SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Land Stewardship Section

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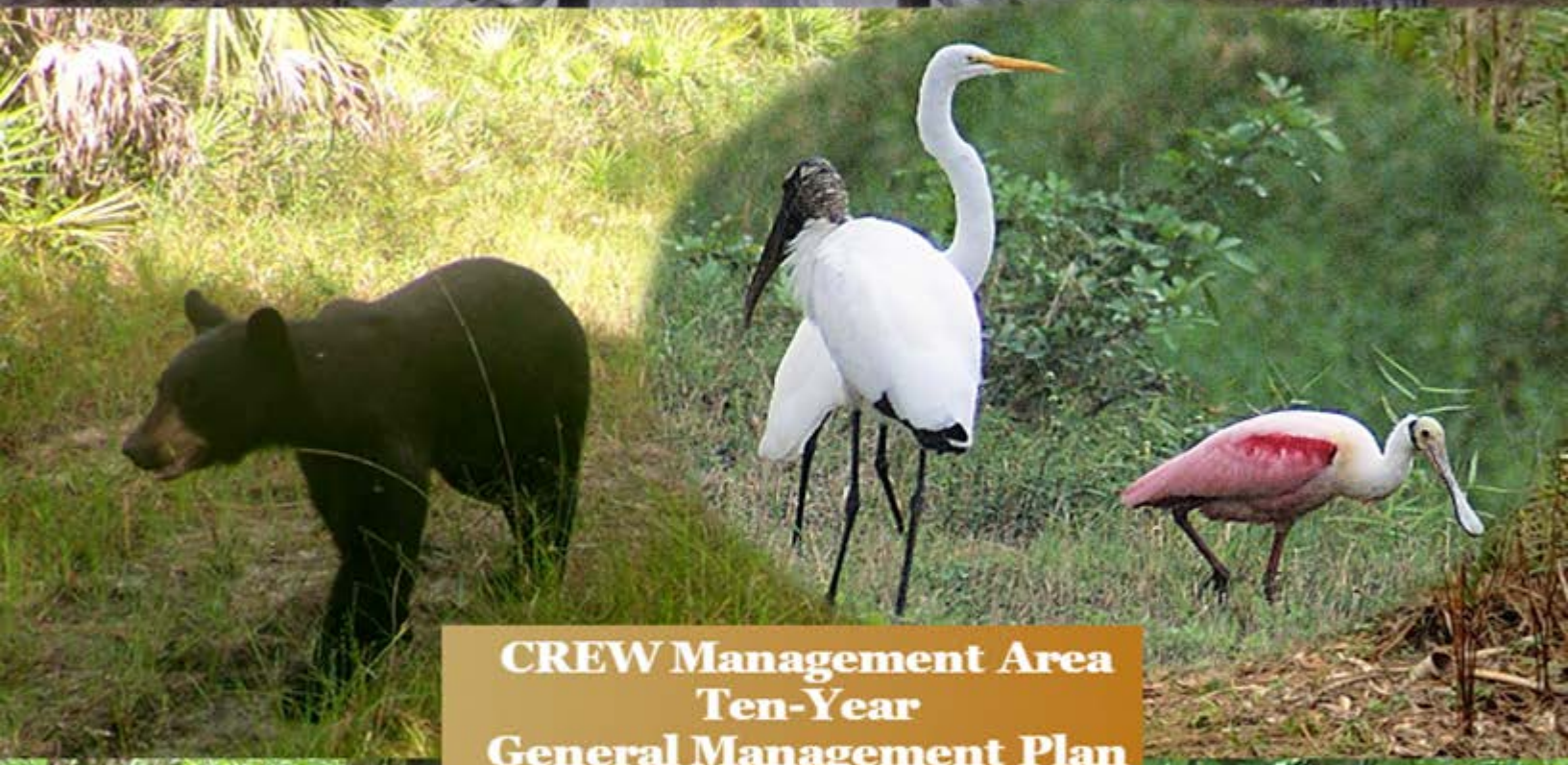

CREW Management Area Ten-Year General Management Plan 2021-2031 October 2021

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ABBREVIATIONS

CARL	Conservation and Recreation Lands
CREW	Corkscrew Regional Ecosystem Watershed
CREW Trust	CREW Land and Water Trust
District	South Florida Water Management District
Fla. Stat.	Florida Statute
FE	Federally-designated Endangered
FFS	Florida Forest Service
FLEPPC	Florida Exotic Pest Plant Council
FNAI	Florida Natural Areas Inventory
FT	Federally-designated Threatened
FT(S/A)	Federally-designated Threatened because of similarity of appearance
FWC	Florida Fish and Wildlife Conservation Commission
Km	Kilometers
m	Meters
mi	Miles
MOU	Memorandum of Understanding
SOR	Save Our Rivers
ST	State-designated Threatened
TIITF	Board of Trustees of the Internal Improvement Trust Fund
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

1. EXECUTIVE SUMMARY

The Florida Legislature established the Water Management Lands Trust Fund (§373.59, Fla. Stat. (1981). The Save Our Rivers (SOR) portion of this legislation allowed water management districts to acquire environmentally sensitive land for the purposes of water management, water supply and conservation and protection of water resources. The South Florida Water Management District (District) used these funds to acquire property within the Corkscrew Regional Ecosystem Watershed (CREW) in 1990. The CREW project currently encompasses 70,279 acres of predominantly marsh, strand swamp and upland communities within the Big Cypress drainage basin that are critical to conserving the hydrologic and wildlife corridor connecting the Florida Panther National Wildlife Refuge and Fakahatchee Strand Preserve State Park with the National Audubon Society's Corkscrew Swamp Sanctuary (Corkscrew Swamp Sanctuary). The District manages 26,953 acres within the CREW area, including 24,903 acres owned by the District and 1,421 acres owned by the Board of Trustees of the Internal Improvement Trust Fund (TIITF), as the CREW Management Area (CREW MA).

Pursuant to §373.1391, Fla. Stat. (2020), the District is charged with the responsibility of managing lands acquired under the SOR program. This General Management Plan (GMP) guides the management of the CREW MA through the 10-year period of 2021-2031 and was developed through stakeholder participation, peer-reviewed by external professionals and approved by the District's Governing Board, as directed by §373.591, Fla. Stat. (2011). Goals identified for the next 10 years include: managing natural communities and modified habitats to protect and enhance water, floral and faunal resources; providing resource-based public use opportunities; maintaining area infrastructure; and providing security and resource protection.

The CREW MA GMP also describes the history and natural resources located on the area, public use opportunities and the management tools used to protect and manage the area. Some of the management tools utilized in the management of the property include prescribed fire, mechanical vegetation treatments, biological and chemical invasive plant control treatments and hydrologic improvements. Public use opportunities include hiking, biking, camping, a hunting program implemented by the Florida Fish and Wildlife Conservation Commission (FWC) and a public use and education program implemented by the CREW Land and Water Trust (CREW Trust), a private, non-profit organization dedicated to this area.

2. INTRODUCTION

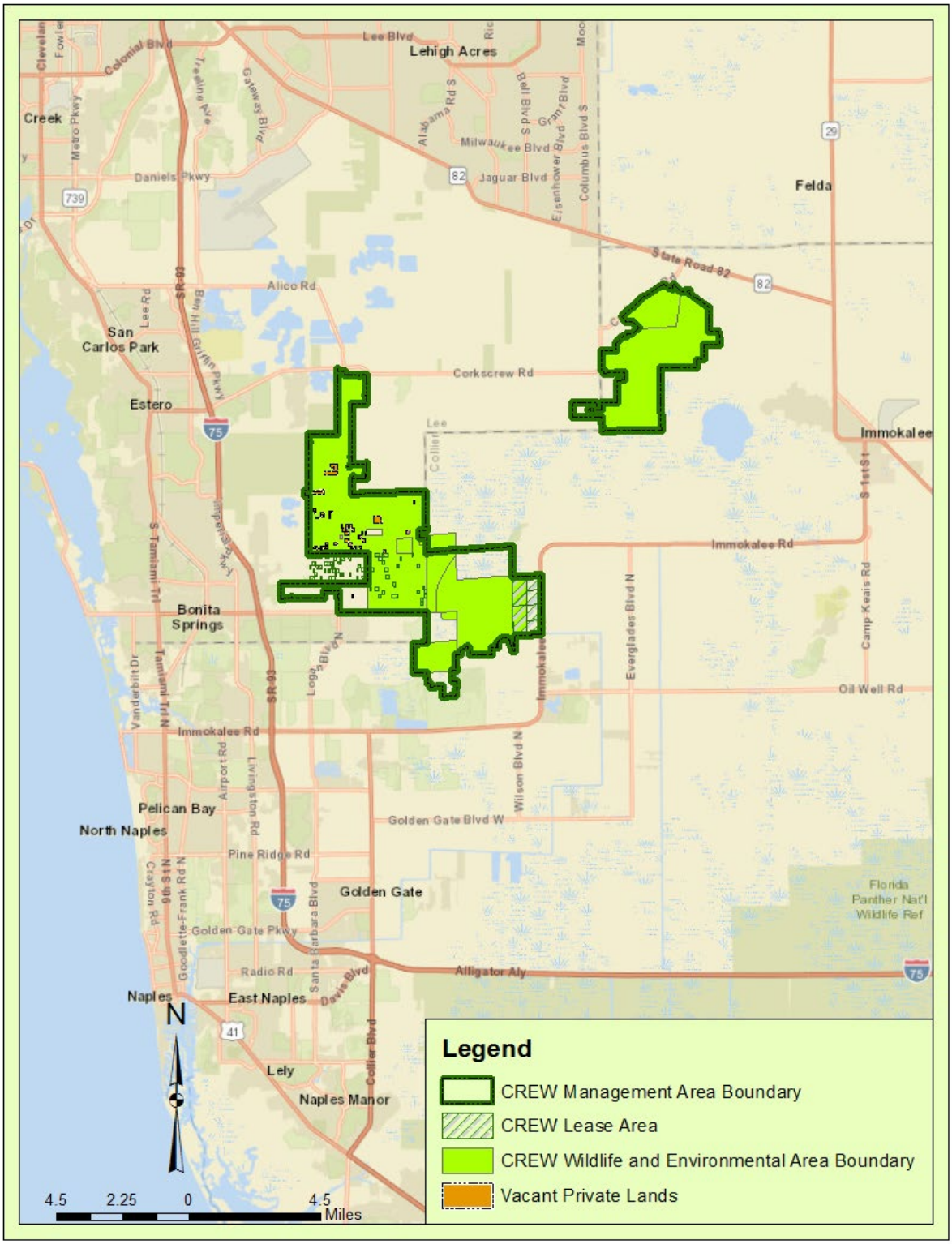
The significant conservation lands within the CREW project boundary include the CREW MA, Audubon Corkscrew Swamp Sanctuary (Corkscrew Swamp Sanctuary) and Camp Keais Strand. The CREW MA lies within southeastern Lee County and northwestern Collier County, Florida (**Map 1**). It is bordered by Corkscrew Road (CR 850) to the north, State Road 82 (SR 82) to the east, Interstate 75 (I-75) to the west and Immokalee Road (CR 846), Shady Hollow Boulevard. and Bonita Beach Road to the south. The CREW MA is divided into three (3) separate areas: Bird Rookery Swamp, Corkscrew Marsh and Flint Pen Strand (**Map 2**).

Corkscrew Marsh (7,330 acres) represents the northeastern portion of the CREW MA. It is located southeast of Corkscrew Road and about 1 mile southwest of SR 82, in Collier county. It is bordered to the east and west by conservation lands and agriculture/rural lands to the southeast by Camp Keais Strand and to the southwest by the Corkscrew Swamp Sanctuary and Panther Island Mitigation Bank. Corkscrew Marsh forms the headwaters of the Corkscrew Swamp Sanctuary and Bird Rookery Swamp and flows into the larger Big Cypress system to the south.

