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North Belle Meade Sending Area General Management Plan

(2007 - 2012)

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1. Executive Summary

The North Belle Meade Sending Area (NBMSA) comprises approximately 10,500 acres surrounded by Golden Gate Estates to the north, east and west and 1-75 to the south and is one of three major Transfer of Development Rights (TDR's) sending areas within the Rural Fringe Mixed Use District (RFMUD). Collier County Growth Management Plan (GMP) requires that for a fully functional TDR program to be in place and that a government agency be designated to manage lands transferred under the program.

The NBMSA presents a property management opportunity for Collier Soil and Water Conservation District (CSWCD) to promote conservation and preservation of county natural resources in perpetuity. (See Appendix A for a list of abbreviations.)

The North Belle Meade Sending Area (NBMSA) comprises approximately 10,500 acres surrounded by Golden Gate Estates to the north, east and west and 1-75 to the south. Management of lands transferred under the TDR Program be managed to assure regulatory compliance through active partnerships and shared work among federal, state and local conservation and government partnerships and agreements.

CSWCD was established on August 29, 1984 and is a governmental sub-division of the State of Florida~~,~~ encompassing all of Collier County. Authorized under the Soil and Water Conservation Law of 1937, Chapter 582, F.S., CSWCD intends to promote active "…conservation, development and utilization of soil and water resources to protect and promote the health, safety and general welfare…" of county residents.

CSWCD currently operates the North Golden Gate Regional Offsite Mitigation Area (ROMA), the Lower West Coast Agricultural Mobil Irrigation Lab and the Big Cypress Basin (BCB) Urban Mobil Irrigation Lab. We completed mapping approximately 20,000 acres of Picayune Strand State Forest (PSSF) under a Department of Environmental Protection (DEP) contract and are currently coordinating future projects with the Florida Division of Forestry (DOF). Since 1984, we have been in partnership with Natural Resource Conservation Service (NRCS), Florida Department of Agriculture & Consumer Services (FDACS), Division of Forestry and the US Army Corps of Engineers (USACOE).

It is the intent of CSWCD is to serve as the government agency responsible for management of all properties transferred under the TDR program in perpetuity and to preserve, restore or improve ecological functions.

Resource Management programs in NBMSA may consist of:

- Prescribed fire to mimic the natural fire frequency of NBMSA's fire-dependant natural communities.
- Forestry practices and vegetation management using mechanical and hand removal means, such as mowing, chopping, burning, plantings, etc.
- Wildlife management, including surveys plantings, vegetation management, etc.
- Invasive species control and eradication.
- Adaptive management which monitors the health of the natural communities and the impact of management practices on them.
- Restoration of sites that had previously been converted to other uses.
- Hydrologic recharge and storm water management.

Initial site assessments will be conducted on acquired parcels to document flora, fauna and hydrologic baseline conditions. Sites will be monitored annually thereafter for change analyses and to readjust long term site management needs.

Operational funding will come from the sale of existing and future mitigation credits and a long term management trust fund. Negotiated management funds and will be used solely within the NBM area to finance hydrologic, habitat and restoration projects, including the diversion of flows from the Golden Gate Main Canal into their historic wetlands and watersheds. Specific projects will be identified as lands are secured for management and will be included in future management plan revisions.

Transfer fees and mitigation credit sale funds will be deposited into a land trust fund established by cswcd to promote mitigation solutions in the basin of impact.

Public access to parcels will be on a case-by-case basis following acquisition. The primary purpose of these lands is for protection and conservation as listed in LDC 2.03.07 and 2.03.08. See Appendix A.

TDR bonus credit 4 shall not be issued until the County has accepted a Restoration and Maintenance Plan (RMP) for sending lands.

2. Management Plan Purpose

This management plan consolidates basic information about the NBMSA, including goals and objectives, past and present land uses, resource data, restoration where practicable and management needs for listed species as required by Collier County Land Development Code (LDC).

2.1 NBMSA General Management Plan Goals and Objectives:

Goal 1: Acquire and manage listed species and natural communities and modified habitats to protect and enhance hydrologic, floral and faunal resources.

Objectives:

- Evaluate land management needs for acquired parcels using baseline site surveys to determine prescribed fire regimes, invasive species control and hydrologic/habitat restoration needs on the site.
- Develop partnerships to administer resource protection activities with other agencies and organizations to manage air, soil, water, plants, animal habitat and human issues.

Goal 2: Explore possibilities for resource-based public use opportunities.

Objectives:

- Establish presence, using boundary and interpretive signage.
- Assess acquired parcels for compatible passive public use where practicable.

Goal 3: Survey and treat exotic vegetation.

Objectives:

- Treat invasive exotic vegetation on acquired properties, e.g., Earleaf acacia (Acacia auriculiformis); Australian pine (Casuarina spp.); Melaleuca (Melaleuca spp.); Catclaw mimose (Minosa pigra); Downy rosemyrtle (Rhodomyrtus tomentosa); Brazilian pepper (Schinus terebinthifolius); Java plum (Syzygium cumini); Women's tongue (Albizia lebbeck); Climbing fern (Lygodium spp.); Air

potato (Dioscorea bulbifera); Lather leaf (Colubrina asiatica); Carrotwood (Cupaniopsis anacardioides), etc., using established methodology and approved application rates.

- After initial treatment, maintenance treatments will occur as necessary as prescribed by the treatment plan.
- Develop exotic vegetation controls to conserve and protect the natural, environmental, and economic resources of the Big Cypress area.
- Provide a land and water management system that will preserve water quality, provide for the optimum utilization of the limited water resources of the area, facilitate orderly and well-planned development, and protect the health, safety and welfare of residents of the state.

Goal 4: Survey and protect habitat for rare, threatened and endangered species.

Objectives:

- Conduct periodic surveys to determine the species, location and distribution of protected species on the area.
- Particular emphasis shall be placed on rare, threatened and endangered species, e.g, Florida Panther (*Puma concolor coryi)*, Florida Black Bear (Ursus americanus*)*, Crested Caracara (Caracara cheriway), Snail Kite (Rostrhamus sociabilis), Bald Eagle (Haliaeetus leucocephalus), Big Cypress Fox Squirrel (Sciurus niger avicennia), Gopher Tortoise (Gopherus polyphemus), Sandhill Crane (Grus canadensis), etc., identification, protection and management.

  Florida Fish and Wildlife Conservation Commission (FFWCC) classified most of the NBMSA as a Regional Biodiversity Hotspot. Impacts to these species from planned land management and recreational activities are of special concern. Activities that might jeopardize the well being of these species may be altered or cancelled. District land management activities including prescribed burning, hydrologic restoration, exotic vegetation eradication, understory control, and selective forest thinning improve natural environmental characteristics that benefit listed species as well as a variety of other indigenous wildlife.

Table 1. Potential Listed Wildlife Species In NBM

	Common Name	Scientific Name	FFWCC	USFWS
Mammals	Florida Panther	Fells concolor coryi	E	E
	Big Cypress Fox Squirrel	Sciurus niger avicennia	T	
	Florida Black Bear	Ursus americanus floridanus	T	
Birds	Roseate Spoonbill	Ajala ajaia	SSC	
	Limpkin	Aramus guarauna	SSC	
	Burrowing Owl	Athene cunicularia	SSC	
	Little Blue Heron	Egretta caerulea	SSC	
	Reddish Egret	Egretta rufescens	SSC	
	Snowy Egret	Egretta thula	SSC	
	Tricolor Heron	Egretta tricolor	SSC	
	White Ibis	Eudocimus Albus	SSC	
	Southeastern American Kestrel	Falco sparverius paulus	T	
	Florida Sandhill Crane	Geis canadensis pratensis	T	
	Bald Eagle	Haliaetus leucocephalus	T	
	Wood Stork	Mycteria Americana	E	E

	Red-Cockaded Woodpecker	Picoides borealis	SSC	E
Reptiles	American Alligator	Alligator mississippensis	SSC	
	Eastern Indigo Snake	Drymarchon corals coupe,'	T	T
	Red Rat Snake	Elaphe guttata	SSC	
	Bluetail Mole Skink	Eumeces egregious lividus	T	T
	Gopher Tortoise	Gopherus polyphemus	SSC	

3. Introduction and Site History

The project totals 10,500 acres and area currently encompasses approximately 10,500 acres in central Collier County (Figures 1 and 2) is bounded by North, Golden Gate Main Canal; South, 1-75 and the adjacent borrow ditch; East, Miller Boulevard and Miller Canal, and on the West, by Collier Boulevard and the CR 951 Canal. NBMSA was not originally included in the development of NGGE in the 1960's where zoning is primarily agricultural and the most common activity is container nursery/tree farming, followed by cattle grazing. There is a scattering of houses estimated to be at 1 per 100 acres or more and there are no paved roads.

In 2002 the TDR program within the Rural Fringe Mixed Use (RFMU) district established a method of protecting and conserving the most sensitive environmental land, including large connected wetland systems and significant areas of habitat for listed species. In return it allowed property owners of those lands to recover lost value and residential development potential through an economically viable process of transferring such rights to other more suitable lands. Additionally, the TDR program responds to the GMP objectives by focusing growth into areas where sewer, water and transportation services, etc., exist or can be readily provided.

Within the RFMU district, residential density may be transferred from lands designated as sending lands to lands designated as receiving lands, urban designated areas, and the urban residential fringe described by the county future land use map. Participation in the TDR program is voluntary; however, land uses in the RFMU program are restricted. Currently, 1,784 acres of land have been purchased for potential future transfer by developers which equates to an estimated 17% of the project area.

4. Resource Inventory

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

Floral and faunal species will be inventoried and natural communities will be mapped by CSWCD personnel, consultants or private contractors within one-year of acquisition to define the needs and opportunities on the site.

Natural areas and species data will be shared with the Florida Natural Areas Inventory (FNAI) and adjacent land managers. Floral and faunal inventories of NBMSA will serve as baselines for long term site management needs and changes. Cultural resource inventories will be conducted in coordination with the Department of State, Division of Historical Resources.

4.1 Hydrology

Surface water flowing from the eastern portion of the NBMSA is part of the larger Big Cypress watershed. Historically, surface water flowed from northeast to the southwest through interconnected wetlands in the NBMSA to the wetlands in the South Belle Meade area, now PSSF and Lely Basins. A series of minor roadways and ditches were constructed to provide access and drainage for residential lots ranging in size from 1.14 to 2.5 acres. There are also larger tracts of developed and undeveloped land within and adjacent to North Belle Meade (NBM).

A maximum natural elevation in NBM is approximately 12 feet National Geodetic Vertical Datum (NGVD) in the flatwoods. NBM drains south/southwest to an average low elevation of +/-8 feet NGVD in the marshes. The average elevation in the NBMSA is approximately 10.5 feet NGVD. From the highest flatwoods and hammocks to the wetland flow ways is an elevation change of approximately four feet.

Collier County has faced unprecedented growth over the last decade. While initially focused along the coast, development pressure has spread eastward with little associated stormwater or watershed planning. Flooding has been reported with increasing frequency during recent storm events in residential areas where a patchwork of isolated, wetlands with diminished functionality, exists. The hydrology of NBMSA has been significantly impacted by development and while the anthropogenic drainage has been somewhat altered the vegetation composition in NBM, e.g., cabbage palm hammocks appear with greater frequent; however, the overall ecological landscape remains intact (The Conservancy of Southwest Florida, 2000).

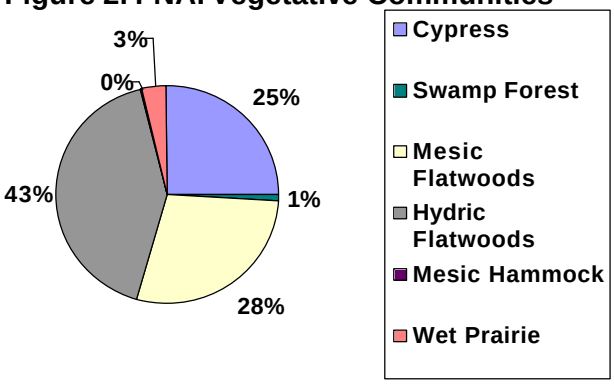
4.2 Soils

There are sixteen distinct soil categories within the NBMSA as defined by the Natural Resources Conservation Service (NRCS) soil classification system:

Boca Fine Sand; Chobee Limestone Soil; Chobee, Winder and Gator Soils; Ft. Drum and Malabar Fine Sand; Hallandale and Boca Fine Sands; Hallandale Fine Sand; Hilolo Limestone Soils; Holopaw Fine Sand; Holopaw Limestone Soils; Immokalee Fine Sand; Malabar Fine Sand; Oldsmar Fine Sand; Oldsmar Limestone Soil; Pennsucco Silt Loam; Pineda Fine Sand; and, Riviera Fine Sand. Soil classification descriptions can be found in Appendix B.

NBM soils are mostly in the fine sand groups, poorly drained being near water level or inundated most of the year and organic soils contribute to the soil profiles in the depression areas in cypress, hydric flatwoods and wet prairies as shown in Figure 2.

Figure 2. FNAI Vegetative Communities



4.3 Natural Communities

There are six distinct natural communities within the NBMSA (Figure 4) as described in the Florida Natural Areas Inventory (FNAI) classification system (Appendix C).

4.4 Wildlife

Wildlife is abundant in the hydric pine flatwoods, interspersed cypress and wet prairies of NBMSA. Thirty of the 34 mammal species (88%), 139 of the 274 bird species (51 %), 40 of the 48 reptile species (83%), 17 of the 21 amphibian species (85%), 22 of the 54 freshwater fish species (41%) in southwest Florida occur in hydric pine flatwoods (Beever and Dryden, 1993).

The Fish and Wildlife Conservation Commission (FFWCC) has identified the area in and around NBM as a "Biodiversity Hotspot" and a "Priority Wetland for Listed Species" (Cox et al. 1994; Kautz et al. 1994). The natural communities within the project provide habitat for numerous bird, reptile, and mammal species, several of which are listed federally or by the state.

4.5 Cultural Resources

Archaeological and historic resources are protected by site identification and interagency coordination with the Florida Division of Historical Resources.

NBM has experienced a variety of land use patterns similar to other inland areas of southwest Florida where native Americans lived in southwest Florida approximately 2,000 years before European discovery. Calusa Indians occupied the region surrounding western Belle Meade with primary settlements at Mound Key in Estero Bay and Pineland on Pine Island. By the mid 1800s, south Florida native Calusa tribes were decimated and replaced by Seminole Indians, an association of several tribes displaced from Georgia and north Florida.

