pine life history, natural range and distribution, and management challenges. This information is posted onsite and is available online. The signage and brochures will continue to be available.

Longleaf Pine Management

The reestablishment of longleaf pine within the conservation area is planned for approximately 128 acres of scrubby flatwoods (Figure 11). These areas have been roller chopped and received an herbicide treatment. In December 2009, containerized longleaf will be hand planted at a rate of three hundred (300) stems per acre. This planting will be

A combination of prescribed fire and mechanical vegetation management will be implemented in the sandhill and scrubby flatwoods areas, excluding the regeneration of most sand pine in these areas. Since it is unclear as to the extent and densities that sand pine may have naturally occurred on the scrub sites, these areas will be monitored for monitored for success and the need for additional plantings will be evaluated. Additionally, natural regeneration of longleaf pine will be encouraged in this area as well as the sandhill and mesic flatwoods through the application of prescribed fire.

Slash Pine Management

Portions of the mesic flatwoods along the south boundary were planted in slash pine. Management in these areas as well as in areas of natural slash pine has included harvest/thinning operations (~133 acres), targeting a basal area of 60- 65ft^2/acre and

Moses Creek Conservation Area

Figure 10 - Mature Sand Pine Stand

N

0.5

Miles

1 = 20000

Legend

Sand Pine Stand

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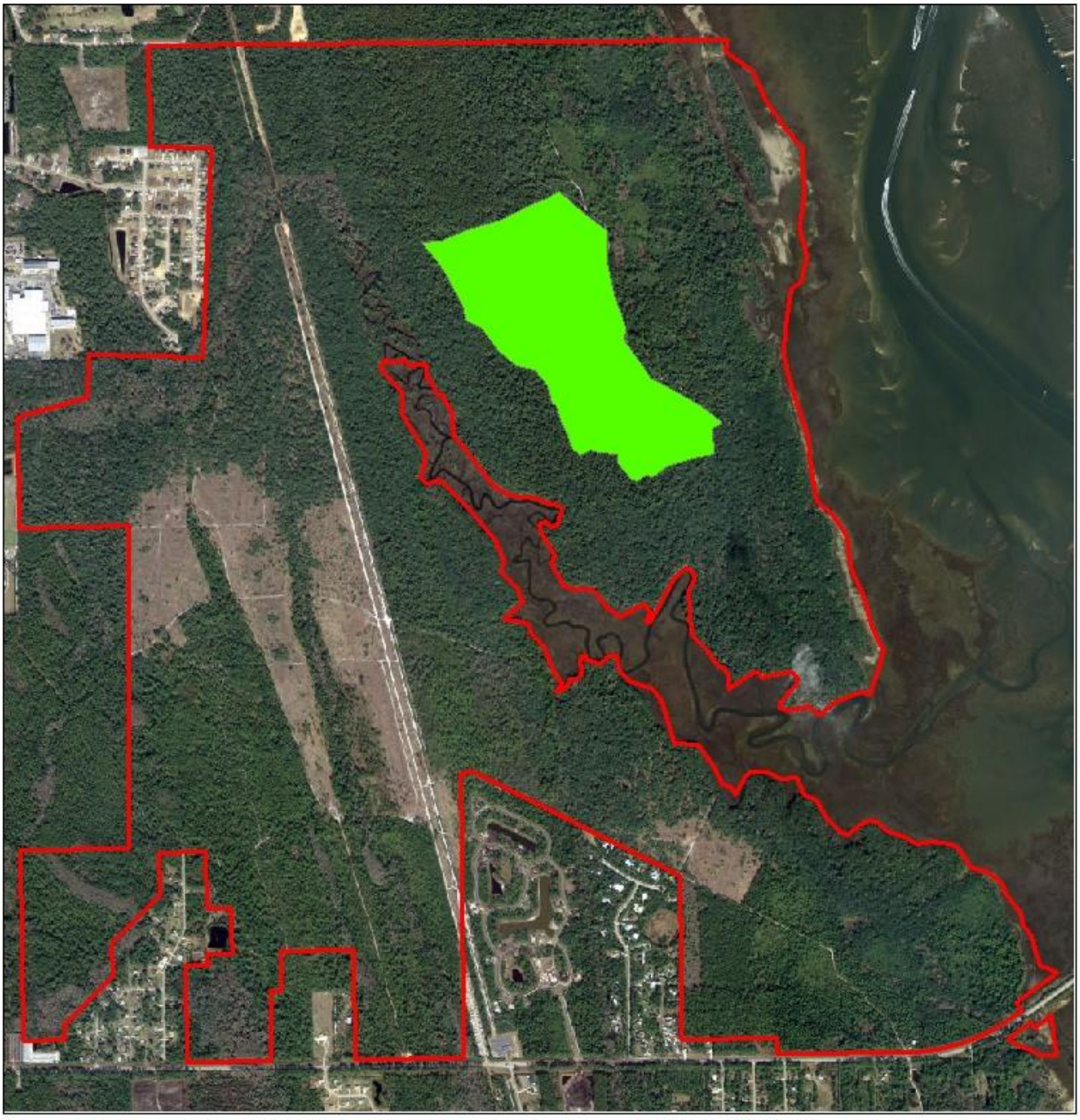

Moses Creek Conservation Area

Figure 11 - Longleaf Pine Planting Area

N

0.5

Miles

1 = 20000

Future Longleaf Pine Planting Location

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fire, mechanical and chemical management may be necessary for the continued management of shrub layers in these areas.

Oak and Shrub Layer Management

In August of 2003, the District entered into a 290 acre timber sale agreement that called for the harvest of decadent sand pine, the removal of flammable hardwoods in buffers, and the mowing of shrubs within portions of the sale area. Approximately 144 acres of the sale area were subject to clear cutting and mowing, using the saw head on the feller buncher. Approximately 156 acres of the sale area were subject to the selective harvest of sand pines from upland mixed forest communities.

In addition to sand pine encroachment, the sandhill communities along the north end of the property were encroached by hardwoods (water, laurel, and turkey oaks) and the scrubby flatwoods exhibited shrub layers that were heavily overgrown. Oak and shrub management methods employed include selective herbicide and roller chopping treatments.

Approximately 128 acres of the scrubby flatwoods were treated mechanically using a double drum roller chopper to reduce the stature of the shrub layer. Additionally, approximately 172 acres of both sandhill and scrub (Figure 12) were treated with an aerial application of Garlon 3A applied at a rate of 6 quarts per acre. The herbicide treatments targeted oaks to reduce canopy coverage and closure, allowing sunlight to penetrate and encourage the proliferation of groundcover species. Additional herbicide treatments applied basally or foliarly from the ground are anticipated to further restoration success within the sandhills.

Typical management and restoration practices employed by the District aim to reverse successional changes and maintain a more natural vegetative structure and composition. Atypical of District management practices are areas of the MCCA that are being managed for succession. These areas are located on the southern reaches of the property near The Pines and Hidden Creek neighborhoods. These areas received mechanical manipulations including mowing and roller chopping, selecting for the retention and proliferation of oak. The intent is to encourage these areas into successional changes that will result in xeric hammock, a relatively nonpyric plant community that will eventually provide some measure of protection against wildfire. Additional mechanical and chemical measures will be implemented as necessary during the scope of this plan to perpetuate this transition.

An area of historic scrub located along the boundary between the conservation area and the Hidden Creek neighborhood is mowed twice annually. This mowing is mitigative in nature and is conducted to maintain a low herbaceous cover, providing a measure of protection and defensible space between the pyric plant communities within the conservation area and the neighboring residential development. This area will continue to be maintained with mowing. Figure 13 depicts the extent of both forms of adaptive management.

Moses Creek Conservation Area

Figure 12 - Herbicide Map

N

0.5

Miles

1 = 20000

Legend

Tractor Application Area

Aerial Application Area

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Moses Creek Conservation Area

Figure 13 - Adaptive Management

N

0.5

Miles

1 = 20000

Mitigation Mowing

Hammock Management

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Forest Management Strategies

- Manage sand pine with prescribed fire, mechanical manipulations and chemical treatments to promote species diversity within sandhill and scrubby flatwoods natural communities.
- Monitor sand pine regeneration within scrub systems and apply appropriate management.
- Evaluate the need for selective harvest of mature sand pines to reduce hazard trees and occurrence in forested/hammock areas and conduct harvests as necessary.
- Continue to provide sand pine management signage and fact sheets.
- Plant containerized longleaf pine at a rate of 300 stems per acre by December 2009.
- Monitor survival of planted longleaf and evaluate the need for additional planting.
- Implement mechanical treatments as necessary in areas near neighborhoods for succession to xeric hammock.
- Implement mitigation mowing twice annually.
- Implement herbicide applications to achieve naturalistic densities of oaks within the sandhills.

Exotic Species

Several exotic pest plants occur within the Conservation area including camphor tree Chinese tallow, and Brazilian pepper. The MCCA is part of the District's invasive plant management program. Exotic species control is necessary to inhibit the continued proliferation of exotic plants and integral in the maintenance and restoration of natural plant communities. While it is unlikely that the District will entirely eradicate invasive plants within the conservation area, a "maintenance control" level of such species is targeted. At this level, the property will be regularly monitored and treated as necessary. Annual herbicide application restrictions among other constraints will require several years of treatment and monitoring across the conservation area to reach desired maintenance levels.

Exotic animal species known to occur within the conservation area include feral hogs (*Sus scrofa*), Cuban brown anole (*Anolis sagreii*) and nine-banded armadillos (*Dasypus novemcinctus*). Soil disturbance from feral hog activity on the property is minimal; however areas of disturbance do occur. The United States Department of Agriculture is contracted to assist in the removal of feral hogs from the conservation area.

Laurel wilt, a disease of red bays (*Persea borbonia*) and other trees in the laurel family has been observed in red bay populations within the MCCA. Caused by a fungus, laurel wilt is carried and transmitted by the non-native Japanese ambrosia beetle (*Xyleborus glabratus*.) The beetles generally attack healthy mature trees and the subsequent fungal infection causes the flow of water to be restricted to the leaves and branches, eventually causing mortality. Laurel wilt is devastating to infected populations and there are currently no established methods for controlling the laurel wilt disease in wild populations of *Persea*.

This disease has the potential to have detrimental effects on wildlife populations, including the palamedes swallowtail butterfly (*Papilio palamedes*). The palamedes is relatively common in Florida. Larval host plants for the palamedes swallowtail butterfly include species of *Persea*, but are primarily red bay.

Additional information on laurel wilt disease and the red bay ambrosia beetle can be found at http://www.fl-dof.com/publications/fh_pdfs/Laurel_Wilt.pdf and http://edis.ifas.ufl.edu/HS391.

Exotic Species Strategies

- Continue to monitor for exotic plant species and implement appropriate action.
- Continue to administer the USDA feral hog removal program.

Cultural Resources Protection

A review of the Department of State, Division of Historical Resources (DHR) indicates ten registered Florida master site locations within the conservation area. If additional sites are located, District staff will document and report sites to the DHR. District land management activities that may affect or impact these resources will be evaluated and modified to reduce the potential for disturbance of the identified sites. Additionally, detrimental activities discovered on these sites will also be reported to the DHR and appropriate law enforcement agencies. Due to the District and State policy, the location of the sites is not identified on public maps.

Cultural Resources Strategies

- Identify and report newly discovered sites to the DHR.
- Identify and report any detrimental activities to the sites to the DHR and law enforcement.