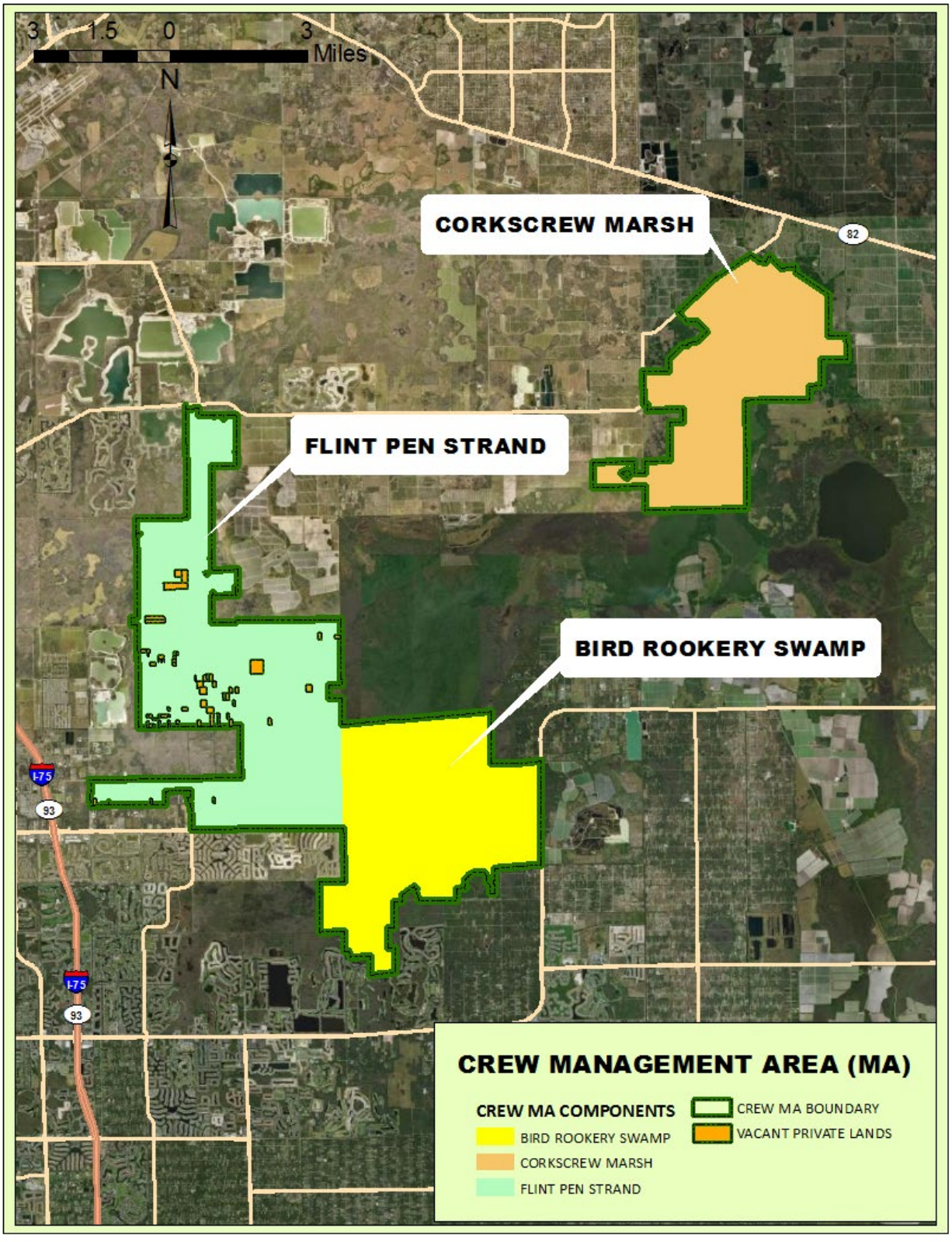
Bird Rookery Swamp (8,886 acres) represents the southeastern portion of the CREW MA, also in Collier County. It is located south of the Corkscrew Swamp Sanctuary, while its northwestern boundary is contiguous with Flint Pen Strand. It is bordered to east by Immokalee Road and to the south and southwest by residential, rural and other conservation lands and has been a nesting site for wading birds.

Flint Pen Strand (10,272 acres), in Lee county, represents the western portion of the CREW MA. It is approximately 0.1-mile south of Corkscrew Road, approximately 4.5 miles east of I-75, and extends south to Bonita Beach Road and east to the western Collier County line. It is bordered by residential and other conservation lands to the west and south. The eastern boundary is contiguous with Panther Island Mitigation Bank, Bird Rookery Swamp and the Corkscrew Swamp Sanctuary, forming a corridor to Corkscrew Marsh.

The vegetation in the CREW MA ranges from an historic sawgrass marsh in Corkscrew Marsh, surrounded by hydric and mesic pine flatwoods dotted with isolated marshes, to a cypress/hardwood slough in Bird Rookery Swamp, to the pine flatwoods/cypress swamp complex of Flint Pen Strand.



Map 1. CREW Management Area location map.

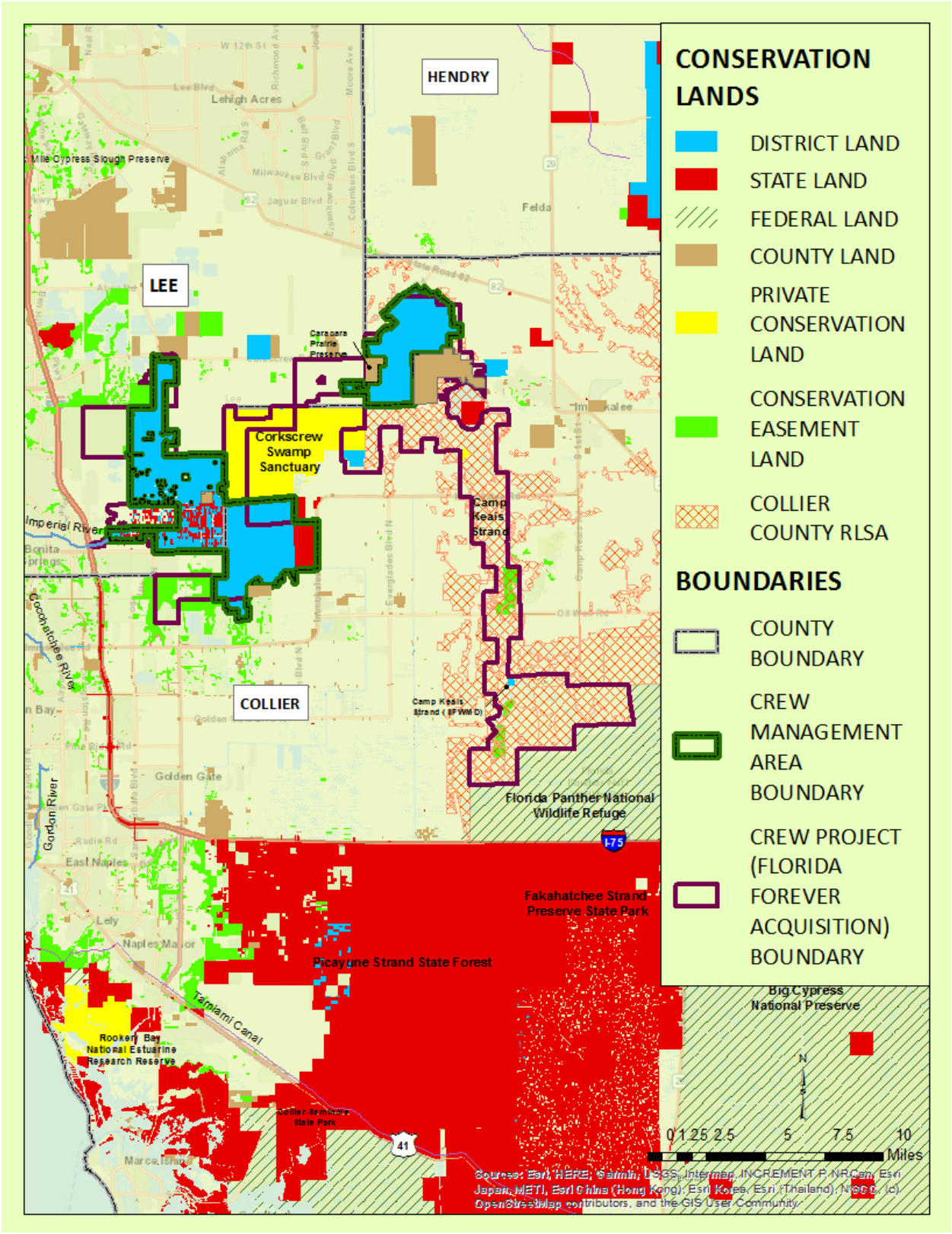


Map 2. CREW Management Area components.

2.1. Acquisition Purpose and Significance of the Area

The District began to acquire properties within CREW in 1990. Purchased to conserve the wetland habitats and improve water quality within the watershed, the District currently owns 25,353 acres in fee simple and manages 1,523 acres of Trustees for the Internal Improvement Trust Fund (TIITF) owned land under a lease agreement. Due to its regional significance, CREW was added to the Florida Department of Environmental Protection Conservation and Recreation Lands (CARL) acquisition program list in 1990 and was latter included in the Florida Forever program to expand acquisition efforts. The CREW acquisition boundary has grown considerably since its incorporation into the Florida Forever Program. The CREW Florida Forever project boundary includes the CREW MA, Camp Keais Strand, Corkscrew Swamp Sanctuary and smaller Lee and Collier County parcels, and currently encompasses 70,279 acres (**Map 3**), of which 35,579 acres have been acquired to-date with the District, TIITF, Lee County and Collier County as acquisition partners. Camp Keais Strand has been protected through conservation easements and Collier County's Rural Lands Stewardship Area program; an incentive-based stewardship credit trading system designed to incentivize preservation of the most significant environmental lands by awarding higher credit values for high value preservation areas.

The CREW MA provides a critical wildlife corridor for Florida panthers and other wildlife species, and forms a connected network of protected areas, including the Florida Panther National Wildlife Refuge, Fakahatchee Strand Preserve State Park, Picayune Strand State Forest, Collier-Seminole State Park, Rookery Bay National Estuarine Research Reserve, Ten Thousand Islands National Wildlife Refuge, Big Cypress National Preserve and Everglades National Park. The acquisition of the CREW MA properties protected the natural wetland connection between Corkscrew Marsh and the Cocohatchee River drainage basin, benefiting the region by providing water storage and supporting water flows to Fakahatchee Strand, the Florida Panther National Wildlife Refuge and other conservation lands downstream. CREW also contains some of the largest remaining old growth cypress wetlands in the United States.



Map 3. Conservation lands near the CREW Management Area.

2.2. Legal Requirements of Management

The CREW MA properties were purchased with funds from the SOR land acquisition program to protect lands having important water resource value through acquisition, restoration and management for environmental benefits. SOR was one of several programs funded through the Water Management Lands Trust Fund legislation (§373.59, Fla. Stat. (1981)) using documentary stamp tax revenue. This legislation also directed the District to utilize lands acquired with monies from the trust fund for general public recreation purposes to the extent possible considering the environmental sensitivity and suitability of those lands for recreation.

§373.1391, Fla. Stat. (2020) requires the District to manage lands in a manner consistent with legislative criteria. This legislation reinforces the Water Management Lands Trust Fund requirements by directing the District to manage lands titled to the District in such a way as to maintain a balance between resource conservation and public recreational use. Management activities on the leased area are consistent with the requirements for State Lands as set forth in §259.032, Fla. Stat. (2020).

Public use on District lands is also governed by Fla. Admin. Code Rule 40E-7.511-539 (2014), which allows the District to establish regulations governing public access to District lands and use of said lands for appropriate nature-based recreation and allied purposes whenever possible and not in conflict with other District objectives. As steward, the Land Stewardship Section is responsible for protecting, enhancing, restoring and preserving District lands for the beneficial use and enjoyment of existing and future generations.

The District has also partnered with the FWC to establish portions of CREW as a Wildlife and Environmental Area (WEA), through their authority under §120, Fla. Stat. (2008). This partnership allows the FWC to promulgate rules under Fla. Admin. Code Rule 68 (2021), in coordination with the District, to regulate public use on that portion of the CREW MA.

The determination of compatible public uses on lands titled to the District is based on the following criteria:

- Consistency with the acquisition purposes, including protecting natural ecosystems;
- Restrictions by easements, leases, reservations, adjacent land ownership or conditions of the purchase agreement;
- Existing infrastructure and facilities, such as fences, gates, signage, access, trails, campsites, etc.;
- Available funding;
- Limitations on use resulting from endangered species, sensitive natural or archeological resources; and
- Public health, safety and welfare.

Public input into the management of the area is solicited from the public through the District's quarterly Recreational Forum meetings, the CREW Trust, and through partnering agencies.

The CREW MA GMP serves as the basic statement of management intent and consolidates relevant information about the CREW MA to guide management actions for the 2021 to 2031 period. This includes land management goals and objectives, past and present land uses, resource data, restoration and management needs, public use programs and administrative duties.

2.3. General Management Plan Development

General Management Plans for the District are developed for selected areas established as management areas to guide management for 10 years. The current management plan for the CREW MA covered years 2011-2021 and expires in October of 2021. Staff have reviewed the current plan, identified accomplishments made on previous goals and objectives, and developed goals and objectives for the coming ten years. These updated goals and objectives are based on District priorities, previous public input through meetings of the Recreation Forum and other venues, and current best management practices. This process is designed to also meet State requirements for management plans (§259.032, Fla. Stat. (2020)) on areas leased from the State of Florida.

A draft of the plan was provided to the management review team specified in §373.591, Fla. Stat. (2020), and comments from this multi-agency and stakeholder management review team on the draft and past management were included in the updated plan.