Early inhabitants used Belle Meade's endemic plants and animals for substance living; however, with European arrival, commercial utilization of wildlife flourished. Through 1940, pelts, plumes and hides were items of commerce. Alligator, deer, raccoon and otter hides were harvested. Breeding plumes from egrets and herons were also harvested, and rookeries throughout south Florida were decimated to supply the fashion trade. Recreational hunting also occurred during early times; however, its impacts were likely minimal.

Euro-Americans settled in the area at the end of the 19th century. NBM is at the northwest boundary of the Big Cypress region and its wetlands limited development until recently. In the latter half of the 20th century additional commercial activities occurred. Cattle, timber, oil exploration and recreational hunting became important activities around interior Collier County.

Based on known patterns regarding the locations of archaeological sites in Collier County, it is likely that a significant number of archaeological sites are located in NBM (Addison and Lytton, 1992), However, since the area has not been completely surveyed, no sites have been recorded.

5. Natural Resource Management

Resource management includes all applied programs wherein activities manipulate, modify or control natural features within the project area. CSWCD will strive to manage and maintain lands associated with this project in an environmentally acceptable manner and, to the extent practicable, restore and protect in their natural

state and condition. Natural resource management goals and objectives for NBM clarify resource management guidelines necessary to fulfill the CSWCD's land stewardship responsibilities. In the future, land management activities in the NBMSA may consist of:

- Prescribed fire to mimic the natural fire frequency of NBM's fire-dependant natural communities [primarily pine flatwoods (3-10 year interval) and marsh systems (2-4 year interval)].
- Forestry practices and vegetation management using mechanical means, such as shredding or mowing overgrown understories near residential areas, may be employed.
- Wildlife management, including survey, trapping, and hunting programs.
- Invasive species control and eradication.
- Adaptive management which monitors the health of the natural communities and the impact of management practices on them.
- Restoration of sites that had previously been converted to other uses.
- When listed species are expected to occur on site, they will be monitored using the attached management plan.

5.1 Restoration Projects

Restoration of hydro periods will be examined and pursued as practicable. This will also allow water within the existing network of canals to be redirected to the historical watershed. Currently, much of the surface waters that historically hydrated the NBM wetlands and flowed south to Belle Meade proper, are captured by Golden Gate Main Canal and exit to Naples Bay. The Naples Bay system has been significantly impacted by the discharge of excessive freshwater to the system, degrading estuarine resources. Restoration efforts will focus on mechanisms to restore freshwater to the appropriate watersheds and alleviate some stress.

Restoration projects will be designed to restore areas to their original, pre-disturbed state, as practicable. For the Rural Fringe TDR Bonus parcels, when listed species are expected to occur on site, restoration will be for the benefit of listed species.

Before developing a management plan, CSWCD will perform a FLUCFCS evaluation and a Uniform Mitigation Assessment Methodology (UMAM) evaluation to compare the pre-development and post development considerations for quantity and potential for improvement. We are acutely aware of a potential loss of protection for a species and will continue to work to ensure that the management plans are developed adequately to cover local issues relevant to the management needs of the species.

5.2 Mitigation

Mitigation will play an important role inboth the NBM and in adjacent areas. North Golden Gate Estates was designated a regional mitigation area with CSWCD receiving mitigation funds to be used for land acquisition and restoration purposes.

5.3 Vegetation Management

Where practicable, an attempt shall be made to restore and maintain desirable vegetation to promote habitat diversity in areas where invasive exotic vegetation, grazing practices, or improved land uses have substantially altered the historic landscape. Mechanical equipment may be used in conjunction with prescribed burning and other management tools to control vegetation and restore habitat structure. Since there are currently no lands associated with this project, options in the land management toolbox will be evaluated as lands are acquired. When listed species occur on site, management will be prioritized for their needs using the attached management plan.

5.3.1 Mowing for Wildlife Benefits

In NBM, openings may be mowed every two to three years to maintain their structural integrity. Mowing is considered an alternative to prescribed bums when weather conditions or other constraints prohibit fire application.

Mowing can provide similar benefits as grazing and prescribed fire by suppressing woody plant growth and by encouraging grasses and low-growing herbs to produce new growth (Williams, 1991; Landers and Mueller, 1992). Mowing improves brood habitat conditions for wild turkeys by reducing dense understory vegetation in hardwood hammocks, as well as invasion of woody plants in grassy fields (Williams, 1991). Mowing also benefits rabbits by providing a supply of growing forage (Shame, 1990).

5.3.2 Exotic/Invasive Plants

Management practices will strive to identify existing infestations and implement appropriate control or eradication measures. Exotic plant control in all management areas shall strive to attain a level of success where periodic maintenance eliminates the infestation or reduces the coverage of exotic plants.

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

The NBMSA will target Category I and II non-native plant species as identified on the Exotic Pest Plant Council's biennially updated list of *Florida's Most Invasive Species* (http://www.fleppc.org/). Category I species include non-native plants that invade and disrupt Florida native plant communities. Category II plants have the potential to invade and disrupt natural successional processes. Both Category I and II exotics are considered invasive and a threat to the function and ecological stability of Florida's natural communities.

Invasive plant species have become established in portions of NBM, primarily colonizing disturbed sites. Brazilian pepper (Schinus terebinthifolius) and melaleuca (Melaleuca quinquenervia) are the most prevalent (The Conservancy of Southwest Florida, 2000). Control efforts will be initiated by CSWCD staff, consultants and/or contractors as lands are acquired, with timing based on the status of the adjacent parcels.

Invasive plant control activities will include a combination of herbicide application, prescribed fire and physical removal. Selection of control measures is dependent upon species type, environmental factors and natural communities impacted, including listed species habitat. All treatments will follow herbicide BMP's and use the best available science.

Herbicides utilized in the removal of prohibited exotic vegetation shall have been approved by the U.S. Environmental Protection Agency. When prohibited exotic vegetation is removed, but the base of the vegetation remains, the base shall be treated with an U.S. Environmental Protection Agency approved herbicide and a visual tracer dye shall be applied.

CSWCD will coordinate with Collier County Environmental Services as to management actions, exotic/invasive species to target for treatment, utilization of

persons with an FDACS Natural Areas Weed Management License, and to requirements of paragraph 3.05.08 of the LDC. Verification of prohibited exotic vegetation removal shall be performed by the development services director's field representative.

A maintenance plan shall be submitted to the development services director for review. This maintenance plan shall describe specific techniques to prevent reinvasion by prohibited exotic vegetation of the site in perpetuity and be implemented on a yearly basis at a minimum.

5.3.3 Rare, Threatened and Endangered Plant Species

Particular emphasis shall be placed on the identification, protection and management of rare, threatened and endangered species. Listed species are those plants and animals considered rare within a specific geographic area by the U.S. Fish and Wildlife Service (FWS), FFWCC, FNAI, and the Florida Department of Agriculture and Consumer Services (FDACS). A list of these species is annually updated and published by the FFWCC. A plant list will be developed for the NBMSA and included in future versions of the management plan.

Native vegetation shall be protected during the process of removing prohibited exotic vegetation, in accord with the provisions of paragraph 3.05 of the LDC.

At least 56 species that potentially occur in the NBMSA that are listed under federal and/or state guidelines as endangered; threatened, or commercially exploited:

Table 1: Potential Listed Plants Occurring in NBM

Common Name	Scientific Name	FDACS	FWS
Giant Leather Fern	Acrostichum danaeifolium	T	
Bird's Nest Spleenwort	Asplenium serratum	E	
Fakahatchee Burmannia	Burmannia flava	E	
Narrow Strap Fern	Campyloneurum angustifolium	E	
Strap Fern	Campyloneurum costatum	E	
Satinleaf	Chrysophyllum oliviforme	T	
Comb Fern	Ctenitis sloanei	E	
Comb Fern	Ctenitis submarginalis	E	
Blodgett's Swallowwort	Cynachum blodgettii	T	
Butterfly Orchid	Encyclia tampensis	C	
Clam-shell Orchid	Encyclia cochleata v. triandra	E	
Brown Epidendrum Orchid	Epidendrum anceps	E	
Night-blooming Orchid	Epidendrum nocturum	E	
Matted Epidendrum Orchid	Epidendrum rigidum	E	
Orchid	Harrisella filiformis	T	
Rocklands Morning Glory	1pomea tenuissima	E	
Englemann's Quillwort	lsoetes englemannii	E	
Licaria	Licaria triandra	E	
Sand Flax	Linum arenicola	E	
South Florida Flax	Linum cartetri v. smaffii	E	
Catesby's Lily	Lilium catesbaei	T	
Nodding Club Moss	Lycopodium cemuum	C	
Lowland Loosestrife	Lythrum flagellare	E	
Climbing Milkweed	Matelea gonocarpa	T	
Polypody Fern	Microgramma heterophylla	E	
Simpson's Stopper	Myrcianthes fragrans	T	

Giant Sword Fern	Nephrolepsis biserrata	T	
Hand Adder's Tongue	Ophioglossum palmatum	E	
Cinnamon Fern	Osmunda cinnamomena	C	
Royal Fern	Osmunda regalis	C	
Cypress Peperomia	Peperomia glabella	E	
Blue Butterwort	Pinguicula caerulea	T	
Snowy Orchid	Plantanthera nivea	T	
Everglades Poinsettia	Poinsettia pinetorum	E	
Hairy Jointweed	Polygonella ciliata v. basiramia	E	E
Widespread Polypody	Polypodium dispersum	E	
Plume Fern	Polypodium plumula	E	
Swamp Plume Polypody	Polypodium ptilodon	E	
Pale-Flowered Polystachya	Polystachya concreta	E	
Shadow Witch	Ponthieva racemosa	E	
Pink Azalea	Rhododendron canescens	C	
Parsley Fern	Sphenomeris clavata	E	
Small Ladies' Tresses	Spiranthes brevilabris v. floridana	E	
Long-Lipped Ladies' Tresses	Spiranthes lacinata	T	
Long-Lipped Ladies' Tresses	Spiranthes longilabris	T	
Tetrazygia	Tetrazygia bicolor	T	
Shield Fern	Thelypteris sclerophylla	E	
Aspindium Fern	Thelypteris serrata	E	
Bulbous Wild Pine	Tillandsia balbisiana	T	
Common Wild Pine	Tfflandsia fasciculata	E	
Stiff Wild Pine	Tillandsia flexulosa	T	
Giant Wild Pine	Tillandsia utriculata	E	
Soft Wild Pine	Tillandsia valenzuelana	T	
Florida Coontie	Zamia floridana	C	
Atamasco Rainlily	Zephyranthes atamasco	T	
Simpson's Rainlily	Zephyranthes simpsonii	T	

Several listed bromeliad species may occur in the NBMSA and may be threatened by the exotic Mexican weevil (Metamasius callizona) that has caused destruction of native bromeliads in other south Florida locations. Five species of once abundant bromeliads, Tillandsia, have been placed on the state's list of endangered and threatened plant species as a direct result of this weevil. CSWCD will conduct periodic surveillance of areas of potential infestations to assess management needs.

5.3.4 Forest Resources

Sustainable use of forest resources shall be conducted where these activities adhere to a series of environmental criteria (see 1999 Forest Management Plan). Timber contractors will be required to meet silviculture best management practices (BMP) developed for Florida forests

Timber sales will be conducted to improve forest health, health/safety issues, to support specific forest management goals and coordinated for the benefit of listed species. There are not sufficient forest resources to support a significant source of revenue--primarily wetland areas.

5.3.5 Range Resources

Range management and grazing will be considered on improved or native ranges when the introduction of cattle will not conflict with other natural resource management and public use goals. There are insufficient range resources to support a significant source of revenue--primarily wetland areas.

5.4 Prescribed Fire

Prescribed fire will be a primary management tool and will be applied within fire-maintained communities at appropriate intervals. Prescribed fire management will be assessed as lands are acquired. This could be an important tool for fuel reduction based on the proximity of these lands to residences.

The majority of natural communities rely on frequent fire to maintain their vegetative characteristics and biodiversity. Wildfires no longer occur with historical frequency or extent, and this has altered natural community structure and function. Prescribed fire attempts to mimic the benefits of natural wildfires that historically reduced fuel loads, recycled soil nutrients and maintained natural communities by inhibiting hardwood encroachment and stimulating fire-adapted plant growth.

5.4.1 Fire History

There is minimal anecdotal information on the incidence of past fire use in BM has varied. Past land uses range in intensity from agricultural practices, such as row crop farming, logging and ranching to idle, overgrown land like that found today in the centers of wetland systems. Most of the wet and mesic flatwoods, as well as the open marsh, were probably burned for improvement of cattle grazing.

5.4.2 Prescribed Fire Planning

A fire management plan will be developed for lands acquired in NBM. Each plan will include a description of location and natural community types, fire history, fire management objectives and constraints and a burn prescription. Fire frequency schedules for each natural community consider recommendations provided in The Natural Communities of Florida (FNAI, 1990). Natural firebreaks will be utilized where possible to promote historic fire patterns, avoid soil disturbance and reduce hydrologic flow disruption created by fire lines. Listed species life requirements and welfare are elements of prescribed fire planning. Application of fire, with appropriately timed herbicide treatments, is used as a tool for control of invasive plants.

Burns will be executed using proven safety measures as defined by the Prescribed Burning Act of 1990, F.S. 590.026. This legislation and associated administrative rules outlines accepted forestry bum practices and is administered through DOF. CSWCD plans to use staff trained in prescribed fire management and plans to rely on other CSWCD staff, as well as work with other cooperating agencies, i.e., DOF; Golden Gate Fire and Rescue District; Florida Panther and FFWCC to conduct bums in NBM.

CSWCD intends to contract with DOF to insure fire safety and burning efficiency and will plan, coordinate, oversee and manage activities associated with fire for the project area.

5.4.3 Wildfire Suppression

The DOF will be notified of all wildfires on CSWCD lands. DOF will provide initial suppression, when commensurate personnel and equipment are available. DOF will respond to, and if appropriate, begin suppression of area wild fires if necessary.

5.5 Wildlife Management

A primary objective in the management of NBM is to maintain healthy fish and wildlife populations. CSWCD will take the following actions into consideration based on the parcels acquired through this program:

- Performing land management activities that maintain and/or improve native wildlife habitat
- Conducting specific management beneficial to protected species based on periodic monitoring as described in the Species Monitoring Plan
- Conducting wildlife inventories where management activities may negatively impact listed species
- Following management guidelines for listed species protection—see reference section for current literature
- Reducing invasive species populations where appropriate
- Maintaining a master file of confirmed and potential wildlife species
- Cooperating with the FFWCC on wildlife management issues
- Using best snag management practices: removing snags only when they pose a safety hazard

5.5.1 Game Management

FFWCC regulations shall govern hunting in areas opened for such use.