LAND USE MANAGEMENT

Access

Two public parking areas are located off SR 206 along the south end of the conservation area. The parking areas are fenced, and have walkthroughs providing for recreational access. Additional public access is provided from the water with a boat dock and access ramp, and access stairs. Informative kiosks are provided at the parking area trailheads and Murat's Point. Additional local access is provided along the north boundary.

There are currently eight (8) gates providing management access to the property. These gates are monitored regularly for maintenance and/or repair needs from normal wear and tear and vandalism.

Several interior management roads traverse the conservation area; some are incorporated into a multiuse trail system. In order to manage road maintenance, District roads are classified according to anticipated maintenance needs. All roads within the conservation area are classified by the District as either "Type D or "Type E". Type D roads are roads with limited stabilized surfaces with or without ditches (existing) that receive occasional

traffic. Maintenance consists of routine mowing of the road surface and side and overhead vegetation. Type E roads are seasonal roads between 9 and 12 feet wide that receive infrequent traffic. Maintenance is generally limited to mowing. Many of these roads are also incorporated into the recreational trail system. Some roads within this classification may also be harrowed and utilized as firelines. These roads may require tree cutting and pruning to remove branches and/or stems that may impede the access of maintenance and fire-fighting vehicles and equipment. Roads will be regularly inspected and receive maintenance and repair as necessary and may be subject to closure during these times. Figure 14 depicts the location of the parking areas and roads on the property.

Access Strategies

- Maintain parking areas, signs, gates, trails, and roads.

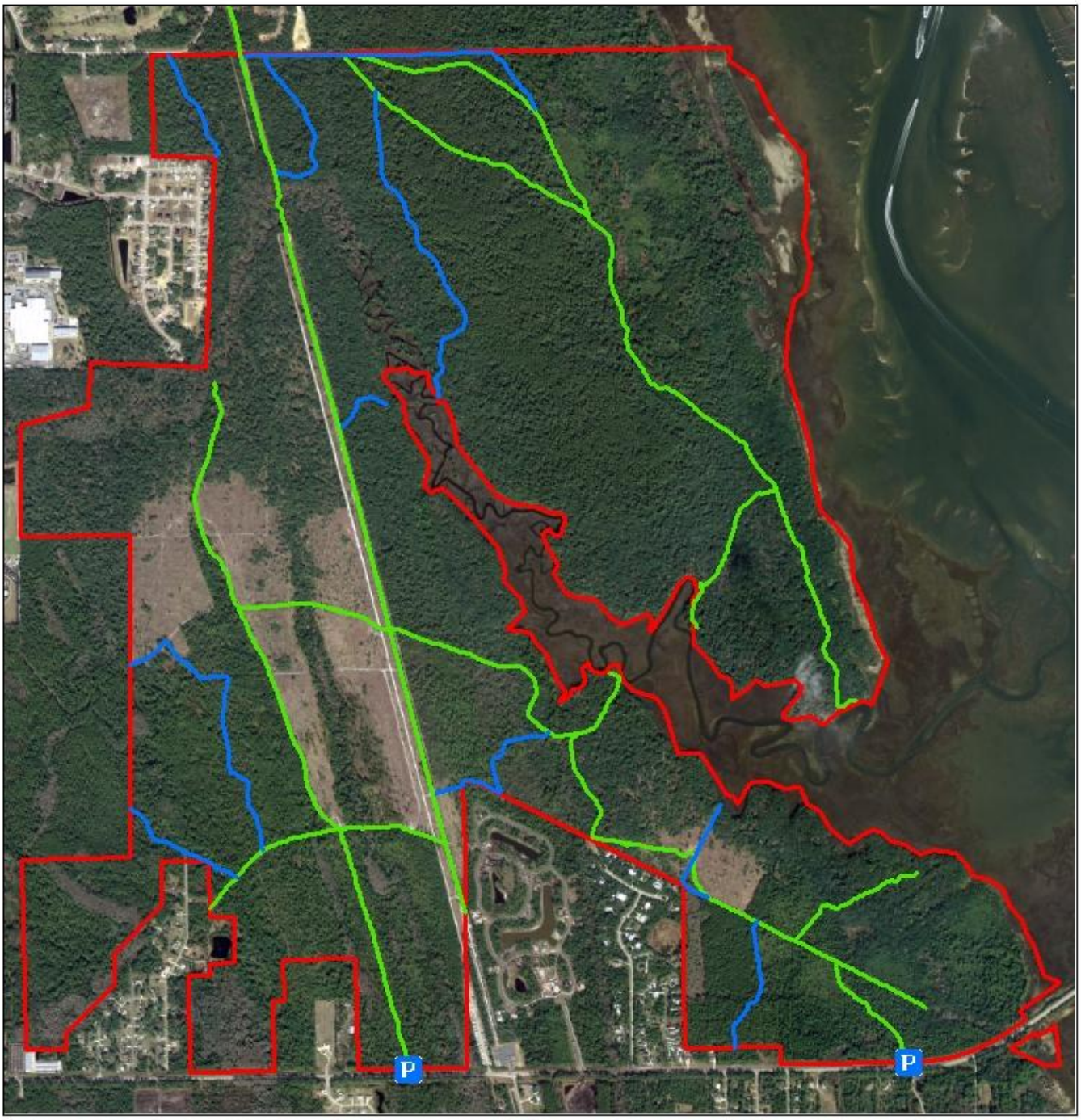
Recreation

The primary objective of the Recreation Management Program is to facilitate resource-based recreational activities on District lands. An aspect in developing the SJRWMD Recreation Program is not to compete with other local recreational opportunities, but rather to complement what they may already have in place by filling an outdoor recreation niche through dispersed recreation opportunities. Dispersed recreation activities generally require large tracts of land with some level of isolation. This type of recreation blends well with District conservation areas, providing numerous opportunities for passive recreation which also provides solitude and challenge.

Recreational opportunities within the MCCA are geared toward dispersed resource-based activities. The conservation area includes two trailheads with designated parking areas, information kiosks, and access to the land using trails that are primarily interior roads, and fire lines that are currently maintained for land and water management purposes. The trail system is used predominantly for hiking, off-road bicycling, and/or horseback riding and primitive camping, group camping, fishing, and wildlife viewing and incorporates scenic vistas of both Moses Creek and the Matanzas River. A boat dock, access ramp and stairs provide similar access from the water.

The group campsite includes a, pitcher pump, picnic tables, fire ring, and an amphitheater. The amphitheater was constructed by student volunteers from Gamble Rogers Middle (GRMS) School and St. Johns County School Board summer programs through the District's Legacy program (described in the environmental education section of this plan) and has been used for weddings and as an outdoor classroom. Students also constructed a covered observation platform along the northern reaches of Moses Creek. The Legacy program has been inactive on the MCCA since 2006. In March 2009, District staff reestablished contact with GRMS and are coordinating Legacy projects.

The recreation infrastructure is well established within the MCCA and is actively maintained. The approximately 7 miles of trails are maintained through a trail maintenance contract. Grassy trails and road edges are mowed four (4) times yearly, as are the parking areas. Additionally, the trails are blazed and trimmed of overhanging



Moses Creek Conservation Area

Figure 14 - Roads Map

0.5

Miles

1 = 20000

Legend

P

Parking Areas

District Roads

Class D

Class E

Moses Creek Conservation Area

branches as needed. The District will evaluate the need for further recreational development as visitor usage increases or new land is acquired.

In response to increasing public usage, portable restrooms have been placed on the conservation area in key locations. Poured cement pads and fencing provide stabilization, privacy, and some protection from vandalism. The restrooms are rented and cleaning is provided through contractors. Figure 15 depicts the location of recreational amenities found within the conservation area.

The entire conservation area is open to the public for passive recreation and is included in the District's *Recreation Guide to District Lands*, which can be viewed online at floridaswater.com.

Recreation Strategies

- Maintain portable restroom contracts.
- Maintain trail maintenance contract.
- Maintain campsites and picnic areas.
- Evaluate the potential for additional recreational facilities or infrastructure.
- Maintain current information in the recreation guide, trail guides, and kiosks.

Environmental Education

The District offers numerous educational opportunities in the form of online materials and workshops. Programs include Project Wet and the Great Water Odyssey. The former, available in St. Johns County, is a program designed to teach educators about water resources and is based on FCAT standards while the latter is an interactive, multidisciplinary educational experience offered free of charge to educators within the District.

The MCCA has a Legacy Water Resource Education Program with the St. Johns County School Board/GRMS. This program is a cooperative educational venture among the St. Johns River Water Management District and area schools in which the District works with educators and their students to make public lands more accessible. Public lands serve as living laboratories where students take the lead in managing land for their community while learning about natural resources.

The program is a way to get the most out of Florida's public lands by using them as classrooms, using them as recreation areas, and making sure they remain safeguarded for Florida's future.

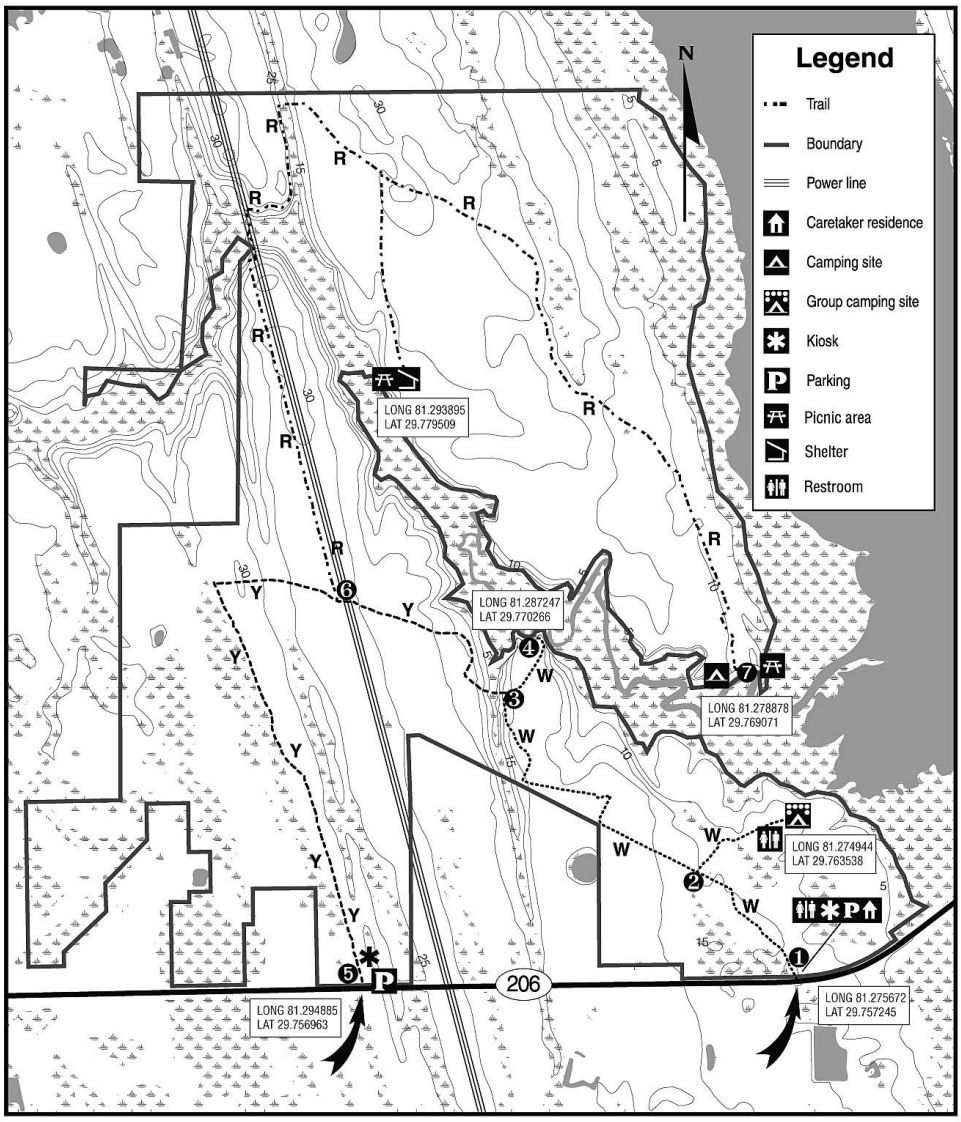
Environmental Education Strategies

- Maintain parking areas, signs, gates, trails, and roads.