Common resource management and public use activities implemented by the District on management areas include:

- Prescribed fire to mimic the natural fire frequency in the fire-dependent habitats.
- Vegetation management such as shredding and/or mowing to control invasive woody shrubs and eliminate hazardous fire fuels.
- Wildlife management, including surveys, nest box installation and habitat management.
- Exotic vegetation control.
- Monitoring the health of the natural communities and the impact of management practices on them.
- Hydrologic restoration of wetlands to establish optimal flows and hydroperiods.
- Providing public use facilities that support hunting, hiking, fishing, birding, canoeing, horseback riding, camping, nature appreciation, geocaching, and biking.
- Providing security and hunting opportunities through partnership with FWC.
- Providing educational programs through partnerships with external educational organizations.
- Leveraging staff time through contracts with the private sector when appropriate.

3. MANAGEMENT AREA GOALS AND OBJECTIVES

The CREW MA's primary functions and management priorities for 2021 - 2031 are outlined in the following goals and objectives:

Management of Wildlife and Habitats

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

Objectives:

- Maximize the number of fire dependent management units being maintained within their appropriate fire-return interval through the application of prescribed fire.
- Identify a strategy to apply prescribed fire on significant portions of Flint Pen Strand, including private inholdings.
- Mechanically treat at least 50 acres of willow annually in Corkscrew Marsh and other areas of woody vegetation encroaching into freshwater marshes and short hydroperiod wetlands as needed.
- Mechanically remove 10 acres of cabbage palms annually to reduce fuel loads adjacent to fire lines and property boundaries while maintaining swallowtail kite nesting sites.
- Continue to administer a resource protection program through partnerships with FWC's Division of Law Enforcement.
- Continue to contract additional wildlife management services with FWC.

Goal 2: Maintain, improve, or restore listed species populations and habitats.

Objectives:

- Continue to collect opportunistic wildlife species occurrence data.
- Combine FWC & DISTRICT species occurrence data into 1 GIS layer annually.
- Monitor populations of breeding birds, wading birds, swallow-tail kite, panther, gopher tortoise, caracara, Big Cypress fox squirrel and Florida bonneted bat in conjunction with FWC.
- Increase herbaceous vegetation component in flatwoods around Corkscrew Marsh by 50% to benefit gopher tortoises.
- Maintain specific areas of dense shrub and palmetto cover for bear and panther denning cover.
- Mechanically treat 100 acres of the fallow agricultural property east of Bird Rookery Swamp to maintain as open grasslands for wintering sparrows.

Exotic Species Management

Goal 3: Manage non-native species to minimize their negative impacts on natural communities.

Objectives:

- Maximize the number of management units in Condition Class 1 (maintenance) for select invasive exotic plant species.
- Continue to treat specific additional exotic invasive plant species to achieve maintenance levels as they become priorities in identified areas.
- Continue to implement Early Detection Rapid Response treatments of invasive exotic plant species as needed.
- Continue to secure additional outside funding to support treatments of exotic invasive plant species, including through the FWC Upland Invasive Exotic Plant Management Program.
- Expand control measures for wild hog populations.
- Monitor for exotic animal species including pythons, tegus, and spiny-tailed iguanas, and implement control measures as necessary.
- Participate in local Cooperative Invasive Species Management Areas.
- Continue to coordinate with FWC and District python hunter programs.

Hydrological Management

Goal 4: Protect and enhance hydrological resources

- Install water stage recorders that are located to support development of hydrologic restoration options for CREW MA and adjacent conservation properties.
- Coordinate with Corkscrew Swamp Sanctuary to develop hydrologic improvements in Bird Rookery Swamp.
- Develop and implement a plan to fill drainage ditches on the fallow agricultural property east of Bird Rookery Swamp.
- Investigate options to mitigate off-site discharges into the CREW MA.

Public access and Recreational opportunities

Goal 5: Provide nature-based public use opportunities

Objectives:

- Continue to provide compatible uses such as hiking, biking, fishing, hunting, horseback riding, camping, canoeing/kayaking, wildlife viewing and environmental education.

- Improve public access through construction, acquisition, easements and/or cooperative agreements.
- Continue to maintain the public use areas at Bird Rookery Swamp, Flint Pen Strand, and the Corkscrew Marsh.
- Maintain all current recreational trails and explore the potential for additional trails in Flint Pen Strand if resources for routine and long-term maintenance will be available.
- Improve existing primitive camping area locations to allow for year-round camping opportunities.
- Continue to support efforts of the CREW Trust's environmental education, volunteer coordination and public use programs.
- Develop and install interpretive signage at key points to enhance visitor experience and to educate visitors about the CREW MA and the Southern CREW restoration project.
- Continue to partner with FWC on the administration of hunting and other public use activities.

Operation and Maintenance of Capital Facilities and Infrastructure

Goal 6: Maintain and improve facilities and infrastructure

Objectives:

- Maintain present public-use improvements (roads, signs, parking areas and trailheads, camping areas, multi-use trails, structures) using a combination of District staff, volunteers and private contractors.
- Maintain 52 miles of firebreaks, 4 miles of roads and 40 miles of trails annually.
- Replace Bird Rookery Slough tram bridge and install controlled hydrologic connections to reduce impacts of high-water events and improve hydrologic conditions in the Corkscrew Swamp Sanctuary.
- Continue to maintain and manage the management area boundaries through posting, fencing and fire line maintenance.
- Continuously evaluate potential additions to the area, ensure all MOUs are current and coordinate with FWC to ensure WEA boundaries are optimized.
- Update and maintain information kiosks at points of public access.
- Explore and implement strategies for reducing illegal ORV access to prevent resource damage.

Cultural Resource Management

Goal 7: Protect existing cultural resources

Objectives:

- Ensure all known sites are recorded in the Florida Division of Historical Resources Master Site file.
- Continue to monitor, protect, and preserve all known/identified sites.
- Coordinate with Florida Division of Historic Resources (FDHR) to assess the need for conducting a cultural resource survey.
- Ensure at least 1 member of staff has attended the FDHR cultural resource training program.

4. SITE HISTORY

CREW has been inhabited by humans for possibly 15,000 years. The Spanish explorers were met by the powerful and populous Calusa nation when they arrived in SW Florida in 1513. The Calusa occupied over 10,000 square miles in more than 50 pueblos. These villages were concentrated heavily along the coast and were home to between 700 and 1000 people each. The interior settlements, including those in and around CREW, were much smaller, typically with less than 100 residents. The Calusa's isolation broke in the 1688, when the Calusa chief converted to Christianity and allowed a group of his people to live near Havana. Visitation to Cuba by the Calusa increased through the 1690s. By 1711 most of the Calusa had evacuated to the Keys, including the Calusa Chief and most of his surviving vassals.

In the years leading up to the Second Seminole War (1835-1842), there was a significant immigration of Seminole Indians into the area. These were both Seminoles who had been living in Florida for many years as well as new arrivals following the Creek War of 1813-1814. During the progression of the second Seminole war, the military established a series of frontier outposts approximately 20 miles apart as an attempt to contain the Seminoles to areas south of the Lake Okeechobee and away from the coasts (Maps 4 – 5). The third Seminole war focused on removing a few hundred Seminoles living in the vicinity of CREW and Big Cypress, including Billy Bowlegs II, who was relocated to Oklahoma following the end of that conflict in 1858.

Many of the 20th century settlers in Florida were cattlemen, ranchers, farmers and fishermen. Settlers in the CREW altered the natural communities to support cattle grazing, logging and urban and rural developments. In the early 1900s, the surrounding landscape was largely used for agriculture, which introduced dirt roads and man-made ditches that changed the historical flow patterns. Several ditches were constructed to drain the surrounding agricultural lands into Corkscrew Marsh. Adjacent landowners still retain the right to drain into Corkscrew Marsh. The northern and eastern boundaries of Corkscrew Marsh, which once extended to SR 82 and SR 29, gradually began to be replaced by extensive citrus operations. In the mid-20th century, additional commercial activities such as cattle operations, timber, oil exploration and recreational hunting became important land uses within CREW. The uplands in the CREW were grazed as native range

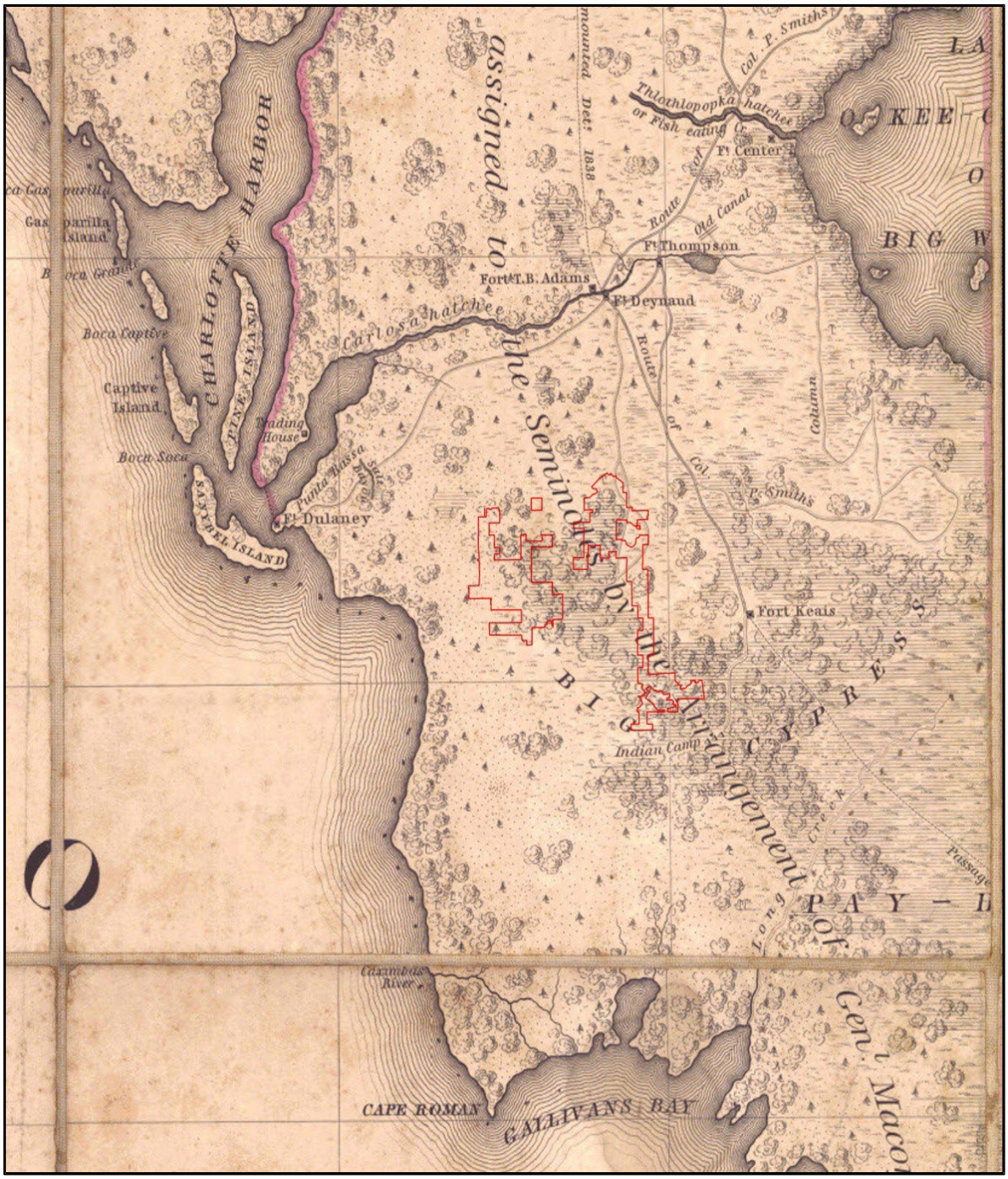
for decades. However, its remoteness and inaccessible wetlands shielded CREW from more intensive agricultural use.

Logging of pine forests began in the 1930s on the west side of Corkscrew Marsh and continued until 1989. In 1943, oil exploration and production began in Southwest Florida with Florida's first oil discovery at the Sunniland field in Collier County. The Corkscrew oil wellfield was later established within uplands in the vicinity of Corkscrew Marsh and exploration continued until the early 1990s. Seismic testing and several exploratory oil wells were drilled at Corkscrew wellfield by Alico Inc., but only one of the wells was successfully completed as a potential producer. By 1945, narrow-gauge tram roads had been constructed through the hardwood hammocks and cypress forests, making industrial scale logging possible. In the 1950s, old growth cypress trees were logged from Bird Rookery Swamp. In 1960, Suncoast Acres residential development was established in the southern portion of Flint Pen Strand. Other land developments within CREW included efforts to drain wetter areas and provide water management for agricultural areas. A combination of roads, ditches and canals were constructed in southern Flint Pen Strand to provide access and drainage for developments. The most notable of these ditches and canals is the Kehl canal.

Efforts to protect wildlife resources and provide recreation on CREW lands began in 1951 with the Collier Wildlife Management Area. This management area was established under agreement with private landowners and the Florida Game and Fresh Water Fish Commission, presently FWC. The Collier Wildlife Management Area covered 350,000 acres located within Collier County from west of SR 29 to US 41. This area included a 50,000-acre refuge on lands that are now part of the Flint Pen Strand and the Bird Rookery Swamp. The Collier Wildlife Management Area was closed in 1961 due to land sales and changes in land use.