5.5.2 Invasive Animal Species

Invasive animal species are those non-native species that are harmful to native wildlife, that negatively impact native vegetation or seriously interfere with management objectives. The CSWCD goal for invasive wildlife management is to reduce populations to attain an acceptable level of impact to natural plant and animal communities. The NBM land manager will use personal knowledge of the problem and consultation with the FFWCC to define the acceptable level of impact. When population control measures are warranted, land managers will consult with the FFWCC to determine appropriate control techniques that are cognizant of public safety and humane to the species. The effects of invasive species population control efforts are monitored by periodic site evaluations.

The feral hog has been a pest species within NBM, including its wetland habitats. Disturbance caused by this species negatively impacts natural communities and interferes with land management operations. Their high fecundity, adaptability and rooting behavior make them a potent, destructive force and environmental concern. Their disruption of soil and vegetation alter natural communities and can be especially damaging in sensitive habitats that are slow to recover. Land management objectives are affected when rooting disturbance disrupts prescribed bums by preventing the spread of fire. Areas of disturbed soil can also be more susceptible to exotic plant invasion. Rooting disruption can make perilous conditions on hiking trails, and hog foraging can have a detrimental impact on native reptile populations. Surveys and monitoring for invasive animal species will be planned as lands are acquired and as warranted.

5.5.3 Rare, Threatened and Endangered Animal Species

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

FFWCC has identified the area in and around NBM as a "Biodiversity Hotspot" and a "Priority Wetland for Listed Species" (Cox et al., 1994; Kautz et al., 1994). The natural communities within the project provide habitat for numerous bird, reptile, and mammal species, several of which are listed federally or by the state.

Impacts to these species from planned land management and recreational activities are of special concern. Activities that might jeopardize the well being of these species may be altered or cancelled. CSWCD land management activities including prescribed burning, hydrologic restoration, invasive vegetation management, understory control and selective forest thinning improve natural environmental characteristics that benefit listed species as well as a variety of other indigenous wildlife.

Wildlife management is the process of keeping certain wildlife populations, including endangered animals, at desirable levels determined by wildlife managers. Wildlife management is interdisciplinary, integrating science, mathematics, imagination, and logic. It deals with protecting endangered and threatened species and subspecies and their habitats, as well as with non-threatened agricultural pests and game species. Aldo Leopold, one of the pioneers of wildlife management, defined it as "the art of making land produce sustained annual crops of wildlife."

CSWCD's aim is to use the best available science to balance the needs of wildlife with our perception of the needs of people while taking into consideration ecological principles such as carrying capacity of the habitat, reforestation, predator control techniques such as trapping, re-introduction of species or hunting may also be used to help manage "desirable" or "undesirable" species.

If a habitat is to be maintained, it must include natural disturbances that are normally present, such as wildfire and grazing by wild animals. Fire is a natural phenomenon that is required for many ecological processes, such as the clearing of dead plant materials and the germination of some types of plant seeds. For this reason, controlled burns are sometimes implemented in areas where wildfire is suppressed. Using controlled burns and other techniques of habitat manipulation, wildlife management aims to maintain a diversity of successional stages, from the first pioneer species to the full array resident in the climax community.

Wildlife management sometimes involves enhancing keystone resources in the habitat, such as sources of food, water, and protection. Some examples of artificial enhancements to keystone resources include water sources, nest boxes for cavity-nesting birds, and salt licks to provide minerals to animals. CSWCD will employ custodial management techniques, i.e., preventive or protective. Our aim will be to minimize external influences on the population and its habitat. See Appendix F.

5.6 Monitoring

Periodic monitoring shall be conducted to identify landscape changes resulting from management activities, and to identify wildlife/protected species, location, and distribution on the area—See Restoration Management Plan Appendix.

Tracking environmental response to restoration projects provides valuable information on progress toward restoration objectives. Information obtained by monitoring

specific sites assists land managers in making sound ecological choices for each unique parcel.

CSWCD and private contractors will initiate vegetative monitoring on parcels acquired in NBM. This will provide baseline information for future studies and help determine the effects of future restoration projects in NBM. As part of this effort, initial photo points will be established in the acquired areas. Photos are taken from these points at least bi-annually to monitor ecological change over time. Four-direction photos will be taken quarterly with water level and canopy density recorded as well.

CSWCD will use TDR, mitigation and grant funds to finance hydrologic and habitat restoration projects associated with NBM, including the diversion of flows from Golden Gate Main Canal into their historical wetlands and watersheds. Specific projects will be identified as lands are secured for management and will be included in future management plan revisions.

CSWCD will monitor and document hydrologic and vegetative changes in NBM. Hydrologic monitoring data will be added to the SFWMD's DBHYDRO Browser internal website http://www.sfwmd.gov/. See Appendices E and G.

6. Public Use

Public use of management areas for appropriate resource-based activities shall be considered normal, except in rare instances where there is no legal public access or where lease restrictions prohibit public entry.

The NBMSA will be a patchwork initially. Public use will be assessed at the five-year period. A plan for compatible uses will be developed based on site conditions, restoration needs and natural resources. The determination of compatible public use will be based on the following criteria:

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

6.1 Nature Appreciation

Nature appreciation was identified as the primary potential activity accommodated on NBM. Nature appreciation includes wildlife viewing, nature photography, natural history study, and plant and wildflower identification. The flatwoods areas are a suitable location for these activities, as well as hiking and environmental education.

6.1.1 Environmental Education

Boundary and interpretive signage will be installed as parcels are acquired, as access points are established and as deemed necessary.

6.1.2 Hiking

Hiking trails may be established. These trails could provide seasonal access to a variety of habitats including hammocks, marshes and flatwoods.

6.2 Resource Protection

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

6.2.1 Resource protection shall be provided by professional law enforcement services through funded and unfunded contractual agreements to safeguard the public and protect natural and cultural resources on CSWCD managed lands.

Management of public activities on NBMSA lands will require a strong commitment to resource protection, while simultaneously promoting appropriate public uses. The LSP emphasizes the enforcement of pertinent rules and regulations to protect natural resources and also provide a safe recreational opportunity. CSWCD will develop relationships with Florida Fish and Wildlife Conservation Commission and Collier County Sheriff's Office to oversee lands deemed acceptable for public use activities.

Resource protection is also greatly enhanced by the presence and maintenance of continual, posted boundary signs that delineate CSWCD property boundaries. The NBM perimeter will be posted where entry is likely. Fencing will be addressed as necessary.

7. Planning and Budgeting

Planning is a major function of the TDR mission and is critical to maintain proper program focus, direction and coordination with other agencies. CSWCD will develop land acquisition strategies, project evaluations and coordinate acquisition planning with BCB and outside agency personnel, including Collier County government and private interests.

Since this is a new management area, this Plan will be updated annually for the first five years to reflect newly acquired parcels, then every five years thereafter to incorporate additional lands. This management plan has been developed in sufficient detail to establish initial strategies to guide management activities on individual project areas. As such the management plan defines goals and objectives, major management issues and describes management activities.

8. Annual Work Plan (AWP)

An AWP will be developed in conjunction with each fiscal year budget preparation to address activities and projects targeted for completion on individual properties. The AWP will include performance objectives for invasive plant control, vegetation management, prescribed burning, fencing, infrastructure maintenance, forest management, resource protection, public use development, environmental monitoring and contract administration.

9. Infrastructure:

Infrastructure support shall be developed and maintained to provide safe access for responsible management and public use on CSWCD lands. Such infrastructure may include access points, roads, trails, signs, utilities and minimal public facilities.

The development of adequate infrastructure for NBM public use and management activities will be explored on a case-by-case basis.

10. Personnel and Equipment

Management of NBM is the primary responsibility of CSWCD, in conjunction with the BCB and other partnerships that will develop as the project progresses.

10.1 Alternative Work Force

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

Section 373.1391(3), F.S. encourages the use of volunteers for land management and other services. CSWCD recognizes the merits of volunteerism and welcomes participation in activities appropriate for public involvement. Selection of appropriate management activities is at the discretion of the land manager and may fall under the general guidance of the supervising land manager. All volunteer activities will help accomplish management objectives, promote citizen involvement, and allow CSWCD staff to focus on other needs.

10.2 Contractual Management

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

Effective operation and management of TDR properties requires the services and cooperation of private organizations, other governmental agencies and volunteers. Contractual management is legalized through a management agreement signed by both the CSWCD and contracting entity with the document defining responsibilities of each party.

CSWCD plans to pursue management agreements to accomplished several goals associated with the NBMSA. The CSWCD has established and maintains several contractual management agreements to assist with MA management:

11. Management Review

CSWCD will invite professional peer review to evaluate compliance with the goals of the TDR program.

Appendix A: Reference

"Biodiversity Hotspots" are areas with a high degree of overlap for 54 declining species of wildlife plus known occurrences of rare flora, fauna, and natural communities (Cox et al., 1994).

"Priority Wetland for Listed Species" represents wetland habitats critical for 1-3 wetland-dependent species of vertebrates listed as endangered, threatened or species of special concern (Kautz et al., 1994).

“Florida Land Use, Cover and Forms Classification System” was created by the Florida Department of Transportation for statewide application, established Land cover codes for land use that are converted into index scores, e.g., palmetto prairie (FLUCFCS code 321) is included in Group 2 (with a index score of 0.3), while all other agricultural land types are in Group 3 (with an index score of 0.2).

“Natural Communities” provide habitat for numerous bird, reptile and mammal species.

“Nature Appreciation” includes wildlife viewing, nature photography, natural history study, and plant and wildflower identification.

“Transfer of Development Rights” programs rely on a number of concepts that may, at first, be difficult to understand. The most important concept is that physical ownership of land is legally distinct from the owner's rights of use concerning the land. As an example of this concept, you are probably aware that it is possible to purchase mineral rights, or the right to mine, on property that you do not own. A similar arrangement would be the purchase of an easement on one property to allow access to an adjacent property.

A TDR program relies on the concept that a landowner can sell specific development rights (in particular to residential development) to some third party. In order to implement a TDR program, certain areas are designated as "sending lands," while other areas are designated as "receiving lands." Individuals in sending lands are able to sell (or "send") certain development rights to individuals in receiving lands. The individual in the sending area gives up some part of the ability to develop his/her own property in return for payment. The individual in the receiving area gains the ability to develop his/her property in a fashion otherwise not allowed.

- Agricultural uses, such as farming, ranching, forestry, or bee keeping.
- Certain oil and mineral extraction and processing facilities, but excluding earth mining.
- Detached single-family dwelling units, at a density of 1 unit per 40 acres, or per approved lot or parcel, as applicable and including mobile homes in some instances.
- Essential services.
- Habitat preservation and conservation uses.
- Parks, open space and passive recreational uses.
- Public facilities, such as solid waste facilities, resource recovery facilities, and public vehicle/equipment storage and repair facilities are allowed in Section 25, Township 50, South, Range 26, East, in the vicinity of the existing county landfill.
- Sporting and recreational camps, as defined by the County Land Development Code.

- TDR Program is voluntary. Landowners in sending lands may opt to participate in the TDR program or not.

"DBHYDRO Browser" DBHYDRO is the South Florida Water Management District corporate environmental database which stores hydrologic, meteorologic, hydrogeologic, and water quality data. This corporate database is a one-stop source for all historical and up-to-date environmental data for the region covered by the District. The database includes the not only data from South Florida Water Management District but also data from other agencies such as United States Geologic Survey, National Oceanic and Atmospheric Administration, and Everglades National Park.

What kind of data is in DBHYDRO? DBHYDRO contains environmental data, such as surface and ground water levels and quality, flows, and hydrogeologic data it also stores additional information about sites, water control structures, and stations where data are collected. Accurate descriptions are available for most of the sites, giving the user information on the hydrologic basin, latitude, longitude, state plane coordinates, county, section, township, range, and many other useful attributes.

Black Bear Habitat Management Guidelines for Florida. 2001. Maehr, David S., T. S. Hoctor, L. J. Quinn, and J. S. Smith. FFWCC.

Status, Life History, and Management of Fox Squirrels in Florida. 1990. John B. Wooding. FFWCC.

Recovery Plan for the Red-Cockaded Woodpecker (Picoides borealis) Second Revision, 2005. USFWS.

Management Plan Red-Cockaded Woodpecker. 2003. FFWCC

Gopher Tortoise Management Plan. 2007. FFWCC

Downloaded a digital copy: http://myfwc.com/imperiledspecies/plans.htm

2.03.07 Overlay Zoning Districts

4. Transfer of development Rights (TDR).
a. Purpose, Intent and Applicability.
i. Purpose. The primary purpose of the TDR process is to establish an equitable method of protecting and conserving lands determined to have significant environmental value, including large connected wetland systems and significant areas of habitat for listed species; and
To provide a viable mechanism for property owners of such environmentally valuable lands to recoup lost value and development potential which may be associated with the application of environmental preservations standards to such lands.
ii. Intent . These TDR provisions are intended to accomplish the above stated purpose through an economically viable process of transferring development rights from less suitable non-RFMU sending areas and RFMU sending lands to more suitable non-RFMU receiving areas and RFMU receiving lands.
iii. Applicability . These TDR provisions shall be applicable to those areas specifically identified in (b), (c) and (d) below. These TDR provisions shall not be applicable to the any transfer of development rights within the RLSA District.

2.03.08 Eastern Lands/Rural Fringe Zoning Districts

A. Rural Fringe Mixed-Use District (RFMU District).

1. Purpose and scope. The purpose and intent of the RFMU district is to provide a transition between the Urban and Estates Designated lands and between the Urban and Agricultural/Rural and Conservation designated lands farther to the east. The RFMU district employs a balanced approach, including both regulations and incentives, to protect natural resources and private property rights, providing for large areas of open space, and allowing, in designated areas, appropriate types, density and intensity of development. The RFMU district allows for a mixture of urban and rural levels of service, including limited extension of central water and sewer, schools, recreational facilities, commercial uses and essential services deemed necessary to serve the residents of the RFMU district. The innovative planning and development techniques which are required and/or encouraged within the RFMU district were developed to preserve existing natural resources, including habitat for listed species, to retain a rural, pastoral, or park-like appearance from the major public rights-of-way, and to protect private property rights.

Appendix B: North Belle Meade Soils (USDA 1998)

Boca Fine Sand
This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 20 to 350 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 26 inches. The upper part of the subsurface layer is light gray, and the lower part is brown. The subsoil is dark grayish brown fine sandy loam to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

The natural vegetation consists mostly of South Florida slash pine, cabbage palm, saw palmetto, wax myrtle, chalky bluestem and pineland threeawn.