Security

The boundaries of the MCCA were marked and posted soon after the original survey work was complete. Security concerns include illegal motorized vehicle access and poaching. While much of the boundary was fenced prior to acquisition, a few areas remain unfenced. The unfenced areas are in heavy vegetation and do not appear to be

Figure 15 – Recreation Map



Trail Key

W — White — 1.35 miles
Y — Yellow — 2.00 miles
R — Red — 3.70 miles

East trailhead to group camping site — 0.7 miles
East trailhead to bluff observation point — 1.5 miles
West trailhead to bluff observation point — 2.2 miles
East trailhead to Murats Point — 5.7 miles
West trailhead to Murats Point — 5.7 miles

0.1 0 0.1 0.2 0.3 0.4 0.5 Miles

Points of Interest

1. East trailhead (White Blaze Trail)
2. Spur trail to group camping site
3. White Blaze/Yellow Blaze trail intersection
4. Bluff observation point
5. West trailhead (Yellow Blaze Trail)
6. Red Blaze/Yellow Blaze Trail intersection
7. Murat Point — picnic tables/campsite

facilitating any undesirable or illegal access. Portions of the north and southeastern boundary fencing extending in the tidal marsh are frequently vandalized; and illegal vehicular access is problematic in this area. In an effort to deter mechanized entry to the conservation area in this location, and minimize disturbance to the sensitive marshes, District staff installed stainless steel braided cable, secured to fence posts with cable clamps. Vehicular access to the property is managed through a system of gates an locks.

Law enforcement for the property is administered by the District, primarily through a contract security firm as well as coordination with FWC and local law enforcement. A security residence is located near the east parking area. The resident provides routine patrol of the property, reporting violations and concerns law enforcement and the District. Additionally, the District coordinates with GTM regarding security and patrolling needs.

Security Strategies

- Maintain signage, fencing, gates, and locks.
- Continue coordination with private security firm, FWC, and local law enforcement.
- Maintain coordination with security resident
- Maintain coordination with GTM.

ADMINISTRATION

There are no anticipated surpluses or acquisitions associated with the Moses Creek Conservation Area over the next five years.

Acquisition Strategies

- Evaluate adjacent properties for potential acquisition.

Cooperative Agreements, Leases, Easements, and Special Use Authorization

In accordance with District Policy #90-16, the District promotes entering into agreements with other agencies and private parties for cooperation and coordination of management of the District's lands. These cooperative agreements serve to protect the District's water management interests and to enhance the management and public value of the land. The following are the agreements and SUAs in effect during the writing of this plan.

- An intergovernmental/Legacy agreement exists between the District and the St. Johns County School Board.
- The District holds a residence agreement providing for security of the conservation area.
- The District issued an SUA for the purposes exotic pest plant surveys.
- The District issued an SUA for vehicular access to and use of the property in mosquito and arbovirus surveillance.

Cooperative Agreements, Leases, Easements, and Special Use Authorization Strategies

- Incorporate any new acquisitions into the existing Legacy agreement.
- Incorporate any new acquisitions into the existing security residence agreement.

Implementation Chart

Table 2. Moses Creek Conservation Area Implementation Chart

TASK	RESPONSIBLE LEAD	DUE DATE	COOPERATORS
RESOURCE PROTECTION AND MANAGEMENT			
Water Resources			
○ Include depression marsh and other wetland edges in fire management activities.	DLM	Annually by September 1	
○ Regularly inspect roads, trails, low water crossings, water bars and structures for erosion problems and maintenance and repair needs.	DLM	Annually by September 1	
Flora and Fauna			
○ Conduct floral and faunal surveys and develop species lists.	DLM	Upon discovery	
○ Continue to monitor for the presence of listed species.	DLM		
○ Continue to monitor bald eagle nesting site.	DLM		
○ Continue to follow national bald eagle guidelines.			
Fire Management			
○ Introduce growing season burns where applicable.	DLM	2010	
○ In the absence of fire, conduct mechanical and chemical treatments to mimic fire effects.	DLM	Annually by September 1 as fire return intervals become tardy	
○ Continue communication with neighboring homeowners and homeowners associations regarding prescribed fire program within the conservation area.	DLM		
○ Maintain prescribed fire signage.	DLM	Annually by September 1	OC
○ Maintain firelines annually.	DLM	Spring and Fall	
○ Prepare annual burn plans.		Annually by September 1	
○ Implement prescribed fire activities in accordance with the Districts draft Fire Management Plan and the Moses Creek Fire Management Plan.	DLM		

TASK	RESPONSIBLE LEAD	DUE DATE	COOPERATORS
Forest Management			
○ Manage sand pine with prescribed fire, mechanical manipulations and chemical treatments to promote species diversity within sandhill and scrubby flatwoods natural communities.	DLM		
○ Monitor sand pine regeneration within scrub systems and apply appropriate management.	DLM	Annually by September 30	
○ Evaluate the need for selective harvest of mature sand pines to reduce hazard trees and occurrence in forested/hammock areas and conduct harvests as necessary.	DLM	Annually by September 30	
○ Continue to provide sand pine management signage and fact sheets.	DLM		
○ Plant containerized longleaf pine at a rate of 300 stems per acre by December 2009.	DLM	December 2009	
○ Monitor survival of planted longleaf and evaluate the need for additional planting.		Within one year post planting	
○ Implement mechanical treatments as necessary in areas near neighborhoods for succession to xeric hammock.		Annually by September 1 or as needed	
○ Implement mitigation mowing twice annually.		Spring and Fall	
○ Implement herbicide applications to achieve naturalistic densities of oaks within the sandhills. ○			
Exotic Species			
○ Continue to monitor for exotic plant species and implement appropriate action.	DLM	Upon discovery	
○ Continue to administer the USDA feral hog removal program..	DLM	Annually by September 1	

TASK	RESPONSIBLE LEAD	DUE DATE	COOPERATORS
Cultural Resources			
○ Identify and report newly discovered sites to the DHR.	DLM	Upon discovery	
○ Identify and report any detrimental activities to the sites to the DHR and law enforcement.	DLM	Upon discovery	
LAND USE MANAGEMENT			
Access			
○ Maintain parking areas, signs, gates, trails, and roads.	DLM		OC
Recreation			
○ Maintain portable restroom contracts.	DLM	Annually by September 1	
○ Maintain trail maintenance contract.	DLM	Annually by September 1	
○ Evaluate the potential for additional recreational facilities or infrastructure.	DLM	Annually by September 1	
○ Maintain campsites and picnic areas.	DLM	Monthly	
○ Maintain current information in the recreation guide, trail guides, and kiosks.	DLM	Annually by September 1	OC
Environmental Education			
○ Maintain parking areas, signs, gates, trails, and roads.	DLM		OC
Security			
○ Maintain signage, fencing, gates, and locks.	DLM	Annually by September 1	OC
○ Continue coordination with private security firm, FWC, and local law enforcement.	DLM	Monthly	
○ Maintain coordination with security resident		Monthly	
○ Maintain coordination with GTM.	DLM	Annually by September 1	
ADMINISTRATION			
Acquisition			
○ Evaluate adjacent properties for potential acquisition.	DLA	Annually by September 1	DLM

TASK	RESPONSIBLE LEAD	DUE DATE	COOPERATORS
Cooperative Agreements			
○ Incorporate any new acquisitions into the existing Legacy agreement.	DLM	Upon closing	
○ Incorporate any new acquisitions into the existing security residence agreement.	DLM	Upon closing	

IMPLEMENTATION CHART KEY

DLA	Division of Land Acquisition
DLM	Division of Land Management
FDOF	Florida Division of Forestry
FDHR	Florida Division of Historical Resources
FWC	Florida Fish and Wildlife Conservation Commission
OC	Office of Communication

ADDENDUM 1 SPECIES RANKING DEFINITIONS

FNAI GLOBAL RANKING

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
G2 = Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
G3 = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
G4 = Apparently secure globally (may be rare in parts of range).
G5 = Demonstrably secure globally.
G#T# = Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1).

FNAI STATE RANKING

S1 = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
S2 = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
S3 = Either very rare and local in Florida (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
S4 = Apparently secure in Florida (may be rare in parts of range).
S5 = Demonstrably secure in Florida.

STATE LEGAL STATUS

LE Endangered: species, subspecies, or isolated population so few or depleted in number or so restricted in range that it is in imminent danger of extinction.
LT Threatened: species, subspecies, or isolated population facing a very high risk of extinction in the future.
LS Species of Special Concern is a species, subspecies, or isolated population which is facing a moderate risk of extinction in the future.
PE Proposed for listing as Endangered.
PT Proposed for listing as Threatened.
PS Proposed for listing as Species of Special Concern.
N Not currently listed, nor currently being considered for listing.

FEDERAL LEGAL STATUS

LE Endangered: species in danger of extinction throughout all or a significant portion of its range.
LT Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.
LT,PDL Species currently listed threatened but has been proposed for delisting.
LT,PE Species currently listed Threatened but has been proposed for listing as Endangered.
SAT Treated as threatened due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.
PE Proposed for listing as Endangered species.
PT Proposed for listing as Threatened species.
C Candidate species for which federal listing agencies have sufficient information on

biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.

XN Non-essential experimental population.

SC Not currently listed, but considered a "species of concern" to USFWS.

N Not currently listed, nor currently being considered for listing as Endangered or Threatened.

ADDENDUM 2 SOILS

ADAMSVILLE SERIES

The Adamsville series consists of very deep, somewhat poorly drained, rapidly permeable soils on broad flats, low knolls, and lower side slopes. They formed in thick sandy marine sediments in central and southern Florida.

With adequate water control, many areas are used for citrus. Some areas are in improved pasture. Natural vegetation consists of pines, laurel, and water oaks with a ground cover of saw palmetto, pineland threeawn, indiangrass, bluestem grasses, and several low panicums.

ASTATULA SERIES

The Astatula series consists of very deep, excessively drained, rapidly permeable soils that formed in eolian and marine sands.

Used mainly for citrus, truck crops, and improved pasture. Natural vegetation consists of bluejack, blackjack, turkey oaks, longleaf pine, sand pine, and an understory of rosemary, pineland threeawn, bluestem, paspalum, lopsided indiangrass, and panicum.

CASSIA SERIES

The Cassia series consists of very deep, somewhat poorly drained, moderately rapid permeable soils on low ridges and knolls that are slightly higher than the adjacent flatwoods. They formed in sandy materials in the Lower Coastal Plain.

Most areas of Cassia soils are used for range. The native vegetation consists of scattered slash pine, longleaf pine, and saw palmetto.