In 1953, additional efforts to protect wildlife resources were undertaken in Lee County by many landowners, including Alico Inc., Henderson Ranch and doctors William E. Berkey and Ben L. Fabric. These landowners worked cooperatively to establish a wildlife management area on private lands in Lee County, extending south of Corkscrew Road and including portions of Flint Pen Strand. Land owned by Alico Inc. remained a wildlife management area until 1966.

A more in-depth discussion regarding historical land uses in the region prior to and including the 20th century can be found in **Appendix A**.



Map 4. 1839 Military map of the area around CREW.

Map 5. 1856 Military Map of the area around CREW.

5. RESOURCE DESCRIPTION AND ASSESSMENT

5.1 Infrastructure

CREW MA has a variety of infrastructure developed for public use purposes. The area contains seven parking areas, three boardwalks including a 1,500 feet boardwalk with ADA-compliant access, an observation tower, an observation deck, 2 pavilions, 40 miles of marked trails which include 12 miles of equestrian trails and 9 miles of elevated tram roads for hiking/biking, and six ADA-compliant port-a-potties which require regular maintenance. Also on the area are perimeter fences, 56 miles of service roads and fire lines, and several buildings that are maintained for land management purposes, including the Corkscrew Marsh and Flint Pen Strand check stations, the CREW MA field office, a maintenance shop, a storage shed, and a residence privately owned by an FWC Law Enforcement officer.

5.2 Physiography

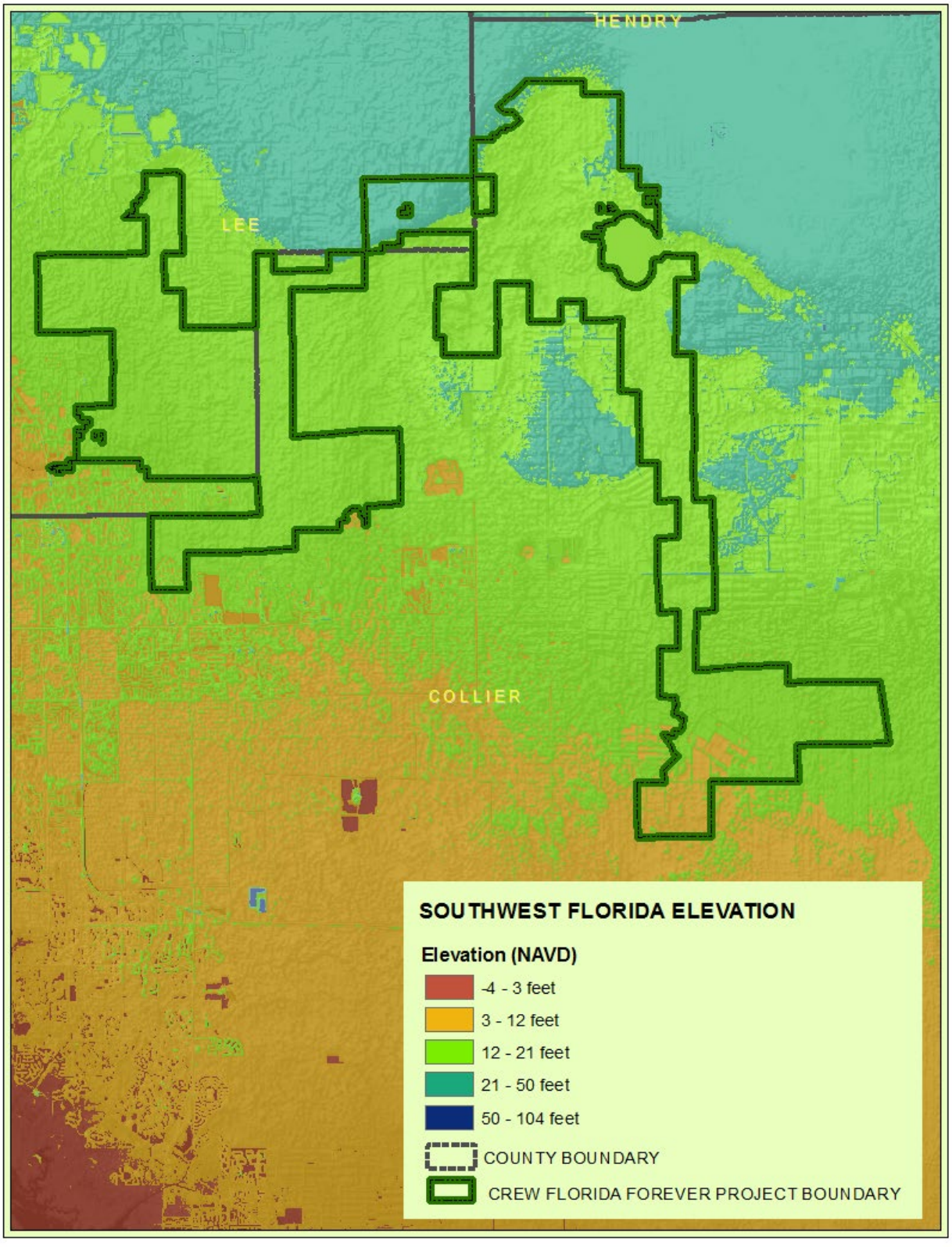
Topography

The topography in the CREW MA (**Map 6**) slopes southward from an elevation range of 26 feet NGVD in the flatwoods north of the Corkscrew Marsh to an average of 20 feet NGVD in Corkscrew Marsh and 15 feet NGVD in the southern end of Bird Rookery Swamp. The elevations in Flint Pen Strand range from 20 feet NGVD near Corkscrew Rd to elevation 15 feet NGVD north of the Lee/Collier County line. The combination of mining operations, agriculture and residential developments have produced higher elevations adjacent to Flint Pen Strand. The elevations in Bird Rookery Swamp range from 16 feet NGVD near the northeast boundary to 15 feet NGVD along the southwest boundary, although these elevations are currently being reviewed. The topography along the southern boundary of Bird Rookery Swamp has undergone substantial modifications due to the surrounding residential development, mining operations and widespread channelization.

Geology

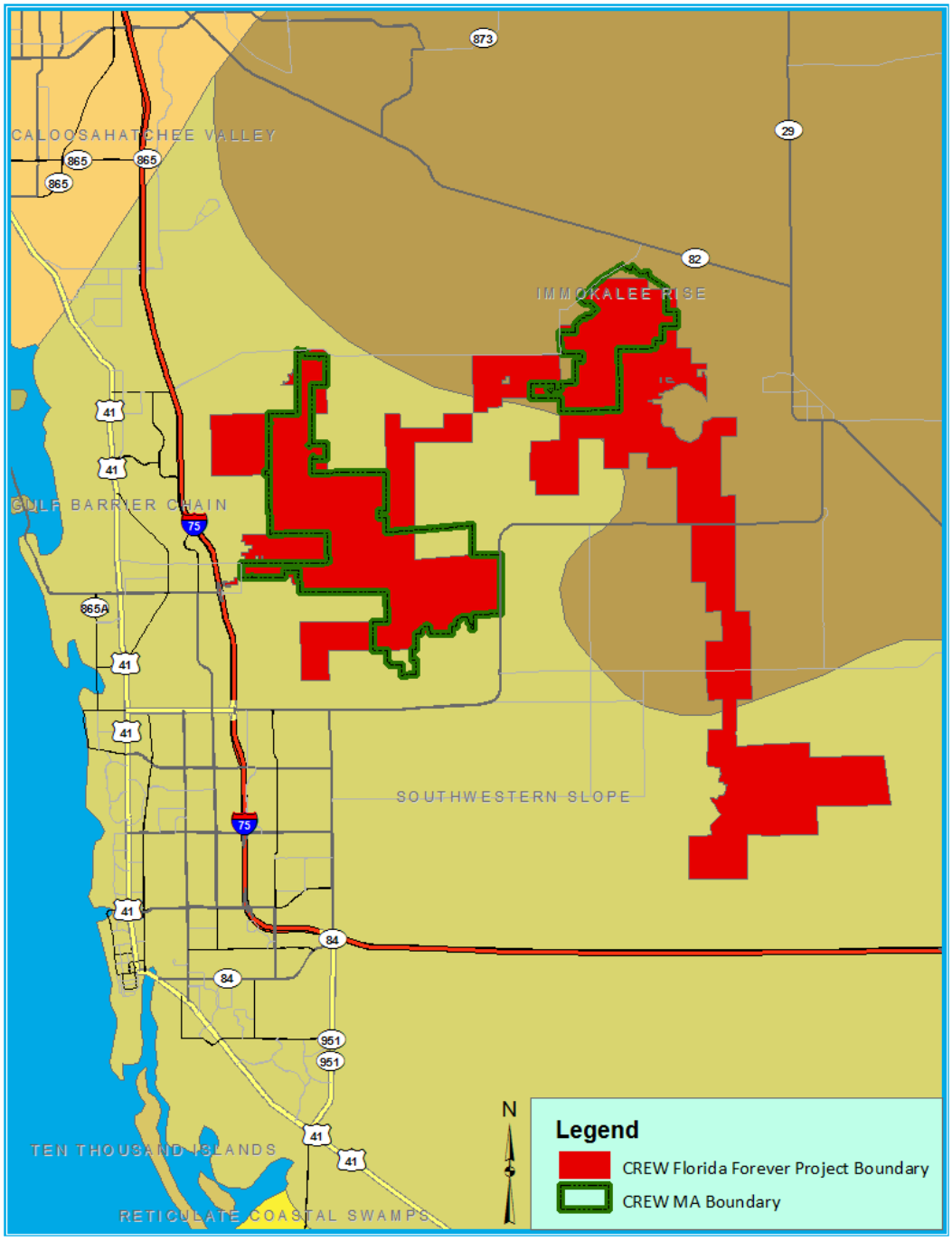
CREW lies within the Southern Physiographic Zone of the Florida peninsula. It falls within the Immokalee Rise (Flatlands) and the Southwestern Slope physiographic regions (**Map 7**). Immokalee Rise are remnant ancient sea level terraces made up of Pamlico (Pleistocene) and Talbot (Pliocene) terrace sands. The Immokalee Rise geomorphic feature is primarily found in Hendry County, but extends into eastern Lee County and northeastern Collier. The Southwestern Slope region lies southwest of the Immokalee Rise at elevations below 25 feet above mean sea level and slopes toward the Gulf of Mexico. Most of the Southwestern Slope geomorphic feature is a thinly coated sand overlying an eroded Tamiami Formation limestone surface.

Mineral soils covering the rock and marl formations are primarily composed of marine sands that were deposited during the Pleistocene period. During this period, the sand on the Talbot and Pamlico terraces was deposited by high sea levels of the Sangamon and Peorian interglacial ages. Other sand, marl and peat were deposited on top of some of the Pamlico sand at the end of the Wisconsin glacial stage of the Pleistocene series.



Map 6. CREW regional topography.

The sand underneath CREW is underlain by the Tamiami formation which was deposited in the open ocean during the Pleistocene age. The Tamiami formation is a sandy limestone or calcareous sandstone that appears at the surface where sand deposits are absent. It occurs at or near the land surface in Charlotte, Collier, Hendry, Lee and Monroe Counties. Near the Corkscrew Marsh, where the Pamlico sand is very shallow and overlies other calcareous materials, the soils belong to the Sunniland, Felda and Matmon series.



Map 7. CREW major geomorphic features.