Chobee Limestone Soil
This level, very poorly drained soil is in cypress swamps and marshes. Individual areas are elongated and irregular in shape, and they range from 10 to 100 acres in size. The slope is 0 to 1 percent.

Typically, the surface layer of the Chobee Soil is black fine sandy loam to a depth of about 6 inches. The subsurface layer is black fine sandy loam to a depth of about 13 inches. The subsoil is mottled sandy clay loam to a depth of about 45 inches. The upper part of the subsoil is dark gray, and the lower part is gray. Limestone bedrock is at a depth of about 45 inches.

The natural vegetation consists of cypress, red maple, ferns, maidencane and other wetland plants.

Chobee, Winder and Gator Soil
These level, very poorly drained soils are in depressions and marshes. Individual areas are circular or elongated in shape, and they range from 5 to 200 acres in size. The slope is 0 to 1 percent.

Typically, the Chobee soil has a surface layer of black fine sandy loam about 13 inches thick. The subsoil is mottled sandy clay loam to a depth of about 47 inches. The upper part of the subsoil is dark gray, and the lower part is gray. The substratum is dark greenish gray and gray fine sandy loam to a depth of about 80 inches.

Typically, the Winder soil has a surface layer of dark gray fine sand about 5 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 15 inches. The subsoil extends to a depth of about 50 inches. The upper part of the subsoil is gray fine sandy loam, the next part is gray sandy clay loam, and the lower part is dark gray sandy clay loam. The substratum is white fine sandy loam to a depth of about 80 inches.

Typically, the Gator soil has a surface soil of black muck about 25 inches thick. The substratum is very dark gray, grayish brown, greenish gray, and light gray fine sandy loam to a depth of about 80 inches.

The natural vegetation consists of pickerelweed, maidencane, rushes, fireflag, sawgrass, Florida willow and a few cypress trees.

Ft. Drum and Malabar Fine Sand

These nearly level, poorly drained soils are on ridges along sloughs. Individual areas are elongated and irregular in shape, and they range from 10 to 200 acres in size. The slope is 0 to 2 percent.

Typically, the Ft. Drum soil has a surface layer of very dark grayish brown fine sand about 5 inches thick. The subsoil is fine sand to a depth of about 20 inches. The upper part of the subsoil is light brownish gray, and the lower part is light gray. The substratum is fine sand to a depth of about 80 inches. The upper part of the substratum is brownish yellow, the next part is white, and the lower part is brown.

Typically, the Malabar, high, soil has a surface layer of dark gray fine sand about 2 inches thick. The subsurface layer is a light brownish gray fine sand to a depth of about 15 inches. The subsoil extends to a depth of about 72 inches. The upper part of the subsoil is brownish yellow and yellow fine sand, the next part is very pale brown and light gray fine sand, and the lower part is grayish brown, mottled sandy clay loam. The substratum is light gray fine sand to a depth of about 80 inches.

The natural vegetation consists mostly of South Florida slash pine, saw palmetto, live oak, cabbage palm, wax myrtle, chalky bluestem, creeping bluestem, low panicum and pineland threeawn.

Hallandale and Boca Fine Sand
These nearly level, poorly drained soils are in sloughs and poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 20 to 600 acres in size. The slope is 0 to 2 percent.

Typically, the Hallandale soil has a surface layer of very dark gray fine sand about 4 inches thick. The subsurface layer is grayish brown fine sand to a depth of about 9 inches. The subsoil is yellowish brown fine sand to a depth of about 12 inches. Limestone bedrock is at a depth of about 12 inches.

Typically, the Boca soil has a surface layer of very dark gray fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 26 inches. The upper part of the subsurface layer is light gray, and the lower part is brown. The subsoil is dark grayish brown fine sandy loam to a depth of about 30 inches. Limestone bedrock is at a depth of about 30 inches.

The natural vegetation consists of scrub cypress, sand cordgrass, wax myrtle and maidencane.

Hallandale Fine Sand
This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 20 to 1,000 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 3 inches thick. The subsurface layer is grayish brown fine sand to a depth of about 9 inches. The subsoil is yellowish brown fine sand to a depth of about 12 inches. Limestone bedrock is at a depth of about 12 inches.

The natural vegetation consists of South Florida slash pine, saw palmetto, creeping bluestem, chalky bluestem and pineland threeawn.

Hilolo Limestone Soil

This nearly level, poorly drained soil is on hammocks and flatwoods. Individual areas are elongated and irregular in shape, and they range from 5 to 600 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is very dark grayish brown fine sand about 9 inches thick. The subsurface layer is dark grayish brown fine sand to a depth of about 12 inches. The subsoil extends to a depth of about 50 inches. The upper part of the subsoil is light brownish gray fine sandy loam, the next part is a light gray sandy clay loam and fine sandy loam, and the lower part is gray fine sandy loam. The substratum is light olive gray loam fine sand to a depth of about 61 inches. Limestone bedrock is at a depth of about 61 inches.

The natural vegetation consists mostly of cabbage palm, saw palmetto, chalky bluestem, broomsedge bluestem, scattered areas of water oaks and pineland threeawn.

Holopaw Fine Sand
This nearly level, poorly drained soil is in sloughs and poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 10 to 400 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 5 inches thick. The subsurface layer is a fine sand to a depth of about 52 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 62 inches. The upper part of the subsoil is dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam. The substratum is gray loamy fine sand to a depth of about 80 inches.

The natural vegetation consists of scattered areas of South Florida slash pine, cypress, cabbage palm, saw palmetto, wax myrtle, sand cordgrass, gulf muhly, panicums, chalky bluestem, plumgrass, gulf dune paspalum and blue maidencane.

Holopaw Limestone Soil
This nearly level, poorly drained soil is in sloughs and broad, poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 20 to 300 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 5 inches thick. The subsurface layer is a fine sand to a depth of about 57 inches. The upper part of the subsurface layer is white, and the lower part is light gray and dark grayish brown. The subsoil extends to a depth of about 62 inches. It is dark grayish brown fine sandy loam. Limestone bedrock is at a depth of about 62 inches.

The natural vegetation consists of scattered areas of South Florida slash pine, cypress, cabbage palm, saw palmetto, wax myrtle, sand cordgrass, chalkly bluestem and gulf muhly.

Immokalee Fine Sand
This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 10 to 500 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer is light gray fine sand to a depth of about 35 inches. The subsoil is fine sand to a depth of about 58 inches. The upper part of the subsoil is black, the next part is dark reddish brown, and the lower part is dark brown. The substratum is pale brown fine sand to a depth of about 80 inches.

The natural vegetation consists of South Florida slash pine, saw palmetto, wax myrtle, chalkly bluestem, creeping bluestem and pineland threeawn.

Malabar Fine Sand

This nearly level, poorly drained soil is in sloughs and broad, poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 10 to 250 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 2 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 15 inches. The subsoil extends to a depth of about 72 inches. The upper part of the subsoil is brownish yellow and yellow fine sand, the next part is very pale brown and light gray fine sand, and the lower part is grayish brown, mottled sandy clay loam. The substratum is light gray fine sand that has 10 percent shell fragments to a depth of about 80 inches.

The natural vegetation consists of scattered areas of South Florida slash pine, cypress, cabbage palm, saw palmetto, wax myrtle, pineland threeawn and chalkly bluestem.

Oldsmar Fine Sand

This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 20 to 450 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark grayish brown fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 35 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 80 inches. The upper part of the subsoil is black fine sand, the next part is very dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam.

The natural vegetation consists mostly of South Florida slash pine, cabbage palm, saw palmetto, wax myrtle, chalky bluestem and pineland threeawn.

Oldsmar Limestone Soil

This nearly level, poorly drained soil is on flatwoods. Individual areas are elongated and irregular in shape, and they range from 10 to 300 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark grayish brown fine sand about 4 inches thick. The subsurface layer is fine sand to a depth of about 35 inches. The upper part of the subsurface layer is light gray, and the lower part is light brownish gray. The subsoil extends to a depth of about 60 inches. The upper part of the subsoil is black fine sand, the next part is very dark grayish brown fine sand, and the lower part is dark grayish brown fine sandy loam. Limestone bedrock is a depth of about 60 inches.

The natural vegetation consists mostly of cabbage palm, South Florida slash pine, saw palmetto, wax myrtle and chalky bluestem.

Pennsucco Silt Loam

This level, poorly drained soil is on low prairies. Individual areas are elongated and irregular in shape, and they range from 20 to 300 acres in size. The slope is 0 to 1 percent.

Typically, the surface layer is very dark gray silt loam about 5 inches thick. The subsoil is dark gray silt loam to a depth of about 40 inches. The substratum is grayish brown fine sand to a depth of about 48 inches. Limestone bedrock is at a depth of about 48 inches.

The natural vegetation consists of sawgrass, reeds, scattered areas of cypress, maidencane, needlegrass, sedges, wax myrtle and other wetland plants.

Pineda Fine Sand
This nearly level, poorly drained soil is in sloughs and broad, poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 20 to 300 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is dark grayish brown fine sand about 4 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 12 inches. The subsoil extends to a depth of about 55 inches. The upper part of the subsoil is brownish yellow and very pale brown fine sand, the next part is grayish brown sandy clay loam, and the lower part is light brownish gray and dark grayish brown fine sandy loam. Limestone bedrock is at a depth of about 55 inches.

The natural vegetation consists of South Florida slash pine, wax myrtle, chalkly bluestem, blue maidencane and gulf muhly.

Riviera Fine Sand
This nearly level, poorly drained soil is in sloughs and broad, poorly defined drainageways. Individual areas are elongated and irregular in shape, and they range from 25 to 500 acres in size. The slope is 0 to 2 percent.

Typically, the surface layer is gray fine sand about 6 inches thick. The subsurface layer is fine sand to a depth of about 32 inches. The upper part of the subsurface layer is light brownish gray, and the lower part is light gray. The subsoil is sandy clay loam to a depth of about 54 inches. The upper part of the subsoil is grayish brown, and the lower part is dark gray. Limestone bedrock is at a depth of about 54 inches.

The natural vegetation consists of scattered areas of South Florida slash pine, cypress, cabbage palm, wax myrtle, sand cordgrass, gulf muhly, blue maidencane, South Florida bluestem and chalky bluestem.

Appendix C: North Belle Meade Sending Area Natural Communities (FNAI 1990)

Cypress

Strand Swamp - (synonyms: cypress strand, stringer). Strand Swamps are shallow, forested, usually elongated depressions or channels dominated by bald cypress. They are generally situated in troughs in a flat limestone plain. Typical plants include red maple, laurel oak, cabbage palm, strangler fig, red bay, sweet bay, coastal plain willow, wax myrtle, myrsine, buttonbush, royal palm, poison ivy, swamp lily, leather fern, royal fern, sawgrass, swamp primrose, water hyssop, floating heart, dotted smartweed, and arum. Canopy plants are mainly temperate, while understory and epiphytic plants are mainly tropical. Small young trees at the outer edge of Strand Swamps grade into large old ones in the interior, giving a strand a distinctly rounded cross-sectional profile. Typical animals include ribbon snake, cottonmouth, opossum, gray squirrel, black bear, raccoon, mink, otter, Florida panther, and white-tailed deer.

Strand Swamp soils are peat and sand over limestone. The best developed forests are on deep peat that acts as a wick to draw moisture from groundwater up into the root zone during droughts. The normal hydroperiod is 200-300 days with a maximum water depth of 18 to 30 inches. Water is deepest and remains longest near the center where the trees are biggest.

Fire occurs in Strand Swamps on a cycle of perhaps 30 to 200 years, with the largest trees on the deepest peat towards the center of the strand burning least frequently. Fire is essential for maintenance of this natural community; without fire, hardwood invasion and peat accumulation would convert the strand to Bottomland Forest in a few hundred years. Cypress is very tolerant of light surface fires, but muck fires burning into the peat can kill the trees, lower the ground surface, and transform a Strand into a Slough.

The classic examples of Strand Swamp, those with tropical species, occur mainly in Collier County, Florida, where the Fakahatchee Strand is perhaps the finest example. Strand Swamps also occur in other areas of the southeastern coastal plain. Strand Swamps are extremely vulnerable to local, as well as regional, hydrological modifications. Most Strands were heavily disturbed by logging but many have recovered well and there are a few small strands that are thought to be virgin.

Swamp Forest

Basin Swamp - (synonyms: gum swamp, bay, bayhead, swamp). Basin Swamp is generally characterized as a relatively large and irregularly shaped basin that is not associated with rivers, but is vegetated with hydrophytic trees and shrubs that can withstand an extended hydroperiod.

Dominant plants include blackgum, cypress, and slash pine. Other typical plants include red maple, swamp redbay, sweetbay magnolia, loblolly bay, Virginia willow, fetterbush, laurel greenbrier, Spanish moss, wax myrtle, titi, sphagnum moss, and buttonbush. Typical animals include southern dusky salamander, cricket frog, little grass frog, chicken turtle, striped mud turtle, ringneck snake, scarlet kingsnake, crayfish snake, cottonmouth, wood duck, hawks, turkey, great horned owl, barred owl, pileated woodpecker, songbirds, gray squirrel, black bear, raccoon, mink, river otter, bobcat, and white-tailed deer.

Soils in Basin Swamps are generally acidic, nutrient poor peats, often overlying a clay lens or other impervious layer. The resulting perched water table may act as a reservoir releasing groundwater as adjacent upland water tables drop during drought periods. The typical hydroperiod is approximately 200-300 days. 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.

Infrequent fire is essential for the maintenance of cypress dominated Basin Swamps. Blackgum and hardwood dominated Basin Swamps burn less often, while pine dominated Basin Swamps burn more frequently. Without fire, hardwood invasion and peat accumulation will eventually create a Bottomland Forest or Bog. Typical fire intervals in Basin Swamps may be anywhere from 5 to 150 years. Cypress and pines are very tolerant of light surface fires, but muck fires burning into the peat can kill the trees, lower the ground surface, and transform a swamp into a pond or lake.

Small Basin Swamps may be difficult to distinguish from large Dome Swamps. Basin Swamps are often associated with, and may grade into, Wet Flatwoods, Hydric Hammock, or Bottomland Forest. The species composition of Basin Swamps frequently overlaps with Floodplain Swamp, Strand Swamp, and Baygall.

Like other wetland communities, normal hydroperiods must be maintained in Basin Swamps. If water levels must be artificially manipulated, somewhat deeper than normal water is not likely to do much harm, but extended hydroperiods will limit tree growth and prevent reproduction. Shortened hydroperiods will permit invasion of mesophytic species and change the character of the understory or will allow a devastating fire to enter which would drastically alter the community. Occasional fires are necessary to maintain the cypress and pine components.