EAUGALLIE SERIES

The EauGallie series consists of deep or very deep, poorly or very poorly drained, slowly permeable soils in flats, sloughs and depressional areas. They formed in sandy and loamy marine sediments in Peninsula Florida.

Many areas of EauGallie soils are used for citrus, truck crops, and pastureland. Natural vegetation consists of longleaf pine, South Florida slash pine, and saw palmetto. The understory vegetation includes inkberry, southern bayberry, and pineland threeawn.

FLORIDANA SERIES

The Floridana series consists of very deep, very poorly drained, slowly to very slowly permeable soils on low broad flats, flood plains, and in depressional areas. They formed in thick beds of sandy and loamy marine sediments.
Many areas of Floridana soils have been cleared and used for pasture. Where water control is adequate, it is used for growing truck crops and citrus. Natural vegetation consists of sand cordgrass, cabbage palmetto, myrtle, and pineland threeawn. In depressional areas, most of the soil has a sparse to dense cover of cypress. In flood plains, the vegetation is mostly sweetgum, blackgum, red maple, and cypress.

IMOKALEE SERIES
The Immokalee series consists of deep and very deep, poorly drained and very poorly drained soils that formed in sandy marine sediments. They occur on flatwoods and in depressions of Peninsular Florida.

Principal vegetation is longleaf and slash pines and undergrowth of saw palmetto, gallberry, wax myrtle, and pineland threeawn. In depressions, water tolerant plants such as cypress, loblolly bay gorodonia, red maple, sweetbay, maidencane, blue maidencane, chalky bluestem, sand cordgrass, and bluejoint panicum are more common. Most areas are used for range and forest. Large areas with adequate water management are used for citrus, tame pasture, and truck crops.

MOULTRIE SERIES
The Moultrie series consists of very deep, very poorly drained, rapidly permeable soils in tidal marshes along the Atlantic Coast in Peninsular Florida. They formed in thick deposits of sandy marine sediments.

Moultrie soils are used mainly for wildlife habitat. The native vegetation consists of seashore saltgrass, bushy sea-oxeye, glasswort, big leaf sumpweed, and a few red mangroves.

MYAKKA SERIES
The Myakka series consists of deep and very deep, poorly to very poorly drained soils formed in sandy marine deposits. These soils are on flatwoods, high tidal areas, flood plains, depressions, and gently sloping to sloping barrier islands.

Most areas are used for commercial forest production or native range. Large areas with adequate water control measures are used for citrus, improved pasture, and truck crops. Native vegetation includes longleaf and slash pines with an undergrowth of saw palmetto, running oak, inkberry, wax myrtle, huckleberry, chalky bluestem, pineland threeawn, and scattered fetterbush.

ONA SERIES
The Ona series consists of poorly drained, moderately permeable soils that formed in thick sandy marine sediments. They are in the flatwoods areas of central and southern Florida.

Much of the soil is used for growing truck crops, citrus, and improved pasture. Natural vegetation is slash pine and longleaf pine, gallberry, widely spaced saw palmettos, huckleberry, and pineland threeawn. A small part remains in forest and range.

ORSINO SERIES
The Orsino series consists of very deep, moderately well drained, very rapidly permeable soils that formed in thick beds of sandy marine or aeolian deposits.

A few small areas are used for citrus and tame pasture. Most of this soil is used for forest. Native vegetation consists primarily of scrub vegetation with sand live oak, Chapman oak, myrtle oak, and scrub hickory. Scattered sand, slash, and longleaf pines and scattered bluejack, turkey, and post oak are found with a sparse understory.

PAOLA SERIES
The Paola series consists of very deep, excessively drained, very rapidly permeable soils on uplands. They formed in thick sandy marine deposits.

Primarily in forest. Native vegetation consists of sand pine, slash pine, longleaf pine, scrub live oak, scattered turkey oak, and bluejack oak. The undergrowth consists of cacti, mosses, lichens, creeping dodder, rosemary, and scattered saw palmetto.

PELLICER SERIES
The Pellicer series consists of very deep, very poorly drained, very slowly permeable soils in tidal marshes along the Atlantic Coast of Peninsular Florida. They formed in loamy and clayey marine sediments.

Pellicer soils are used to provide habitat for wetland wildlife. The native vegetation consists of seashore saltgrass, needlegrass rush, smooth and marsh hay cordgrass, bushy sea-oxeye, and glasswort.

POMELLO SERIES
The Pomello series consists of very deep, moderately well to somewhat poorly drained soils that are sandy to depths of more than 80 inches. Pomello soils formed in sandy marine sediments in the flatwoods areas of Peninsular Florida.

Pomello soils are mostly used for range and forest production. A few areas are used for pasture. In its northern extent of occurrence many areas are used for urban development. Native vegetation is dominated by scrub oak, dwarf live oak, saw palmetto, longleaf pine, slash pine, and pine land threeawn.

POMONA SERIES
The Pomona series consists of very deep, poorly and very poorly drained, moderate to moderately slowly permeable soils on broad low ridges on the Lower Coastal Plain. They formed in sandy and loamy marine sediments.

Most areas remain in native vegetation and are used for wildlife habitat. A few small areas have been cleared and used for watermelons, truck crops, and tame pasture. The native vegetation consists of slash pine (Pinus Elliottii), longleaf pine (Pinus Palustris), and south Florida slash pine (Pinus Elliottii Densa) with an understory of sawpalmetto, waxmyrtle, gallberry, creeping bluestem, chalky bluestem, indiangrass, and pineland threeawn.

POTTSBURG SERIES
The Pottsburg series consists of very deep, somewhat poorly and poorly drained, moderately permeable soils on flats of the lower coastal plain. They formed in marine sediments.

Many areas are in timber and pulpwood production and community development. The native vegetation consists of second growth slash and longleaf pine with an understory of sawpalmetto, gallberry, pineland threeawn, broomsedge bluestem, lopsided indiangrass, chalky bluestem, wild grape, and other perennial grasses.

RIVIERA SERIES
The Riviera series consists of very deep, poorly drained, very slowly permeable soils on broad, low flats and in depressions in the Lower Coastal Plain. They formed in stratified sandy and loamy marine sediments on the Lower Coastal Plain.

When drained, Riviera soils are used for citrus, winter truck crops, and improved pasture. Native vegetation consists of slash pine, cabbage, and sawpalmetto, scattered cypress, maidencane, and pineland threeawn.

SMYRNA SERIES
The Smyrna series consists of very deep, poorly to very poorly drained soils formed in thick deposits of sandy marine materials.

Natural vegetation consists of longleaf and slash pines with an undergrowth of sawpalmetto, running oak, gallberry, waxmyrtle, and pineland threeawn. Most areas are used for forest and range. Large areas are used for tame pasture.

ST. JOHNS SERIES
The St. Johns series consists very deep, very poorly or poorly drained, moderately permeable soils on broad flats and depressional areas of the lower Coastal Plain. They formed in sandy marine sediments.
Most areas of St. Johns soils are used for forest or rangeland. Principal vegetation of the forested areas is longleaf pine, slash pine, and pond pine with an undergrowth of sawpalmetto, gallberry, waxmyrtle, huckleberry, and pineland threeawn. Some areas that have adequate water control are used for citrus, improved pasture, and special crops.

TAVARES SERIES
The Tavares series consists of very deep, moderately well drained, rapidly or very rapidly permeable soils on lower slopes of hills and knolls of the lower Coastal Plain. They formed in sandy marine or eolian deposits.

Most areas of Tavares soils are used for citrus. A few areas are used for corn, vegetable crops, watermelons, and improved pasture. In most places the natural vegetation consists of slash pine, longleaf pine, a few scattered blackjack oak, turkey oak, and post oak with an undercover of pineland threeawn. In some places natural vegetation consists of turkey oak, blackjack oak, and post oak with scattered slash pine and longleaf pine.

TOMOKA SERIES
The Tomoka series consists of deep, very poorly drained, moderately permeable soils that formed in decomposed dark reddish brown and black organic material about 27 inches thick over sand and loamy mineral material.

Some areas are cleared and used for truck, corn, sod crops and improved pasture. Uncleared areas are used for water storage and as a wildlife habitat. Native vegetation is sawgrass, lilies, reeds, sedges, myrtle and other aquatic plants. Cypress, red and white bay, maple and pond pine are common tree species.

WESCONNETT SERIES
The Wesconnett series consists of very deep, very poorly drained sandy soils that formed in sandy deposits on marine terraces. These soils are in depressions and on flood plains.

Most of this soil is in forest. Natural vegetation is baldcypress, pondcypress, red maple, sweetbay magnolia, sweetgum, cabbage palm, holly, and water oak, with an understory of waxmyrtle and sparse amounts of creeping bluestem, hairy bluestem, and toothachegrass.

ZOLFO SERIES
The Zolfo series consists of very deep, somewhat poorly drained soils that formed in thick beds of sandy marine deposits. These soils are on low broad landscapes that are slightly higher than adjacent flatwoods on the lower Coastal Plain of Central Florida.

Used mainly for citrus crops. Native vegetation consists of scattered turkey, laurel, or water oaks; long leaf or slash pine with an undercover of pineland threeawn, bluestem, lopsided indiangrass, gallberry, native weeds and sawpalmetto.

ADDENDUM 3 SPECIES LIST

	Genus	Species	Common Name	Status
Plants	Acer	rubrum	Southern red maple	
	Agarista	populifolia	Florida leucothoe	
	Ambrosia	artemisiifolia	Common ragweed	
	Andropogon	glomeratus	Busy bluestem	
	Andropogon	virginicus	Borrmsedge bluestem	
	Aristida	stricta var. beyrichiana	Wiregrass	
	Arnoglossum	floridanum	Indian plantain	
	Avicennia	germinans	Black mangrove	
	Baccharis	halimifolia	Groundsel tree/Sea myrtle	
	Batis	maritima	Saltwort	
	Befaria	racemosa	Tar flower	
	Borrichia	frutescens	Sea Oxeye, Sea daisies	
	Callicarpa	americana	Beautyberry	
	Carya	glabra	Pignut hickory	
	Castanea	pumila	Chinquapin	
	Ceratiola	ericoides	Florida rosemary	
	Cinnamomum	camphora	Camphor-tree	Exotic
	Cynanchum	angustifolium	Gulf coast swallowwort	
	Diospyros	virginiana	Persimmon	
	Distichlis	spicata	Saltgrass	
	Elephantopus	elatus	Florida Elephant's-foot	
	Epidendrum	conopseum	Green-fly orchid	
	Gelsemium	sempervirens	Yellow jessamine	
	Gordonia	lasianthus	Loblolly bay	
	Houstonia	procumbens	Innocence	
	Ilex	opaca	American holly	
	Ilex	cassine	Dahoon holly	
	Ilex	glabra	Inkberry, Gallberry	
	Ilex	vomitoria	Yaupon holly	
	Juncus	roemerianus	Needle rush	
	Juncus	effusus	Soft rush	
	Juniperus	virginiana	Southern red cedar	
	Lachnanthes	caroliniana	Bloodroot	
	Limnobium	spongia	Frog's bit	
	Limonium	carolinianum	Sea lavender	
	Liquidambar	styraciflua	Sweetgum	
	Lupinus	diffusus	Sky-blue lupine	
	Lyonia	lucida	Fetterbush	
	Lyonia	fruticosa	Rusty staggerbush	
	Lyonia	ferruginea	Rusty lyonia	
	Magnolia	grandiflora	Southern magnolia	
	Magnolia	virginiana	Sweet bay	