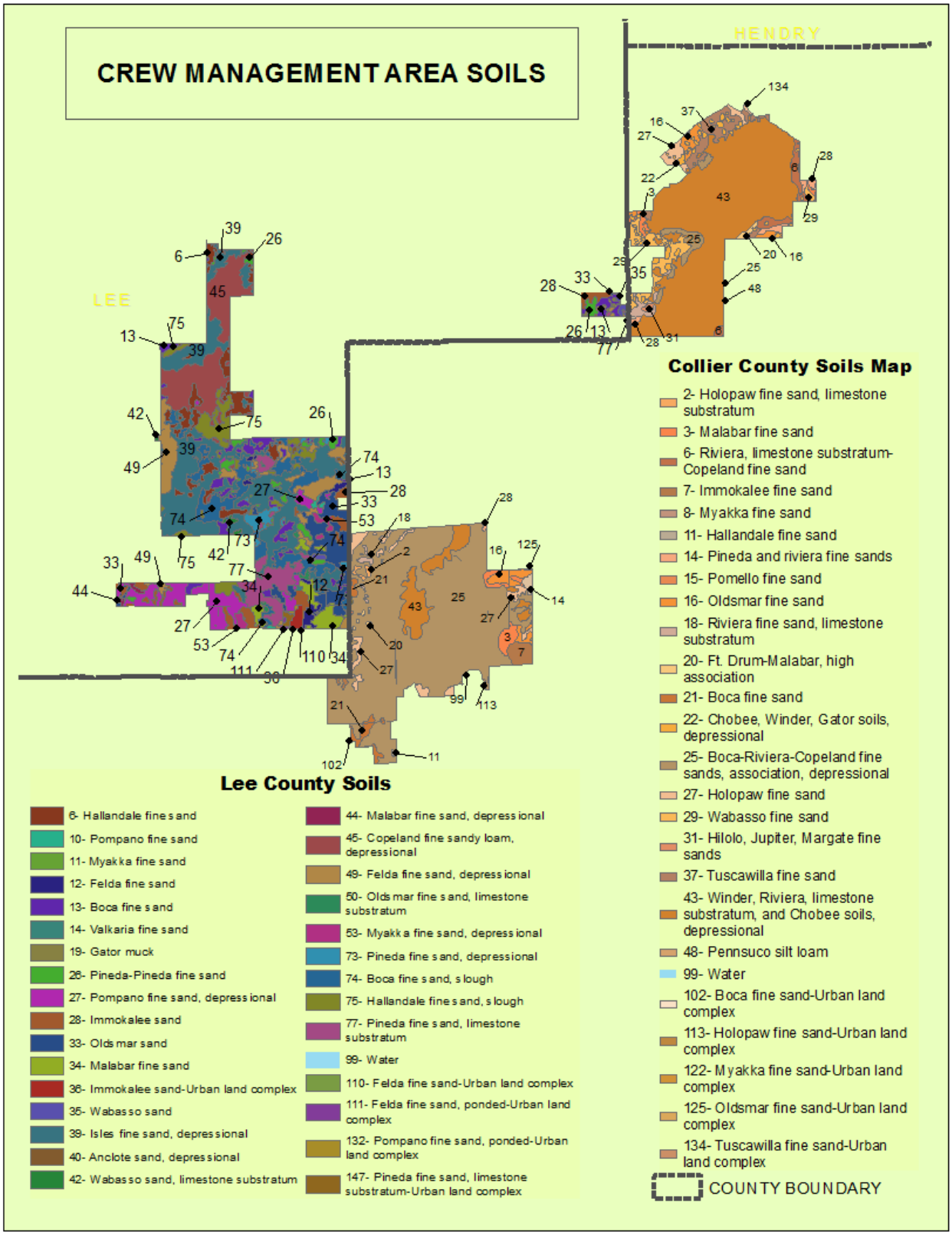
Soils

The soils underlying the CREW MA are mainly sandy mineral with some peat and marl components.

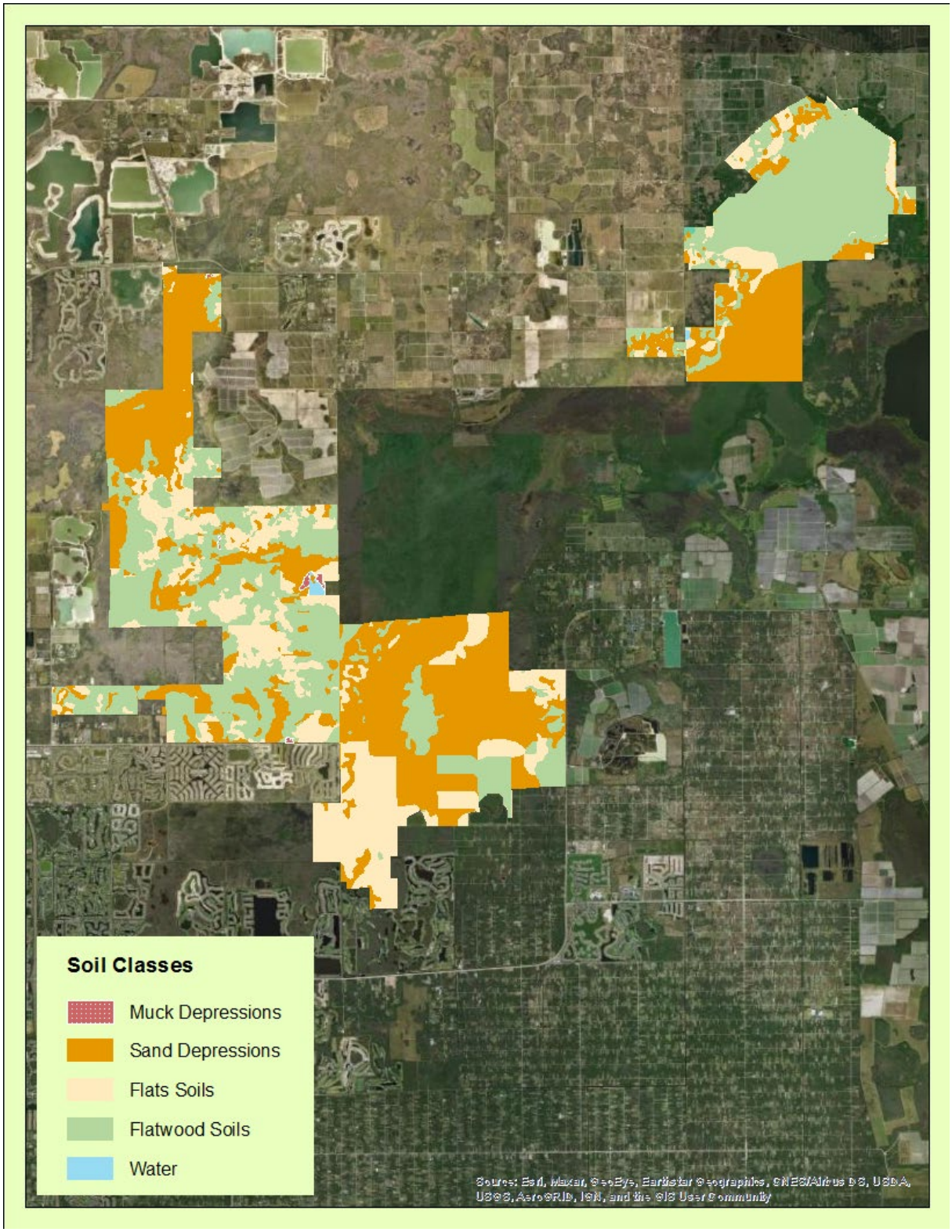
A soil map encompassing the CREW MA (**Map 8**) was compiled using Lee and Collier County soil survey data from the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). The upland soils forming the fringe around Corkscrew Marsh are predominantly Tuscawilla Fine Sand and Wabasso Fine Sand. The wetlands are dominated by the Boca, Riviera, Copeland, Depressional Complex and the Winder, Riviera, Chobee, Depressional complex. In Bird Rookery Swamp, the wetland soils are also dominated by the Boca, Riviera, Copeland, Depressional Complex and the Winder, Riviera, Chobee, Depressional complex. The upland soils are predominantly Holopaw Fine Sand and Pineda fine Sand. Flint Pen Stand soils are dominated by Copeland Sandy Loam, Isles Fine Sand (depressional) and Hallandale Fine Sand (Slough). Other key wetland soil types in Flint Pen Stand include Pineda Fine Sand (depressional) and Felda Fine Sand (depressional). Information about soils is updated by NRCS periodically and available through the NRCS Web Soil Survey.

The Natural Soil Landscape Positions (NSLP) classification system groups South Florida soils into 12 categories based on hydrology and soil morphology that reflect the local relative topography, hydrology and vegetation of the area (Zahina et al. 2001). The soils within the CREW MA are classified into four distinct soil categories: flatwood soils, flats soils, sand depression soils and muck depression soils (**Map 9**). The Soil classification database (Zahina et al. 2001) provide a complete description of soil classification, vegetation associations, and map and data files of NSLP.

While a complete profile analysis of the underlying soil has not been completed for the CREW MA, a soil profile completed in 1974 characterized the soil horizons underlying the Corkscrew Swamp Sanctuary, which is contiguous with the CREW MA. Analysis of this soil sample found up to 6.5 feet of fine sand in the A horizon underlain by marl. Shell beds and limestone bedrock were also sporadically found in the soil profile. The limestone was mainly associated with the hammocks and pine forest and occasionally underlying some of the marshes. Organic matter contributed to the soil profile in depressional flag ponds, willow stands and cypress. Where organic matter was present, peat material ranging from 1 to 6.5 feet made up the O horizon. Typically, the peat was shallowest at the edge of the depressional wetland and deepest at the center.



Map 8. CREW Management Area NRCS soil classifications.



Map 9. CREW Management Area NSPL soil classifications.

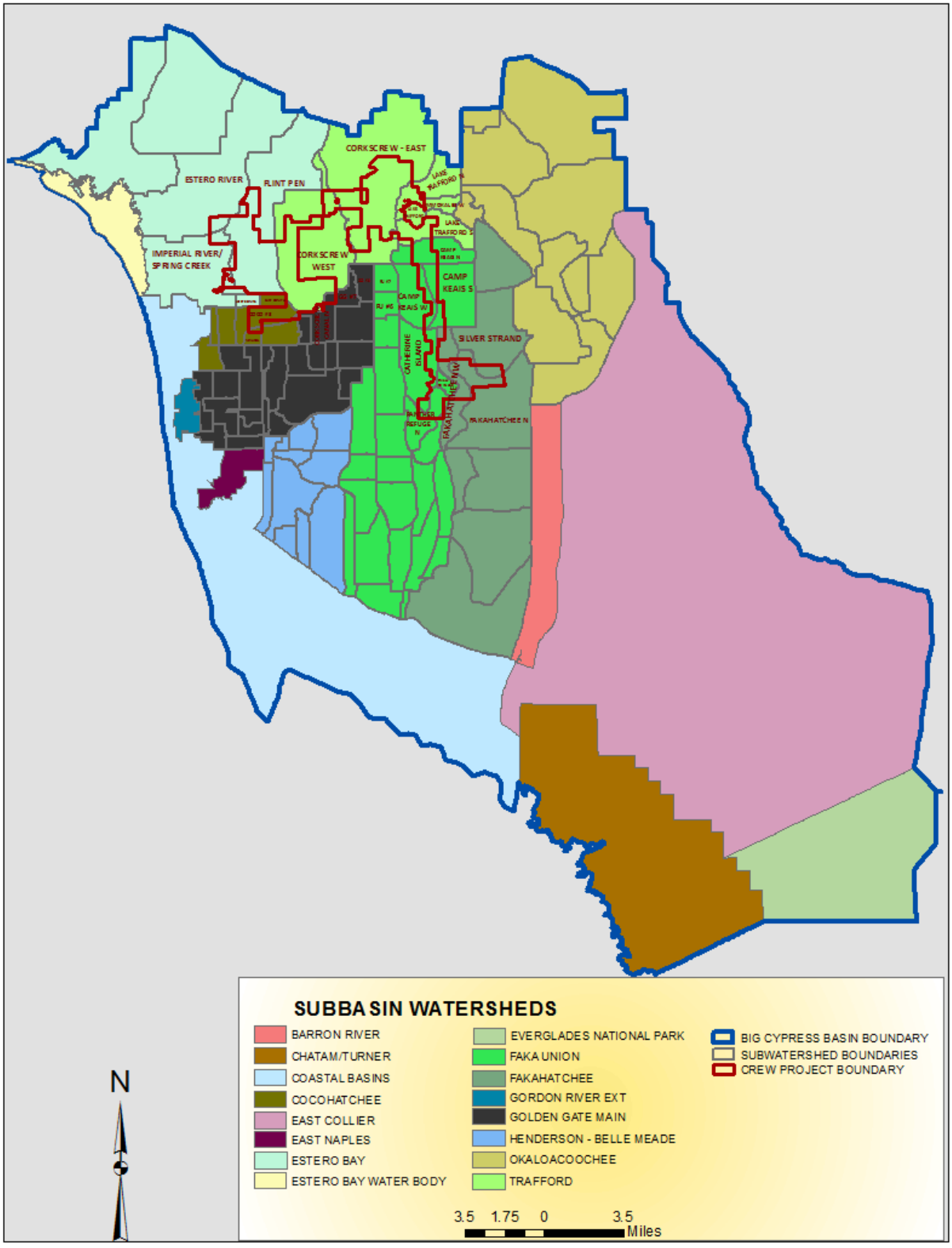
Hydrology

CREW is located within the Big Cypress drainage basin. The boundaries of the CREW MA fall within three interconnected sub-basins within Big Cypress basin (**Map 10**): Cocohatchee, Estero Bay and Trafford sub-basin. Corkscrew Marsh is located within the Trafford sub-basin. Bird Rookery Swamp is located within the Cocohatchee and Trafford sub-basin. Flint Pen Strand is located within the Estero Bay sub-basin.