Basin Swamps are unsuitable for construction because of their extended hydroperiods and peaty soils. Most have been degraded by timber harvests, and many have been drained or polluted. Thus, very few pristine examples of Basin Swamp communities exist. Those that remain should be adequately protected and properly managed.

Mesic Hammock

Mesic Hammock - (new community added 4/4/05 – modified 4/14/05 - Ann F. Johnson) is a hardwood forest community of open or closed canopy dominated by live oak (*Quercus virginiana*), with cabbage palm (*Sabal palmetto*) often present in the canopy and subcanopy.

Epiphytes (ferns orchids and bromeliads) are often found and may become abundant in undisturbed stands. The shrubby understory may be dense or open, tall or short and is composed of saw palmetto (*Serenoa repens*), beautyberry (*Callicarpa americana*), and wax myrtle (*Myrica cerifera*), with the addition of tropical shrubs, such as nakedwood (*Myrcianthes fragrans*) and wild coffee (*Psychotria nervosa*), in the south. The herb layer is often sparse or patchy and consists of various grasses, including low panic grasses (*Dichanthelium* spp.), basket grass (*Oplismenus hirtellus*) and sedges. Mesic hammock usually occurs as fringes or small patches on the borders of, or in higher parts of, rivers, swamps, marshes, and large lakes, and ranges from central and south Florida (Polk to Dade and Collier counties) northward along the Atlantic and Gulf coasts to North Carolina and Texas.

Soils are sand mixed with organic matter and are normally dry underfoot. It is distinguished from prairie hammock by its situation bordering wetlands in an upland landscape, rather than on rises in a marshy, wetland landscape; it differs from hydric hammock in the absence of wetland trees such as sweetbay (*Magnolia virginiana*) and black gum (*Nyssa biflora*), and from xeric hammock in the absence of sand live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*) and other scrub species. It is distinguished from maritime hammock by its inland occurrence on non-dune substrates and from upland hardwood and upland mixed forests to the north by its low species diversity and lack of many

characteristic deciduous broad-leaved trees in the canopy and subcanopy, such as *Quercus michauxii, Carpinus caroliniana*, and *Cornus florida,* as well as by its occurrence on sandy soils in contrast to the loamy or clay-based soils on which upland forests occur. It is found primarily in Florida where its area may be between 100,000 and 500,000 acres, although this is difficult to estimate since it occurs as scattered small stands or fringing borders in a matrix of dry prairie, mesic flatwoods, floodplain marshes, or hydric hammock. Examples may be found around large lakes in Osceola and Polk counties, and along the St Johns River marshes.

Mesic Flatwoods

Mesic Flatwoods - (synonyms: pine flatwoods, pine savannahs, pine barrens). Mesic Flatwoods are characterized as an open canopy forest of widely spaced pine trees with little or no understory, but a dense ground cover of herbs and shrubs. Several variations of Mesic Flatwoods are recognized, the most common associations being longleaf pine - wiregrass - runner oak and slash pine - gallberry - saw palmetto. Other typical plants include: St. Johns-wort, dwarf huckleberry, fetterbush, dwarf wax myrtle, stagger bush, blueberry, gopher apple, tar flower, bog buttons, blackroot, false foxglove, white-topped aster, yellow-eyed grass, and cutthroat grass. Typical animals of Mesic Flatwoods include: oak toad, little grass frog, narrowmouth toad, black racer, red rat snake, southeastern kestrel, brown-headed nuthatch, pine warbler, Bachman's sparrow, cotton rat, cotton mouse, black bear, raccoon, gray fox, bobcat, and white-tailed deer.

Mesic Flatwoods occur on relatively flat, moderately to poorly drained terrain. The soils typically consist of 1-3 feet of acidic sands generally overlying an organic hardpan or clayey subsoil. The hardpan substantially reduces the percolation of water below and above its surface. During the rainy season, water frequently stands on the hardpan's surface and briefly inundates much of the flatwoods; while during the drier seasons, groundwater is unobtainable for many plants whose roots fail to penetrate the hardpan. Thus, many plants are under the stress of water saturation during the wet season and under the stress of dehydration during the dry season. Another important physical factor in Mesic Flatwoods is fire, which probably occurred every 1 to 8 years during pre-Columbian times. Nearly all plants and animals inhabiting this community are adapted to periodic fires; several species depend on fire for their continued existence. Without relatively frequent fires, Mesic Flatwoods succeed into hardwood-dominated forests whose closed canopy can essentially eliminate the ground cover herbs and shrubs.

Additionally, the dense layer of litter that accumulates on unburned sites can eliminate the reproduction of pines which require a mineral soil substrate for proper germination. Thus, the integrity of the Mesic Flatwoods community is dependent on periodic fires. However, fires that are too frequent or too hot would eliminate pine recruitment and eventually transform Mesic Flatwoods into Dry Prairie.

Mesic Flatwoods are closely associated with and often grade into Wet Flatwoods, Dry Prairie, or Scrubby Flatwoods. The differences between these communities are generally related to minor topographic changes. Wet Flatwoods occupy the lower wetter areas, while Scrubby Flatwoods occupy the higher drier areas.

Mesic Flatwoods are the most widespread biological community in Florida, occupying an estimated 30 to 50% of the state's uplands. However, very few undisturbed areas of Mesic Flatwoods exist because of habitat mismanagement and silvicultural, agricultural, or residential development. Mesic Flatwoods are often fairly resilient, and with proper management they can generally be restored.

Hydric Flatwoods

Wet Flatwoods - (synonyms: low flatwoods, moist pine barren, hydric flatwoods, pond pine flatwoods, pocosin, cabbage palm/pine savannah or flatwoods). Wet Flatwoods are characterized as relatively open-canopy forests of scattered pine trees or cabbage palms with either thick shrubby understory and very sparse ground cover, or a sparse understory and a dense ground cover of hydrophytic herbs and shrubs. Several variations exist between these extremes. Typical plants include pond pine, slash pine, sweetbay, spikerush, beakrush, sedges, dwarf wax myrtle, gallberry, titi, saw palmetto, creeping beggarweed, deer tongue, gay feather, greenbrier, bluestem, and pitcher plants. Typical animals include oak toad, cricket frog, chorus frog, black racer, yellow rat snake, diamondback rattlesnake, pygmy rattlesnake, red-shouldered hawk, bobwhite, opossum, cottontail rabbit, cotton rat, cotton mouse, raccoon, striped skunk, bobcat, and white-tailed deer.

Wet Flatwoods occur on relatively flat, poorly drained terrain. The soils typically consist of 1 to 3 feet of acidic sands generally overlying an organic hardpan or clay layer. Cabbage palm flatwoods tend to occur on more circumneutral sands (pH 6.0 - 7.5) underlain by marl or shell beds. The hardpan substantially reduces the percolation of water below and above its surface. During the rainy season, water frequently stands on the surface, inundating the flatwoods for 1 or more months per year. During the drier seasons, ground water is less accessible for many plants whose roots fail to penetrate the hardpan. Thus, many plants are under the stress of water saturation during the wet season, and under the stress of dehydration during the dry season.

Another important physical factor in Wet Flatwoods is fire. Natural fires probably occurred every 3 to 10 years during pre-Columbian times. Nearly all plants and animals inhabiting this community are adapted to periodic fires, and several species depend on fires for their continued existence. Without relatively frequent fires, Wet Flatwoods succeed into hardwood dominated forests whose closed canopy would essentially eliminate the ground cover herbs and shrubs. In fact, much of the variation in community structure is probably associated with fire frequency. Thus, the longer the period of time since the last fire, the more developed will be the understory shrubs. If the understory is allowed to grow for too long, the accumulation of needle drape and the height of flammable understory shrubs will increase the probability of a catastrophic canopy fire.

Wet Flatwoods are closely associated with and often grade into Hydric Hammock, Mesic Flatwoods, Wet Prairie, or Basin Swamp. Wet Flatwoods may also grade into Dome Swamp or
Strand Swamp, but the absence of a Wet Prairie ecotone suggests that the hydrology has been disturbed.

Although Wet Flatwoods may have been an abundant biological community of the Coastal Plain at one time, examples with an intact overstory and understory, without exotics, and with the potential for future maintenance by fire are rare. They are relatively resilient to overstory damage but recover poorly when the ground cover or hydrology has been disturbed.
Wet Flatwoods are vulnerable to disruptions of fire and hydrological regimes. Exotic plants readily invade Wet Flatwoods in south Florida and must be controlled promptly.

<u>Wet Prairie</u>
Wet Prairie - (synonyms: sand marsh, savannah, coastal savannah, coastal prairie, pitcher plant prairie). Wet Prairie is characterized as a treeless plain with a sparse to dense ground cover of grasses and herbs, including wiregrass, toothache grass, maidencane, spikerush, and beakrush.

Other typical plants include hatpins, marsh pinks, crownbeard, sundews, black-eyed susan, stargrass, white-top sedge, meadowbeauty, yellow-eyed grass, sneezeweed, sunflower, wax myrtle, pitcher plants, tickseed, St. John's wort, and panicums. Typical animals include cricket frog, chorus frog, little grass frog, black racer, yellow rat snake, cottonmouth, pygmy rattlesnake, northern harrier, caracara, southeastern kestrel, killdeer, long-billed marsh wren, red-winged blackbird, marsh rabbit, cotton rat, and cotton mouse.

Wet Prairie occurs on low, relatively flat, poorly drained terrain of the coastal plain. Soils typically consist of sands often with a substantial clay or organic component. The most important physical factors are hydrology and fire. Wet Prairie is seasonally inundated or saturated for 50 to 100 days each year and burns every 2 to 4 years. Wax myrtle quickly invades and will dominate Wet Prairies with longer fire intervals. In south Florida, melaleuca invasions can seriously impact Wet Prairies. Generally, Wet Prairies have a much shorter hydroperiod than other herbaceous wetlands and are subject to regular and prolonged desiccation during the dry season due to their flat topography.

Wet Prairie is closely associated with and often grades into Wet Flatwoods, Depression Marsh, Seepage Slope, Mesic Flatwoods, or Dry Prairie. Several other biological communities have somewhat similar species compositions or overlap in characteristics, including Swale, Seepage Slope, Basin Marsh, Floodplain Marsh, and Marl Prairie. Wet Prairies were probably common throughout the Coastal Plain at one time. Few good quality, intact examples remain and some types, e.g. pitcher plant prairies, are becoming increasingly rarer. Wet Prairie is vulnerable to hydrological and fire regime alterations, overgrazing, and soil disturbances by off-road vehicles. Recovery from disturbances is often poor and slow.

Appendix D: Abbreviations

Annual Work Plan (AWP)

Big Cypress Basin (BCB)

Coastal Management Element (CME)

Collier Soil and Water Conservation District (CSWCD)

Division of Forestry and the US Army Corps of Engineers (USACOE)

Fish and Wildlife Conservation Commission (FFWCC)

Florida Department of Agriculture & Consumer Services (FDACS)

Florida Division of Forestry (DOF)

Florida Land Use, Cover and Forms Classification System (FLUCFCS)

Florida Natural Areas Inventory (FNAI)

Florida Plant Council (FPPC)

Florida Statutes (F.S.)

Growth Management Plan (GMP)

Land Development Code (LDC)

National Geodetic Vertical Datum (NGVD)

Natural Resource Conservation Service (NRCS)

North Belle Meade (NBM)

North Belle Meade Sending Area (NBMSA)

Rural Fringe Mixed Use (RFMU)

South Florida Water Management District (SFWMD)

Transfer of Development Rights (TDR)

U.S. Fish and Wildlife Service (FWS)

Universal Mitigation Assessment Methodology (UMAM)

Watershed Management Program (WMP)

Appendix E: Restoration Management Plan Example

1.0 Location and Description

2.0 Purpose

3.0 Florida Land Use, Land Cover Classification System (FLUCCS) Evaluation. See Appendix A.

4.0 Universal Mitigation Assessment Method (UMAM) designation. See Appendix B.

5.0 Landowner Obligations:

5.1.1 To complete the prescribed practice(s) in accordance with the monitoring plan
5.1.2 To assume responsibility for securing required permits
5.1.3 To maintain the habitat and measure improvement in perpetuity

6.0 Treatment--Summary

6.1.1 Prescribed Burning
6.1.2 Vegetation

6.1.3 Endangered Species

7.0 Exotic Plant and Endangered Species Monitoring Field Sheets—See Appendix C.

8.0 Appendices:

8.1 Appendix A-- Florida Land Use, Land Cover Classification System Evaluation
8.2 Appendix B-- Universal Mitigation Assessment Method Designation
8.3 Appendix C--Exotic Plant and Endangered Species Monitoring Field Sheets

Figure 1: Example Restoration and Management Plan
Figure 2: North Belle Meade Sending Area Survey/Monitoring Guidelines

Example Restoration and Maintenance Plan (RMP)

CRITERIA

I. General Criteria Applicable to All Purposes

The method(s) of prescribe burning, to improve habitat structure and composition for species at risk, shall be determined by the assigned biologist conducting the Needs Assessment. Application of the prescribed treatment will be based on the GIS analysis, site examination, and featured species or species groups. The landowner shall obtain all necessary permits before implementation of the practice. Planning and application shall comply with all applicable Federal, State, and local laws, rules and regulations. The procedure, equipment, and the number of trained personnel shall be adequate to accomplish the intended purposes as stated in the burn plan. The expected weather conditions, human and vehicular traffic that may be impeded by heat or smoke, liability, e.g., utility lines and safety and health precautions shall be integrated into the timing, location and expected intensity of the burn. Timing of burning will be commensurate with soil and site conditions to maintain site productivity and minimize effects on soil erosion and soil properties (structure, soil moisture). Firebreak construction and maintenance are not included as a cost-shared treatment.

II. Specific Criteria to Improve Listed Species Habitat

The appropriate season of burning, burning technique, burning frequency, and size of burn shall be selected based on the wildlife habitat needs and site limitations.

Where practical, prescribed burns shall be planned and applied in a manner that creates a "patchy" mosaic of burned and unburned vegetation. Conditions with higher relative humidity and soil moisture are likely to assist in creating a patchy burn.

III. Specific Criteria to Control Undesirable Vegetation

Prescribed burns to control brush or other undesirable vegetation shall consider the anticipated seed production and re-sprouting response of the target specie(s).

The frequency and intensity of the planned burn shall be based on the re-growth of the target species, weighed against forage and/or wildlife habitat considerations. Prescribed burns planned for areas with known infestations of noxious and/or non-invasive species shall address the anticipated response of those species during and following the prescribed burn. Re-establishment of native vegetation Shall be planned for burned areas where re-establishment is needed to prevent encroachment of undesirable plants, control soil erosion, and restore historic plant communities as a means to restoring habitat beneficial to species at risk.