	Myrica	cerifera	Wax myrtle	
	Nyssa	sylvatica var. sylvatica	Blackgum	
	Oplismenus	hirtellus	Woodsgrass; Basketgrass	
	Orontium	aquaticum	Golden club	
	Osmanthus	americana	Wild olive	
	Osmunda	cinnamomea	Cinnamon fern	
	Panicum	hemitomon	Maidencane	
	Peltandra	virginica	Green arum	
	Persea	borbonia	Redbay	
	Persea	humilis	Silkbay	
	Phlebodium	aureum	Golden polypody	
	Pinus	palustris	Longleaf pine	
	Pinus	serotina	Pond pine	
	Pinus	clausa	Sand pine	
	Pinus	elliottii	Slash pine	
	Pleopeltis	polypodioides	Resurrection fern	
	Pluchea	odorata	Sweetscent	
	Polygonum	densiflorum	Smartweed	
	Prunus	caroliniana	Carolina laurel cherry	
	Prunus	angustifolia	Chicksaw plum	
	Prunus	serotina	Wild cherry	
	Psychotria	nervosa	Wild coffee	
	Pteridium	aquilinum var. pseudocaudatum	Bracken fern	
	Quercus	incana	Bluejack oak	
	Quercus	laurifolia	Laurel oak; Diamond oak	
	Quercus	virginiana	Live oak	
	Quercus	myrtifolia	Myrtle oak	
	Quercus	pumila	Running oak	
	Quercus	geminata	Sand live oak	
	Quercus	laevis	Turkey oak	
	Quercus	nigra	Water oak	
	Rubus	cuneifolius	Sand blackberry	
	Sabal	palmetto	Cabbage palm	
	Salicornia	bigelowii	Annual glasswort	
	Salicornia	virginica	Perennial glasswort	
	Salix	caroliniana	Carolina willow	
	Salvia	lyrata	Lyreleaf sage	
	Sapium	sebiferum	Chinese tallow tree	Exotic
	Schinus	terebinthifolius	Brazilian pepper	Exotic
	Serenoa	repens	Saw palmetto	
	Sisyrinchium	angustifolium	Blue-eyed grass	
	Smilax	bona-nox	Greenbrier; Catbrier	
	Smilax	auriculata	Greenbrier; Catbrier	
	Smilax	glauca	Wild sarsaparilla	

	Spartina	patens	Marshhay cordgrass	
	Spartina	alterniflora	Saltmarsh cordgrass	
	Spartina	bakeri	Sand cordgrass	
	Stenotaphrum	secundatum	St. Augustinegrass	
	Taxodium	ascendens	Pond cypress	
	Tillandsia	usneoides	Spanish moss	
	Toxicodendron	radicans	Poison ivy	
	Vaccinium	corymbosum	Highbush blueberry	
	Vaccinium	myrsinites	Shiny blueberry	
	Vaccinium	arboreum	Sparkleberry	
	Viburnum	obovatum	Small viburnum	
	Vitis	rotundifolia	Muscadine grape	
	Yucca	filamentosa	Adam's needle	
	Yucca	aloifolia	Spanish dagger	
	Zamia	pumila	Coontie	
Reptiles	Agkistrodon	piscivorus conanti	Florida cottonmouth	
	Alligator	mississippiensis	American alligator	SSC T(S/A) S4
	Coluber	constrictor priapus	Southern black racer	
	Crotalus	adamanteus	Eastern diamondback rattlesnake	
	Diadophis	punctatus	Southern ringneck snake	
	Elaphe	guttata	Corn snake	
	Eumeces	fasciatus	Five-lined skink	
	Eumeces	laticeps	Broad-headed skink	
	Farancia	abacura	Eastern mud snake	
	Gopherus	polyphemus	Gopher tortoise	SSC S3
	Lampropeltis	triangulum	Scarlet kingsnake	
	Nerodia	fasciata	Florida water snake	
	Opheodrys	aestivus	Rough green snake	
	Ophisaurus	ventralis	Eastern glass lizard	
	Scincella	lateralis	Ground skink	
	Sistrurus	miliarius barbouri	Dusky pygmy rattlesnake	
	Thamnophis	sirtalis	Eastern garter snake	
Amphibians	Acris	gryllus dorsalis	Florida cricket frog	
	Bufo	terrestris	Southern toad	
	Gastrophryne	carolinensis	Eastern narrow-mouthed toad	
	Hyla	cinerea	Green treefrog	
	Hyla	femoralis	Pine woods treefrog	
	Hyla	gratiosa	Barking treefrog	
	Hyla	squirella	Squirrel treefrog	
	Pseudacris	crucifer	Southern spring peeper	
	Pseudacris	ocularis	Little grass frog	
	Rana	grylio	Pig frog	

	Rana	utricularia	Florida leopard frog	
	Scaphiopus	holbrooki	Eastern spadefoot	
Aves	Cygnus	columbianus	Tundra Swan	
	Aix	sponsa	Wood Duck	
	Anas	discors	Blue-winged Teal	
	Bucephala	albeola	Bufflehead	
	Lophodytes	cucullatus	Hooded Merganser	
	Mergus	serrator	Red-breasted Merganser	
	Meleagris	gallopavo	Wild Turkey	
	Colinus	virginianus	Northern Bobwhite	
	Pelecanus	erythrorhynchos	American White Pelican	
	Pelecanus	occidentalis	Brown Pelican	
	Phalacrocorax	auritus	Double-crested Cormorant	
	Ardea	herodias	Great Blue Heron	
	Ardea	alba	Great Egret	
	Egretta	thula	Snowy Egret	
	Egretta	caerulea	Little Blue Heron	G5 S4 N LS
	Egretta	tricolor	Tricolored Heron	
	Butorides	virescens	Green Heron	
	Nyctanassa	violacea	Yellow-crowned Night-Heron	
	Eudocimus	albus	White Ibis	G5 S4 N LS
	Ajaia	ajaja	Roseate Spoonbill	
	Mycteria	americana	Wood Stork	
	Coragyps	atratus	Black Vulture	
	Cathartes	aura	Turkey Vulture	
	Pandion	haliaetus	Osprey	G5 S3 S4 N LS
	Elanoides	forficatus	Swallow-tailed Kite	
	Haliaeetus	leucocephalus	Bald Eagle	G5 S3 N N
	Circus	cyaneus	Northern Harrier	
	Accipiter	striatus	Sharp-shinned Hawk	
	Accipiter	cooperii	Cooper's Hawk	
	Buteo	lineatus	Red-shouldered Hawk	
	Buteo	jamaicensis	Red-tailed Hawk	
	Falco	sparverius	American Kestrel	
	Falco	columbarius	Merlin	
	Falco	peregrinus	Peregrine Falcon	
	Rallus	longirostris	Clapper Rail	
	Porzana	carolina	Sora	
	Grus	canadensis	Sandhill Crane	G5 T2 T3 S2 S3 N LT
	Pluvialis	squatarola	Black-bellied Plover	

	Charadrius	semipalmatus	Semipalmated Plover	
	Charadrius	vociferus	Killdeer	
	Actitis	macularius	Spotted Sandpiper	
	Tringa	semipalmata	Willet	
	Tringa	flavipes	Lesser Yellowlegs	
	Calidris	mauri	Western Sandpiper	
	Limnodromus	griseus	Short-billed Dowitcher	
	Larus	atricilla	Laughing Gull	
	Larus	delawarensis	Ring-billed Gull	
	Onychoprion	fuscatus	Sooty Tern	
	Onychoprion	anaethetus	Bridled Tern	
	Columba	livia	Rock Pigeon (e)	
	Zenaida	macroura	Mourning Dove	
	Columbina	passerina	Common Ground-Dove	
	Coccyzus	americanus	Yellow-billed Cuckoo	
	Megascops	asio	Eastern Screech-Owl	
	Bubo	virginianus	Great Horned Owl	
	Chordeiles	minor	Common Nighthawk	
	Caprimulgus	carolinensis	Chuck-will's-widow	
	Caprimulgus	vociferus	Whip-poor-will	
	Chaetura	pelagica	Chimney Swift	
	Archilochus	colubris	Ruby-throated Hummingbird	
	Ceryle	alcyon	Belted Kingfisher	
	Melanerpes	erythrocephalus	Red-headed Woodpecker	
	Melanerpes	carolinus	Red-bellied Woodpecker	
	Sphyrapicus	varius	Yellow-bellied Sapsucker	
	Picoides	pubescens	Downy Woodpecker	
	Colaptes	auratus	Northern Flicker	
	Dryocopus	pileatus	Pileated Woodpecker	
	Contopus	virens	Eastern Wood-Pewee	
	Empidonax	virescens	Acadian Flycatcher	
	Sayornis	phoebe	Eastern Phoebe	
	Myiarchus	crinitus	Great Crested Flycatcher	
	Tyrannus	tyrannus	Eastern Kingbird	
	Vireo	griseus	White-eyed Vireo	
	Vireo	solitarius	Blue-headed Vireo	
	Vireo	olivaceus	Red-eyed Vireo	
	Cyanocitta	cristata	Blue Jay	
	Corvus	brachyrhynchos	American Crow	
	Corvus	ossifragus	Fish Crow	
	Progne	subis	Purple Martin	
	Tachycineta	bicolor	Tree Swallow	

	Stelgidopteryx	serripennis	Northern Rough-winged Swallow	
	Hirundo	rustica	Barn Swallow	
	Poecile	carolinensis	Carolina Chickadee	
	Baeolophus	bicolor	Tufted Titmouse	
	Thryothorus	ludovicianus	Carolina Wren	
	Troglodytes	aedon	House Wren	
	Cistothorus	palustris	Marsh Wren	
	Regulus	calendula	Ruby-crowned Kinglet	
	Polioptila	caerulea	Blue-gray Gnatcatcher	
	Catharus	ustulatus	Swainson's Thrush	
	Catharus	guttatus	Hermit Thrush	
	Turdus	migratorius	American Robin	
	Dumetella	carolinensis	Gray Catbird	
	Mimus	polyglottos	Northern Mockingbird	
	Toxostoma	rufum	Brown Thrasher	
	Bombycilla	cedrorum	Cedar Waxwing	
	Vermivora	pinus	Blue-winged Warbler	
	Vermivora	peregrina	Tennessee Warbler	
	Vermivora	ruficapilla	Nashville Warbler	
	Dendroica	petechia	Yellow Warbler	
	Dendroica	pensylvanica	Chestnut-sided Warbler	
	Dendroica	magnolia	Magnolia Warbler	
	Dendroica	tigrina	Cape May Warbler	
	Dendroica	caerulescens	Black-throated Blue Warbler	
	Dendroica	coronata	Yellow-rumped Warbler *("Audubon's"* Warbler D. c. auduboni)	
	Dendroica	nigrescens	Black-throated Gray Warbler	
	Dendroica	fusca	Blackburnian Warbler	
	Dendroica	dominica	Yellow-throated Warbler	
	Dendroica	pinus	Pine Warbler	
	Dendroica	discolor	Prairie Warbler	
	Dendroica	palmarum	Palm Warbler	
	Dendroica	castanea	Bay-breasted Warbler	
	Dendroica	striata	Blackpoll Warbler	
	Mniotilta	varia	Black-and-white Warbler	
	Setophaga	ruticilla	American Redstart	
	Protonotaria	citrea	Prothonotary Warbler	
	Helmitheros	vermivorus	Worm-eating Warbler	
	Seiurus	aurocapillus	Ovenbird	
	Seiurus	noveboracensis	Northern Waterthrush	
	Geothlypis	trichas	Common Yellowthroat	