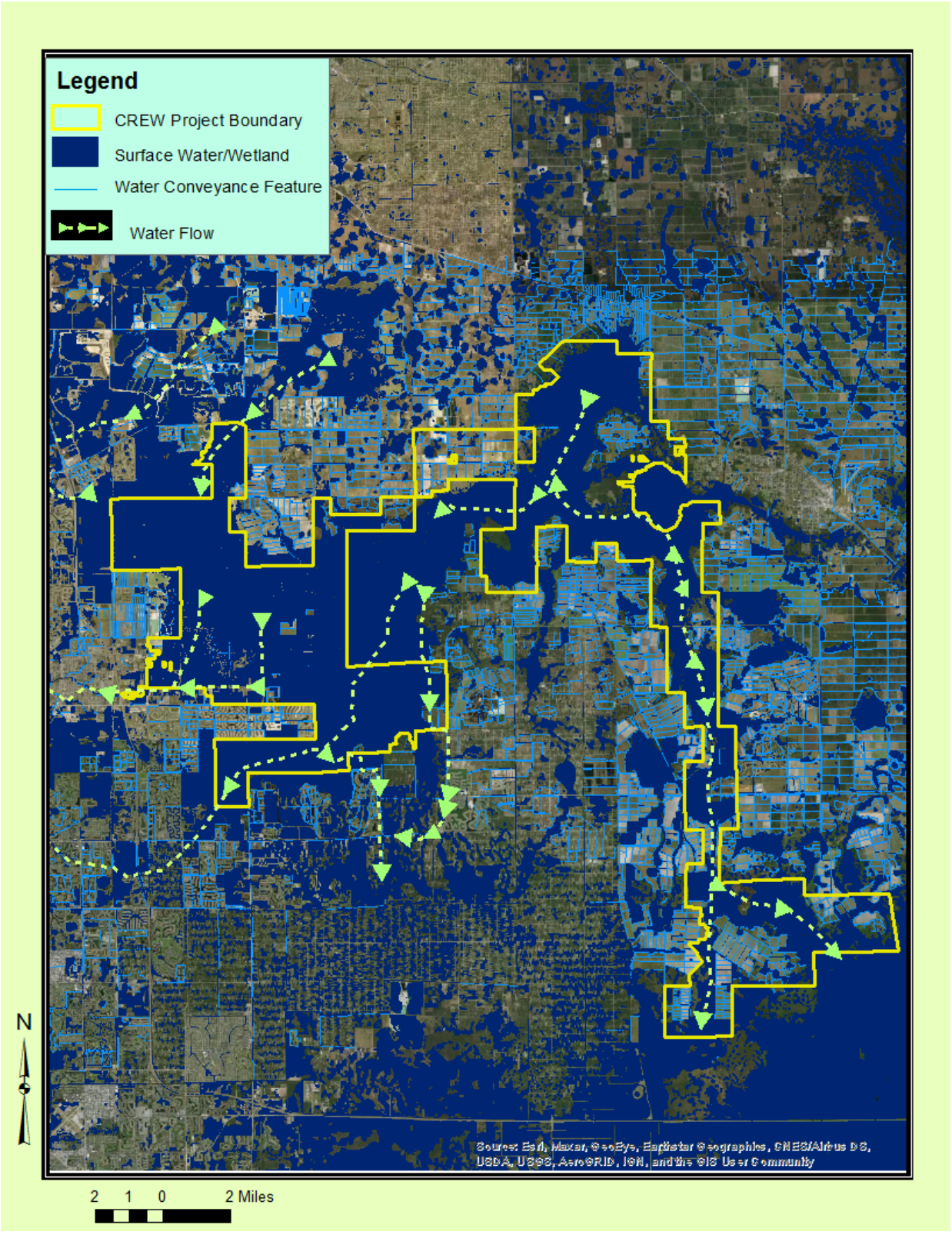
Surface water within the CREW MA generally flows south and west following the relief in topography (**Map 11**). With the onset of the summer rains in early June, the water table in the CREW MA area begins to rise, forming a thin hydrologic gradient. As water levels continue to rise, the strands, sloughs and deeper marshes act as shallow flow ways conveying sheet flow into adjacent marshes, prairies and other low-lying hydric systems. Habitats in higher elevations only get inundated in the wettest part of the year. At the peak of the wet season, the water sheet flows southward depending upon rainfall. The dry season reverses this process as water slowly recedes. With the recession of the water table in the dry season, standing water is confined to the deeper portions of the wetlands in the system (Gee & Jenson 1993).

Corkscrew Marsh is fed by rainfall and agricultural runoff from several major discharge locations (**Map 12**). Surface water from Corkscrew Marsh slowly spills into Corkscrew Swamp Sanctuary and sheet flows south to Bird Rookery Swamp. Areas west of Corkscrew Marsh, including Panther Island Mitigation Bank and an adjacent farm, flow south into either Bird Rookery Swamp or Corkscrew Swamp Sanctuary through existing canals. Water exits Bird Rookery Swamp to the south via Corkscrew Canal, which feeds into the Cocohatchee and Cypress Canals and ultimately is discharged to the Gulf of Mexico. A portion of the water sheet flows south into Golden Gate Estates. Farther west, Flint Pen Strand sheet flows south and drains in the Kehl Canal and ultimately discharges into the Imperial River.

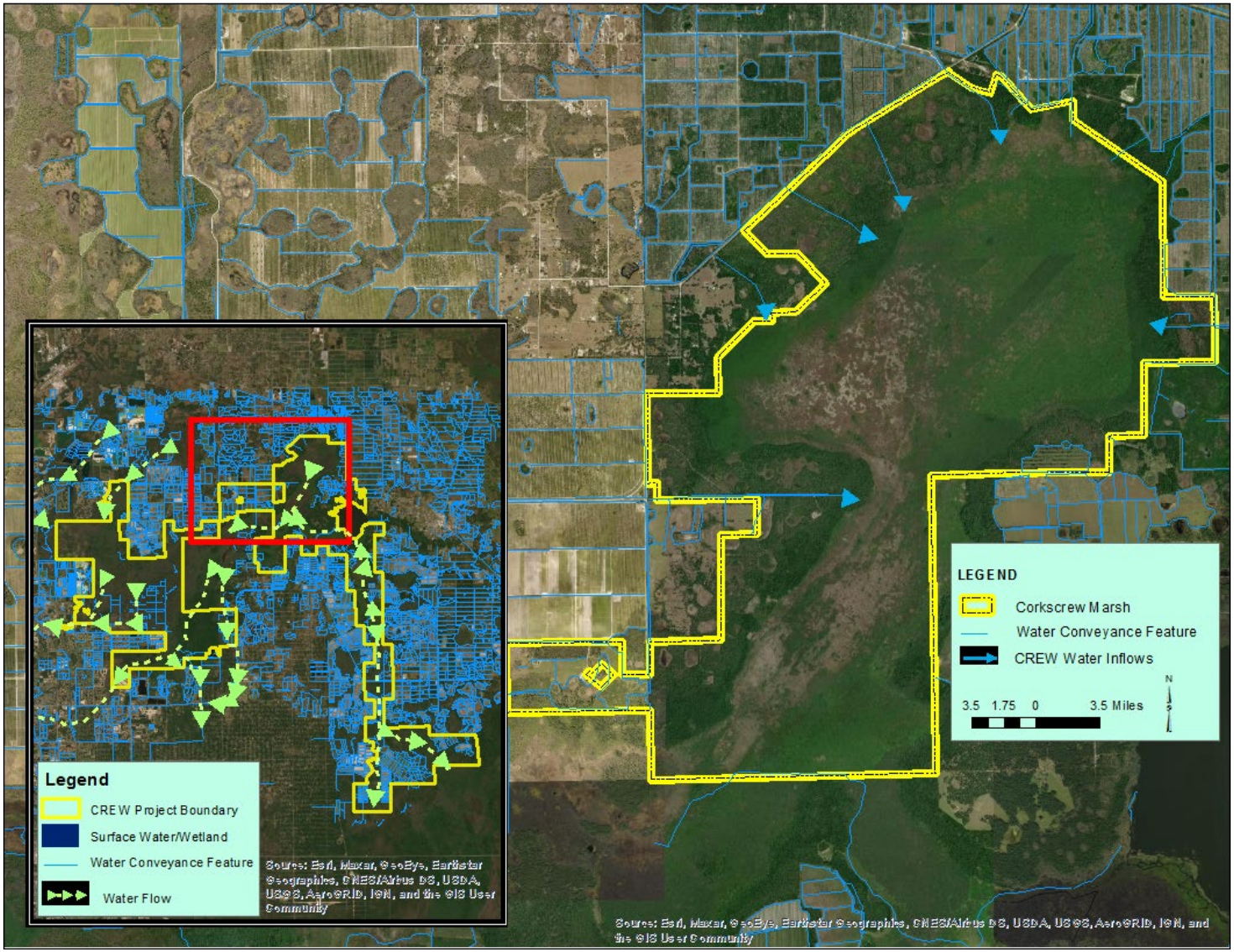
Historically, annual inundation of the hammocks in Corkscrew Marsh averaged 80 days while the marsh averaged 296 days. Cypress and willow habitats in Flint Pen Strand and Bird Rookery Swamp averaged between 278 to 291 days of annual inundation (Clem and Duever 2019). Clem and Duever also found that Corkscrew Swamp Sanctuary, an area connecting Corkscrew Marsh to Flint Pen Strand and Bird Rookery Swamp hydrologically, has undergone significant hydroperiod reductions over the past 60 years, with a 29% decrease in hydroperiod in marshes, 18% in oldgrowth bald cypress and 17% in marshes over the last 15-20 years. One of the District's goals is to coordinate with Corkscrew Swamp Sanctuary to develop hydrologic improvements in Bird Rookery Swamp that would extend hydroperiods to the north in Corkscrew Swamp Sanctuary and ultimately benefitting Corkscrew Marsh.



Map 10. CREW regional basin watersheds and sub-watersheds.



Map 11. CREW regional hydrography.



Map 12. Locations of water inflows to CREW MA.

Agricultural and residential development in the region have steadily increased since the 1950s. While the agriculture land use has decreased in recent years, the residential development pressure has intensified, increasing the demand for flood control and increasing water withdrawals from the Surficial Aquifer for irrigation and public water supply. The CREW MA is located within the cone of influence of two municipal wellfields. These wells, combined with the transmissivity of the Surficial Aquifer, which includes the water table (40-220 feet thick) and the Lower Tamiami Aquifer (100-400 feet thick), reduce hydroperiods and impact hydrology in CREW (Gee & Jenson 1993). A network of canals downstream of CREW rapidly drains surface water and groundwater from the adjacent landscape and carry the runoff to coastal estuaries. This further reduces the natural hydroperiod and degrades wetland habitats (Clem & Duever 2019). Although numerous weirs have been installed to slow flow during drier parts of the year, the transmissivity of porous sand and limestone substrates in this area suggest that the drainage is likely to play a role in the declining hydroperiod (Clem & Duever 2019).

Evapotranspiration can also play a role in the hydroperiod of different plants communities, particularly when the amount of standing water is low. A study by Shoemaker et al. (2011) quantified the evapotranspiration rates in common south Florida plant communities and noted that in drier conditions water loss through evapotranspiration was notably different amongst communities. Budny and Benscoter (2016) suggest that there is greater transpiration water loss in plant communities that have transitioned from herbaceous to a shrub dominated state. This is particularly relevant to Corkscrew Marsh, which has transitioned from a sawgrass-dominated to a willow-dominated marsh in recent decades.

5.3 Vegetation

There are eight distinct natural community types within the CREW MA (**Maps 13 & 14; Figure 1**) (**Appendix B**). The District groups natural community types based on the descriptions contained in the Florida Natural Areas Inventory Classification system (FNAI 2010) and the Florida Land Cover Classification System (Kawula & Redner 2018).

Corkscrew Marsh is dominated by a sawgrass and willow marsh with hammocks and flatwoods on the eastern, northern and western boundaries. Flint Pen Strand consists of cypress-dominated communities, mixed shrubs and pine flatwoods. Bird Rookery Swamp is mostly strand swamp dominated by cypress and maple, with a mix of wet flatwoods and dome swamps along the western portion of the property and an area of open marsh dominated by sawgrass and willow in the center. A system of logging tram roads and adjacent borrow ditches remain in Bird Rookery Swamp from previous cypress logging operations.

Of the 597 species of plants documented in the CREW MA, 495 are native (including 21 endemics), 14 are listed as state-endangered, 20 are listed as state-threatened and 68 are not native (**Appendix C**).