IV. Specific Criteria to Improve Native Plant Production Quantity and/or Quality Prescribed burns shall be planned to provide optimum benefit to the native plant species of concern. When possible, prescribed burns shall be conducted during periods of adequate soil moisture for plant recovery following the burn. Appropriate protection from livestock, human, and wildlife activities shall be implemented to allow the vegetation to recover from the stress of the burn. Burned areas shall be protected until the vegetation has recovered sufficiently to allow use to be restored.

CONSIDERATIONS

Consideration must be given to maintaining existing habitat for species at risk. The site preparation method should be cost effective and protect threatened and endangered species, cultural resources, wildlife habitat, water resources, and identified unique areas. Attention should also be given to soil productivity, preventing erosion, and conserving unique vegetative communities. Visual quality objectives should be considered when selecting site preparation methods. Anticipate possible off-site effects and modify the site preparation design accordingly. Consider personal safety during site preparation activities. Where practical, the season, frequency, and intensity of prescribed burning should mimic the natural occurrence of fire typical of the ecological sites being managed. Consider the use of existing barriers such as lakes, streams, wetlands, roads, and constructed firebreaks in the design and layout of this practice. To minimize carbon release and associated smoke management problems reduce the amount of fuel to be burned, delay burning until acceptable weather conditions exist, alter the method of burn and intensity of the burn, and complete the burn as quickly as possible.

OPERATION AND MAINTENANCE

The following actions shall be carried out to ensure that this practice functions as intended throughout its expected life, these actions include normal repetitive activities in application and use of the practice (operation), and repair and upkeep of the practice (maintenance): Evaluations to determine if the stated objectives were met and to improve coordination of future burns. Initial evaluations should be conducted within 2 weeks following the burn. Long-term evaluations should be conducted during or after the first growing season following the burn. Items to consider in the evaluation include:

a. Were the pre-burn preparations properly completed?
b. Were the initial objectives met?
c. Was the burn prescription followed?
d. Were deviations from the burn prescription documented?
e. Was the burning technique(s) adequate to meet the planned objectives? Were weather conditions, fire behavior, and smoke

dispersion within the planned limits of the prescription?

g. What were the effects on the soil, vegetation, water, and wildlife resources?
h. Did the lire escape the planned area?
i. How could future burns be improved?
j. Were the post burn activities, e.g., grazing deferment, re-planting, etc., applied correctly to meet the stated purpose or objective(s) of the burn?

Florida Panther (Puma concolor)

Photo

Description: A large (70 - 150 lbs. = 32 - 68 kg) cat with a long tail. Fur is dark buff to tawny above and light huff to white below; muzzle and tip of tail are black. The head is broad, and ears are round. Typical track shows four clawless toe pads around a three-lobed heel pad. Defining characteristics of the subspecies are a dorsal hair whorl, a crook in the tail, and white flecking on the .neck and shoulders.

Similar Species: Bobcat *(Lynx ryfits)* has a short tail and is approximately half the size of a Florida. panther. Western cougars (panthers, pumas; different subspecies) occasionally escape captivity or have been released and can be mistaken far Florida panthers; defining characteristics listed. above may be unreliable in distinguishing these close relatives.

Habitat: Requires extensive blocks of mostly forested communities. Large wetlands that are generally inaccessible to humans are important for diurnal refuge. Will tolerate improved areas in a mosaic of natural communities.

Seasonal Occurrence: Year-round resident.

Florida Distribution: Collier, Glades and Lee counties are the stronghold for the Florida panther; Miami-Dade and Monroe counties are also important. Dispersing individuals may range well north in the peninsula searching for new territories.

Range-wide Distribution: Subspecies formerly found throughout the southeastern U.S. from Arkansas and. Louisiana east to Georgia and. south to Florida.

Conservation Status: Found. on several public conservation lands, including Big Cypress National Preserve, Florida Panther National Wildlife Refuge, Fakahatchee State Park, Picayune Strand State Forest, and Everglades National Park. Apparently, numbers are increasing as a result of genetic improvement project.

Protection and Management: Preserve large natural or slightly modified landscapes. Maintain viable populations of deer. Develop safe places for crossing highways. Maintain public support for recovery projects.

Selected Reference: Brown 1997, Humphrey (ed.) 1992, Maehr 1997.

PROTECTED SPECIES LISTED BY FWC & FWS 2007 FOR COLLIER CO.

COMMON NAME	SCIENTIFIC NAME	DESIGNATED STATUS 2006-7 FWC	2007 FWS
AMPHIBIANS			
gopher frog	*Rana capito*	SSC (1,2)	
BIRDS			
Florida scrub jay	*Aphelocoma coerulescens*	T	T
limpkin	*Aramus guarauna*	SSC(1)	
Florida burrowing owl	*Athene cunicularia (Athene cunicularia floridana)*	SSC(1)	
ivory-billed woodpecker	*Campephilus principalis*	E	E; Last 1914
Cuban- / snowy plover	*Charadrius alexandrinus*	T	
piping plover	*Charadrius melodus*	T	T
Kirtland's warbler	*Dendroica kirtlandii*	E	
little blue heron	*Egretta caerulea*	SSC (1,4)	
reddish egret	*Egretta rufescens*	SSC (1,4)	
snowy egret	*Egretta thula*	SSC (1)	
tricolored heron	*Egretta tricolor*	SSC (1,4)	
white ibis	*Eudocimus albus*	SSC (2)	
peregrine falcon	*Falco peregrinus*	E	Recovered
Southeastern American kestrel	*Falco sparverius paulus*	T	
Florida sandhill crane	*Grus canadensis pratensis*	T	
American oystercatcher	*Haematopus palliatus*	SSC (1,2)	
bald eagle	*Haliaeetus leucocephalus*	T	Recovered
wood stork	*Mycteria americana*	E	E
brown pelican	*Pelecanus occidentalis*	SSC(1)	
red-cockaded woodpecker	*Picoides borealis*	SSC	E
roseate spoonbill	*Platalea ajaja (Ajaia ajaja)*	SSC(1,4)	
crested caracara	*Polyborus plancus auduboni (Caracara cheriway)*	T	T
Everglades snail kite	*Rostrhamus sociabilis plumbeus*	E	E
black skimmer	*Rynchops niger*	SSC(1)	
least tern	*Sterna antillarum*	T	
roseate tern	*Sterna dougalli (Sterna dougallii dougallii)*	T	T
Bachman's warbler	*Vermivora bachmanii*	E	
FISH			
smalltooth sawfish	*Pristis pectinata*		E
rivulus (mangrove rivulus)	*Rivulus marmoratus*	SSC(1)	
MAMMALS			
sei whale	*Balaenoptera borealis*	E	
fin whale (finback whale)	*Balaenoptera physalus*	E	E
North Atlantic right whale	*Eubalaena glacialis (Balaena glacialis [incl. australis])*	E	E
Florida mastiff bat	*Eumops glaucinus floridanus*	E	
humpback whale	*Megaptera novaeangliae*	E	E
Caribbean monk seal	*Monachus tropicalis*		E
Everglades mink	*Mustela vison evergladensis*	T	
sperm whale	*Physeter macrocephalus*	E	
Florida panther	*Puma (Felis) concolor coryi*	E	E
Big Cypress fox squirrel	*Sciurus niger avicennia*	T	
Florida/West Indian manatee	*Trichechus manatus latirostris (Trichechus manatus)*	E	E
Florida black bear	*Ursus americanus floridanus*	T_S	
REPTILES			
American alligator	*Alligator mississippiensis*	SSC (1,3)	T(S/A)-
loggerhead seaturtle	*Caretta caretta*	T	T
green seaturtle	*Chelonia mydas*	E	E, & Tt
American crocodile	*Crocodylus acutus*	E	E
leatherback seaturtle	*Dermochelys coriacea*	E	E
Eastern indigo snake	*Drymarchon corais couperi*	T	T
hawksbill seaturtle	*Eretmochelys imbricata*	E	E
gopher tortoise	*Gopherus polyphemus*	T	
Kemp's ridley seaturtle	*Lepidochelys kempii*	E	E
INVERTEBRATES			
MOLLUSKS			
Florida tree snail	*Liguus fasciatus*	SSC(1)	
PLANTS			
None			

PROJECT: NORTH BELLE MEADE SENDING AREA - GMP

Figure 6. 2007 Protected species list for Collier County, FL, for the Florida Fish & Wildlife Conservation Commission (FWC) and the US Fish and Wildlife Service (FWS).

CSWCD
Collier Soil & Water Conservation District
14700 Immokalee Road
Naples, FL 34120
www.colliercswcd.org

NGGE ROMA:
North Golden Gate Estates
Regional Offsite Mitigation Area

Monitoring Plan

prepared by:

Collier Soil and Water Conservation District

prepared for:

Florida Department of Environmental Protection
and
Florida Department of Agriculture and Consumer Services, Division of Forestry

July 31, 2007

Appendix F

ABSTRACT

This Monitoring Plan describes collection and reporting requirements for the North Golden Gate Estates Regional Offsite Mitigation Area (NGGE ROMA) outlined in the Memorandum of Agreement (MOA) entered into by Florida Department of Environmental Protection (DEP), Florida Department of Agriculture and Consumer Services, Division of Forestry (DOF), and Collier Soil and Water Conservation District (CSWCD). Monitoring will be conducted along N-S, E-W, and perimeter transects and will consist of two semi-annual reports: (1) a Spring Qualitative Report due annually by 31 July that includes an overall estimate of exotic vegetation and cover, an overall estimate of native groundcover and vitality, wildlife observations, signs of trespassing or illicit use, and a brief assessment of the site's progress towards success; and (2) a Fall Quantitative Report, due annually by 31 January, that includes qualitative observations plus raw data/field sheets and photographs from designated collection points. Monitoring and reporting will continue for a minimum of 3.5 years after initial exotics treatment, or until all success criteria are satisfied. Long term management is incorporated into the 10 year Picayune Strand State Forest (PSSF) Management Plan. More specific details of monitoring and reporting requirements are described in the methods section of this plan.

SITE DESCRIPTION

PSSF is approximately a 70,000 acre property located in central Collier County (Figure 1) managed by DOF. PSSF is comprised of two large tracts known as Southern Golden Gate Estates (SGGE) and South Belle Meade (SBM), encompassing a large portion of the current Western Everglades. Freshwater sheetflow through the ecosystem drains into the Ten Thousand Islands, Everglades National Park, and other Gulf of Mexico outlets in Southwest Florida. Pine, cypress, and palmetto flatwood communities dominate PSSF, with strands of mixed swamp and cypress forests in the east, and pine/dwarf cypress forests in the north. Both tracts are infested with invasive exotic vegetation, predominantly punk tree (Melaleuca quinquenervia) and Brazilian peppertree (Schinus terebinthifolius), to varying degrees. The Comprehensive Everglades Restoration Plan (CERP) includes hydrologic restoration as a primary goal of the SGGE tract and is designed to restore sheetflow of freshwater to Ten Thousand Islands and Rookery Bay National Estuarine Research Reserve.

ROMA is a 212.4 acre site (Figure 2) located within the SBM tract of the PSSF. The site is predominantly hydric pine and cypress flatwoods (approximately 192.8 acres) and mesic pine/cypress/palmetto flatwoods (approximately 19.6 acres). The main ecological focus for the SBM tract, which was not significantly affected by drainage, is to restore native habitats by the management of exotic vegetation and prescribed fire. On 22 December 2004, DEP, in conjunction with DOF and CSWCD, conducted a site inspection for the purposes of identifying site and wetland boundaries, and to conduct a credit assessment in accordance with Ch. 62-345, F.A.C., the Uniform Mitigation Assessment Method (UMAM).

METHODS

This monitoring plan is implemented in four phases:

Phase 1 – Setup/Baseline:

Locate and clearly mark fixed monitoring sites spaced at approximately 100 meter intervals along N-S, E-W, and perimeter transects (Figure 3). Field-locate monitoring points to ensure sampling is a site-proportional ratio of high, med, low density areas

(2:2:1), and include the initial density ranking on the permanent marker. Within a 15 ft. visual radius around each point, the presence and condition of both native groundcover and exotic vegetation will be noted and recorded on the raw data/field sheets (Exhibit 1). For all 20 representative fixed monitoring sites, 180 degree panoramic photographs (Figure 4) will be taken to include a specific natural or permanent field marker.

Phase 2 – Initial Treatment:

Invasive exotic vegetation, as listed in the Florida Pest Plant Council's (FPPC) list of type 1 invasive plant species (www.fleppc.org), will be treated in accordance with established methodology and approved application rates. In general, Brazilian pepper and melaleuca will be cut and the stump treated, and left in place to decay. All other FPPC type 1 exotic vegetation will be treated in place with appropriate herbicide or removed by hand. Although CSWCD is responsible for the bidding, awarding, and management of treatment contracts, DOF will provide contract review and approval in accordance with methods now employed by PSSF staff and the 10 year PSSF Management Plan prior to the execution of the contract. Additionally, DOF will provide oversight of the treatment operation to ensure safety, efficacy, and compliance with the terms of the ROMA Mitigation Plan.

Phase 3 – Monitoring/Reporting:

Monitoring will be conducted along established N-S, E-W, and perimeter transects, and will consist of two semi-annual reports: (1) Spring Qualitative Report, due annually by 31 July, that includes an overall estimate of exotic vegetation and cover, an overall estimate of native groundcover and vitality, wildlife observations, signs of trespassing or illicit use, a brief assessment of the site's progress towards success, and a summary of all activities since the last reporting period; and (2) Fall Quantitative Report, due annually by 31 January, that includes qualitative observations plus raw data/field sheets and photographs from all monitoring points. Monitoring and reporting will continue for a minimum of 3.5 years after initial treatment of exotics and until all success criteria listed below have been met.

Phase 4 – Long Term Management:

Upon written request by CSWCD, and supported by monitoring information, DEP will inspect the site and make a determination regarding the mitigation success of ROMA. The mitigation shall be deemed successful when all of the following criteria have been met for a period of at least one full year without intervention in the form of artificial manipulation of water levels, eradication of undesirable vegetation, or replanting of desirable vegetation: (1) invasive vegetation will not exceed 2% cover per acre, (2) native groundcover and canopy vegetation will be within the range of species diversity, density, and distribution values documented within either reference sites or literature references for the target communities (pine/cypress flatwood mesic upland flatwoods), (3) native tree and herb characteristics of the target communities shall be reproducing in the vegetative or seeding manner typical of the species, (4) DEP will conduct a UMAM assessment and overall UMAM scores will indicate that the site has attained or is clearly trending towards the "with-mitigation" scores used to determine potential mitigation credits, (5) there is no evidence of anthropomorphic disturbance, and (6) the project is in compliance with the ROMA MOA Mitigation Plan. In order to insure that the mitigation

area is maintained in the restored condition, DOF will undertake long-term management of the site in accordance with the ROMA MOA Mitigation Plan and their 10 year PSSF Management Plan.