	Icteria	virens	Yellow-breasted Chat	
	Piranga	rubra	Summer Tanager	
	Piranga	olivacea	Scarlet Tanager	
	Pipilo	erythrophthalmus	Eastern Towhee	
	Spizella	passerina	Chipping Sparrow	
	Passerculus	sandwichensis	Savannah Sparrow	
	Melospiza	georgiana	Swamp Sparrow	
	Zonotrichia	albicollis	White-throated Sparrow	
	Cardinalis	cardinalis	Northern Cardinal	
	Pheucticus	ludovicianus	Rose-breasted Grosbeak	
	Guiraca	caerulea	Blue Grosbeak	
	Passerina	cyanea	Indigo Bunting	
	Passerina	ciris	Painted Bunting	
	Dolichonyx	oryzivorus	Bobolink	
	Agelaius	phoeniceus	Red-winged Blackbird	
	Quiscalus	major	Boat-tailed Grackle	
	Molothrus	ater	Brown-headed Cowbird	
	Icterus	galbula	Baltimore Oriole	
	Carduelis	pinus	Pine Siskin	
	Carduelis	tristis	American Goldfinch	
Mammals	Geomys	pinetis	Easter pocket gopher	
	Sciurus	carolinensis	Gray squirrel	
	Urocyon	cinereoargenteus	Gray fox	
	Lynx	rufus	Bobcat	
	Didelphis	virginana	Opossum	
	Procyon	lotor	Raccoon	
	Sogmodon	hispidus	Hispid cotton rat	
	Odocoileus	virginianus	White-tailed deer	
	Daspyus	novemcinctus	Armadillo	
	Sus	scrofa	Feral hog	Exotic
Fish				
Freshwater	Gambusia	holbrooki	Mosquito Fish	
	Jordanella	floridae	Flag Fish	
	Lepomis	macrochirus	Bluegill	
	Lepomis	gulosus	Warmouth	
	Lepomis	punctatus	Spotted sunfish	
	Pteronotropis	hypselopterus	Sailfin shiner	
Estuarine	Archosargus	probatocephalus	Sheepshead	
	Ariopsis	felis	Hardhead catfish	

	Carnx	hippos	Crevalle jack	
	Centropomus	undecimalis	Snook	
	Cynoscion	nebulosus	Spotted seatrout	
	Elops	saurus	Ladyfish	
	Eucinostomus	argenteus	Spotfin mojarra	
	Fundulus	grandis	Gulf killifish	
	Fundulus	heteroclitus	Mummichog	
	Fundulus	majalis	Striped killifish	
	Lagodon	rhomboides	Pinfish	
	Leiosomus	xanthurus	Spot	
	Lutjanus	griseus	Gray snapper	
	Menidia	peninsulae	Tidewater silverside	
	Mugil	cephalus	Striped mullet	
	Mugil	curema	Silver mullet	
	paralichthys	lethostigma	Southern flounder	
	Pognias	cromis	Black drum	
	Pomatomus	saltatrix	Bluefish	
	Scianops	ocellatus	Red drum	
Crustaceans	Callinected	sapidus	Blue crab	
	Uca	pugilator	Sand fiddler crab	

ADDENDUM 4 FIRE MANAGEMENT PLAN

Moses Creek Conservation Area

FIRE MANAGEMENT PLAN

PREPARED BY

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

DIVISION OF LAND MANAGEMENT

MOSES CREEK CONSERVATION

FIRE MANAGEMENT PLAN

St. Johns County, Florida

The District Fire Management Plan provides general fire management information relative to policy, procedure, and reporting. This document provides the guidelines for the implementation of prescribed fire activities on the Moses Creek Conservation Area (MCCA).

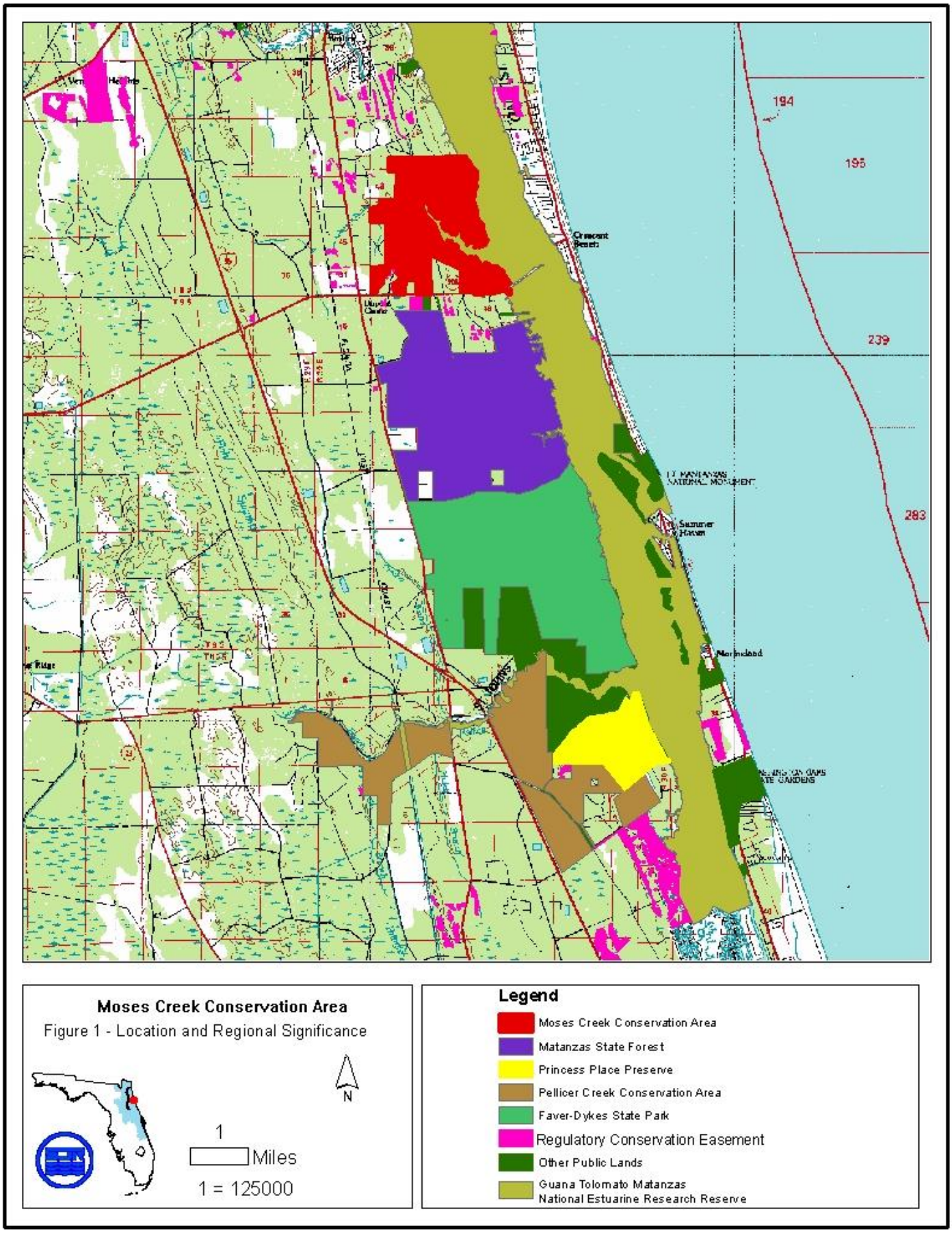
Introduction and Objectives

The MCCA covers approximately 2,173 acres in St. Johns County along the Matanzas River and Moses Creek. This Conservation area includes five contiguous parcels and is located in numerous sections of Townships Township 8 south and Range 30 east.

The property is located off State Road (SR) 206, approximately 1.5 miles west of crescent Beach and 5 miles south of the city of St. Augustine. Interstate 95 is 2.5 miles to the west and US Highway 1 is .25 miles to the west. The A1A is 1.25 miles east of the property and SR 206 forms portions of the south boundary. Figure 1 depicts the general location of the conservation area within the context of other public lands.

Historically, fires have played a vital role in the shaping and maintenance of many of the natural communities in Florida. As such, most vegetative communities and associated wildlife are fire adapted and in many instances fire dependant. Conversely, the exclusion of fire from an area allows for successional changes within the natural community. Fire exclusion leads to the excessive accumulation of fuel loads, which increase the risk for catastrophic wildfires. The goals for the implementation of fire management activities within the MCCA include:

- Reduction of fuel loads through the application of dormant season burns to decrease potential risk of damaging wildfires
- Reintroduction of growing season burns to encourage the perpetuation of native fire adapted ground cover species
- Mitigation of smoke management issues
- Restoration and maintenance of a mosaic of natural plant communities and ecological diversity
- Maintenance and restoration of ecotonal areas



Moses Creek Conservation Area

Figure 1 - Location and Regional Significance

Fire Return Interval

The general frequency to which fire returns to a community type is termed its' fire return interval. Some communities require frequent pyric disturbances to perpetuate themselves while others are not fire adapted and subsequently do not require fire to maintain their characteristics. The following table (Table 1.) and discussion of native plant communities occurring on the conservation area and optimal fire return intervals was characterized in part using information from the Florida Natural Areas Inventory's *Guide to the Natural Communities of Florida*.

Table 1.

Community Type	Fire Return Interval
Floodplain Swamp	This community is not fire adapted.
Basin Swamp (edges)	Infrequent. Edges may burn in conjunction with ecotones and adjacent communities.
Upland Mixed Forest	This community rarely burns.
Estuarine Tidal Marsh	This community is not fire maintained.
Depression Marsh (edges)	1-8 years in conjunction with associated flatwoods and depending on composition of edge species
Sandhill Upland Lake (edges)	Edges may burn in conjunction with ecotones and adjacent communities.
Maritime Hammock	26-100 years
Scrub	20-80 years; catastrophic
Sandhill	2-5 years
Scrubby Flatwoods	8-25 years
Mesic Flatwoods	1-8 years
Xeric Hammock	Infrequent; catastrophic

The above referenced fire return intervals relate to high quality natural communities. The fire return interval within degraded systems is variable. Prescribed fire will be applied as necessary to achieve restoration and management goals.

Mesic and scrubby flatwoods, sandhill, and scrub are the most prevalent fire adapted natural community type found within the conservation area. Theses plant communities at the time of acquisition were dense monoculture stands of sand pine (*Pinus clausa*). Restoration driven management techniques implemented within these areas includes clear cut harvesting of sand pine, thinning of slash pine (*P. elliottii*), roller chopping, selective (oak) herbicide treatments, and prescribed burning. Groundcover and shrub layers in most of these areas are intact, consisting of site appropriate species. Additionally, recent roller chopping activities have resulted in significant dead fuel accumulation. This dead fuel will be the primary carrier of fire for the initial burns implemented in these areas.

Fire management within the remaining plant communities (below) will be in conjunction with the associated dominant pyric plant community within each fire management unit (FMU). These plant communities will burn as site conditions permit during the implementation of controlled burns in adjacent plant communities. Additionally, these areas will not be excluded from fire activities unless warranted by safety or smoke management issues.