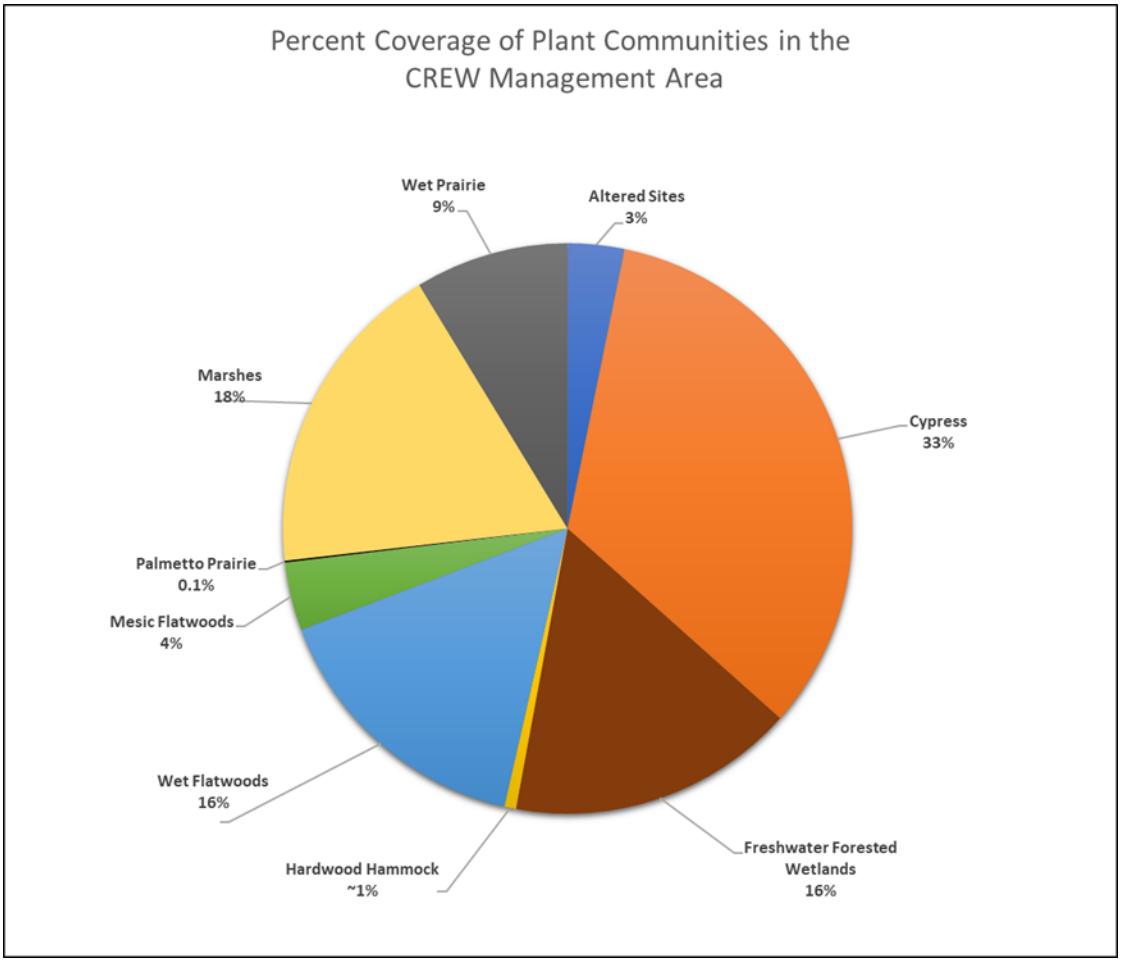
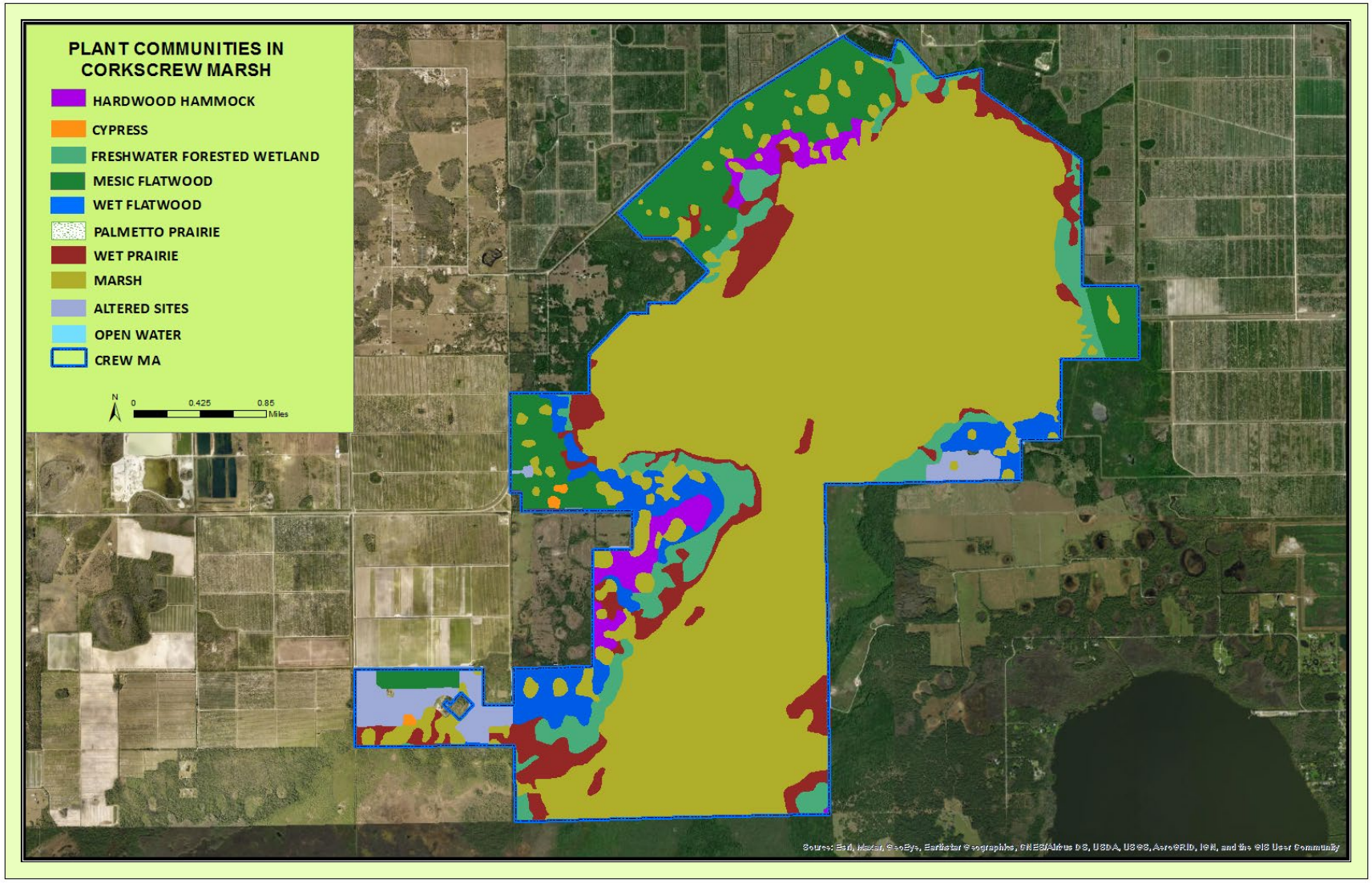
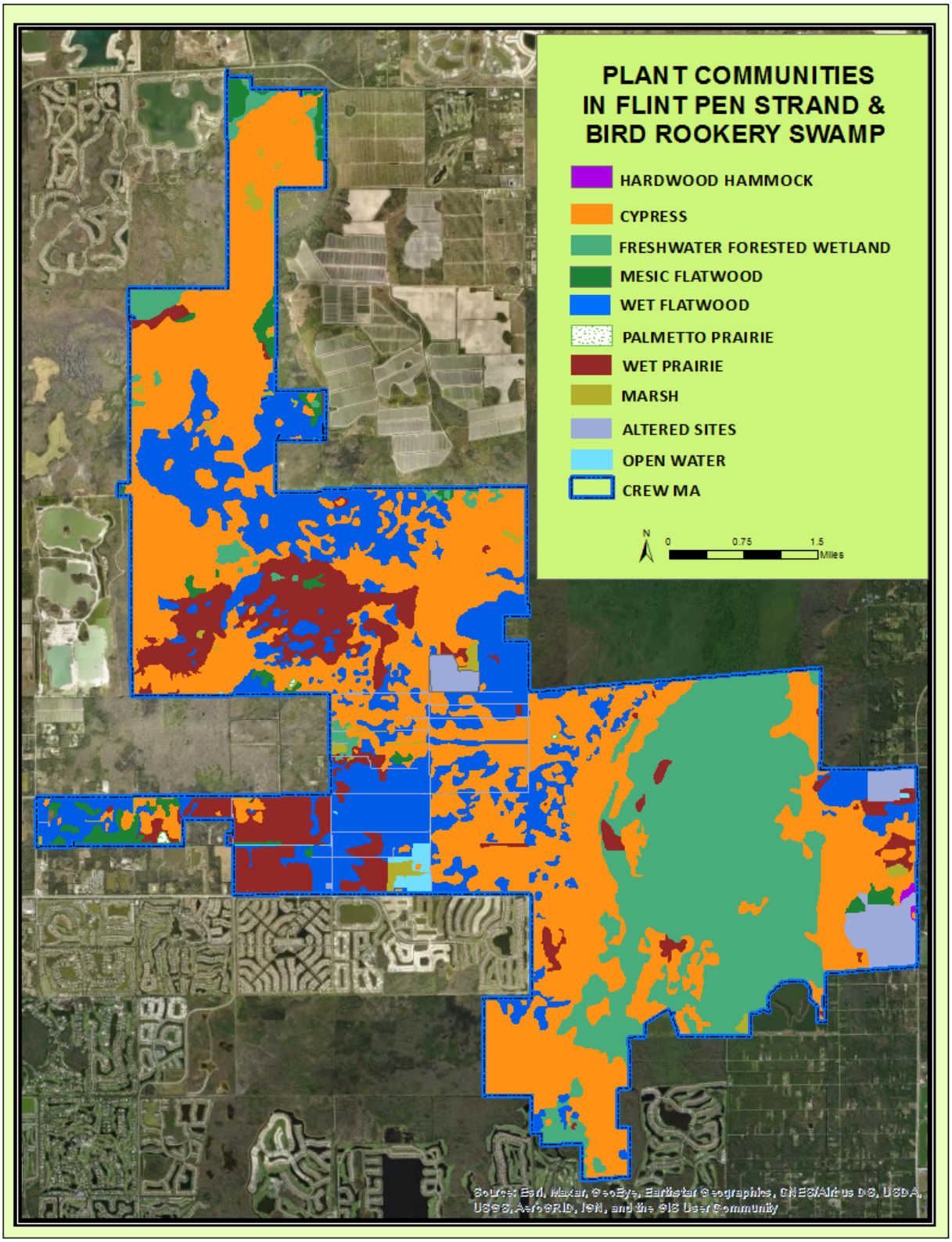


Figure 1. Percent coverage of plant communities in the CREW Management Area.



Map 13. Plant communities in Corkscrew Marsh.



Map 14. Plant communities in Flint Pen Strand and Bird Rookery Swamp.

Listed Species

Listed species include those plants and animals identified as rare, threatened or endangered by the U.S. Fish and Wildlife Service (FWS), FWC and the Florida Department of Agriculture and Consumer Services. Floral and faunal species were inventoried shortly after acquisition to determine the presence of listed species within the Management Area. Additional surveys of floral and faunal species have been completed by FWC biologists with the assistance of other volunteers and the species lists are updated regularly. **Table 1** identifies listed plant species known to occur within the CREW MA.

Table 1. Listed plant species on the CREW Management Area and current status. [a]

Common Name	Scientific Name	Status
Abrupt-Tip Maiden Fern	*Thelypteris augescens*	ST
Angularfruit Milkvine; Angle Pod	*Gonolobus suberosus*	ST
Bahama Wild Coffee	*Psychotria ligustrifolia*	E_s
Blodgett's Swallowwort	*Cynanchum blodgettii/Metastelma blodgettii*	ST
Blueflower Butterwort	*Pinguicula caerulea*	ST
Cardinal Airplant; Common Wild Pine; Stiff-Leaved Wild Pine	*Tillandsia fasciculata*	E_s
Catesby's Lily; Pine Lily	*Lilium catesbaei Walter*	ST
Clamshell Orchid; Flordia Cockleshell Orchid	*Prosthechea cochleata*	E_s
Comb PolyPody; Swamp Plume Polypod; Palmleaf Rockcap Fern	*Pecluma ptilota var. bourgeauana*	E_s
Dingy-Flowered Star Orchid	*Epidendrum anceps*	E_s
Everglades Greenbrier	*Smilax havanensis*	ST
Florida Tree Fern; Red-Hair Comb Fern	*Ctenitis sloanei*	E_s
Giant Airplant	*Tillandsia utriculata*	E_s
Giant Sword Fern	*Nephrolepis biEsrrata*	ST
Greater Yellowspike Orchid	*Polystachya concreta*	E_s
Hand Fern	*Ophioglossum palmatum*	E_s
Jingle Bell Orchid; Needleroot Orchid	*Dendrophylax porrectus*	ST
Lacelip Ladies Tresses	*Spiranthes laciniata*	ST
Leafless Beaked Ladies Tresses; Leafless Beaked Orchid	*Sacoila lanceolata var. lanceolata*	ST
Leafy Beaked Ladies Tresses	*Sacoila lanceolata var. paludicola*	ST
Leatherleaf Airplant	*Tillandsia variabilis*	ST
Manyflowered Grasspink	*Calopogon multiflorusLindl.*	ST
Night-Scented Orchid	*Epidendrum nocturnum*	E_s
Northern Needleleaf	*Tillandsia balbisiana*	ST
Pinepink	*Bletia purpurea*	ST
Plume Polypody; Plumed Rockcap Fern	*Pecluma plumula*	E_s
Satinleaf	*Chrysophyllum oliviforme*	ST

Table 1 (continued). Listed plant species on the CREW Management Area and current status. [a]

Common Name	Scientific Name	Status
Simpson's Zephyrlily	*Zephyranthes simpsonii*	ST
Southern Fogfruit; Southern Matchsticks	*Lippia stoechadifolia*	E_s
Stiff-Flower Star Orchid	*Epidendrum rigidum*	E_s
Twinberry; Simpson's Stopper	*Myrcianthes fragrans*	ST
Twisted Airplant	*Tillandsia flexuosa*	ST
Widespread Polypody; Widespread Rockcap Fern	*Pecluma dispersa*	E_s
Yellow Butterwort; Yellow-Flowered Butterwort	*Pinguicula lutea*	ST

a. Key to abbreviations: Species listed by the State of Florida as Federally-designated Endangered (FE), Federally-designated Threatened (FT), State-designated Threatened (ST), State-designated Endangered (E_s).