SUMMARY

Upon final approval, CSWCD will (1) establish and permanently mark the N-S, E-W, and perimeter transects and sampling points, (2) conduct a baseline inspection at fixed monitoring points to record and verify pre-treatment native and exotic canopy, sub-canopy, and groundcover percentages, (3) report baseline inspection data to DEP per the reporting format described in this plan, (4) coordinate with DOF for initial treatment contracts, (5) execute and monitor initial treatment contract, and (6) implement the semi-annual reporting requirements of this monitoring plan.

NORTH BELLE MEADE SENDING AREA
SURVEY/MONITORING GUIDELINES

Date: Dec 2007
By: Collier Soil and Water Conservation District

INTRODUCTION

This Monitoring Plan describes collection and reporting requirements for the North Belle Meade Sending Area (NBMSA) General Management Plan by Collier Soil and Water Conservation District (CSWCD).

Due to the unique characteristics of the NBMSA, monitoring for listed species and exotics will be conducted as parcels are acquired (baseline) over time. Follow up surveys for distribution, locations, new species and changes will be conducted periodically to ascertain status. This information will then be utilized to update the NBMSA General Management Plan.

SITE DESCRIPTION

The North Belle Meade Sending Area (NBMSA) is approximately 1209 parcels totaling 10,500 acres surrounded by Golden Gate Estates to the north, east and west and 1-75 to the south and is one of three major Transfer of Development Rights (TDR's) sending areas within the Rural Fringe Mixed Use District (RFMUD). Collier County Growth Management Plan (GMP) requires that for a fully functional TDR program to be in place and that a government agency be designated to manage lands transferred under the program.

METHODS

For each new property and all other properties, permanent transects will be established along with survey points as practicable for the area. Transects will be designed to be part of a larger general area transect grid. Transects will be utilized to replicating survey routes periodically for exotic and protected species surveys data collection. Other survey routes may established as needed.

In addition to survey transects, all properties will be mapped for vegetative associations utilizing the Florida Land Use, Cover, and Forms Classification System (FLUCFCS).

It is the goal to provide data on all wildlife use and habitat/vegetative associations in order to develop, evaluate, update and implement an effective management plan.

Setup/Baseline

As parcels are transferred to the CSWCD via the Transfer of Development Rights' (TDR) program. Each parcel will be subjected to a "baseline" survey for general vegetation (FLUCFCS), exotics, listed species and a Universal Mitigation Assessment Methodology (UMAM) evaluation.

FLUCFCS Mapping

Each new parcel acquired will be surveyed and mapped as to vegetative associations as defined by the FLUCFCS definitions. In addition, exotic plant species will also be mapped and quantified at the same times. Each habitat type will have a boundary defined on a map and an acreage. In addition a field sheet will be prepared describing the vegetation in the 3 levels of the vegetation occurrence: canopy, sub-canopy, ground cover.

UMAM Evaluation

Each new parcel acquired will undergo and UMAM evaluation as to it ecological quality. A UMAM evaluation is described in more detail in Chapter 62-345 of the Florida Statutes. This evaluation is utilized by the agencies of the State of Florida to qualify and quantify potential ecological improvement, or impacts in a natural area.

Exotic Plants Monitoring

Invasive exotic vegetation, as listed in the NBMSA General Management Plan will monitored for a total of 5 years after initial treatment. After the baseline survey has been conducted for exotics and an initial treatment for removal has been implemented a follow up survey will be conducted the following year. After the 1st annual report, 4 more annual surveys will be conducted to insure that exotics have been satisfactorily removed from the area. Reports will provide photo documentation and quantify exotic species presences.

Wildlife/Vegetation/Protected Species Monitoring

At the time of parcel acquisition, a baseline survey will be done to determine the species, distribution and type of utilization that is occurring on the area. The appropriate survey methodology as listed by the state and federal agencies will be utilized. A baseline report will be prepared describing the species, occurrence and utilization of the area at the time of acquisition. Periodic surveys and reports will be implemented to as needed to ascertain the changes in distribution/location and/or to evaluate management prescriptions.

SUMMARY

CSWCD will implement a monitoring / survey guidelines that will enable the wildlife, vegetation, protected species and exotic plants to be delineated, documented and quantified in order for management activities to be effectively initiated, and dissemination of information about the status of the NBMSA.

The guidelines will be updated as necessary to improve the collection and dissemination of information for management of the area.

North Golden Gate Regional Offsite Mitigation Area (ROMA)

Date:

Raw Data / Field Sheet

Collection Point:

COLLIER SOIL & WATER CONSERVATION DISTRICT

Original Density Code:

VEGETATION:

CANOPY

%	FAC	%	FAC W	%	OBL	%	UPL
____	% PINUS ELLOTTI V DENSA(F)	____	% QUERCUS LAURIFOLIA(FW)	____	% TAXODIUM DISTICHIUM(O)	____	% ALBIZIA JULIBRISSIN
____	% SABAL PALMETTO(F)	____	% ACER RUBRUM(FW)	____	% PERSEA PALUSTRIS (BORBONEA) (O)	____	% BURSERA SIMARUBA (U) GUM LIMBO
____	% MYRICA CERIFERA(F)	____	% CELTIS LAEVIGATA	____	% ILEX CASSINE (O)	____	% QUERCUS VIRGINANA(FU)
____	**% SCHINUS TEREBINTHIFOLIUS(F)**			____	% SALIX CAROLIANA(O)		
____	**% MELALEUCA QUINQUENERVIA(F)**			____	% FRAXINUS CAROLINIANA(O)		
____	**% ACACIA AURICULIFORMES(F)**						
Other		Other		Other		Other	

SUBCANOPY

%	FAC	%	FAC W	%	OBL	%	UPL
____	% PINUS ELLOTTI V DENSA(F)	____	% QUERCUS LAURIFOLIA(FW)	____	% TAXODIUM DISTICHIUM(O)	____	% ALBIZIA JULIBRISSIN
____	% SABAL PALMETTO(F)	____	% ACER RUBRUM(FW)	____	% PERSEA PALUSTRIS (BORBONEA) (O)	____	% BURSERA SIMARUBA (U) GUM LIMBO
____	% MYRICA CERIFERA(F)	____	% CELTIS LAEVIGATA	____	% ILEX CASSINE (O)	____	% QUERCUS VIRGINANA(FU)
____	**% SCHINUS TEREBINTHIFOLIUS(F)**	____	% CORNUS FOEMINA (FW)	____	% SALIX CAROLIANA(O)	____	% RHUS COPALLINUM (U)
____	**% MELALEUCA QUINQUENERVIA(F)**			____	% FRAXINUS CAROLINIANA(O)		
____	% SERENOA REPENS(F)			____	% CEPHALANTHUS OCCIDENTALIS(O)		
____	% FICUS AUREA(F)						
____	% MYRSINE GUIANENSIS (ARDISIA PUNCTATA)(F)						
____	% DIOSPYROS VIRGINIANA(F)						
____	% EUGENIA CUMINI (F)						
____	**% ACACIA AURICULIFORMES(F)**						
Other		Other		Other		Other	

GROUNDCOVER

%	FAC	%	FAC W	%	OBL	%	UPL
____	% PINUS ELLOTTI V DENSA(F)	____	% QUERCUS LAURIFOLIA(FW)	____	% TAXODIUM DISTICHIUM(O)	____	% ALBIZIA JULIBRISSIN
____	% SABAL PALMETTO(F)	____	% ACER RUBRUM(FW)	____	% PERSEA PALUSTRIS (BORBONEA) (O)	____	% AMBROSIA ARTEMISIIFOLIA (U)
____	% MYRICA CERIFERA(F)	____	% CORNUS FOEMINA (FW)	____	% ILEX CASSINE (O)	____	% BURSERA SIMARUBA (U) GUM LIMBO
____	**% SCHINUS TEREBINTHIFOLIUS(F)**	____	% AMPHICARPUM MUHLENBERGIANUM (FW)	____	% SALIX CAROLIANA(O)	____	% CACUMEN A AMPLIANA (U)
____	**% MELALEUCA QUINQUENERVIA(F)**	____	% BLECHNUM SERRULATUM(FW)	____	% FRAXINUS CAROLINIANA(O)	____	% CENCHRUS SP (U)
____	% SERENOA REPENS(F)	____	% CENTELLA ASIATICA (FW)	____	% CEPHALANTHUS OCCIDENTALIS(O)	____	% DYNOPORI CACTINUM (O) EPIPHYTE
____	% FICUS AUREA(F)	____	% CHRYSOBALANUS ICACO (FW)	____	% AMMONIA GLABRA (O)	____	% EAST TEXAS PENNYROYAL (U) HYDROCOTYLE
____	% MYRSINE GUIANENSIS (ARDISIA PUNCTATA)(F)	____	% CIRSIUM NUTTALII (FW)	____	% BACOPA (O)	____	% DESMODIUM SP (O)
____	% DIOSPYROS VIRGINIANA(F)	____	% CORNEJNA SP (FW)	____	% CLADIUM JAMAICENSE(O)	____	% ILEX GLABRA(O)
____	% EUGENIA CUMINI (F)	____	% CONOCARPUS ERECTUS (FW)	____	% DICHROMENA LATIFOLIA (O)	____	**% LANTANA CAMARA(FU)**
____	**% ACACIA AURICULIFORMES(F)**	____	% DORYOPSIS SP (FW)	____	% ELEOCHARIS SP (O)	____	% OXALIS STRICTA (U)
____	% ANDROPOGON VIRGINICUS(F)	____	% CYPERUS ODORATUS (FW)	____	% ERIOCAULON SEPTANGULARE (O) (FW)	____	% PANICUM MAXIMUM (O) GUINEA GRASS
____	% ARISTIDA STRICTA(F)	____	% DICHROMENA COLORATA (FW)	____	% FUIRENA SCIRPOIDEA(O)	____	% PASPALUM NOTATUM(U)
____	% AXONOPUS SP (F)	____	% DIODIA VIRGINIANA (FW)	____	% JUNCUS SP (O)	____	% PILOBOLUS PACIDA (U)
____	% BACOPARIS HAMIFOLIA(F)	____	% EUSTACHYS CASEA (FW)	____	% LUDWIGIA SP (O)	____	% PITYOPSIS GRAMINIFOLIA (U)
____	% BIDENS FILOSA (F)	____	% EPIDENDRUM AMPHISTYLIS (FW)	____	% NYMPHAEA SP (O)	____	% STERNBERGIA LUTEA (U) DAFFODILS
____	% BUMELIA (F)	____	% GLANDULARIA ARCTICA (FW)	____	% PANICUM HEMITOMON (O)	____	% STIPOCAULON NICOTIANAE (U)
____	% DIOSCOREA BULBIFERA (F)	____	% HELIANTHUS SP (FW)	____	% POLYGONUM SP (O)	____	% QUERCUS CHAPMANII (U)
____	% GRAPTOSIS SP (F)	____	% HYPOXIS TYLE SP (FW)	____	% PONTEDERIA CORDATA (O)	____	% QUERCUS VIRGINIANA (U)
____	% GROSSERONIA ADSCENDENS (F)	____	% HYPERICUM SP (FW)	____	% PROSERPINACA SP (O)	____	% RHUS COPALLINUM (U)
____	% ERYNGIUM BALDWINII (F)	____	% HYPTIS ALATA (FW)	____	% RHYNCOSPORA (O)	____	**% RHYNCHELYTRUM REPENS(U)** INVASIVE GRASS
____	% EUPATORIUM SP (F)	____	% JUNCUS MARGINATUS (FW)	____	% SAGITTARIA LANCIFOLIA (O)	____	% SPERMACOCE SP. (U)
____	% EUTHAMIA SP (F)	____	% LACHNOCAULON SP (BOGBUTTON) (O/FW)	____	% SETARIA MAGNA (O)	____	% STENOTAPHRUM SECUNDATUM (U) FLORATAM
____	% FORESTIERA SEGREGATA(F)	____	% LINDERNIA GRANDIFLORA (FW)	____	% THALIA GENICULATA (O)	____	% URENA LOBATA (U)
____	% ILEX OPACA V OPACA(F)	____	% MELANTHERA HASTATA (FW)	____	% TYPHA SP (O)		
____	**% IMPERATA CYLINDRICA (COGON)**	____	**% PANICUM REPENS (FW)**				
____	% LACHNANTHES CAROLIANA(F)	____	% PASPALUM LIOUALRIS (FW)				
____	**% LYGODIUM JAPONICUM (F)**	____	% PLUCHEA SP (FW)				
____	% LYONIA FERRUGINEA (F)	____	% RHEXIA SP (FW)				
____	% MELOCHIA CORCHORIFOLIA (F)	____	% RUMEX VERTICILLATUS (FW)				
____	% MIKANIA SCANDENS (F)	____	% SCLERIA SP (FW)				
____	% PHYLA SP (F)	____	% SOLIDAGO (FW)				
____	% PSYCHOTRIA SP (F)	____	% SPARTINA BAKERI (FW)				
____	% RUDUS SP (F)	____	% THELYPTERIS SP (FW) SHIELD FERN				
____	% SAMBUCUS CANADENSIS (F)	____	% WOODWARDIA VIRGINICA (FW) VIRGIN FERN				
____	% SESBANIA SP (F)	____	% XYRIS CAROLINANA (FW)				
____	% SETERIA GENICULATA (F)						
____	% SMILAX SP (F)						
____	% TOXICODENDRON RADICANS(F)						
____	% VITIS ROTUNDIFOLIA(F)						
____	% WEDELIA TRILOBATA						
						____	% BARE GROUND
Other		Other		Other		Other	

HYDROLOGIC INDICATORS:

____ ALGAL MATS	____ ADVENTITIOUS ROOTS	____ SURFACE WATER PRESENT	____ AQUATIC PLANTS
____ WATER MARKS	____ HYPERTROPHIC LENTICELS	____ AQUATIC MOSSES/LIVERWORTS	____ BUMMELING
____ AUFWUCHS	____ ACTIVE CYPRESS KNEES	____ DRIFT LINES	____ HYDROLOGIC DATA
____ RAFTING OF DEBRIS	____ FLOW CHANNELS	____ VEGETATED TUSSOCKS/HUMMOCKS	____ SEDIMENT DEPOSITION
		____ ELEVATED LICHEN LINES	____ AQUATIC FAUNA