Depression marsh is a fire-adapted community. Though fire may not carry entirely through each marsh during every burn, it is an important factor in the maintenance of the edge habitats surrounding them. The natural fire regime would burn approximately every 1-8 years. Depression marshes are embedded within in the upland areas at the Conservation area. In general, depression marsh fires are carried through the herbaceous layer. Many of these marshy areas have been disturbed by a prolonged absence of fire and are encroached by hardwoods, but all still occupy an important niche in providing habitat for numerous species of wildlife. Fire will be applied to these marshes any time surrounding natural communities are burned.

The basin swamp is not a primary target for fire management at the MCCA; however, this natural community grades into flatwoods communities, which are fire dependent. Basin swamps are considered fire influenced, because while they do support fire at some frequency, fire has the potential to have rather extreme effects. Under normal hydrologic conditions, fire will burn the edges of this community type without penetrating to the center. This is the desired effect of fire within the basin swamp, as it will prohibit the expansion of hardwoods and shrubs into the adjacent flatwoods.

Seasonality and Type of Fire

Historically, most fires in Florida occurred in what is commonly referred to as the "growing season." The growing season usually spans from mid March through August. Fires during the spring and early summer months generally have significant ecological benefits as most fire adapted flora is perpetuated by fire. Mimicking lightning ignited natural fires by implementing prescribed fire during the growing season provides benefits to natural systems by controlling shrub layers and encouraging diversity in groundcover species.

Dormant season burns, conducted from mid November through the end of February, are less intense than growing season burns, and are desirable when burning under young or newly planted pine. Dormant season burns help to reduce fuel loads resulting in fewer safety and smoke management issues. While fuel loads are not exceptionally high in mechanically altered areas, dead vegetation/fuel remaining from mechanical manipulations may increase the intensity of fires in certain areas. Fuels outside of these areas remain high due to fire exclusion. These fuel conditions may require that some of the initial applications of fire be in the form of dormant season burning. This will allow for the reduction of fuel loads while providing for the protection of desirable vegetation. The ultimate goal of this strategy will be to move the prescribed fire application into a

growing season rotation. District staff anticipate the implementation of growing season burns

In many cases, fire management units with similar fire management needs may be burned simultaneously, either with crews igniting the areas by hand from the ground, or with the aid of aircraft. Aerial ignition allows District staff to ignite fire management units more quickly, resulting in a faster burnout. In an area with a large mosaic of unavailable fuels, fire can be applied easily to all portions of the unit. With ground based crews this sometimes is infeasible or impossible and may pose a safety issue. An aerial burn safety plan (Exhibit 1) will accompany the individual burn prescriptions and be onsite and on the ground the day of any aerial burn.

Wildfire Policy

In the event of a wildfire, if conditions permit, suppression strategies will utilize existing fuel breaks to contain the wildfire. These fuel breaks may include previously burned areas, existing roads, trails, and firelines, and wetlands and other water bodies. This is only possible, with the agreement of local fire rescue, DOF, District staff, and when all of the following conditions are met:

1) Fuels within the area have been managed
2) No extreme weather conditions are present or expected
3) There are no other wildfires that may require action
4) There are sufficient resources available to manage the fire to containment
5) The fire and the resulting smoke will not impact neighbors or smoke sensitive areas

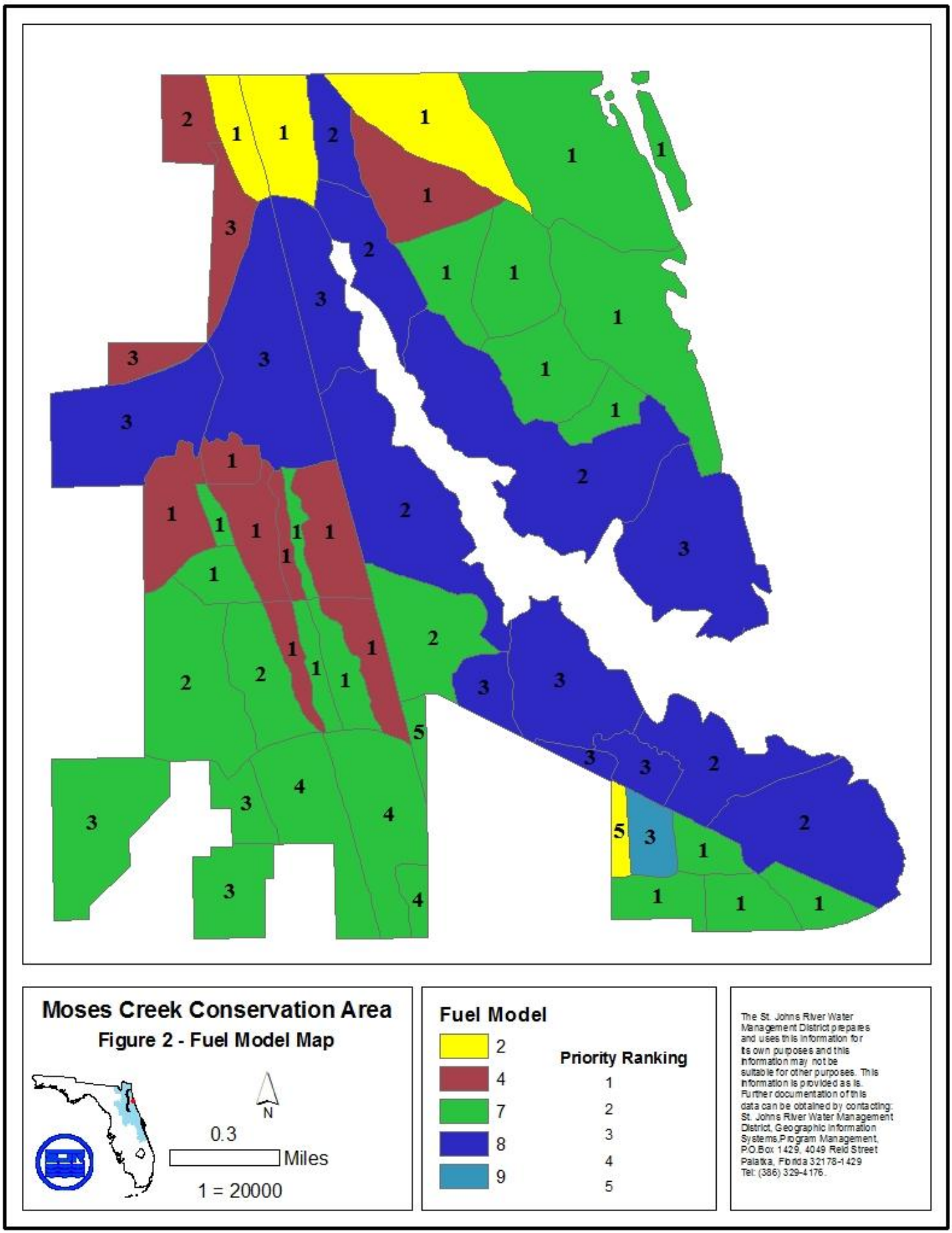
If any of these conditions are not met, direct suppression action will be taken.

As soon as possible following a fire in which firelines are plowed, a plan for fireline rehabilitation shall be developed and implemented.

Persons discovering arson or wildfires on the Conservation Area should report them to the Florida Department of Agriculture and Consumer Services, Division of Forestry (DOF), the St. Johns River Water Management District, or by dialing 911.

Priority Ranking

Priority ranking of FMUs within the MCCA was done to assist land management staff in the application of prescribed fire within the surrounding suburban landscape. The rankings account for required weather conditions, natural community type, fuel loads, acreage, smoke management, staffing and equipment requirements, and urban interface issues. The restricted acceptable weather parameters required for burning within this conservation area translates to an exceedingly low number of available burn days. Changing conditions of any of the above listed criteria may result in a change in the FMU ranking. Figure 2 illustrates the FMUs and associated priority rankings as well as the fuel model type (discussed below).


Moses Creek Conservation Area
Figure 2 - Fuel Model Map
N
0.3
Miles
1 = 20000
Fuel Model
2
4
7
8
9
Priority Ranking
1
2
3
4
5
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Priority 1
This is the highest priority. Desired weather conditions, fuel loads, and existing fire breaks are within acceptable parameters. These areas have the highest likelihood of being maintained within appropriate natural community driven fire return intervals and will be prioritized for the implementation of prescribed fire.

Priority 2
Desired weather conditions, fuel loads, and existing fire breaks are within acceptable parameters. These areas have a moderate likelihood of being maintained within appropriate natural community driven fire return intervals. These areas will assume secondary consideration for the implementation of prescribed fire behind those ranked Priority 1.

Priority 3
The implementation of prescribed fire within these FMUs is possible; however, issues including restrictive weather requirements, urban interface and smoke management issues, natural community type, fuel loads, and fire breaks make these areas a low priority for consideration. These areas may, under exceptional conditions receive prescribed fire.

Priority 4
These areas are not likely to receive consideration for prescribed fire due to excessive fuels, urban interface, smoke management, or control concerns.

Priority 5
These areas are not considered for prescribed fire. They are either not dominated by pyric plant communities or are being managed mechanically.

Post Burn Reports

Burn reports must be completed after each controlled burn or wildfire. These reports include detailed information regarding the acreage, fuel models, staff and equipment hours, cooperator hours, contractor hours, weather (forecasted and observed) and fire behavior. The timely completion of these reports is necessary for the compilation of information relative to the entire District burn program. Additionally, these reports provide a documented account of site specific conditions which are helpful in the planning of future burns.

Smoke Management

A significant challenge to the implementation of any prescribed burn program is smoke management. Fire history across the conservation area includes a total of seven (7) prescribed burns and one wildfire. Prior to acquisition, there is no known fire history on conservation area and fuel accumulation (dead and live) across the flatwoods communities is moderate to high. This accumulation of fuels has the potential to produce a tremendous amount of smoke as areas are burned. As the surrounding areas become