SUMMARY:

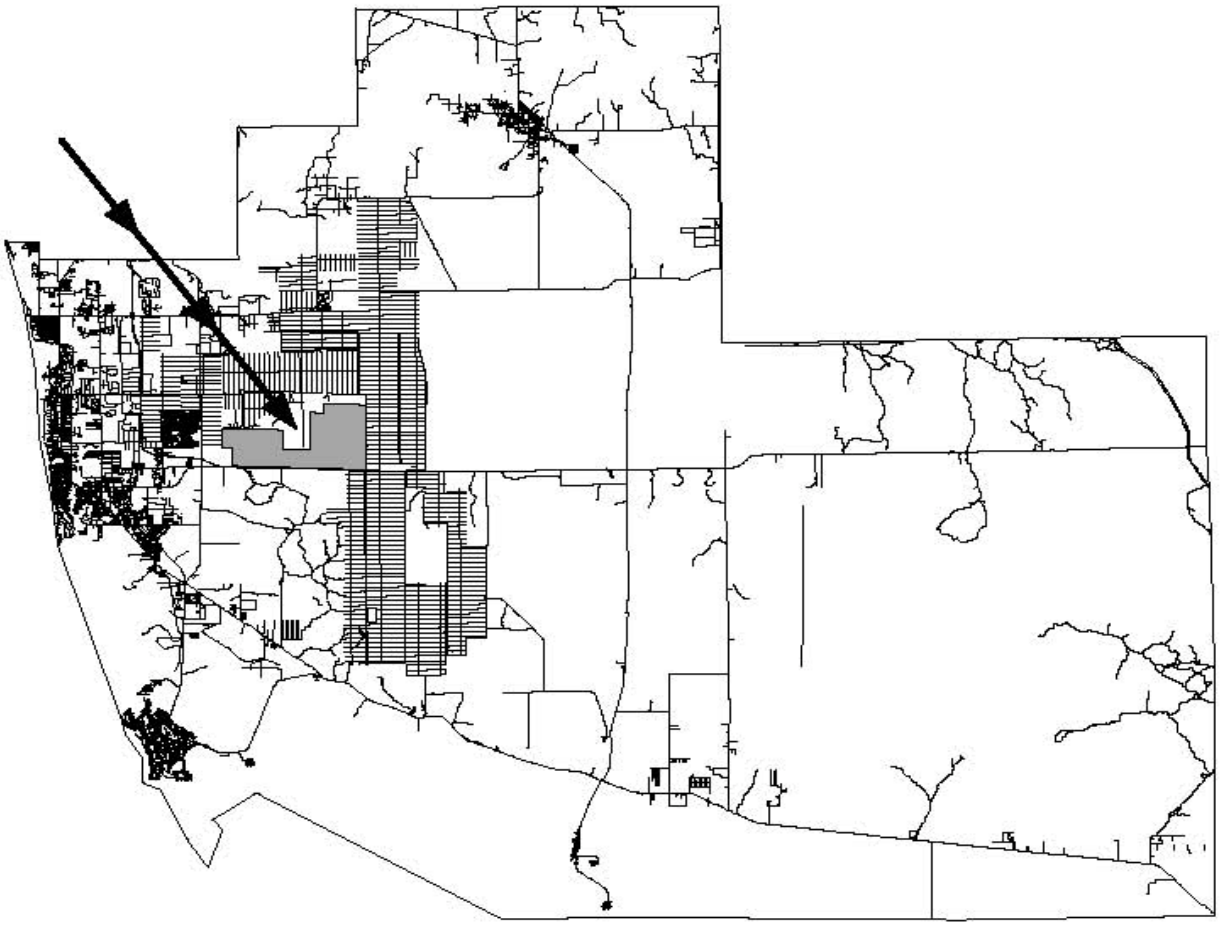
GENERAL OBSERVATIONS:

NATIVE VEGETATION HEALTH & REPRODUCTION:

EXOTIC VEGETATION HEALTH & REPRODUCTION:

WILDLIFE:

PROJECT LOCATION MAP



COLLIER COUNTY, FL

5 0 5 10 15 Miles

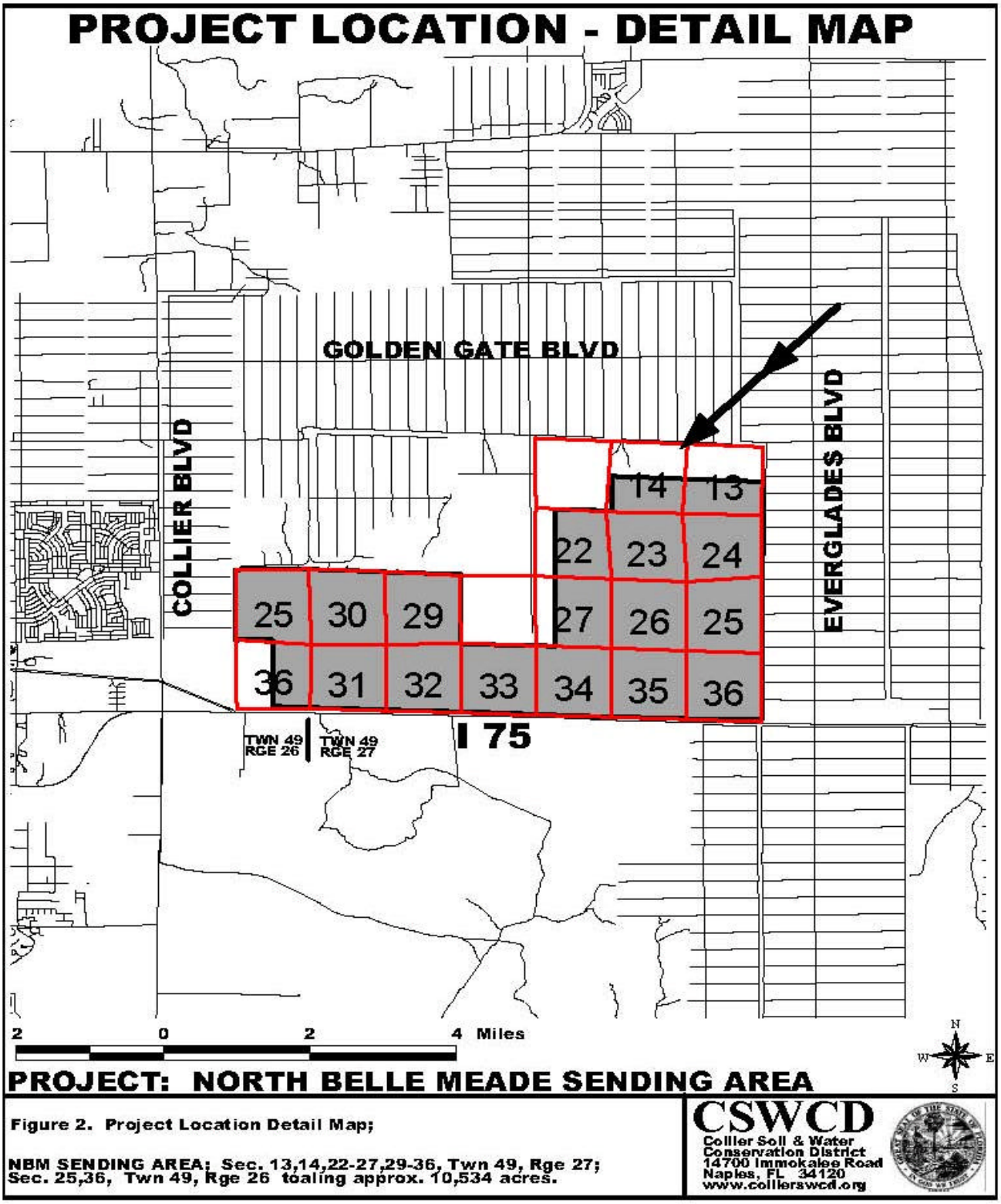
N
W E
S

PROJECT: NORTH BELLE MEADE SENDING AREA

Figure 1. Project Location Map;

NBM SENDING AREA; Sec. 13,14,22-27,29-36, Twn 49, Rge 27; Sec. 25,36, Twn 49, Rge 26 toaling approx. 10,534 acres.

CSWCD
Collier Soil & Water Conservation District
14700 Immokalee Road
Naples, FL 34120
www.collierswcd.org


PROJECT LOCATION - DETAIL MAP
GOLDEN GATE BLVD
COLLIER BLVD
EVERGLADES BLVD
14
13
22
23
24
25
30
29
27
26
25
36
31
32
33
34
35
36
TWN 49 RGE 26
TWN 49 RGE 27
I 75
2 0 2 4 Miles
N
W
E
S
PROJECT: NORTH BELLE MEADE SENDING AREA
Figure 2. Project Location Detail Map;
NBM SENDING AREA; Sec. 13,14,22-27,29-36, Twn 49, Rge 27; Sec. 25,36, Twn 49, Rge 26 toaling approx. 10,534 acres.
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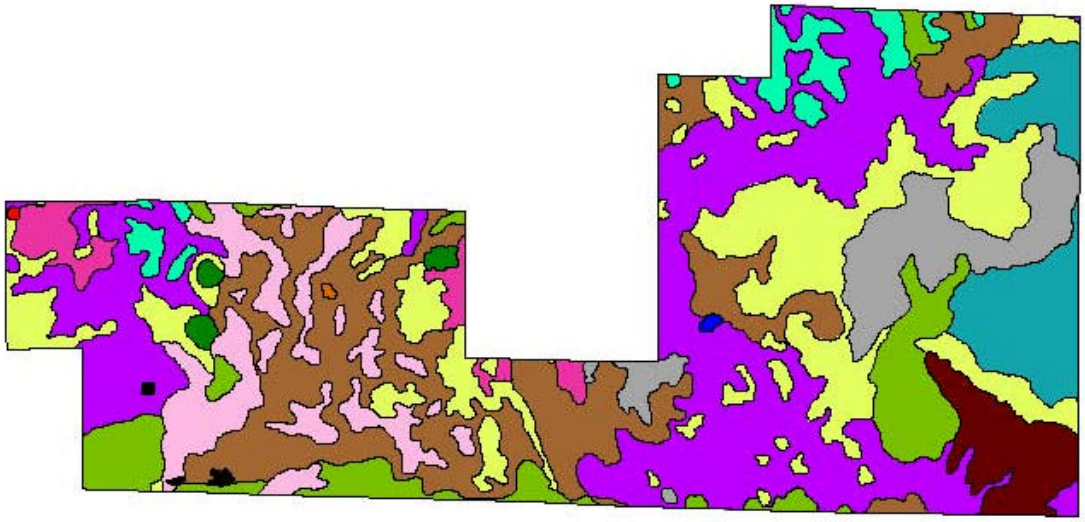
SOIL MAP



LEGEND

- 99 Water
- 21 Boca
- 20 Ft Drum, Malabar
- 16 Oldsmar
- 11 Hallandale
- 10 Oldsmar, Limestone
- 7 Immokalee
- H 49 Hallandale, Boca.
- H 48 Pennsucco
- H 31 Hilolo, Jupiter, Margate
- H 22 Chobee, Winder, Gator
- H 18 Riviera
- H 14 Pineda.
- H 4 Chobe Limestone, Dania Muck
- H 3 Malabar
- H 2 Holopaw

H = HYDRIC

HYDRIC SOILS: 65% OF AREA
NOT HYDRIC SOIL: 35% OF AREA

N
W E
S

PROJECT: NORTH BELLE MEADE AREA

Figure 3 . Hydric Soil Map of project location. Source US Dept. of Agriculture, Natural Resource Conservation Service, 1990, Soil Surveys, Floirida;

N BELLE MEADE AREA; Sec. 13,14,22-27,29-36, Twn 49, Rge 27; Sec. 25,36, Twn 49, Rge 26 totaling approx. 10,534 acres.

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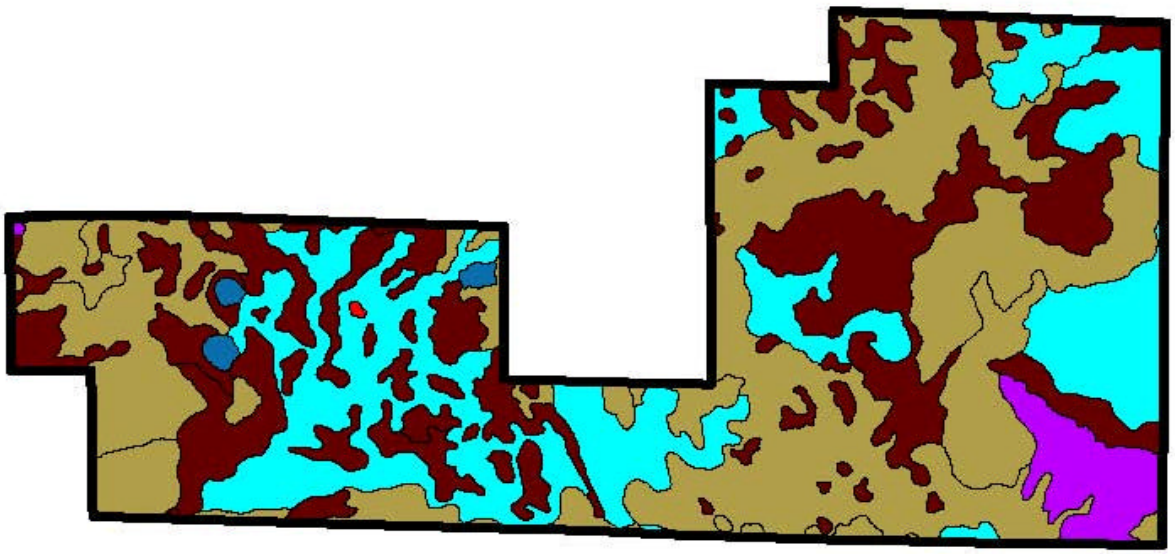
VEGETATION MAP
FNAI NATURAL COMMUNITIES



%	LEGEND
	Boundary
3%	Wet prairie
1%	Swamp forest
<1%	Mesic hammock
28%	Mesic flatwood
42%	Hydric flatwood
25%	Cypress

N
W E
S

PROJECT: NORTH BELLE MEADE SENDING AREA

Figure 4. Vegetation Map; FNAI Natural Communities. Based on FNAI Classification Systme Appendix C.

NBM SENDING AREA: Sec. 13,14,22-27,29-36, Twn 49, Rge 27; Sec. 25,36, Twn 49, Rge 26 toaling approx. 10,534 acres.

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