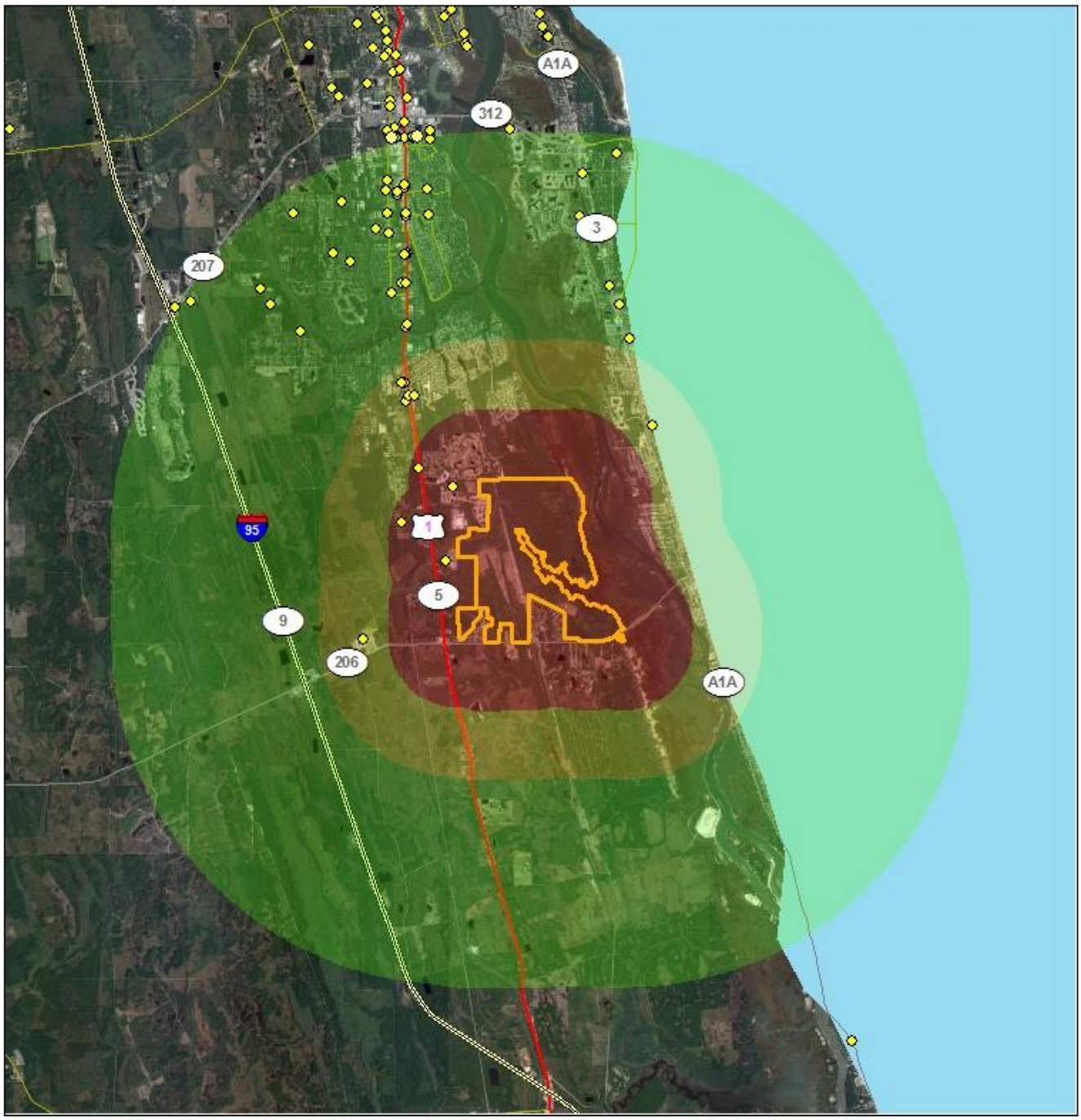
increasingly urbanized, this problem will increase in magnitude, as there become fewer acceptable places to maneuver a smoke column from a prescribed fire.

The MCCA has a limited smoke shed in which to place a smoke column from a prescribed fire. There are smoke sensitive areas that surround the conservation area and affect the smoke management of each burn unit. Smoke management is a limiting factor in the application of prescribed fire within the conservation area. The MCCA is bound on the South side by SR 206. Additionally, other major roadways, schools, healthcare facilities, and numerous residential areas are in the immediate vicinity and within critical smoke impact areas. Figure 3 illustrates smoke sensitive areas in relation the MCCA. As development increases in the area, fire management will become more difficult. Increasing daily traffic on SR 206 and other highways and roads will further impair the District's ability to implement prescribed burns at the appropriate fire return intervals within the conservation area. Currently, portions of this property still have an acceptable smoke shed into which to place a smoke column from a prescribed fire.

A smoke screening process will be completed with each prescription, before an authorization is obtained from the FDOF. A fire weather forecast is obtained and evaluated for suitable burning conditions and smoke management objectives. A wind direction is chosen that will transport smoke away from urbanized areas and/or impact these smoke sensitive areas in the least possible way. When possible, the smoke plume from burns should be directed back through the conservation area or over the ocean. Smoke can then mix and loft into the atmosphere over uninhabited or rural land adequately enough to minimize off-site impacts.

Weather parameters necessary for burning within the MCCA are limited to only those with wind directions including a westerly component. The close proximity to the ocean and the strong influence of afternoon easterly sea breezes further restrict opportunities for burning, particularly in the growing season. Unless in advance of a frontal system, prescribed burns of greater than fifty (50) acres immediately adjacent to developed areas are not likely to occur.

On burn day, the ability of smoke to mix and disperse into the atmosphere should be good. Dispersion indices should be above 40. Dispersions of greater than 69 will not be utilized unless other weather conditions mitigate expected fire behavior. Forecast mixing heights should be above 1700ft. Transport winds should be at least 9 mph to effectively minimize residual smoke. Lower transport wind speeds can be utilized if dispersion index and mixing heights are above average. Burns will be conducted with a carefully plotted wind direction to limit and/or eliminate negative impacts from smoke to neighbors and urbanized areas.



Moses Creek Conservation Area
Figure 3 - Smoke Map

N

2
Miles
1 = 125000

Legend

Schools and Healthcare Facilities
1 Mile Smoke Management
2 Miles Smoke Management
5 Miles Smoke Management

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Mechanical and Chemical Treatments

Short and long term weather conditions and urban interface issues are important considerations when implementing a prescribed fire program. Weather conditions such as extended droughts or insurmountable smoke management issues due to increased urbanization may require the District to manage natural systems mechanically and/or chemically. A variety of methods including mowing, roller chopping, and herbicide applications may be incorporated as alternatives to prescribed fire.

Some of the pyric plant communities within the MCCA include sand pine. After extensive clear cut harvest operations of sand pine in the scrub, scrubby flatwoods, and sandhill communities, only one mature stand remains (Figure 4). Due to the catastrophic nature of fire within sand pine dominated systems, prescribed fire will not be attempted in this area. Additionally, areas of scrub that regenerate in sand pine will be considered for exclusion of prescribed fire and alternate management.

Legal Considerations

Only burn managers certified by FDOF will approve the unit prescriptions and must be on site while the burn is being conducted. Certified burn managers adhering to the requirements of State Statute 590.026 are protected from liability for damage or injury caused by fire or resulting smoke, unless gross negligence is proven.

Fire Management Units

Fire management units (FMUs) have been delineated on the MCCA. Where logical, the District used existing timber stand boundaries and landscape features to delineate fire management units. In many cases, individual timber stands represent the smallest areas of land that are free of roads, trails, or other barriers to fire. Occasionally, several fire management units with similar fire needs will be burned simultaneously and stand lines provide a break in fuels so that staff may burn smaller areas than initially planned if needed. Additionally, in an effort to mitigate smoke management and potential urban interface issues, fire management units may be smaller in size than on other parcels or conservation areas.

Ideally, District staff would thoroughly address and describe each fire management unit in terms of its fire management needs. Though all units within the bounds of the conservation area are somewhat different; all can be categorized into one of several fuel model (FM) descriptions. The thirteen standard fuel models (as described in Hal E. Anderson's *Aids to Determining Fuel Models For Estimating Fire Behavior*) were used as a basis for this categorization. The factors considered in determining each FM are: amount, composition and arrangement of available fuels within units, predicted fire behavior within each unit (under conditions acceptable to implement a prescribed burn), and resources necessary to regain management of a fire in extenuating circumstances. District staff anticipates the change of vegetative assemblages over time due to growth

Moses Creek Conservation Area

Figure 4 - Mature Sand Pine Stand

N

0.5

Miles

1 = 20000

Legend

Sand Pine Stand

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and/or restoration and understand that fuel characteristics, models, and resulting fire behavior will also change.

Below is a brief description of each fuel model occurring within the MCCA and associated natural communities. A detailed description of each individual fire management unit and its associated objectives will be included in the individual prescriptions. Some fire management units within the conservation area contain multiple FMs. In these instances, the designated FM is dominant in coverage. Figure 2 (above) illustrates the FM associated with individual fire management units.

Fuel Models

Fuel Model 2
This category includes fire management units within the conservation area that can best be described as sandhill and includes the areas identified for mitigation mowing. Fires in these fuels are typically spread through the herbaceous layer and have an overstory of longleaf and slash pine and turkey oak. Given appropriate wind speeds and fuel moisture conditions, fire spread can be very rapid. The optimal fire return interval in this fuel model is approximately every 2-8 years with growing season burns being preferred.

Fuel Model 4
This category includes fire management units within the conservation area that are best described as scrub and fire excluded flatwoods. Fire intensity and fast spreading fires involving foliage and live and dead fine woody materials in the crowns of a nearly continuous secondary overstory characterize Fuel Model 4. Besides flammable foliage, there is dead woody material in the stand that significantly contributes to fire intensity.

Fuel Model 7
This category includes fire management units that are best described as mesic and scrubby flatwoods, both natural and planted pine. Fire in these fuel types is spread through both the shrub and herbaceous layers. The shrub layer components present within the fire management units of this FM include saw palmetto, gallberry and other ericaceous shrubs between 3 and 5 feet tall and are contiguous across the units. The herbaceous layer is generally intact and includes wiregrass. The optimal fire return interval for this FM is approximately every 1 to 10 years. Growing season burns are preferable; however, some units of this FM will require initial dormant season burns and/or mechanical treatments.

Fuel Model 8
This category includes fire management units that include primarily upland mixed forests. These units within the conservation area are closed canopy forests that rarely burn. Fires that may ignite in these areas will typically carry through leaf litter.

Fuel Model 9
This category includes the only remaining sand pine dominated scrub fire management unit within the conservation area. Fires run through surface litter faster than in Model 8

and have a higher flame height. Closed stands of pine are grouped in this model. Concentrations of dead-down woody materials will contribute to possible torching out of trees, spotting, and crowning activity. Due to the catastrophic nature of fires in sand pine dominated stands prescribed fire will likely not be applied in this unit. Optimal fire return intervals in these areas are approximately every 20-80 years.

Exhibit 1
Aerial Burn Safety Plan

MOSES CREEK CONSERVATION AREA

The hazards associated with this type of burning are related to working with the helicopter, the sphere dispenser, and dealing with active fire. All helicopter safety procedures and all district fireline policies and procedures will be followed.

1. **BRIEFING -** During the operational briefing the safety plan will be reviewed with all personnel on the burn.
2. **HELICOPTER SAFETY -** The pilot will give a helicopter safety briefing at the morning operational briefing.
3. **AIDS SAFETY –** The operator will review the operation and cleaning procedures for the dispenser at the morning briefing.
4. **PERSONAL PROTECTIVE EQUIPMENT –** The incident commander will ensure that all personnel have the required PPE.
5. **HIGH HAZARD AREAS –** All high hazard areas such as power lines shall be designated on the map and attached to the burn plan.
6. **EMERGENCY LANDING ZONES –** These should be confirmed with the pilot and indicated on the burn map. **Helispot** **Lattitude** _____**"N**
   Longitude _____**"W**

CRASH RESCUE PLAN

In the event of an accident involving the helicopter the following procedures will be followed.

INCIDENT COMMANDER or BURN BOSS

1. **Notify 911**
2. Notify St. Johns County Fire Rescue (904) 491-7525
3. Notify St. Johns Sheriff's Office (904)630-0500
4. Assume responsibility of the Rescue Operation.
5. Notify NTSB (305-957-4610 OR 404-462-1666)
6. Delegate responsibility of fire control to the second in command or the most qualified.

SECOND IN COMMAND

1. Assume responsibility of the burn.
2. Assist the IC or Burn Boss with resource and personnel needs for the rescue operation.
3. If the IC is in the helicopter, second in command will assume rescue operation responsibilities and assign the most qualified to fire control.

Level I Trauma Center

1.	Halifax Daytona	386-254-4000
2.	Shands Gainesville	352-265-0111

DIVISION OF FORESTRY

1.	Bunnell Dispatch	904-446-6786

SJRWMD

1.	Land Management	386-329-4404

NTSB	**1.**	Southeast Regional Office	**305-957-4610**
	2.	Southeast Field Office	**404-462-1666**

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