Invasive Exotic Plant Species

South Florida's subtropical climate provides an excellent environment for the rapid spread of non-native plants that alter natural ecosystems. Florida is second only to Hawaii in the severity of the threats posed by invasive, non-native species to native habitats and species. The District is committed to reducing the proliferation of non-native species to protect the ecological values of its management areas (SFWMD 2020). Changes in the surrounding environment have extensively altered the balance of the natural ecosystem within the CREW MA. These alterations have been a major factor in the exotic plant colonization. Without proper land management exotic plant expansion will continue to displace our native plants, reduce wildlife utilization and degrade public use areas.

5.4 Wildlife

The FWC has identified the area in and around the Management Area 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. "Biodiversity Hotspots" are areas with a high degree of overlap for 5-7+ declining species of wildlife, plus known occurrences of flora, fauna, & natural communities (Cox et al, 1994). "Priority Wetland for Listed Species" represents wetland habitats critical for one to three wetland-dependent species of vertebrates listed as endangered, threatened, or species of special concern (Kautz et al, 1994).

The CREW MA is also a significant wildlife corridor in southwest Florida. It connects the Florida Panther National Wildlife Refuge and Fakahatchee Strand Preserve State Park with the Corkscrew Swamp Sanctuary. This corridor is critical to the long-term survival of the Florida panther and black bear, two species found regularly on CREW MA.

The natural communities within the CREW MA provide habitat for numerous other birds, reptiles and mammal species. Several of these species are listed federally or by the state, such as the Big Cypress Fox squirrel and Florida panther. The FWC has been conducting extensive swallow-tailed kite nest surveys on CREW MA since 2015. In 2020, forty-seven swallow-tailed

kite nests were documented on the CREW MA. According to the Avian Research and Conservation Institute, this was the largest number of swallow-tailed kite nests known to occur on public lands (Smith and Plussa, 2020). Understanding, protecting and promoting this nesting habitat is a priority on the CREW MA due to the high nest site fidelity of swallow-tailed kites.

The Management Area is home to 32 species of mammals, 178 species of birds, 63 species of herpetofauna, 33 species of fishes, 225 species of insects, 10 species of invertebrates and 3 species of crustaceans (**Appendix C**).

Game species

Providing quality habitat for game species is an essential part of the land management program. Many District lands provide quality habitat for game species and contain abundant populations of white-tail deer, turkey and small game. The District encourages the public to utilize District lands and provides resource-based opportunities including archery, muzzleloader gun, general gun, small game and spring turkey seasons. Harvestable game on the CREW MA include deer, hog, small game, wild turkey and migratory birds.

Rare, Threatened and Endangered Listed Species

The CREW MA supports a variety of federally listed species, including 3 as endangered, 2 as threatened and 2 as threatened do to similarity of appearance. The CREW MA also supports 8 listed species designated as state threatened. A list of these listed species occurring on the CREW MA is included in Table 2.

Table 2. Listed wildlife species on the CREW Management Area and current status. [a]

Common Name	Scientific Name	Status
Birds		
Black Skimmer	*Rynchops niger*	ST
Crested Caracara	*Caracara cheriway*	FT
Everglade Snail Kite	*Rostrhamus sociabilis plumbeus*	FE
Florida Sandhill Crane	*Grus canadensis pratensis*	ST
Little Blue Heron	*Egretta caerulea*	ST
Roseate Spoonbill	*Platalea ajaja*	ST
Southeastern American Kestrel	*Falco sparverius paulus*	ST
Tricolored Heron	*Egretta tricolor*	ST
Wood Stork	*Mycteria americana*	FT
Herps		
American Alligator	*Alligator mississippiensis*	FT/(S/A)
Gopher Tortoise	*Gopherus polyphemus*	ST
Insects		
Ceraunus Blue	*Hemiargus ceraunus*	FT (S/A)

Table 2 (continued). Listed wildlife species on the CREW Management Area and current status. [a]

Common Name	Scientific Name	Status
Mammals		
Big Cypress Fox Squirrel	*Sciurus niger avicennia*	ST
Florida Bonneted Bat	*Eumops floridanus*	FE
Florida Panther	*Puma conolor coryi*	FE

a. Key to abbreviations: Species listed as Federally-designated Threatened because of similarity of appearance [FT(S/A)].

Exotic Animal Species

Non-native wildlife species are harmful to native wildlife and can negatively impact native vegetation or seriously interfere with management objectives. Feral hog, pythons, tegu and spiny iguana are some of the species of concern. The District coordinates with FWC to reduce populations of these species through public hunts. The effects of population control efforts are monitored by periodic site evaluations.

Feral hogs have caused negative impacts to natural communities and land management operations. Their disruption of soil and vegetation through rooting 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 burns by limiting the horizontal spread of fire. Areas of disturbed soil can also be more susceptible to exotic plant invasion. Rooting can also impact hiking trails, reptile populations and ground nesting birds. Feral hog populations in CREW MA have been stable for many years but are now increasing, despite pressure being applied through hunting and panther predation.

Pythons have established a breeding population in the Everglades and continue to spread throughout South Florida. Their predation can significantly reduce small mammal populations, depriving native predators of their primary food sources. The District remains an active partner in regional efforts to control pythons in addition to an established systemwide monitoring programs for Burmese pythons and other priority invasive reptiles. The District and FWC began python removal incentive programs in March 2017 to encourage public participation on Everglades National Park (ENP), Big Cypress National Preserve (BCNP), Water Conservation Areas and other lands within the core python population area. Although there has not been a confirmed python sighting in CREW MA, surveys and removal efforts have been expanded to include the CREW MA.

5.5 Cultural Resources

The Florida Division of Historic Resources (FDHR) completed a survey of archaeological sites within Corkscrew Marsh in 2002. Three pre-contact Native American sites were recorded during the survey and the potential for additional sites was identified based on the geological features.

In 1988, FDHR reviewed existing information on archaeological or historic sites in or near Flint Pen Strand and Bird Rookery Swamp, but a complete survey was not conducted. Their report identified several archaeological sites near Flint Pen Strand and Bird Rookery Swamp and indicated the potential for similar cultural resources to be present within these areas. The Bird Rookery Swamp tram road, which was built to allow harvest of the virgin cypress forests once found here, is also of historic value.

The District is committed to protecting the integrity of the cultural resource sites within the management area. The management goal for cultural resources within the management area is to preserve sites and objects that represent Florida's cultural periods. Land managers focus primarily on prohibiting ground disturbing activities in and around these archaeological sites. Vegetation management and prescribed burning activities are carefully conducted in a manner that have no impact on these resources.

5.6 Mitigation

Mitigation played an important role in the land acquisition and resource management within the CREW. In 1995, the District began accepting mitigation funds for land acquisition, restoration and management purposes. While the CREW project no longer accepts mitigation funds, the District continues to use available funds from the previous mitigation payments for land management activities.

5.7 Potential Additions

The District obtains land interests through donations, mitigation and purchase. Land acquisition within the CREW project boundary contributes towards the District's core missions for flood control, water quality improvement, water supply, and natural ecosystem protection and restoration. Land acquisition began with the purchase of 7,348 acres of land owned by Alico Inc. within Corkscrew Marsh. Since that time, the District has worked with other partners to acquire parcels within Flint Pen Strand and Bird Rookery Swamp. Although most of the parcels within the CREW project footprint are held in public interest or easement, there remain several private inholdings within the CREW MA. The acquisition of these parcels through a willing seller program would improve the continuity of existing conservation lands, management area boundary configuration, access and recreational opportunities.

6. PUBLIC USE

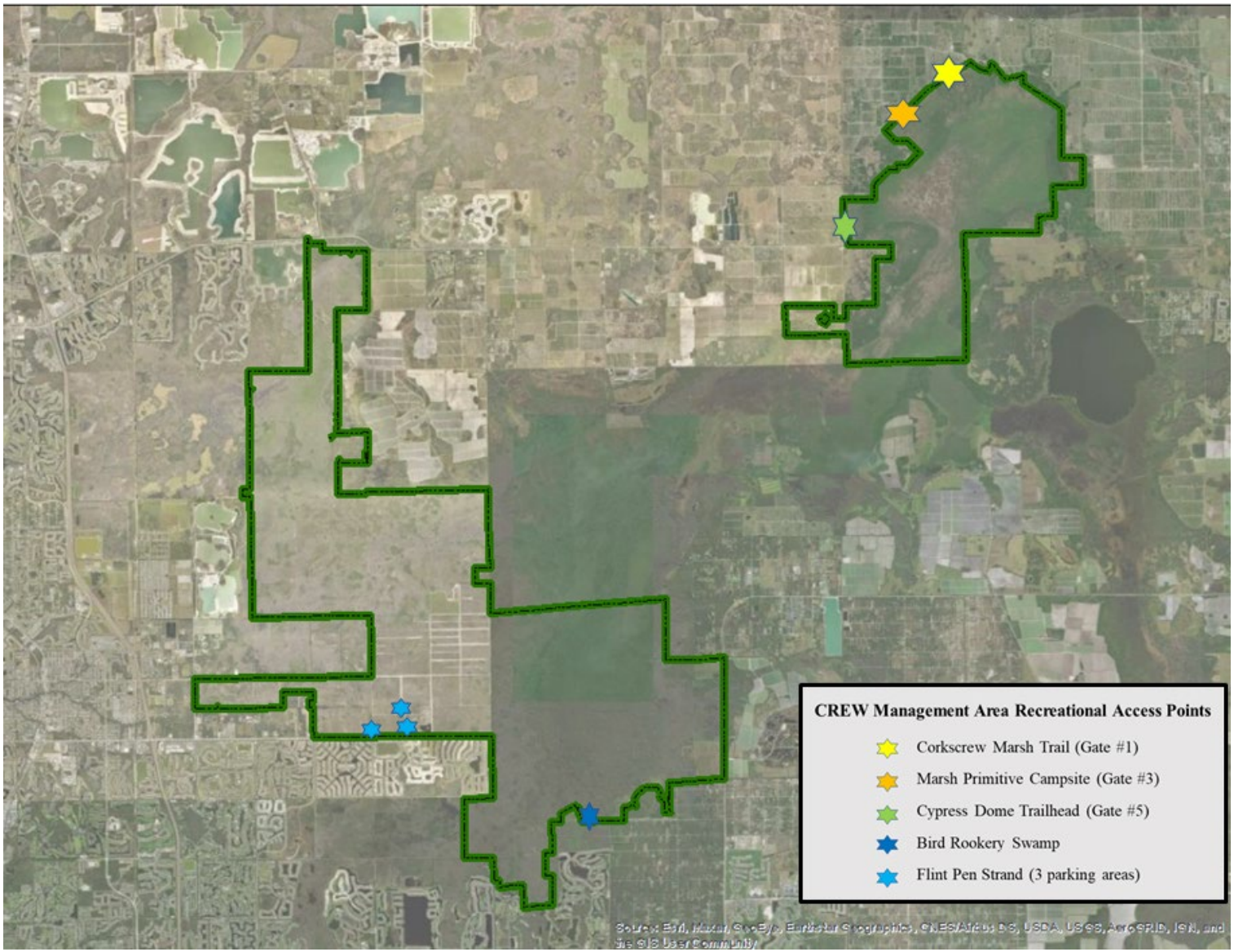
The District promotes and encourages public use of the CREW MA. Recreational opportunities provided on the area include hiking, biking, hunting, fishing, frogging, horseback riding, canoeing, geocaching, primitive camping, environmental education, wildlife viewing, nature photography, natural history study and plant and wildflower identification. Additional user information concerning recreational activities is located at each entrance to the CREW MA and on the District and the CREW Trust websites.

Seven access points and seven parking areas for public use (**Map 15**), including three new parking areas in Flint Pen Strand, provide access for hiking, biking, horseback riding and hunting. Forty miles of hiking, biking and equestrian trails are available for year-round use (**Maps 16-19**), with additional trails having been recently added to Flint Pen Strand. The adjacent residential development in the area has expanded significantly, making Flint Pen Strand very popular for public use visitors. Public recreational visits to the CREW MA exceed 50,000 annually, although during the COVID-19 pandemic over 97,628 visits were documented.

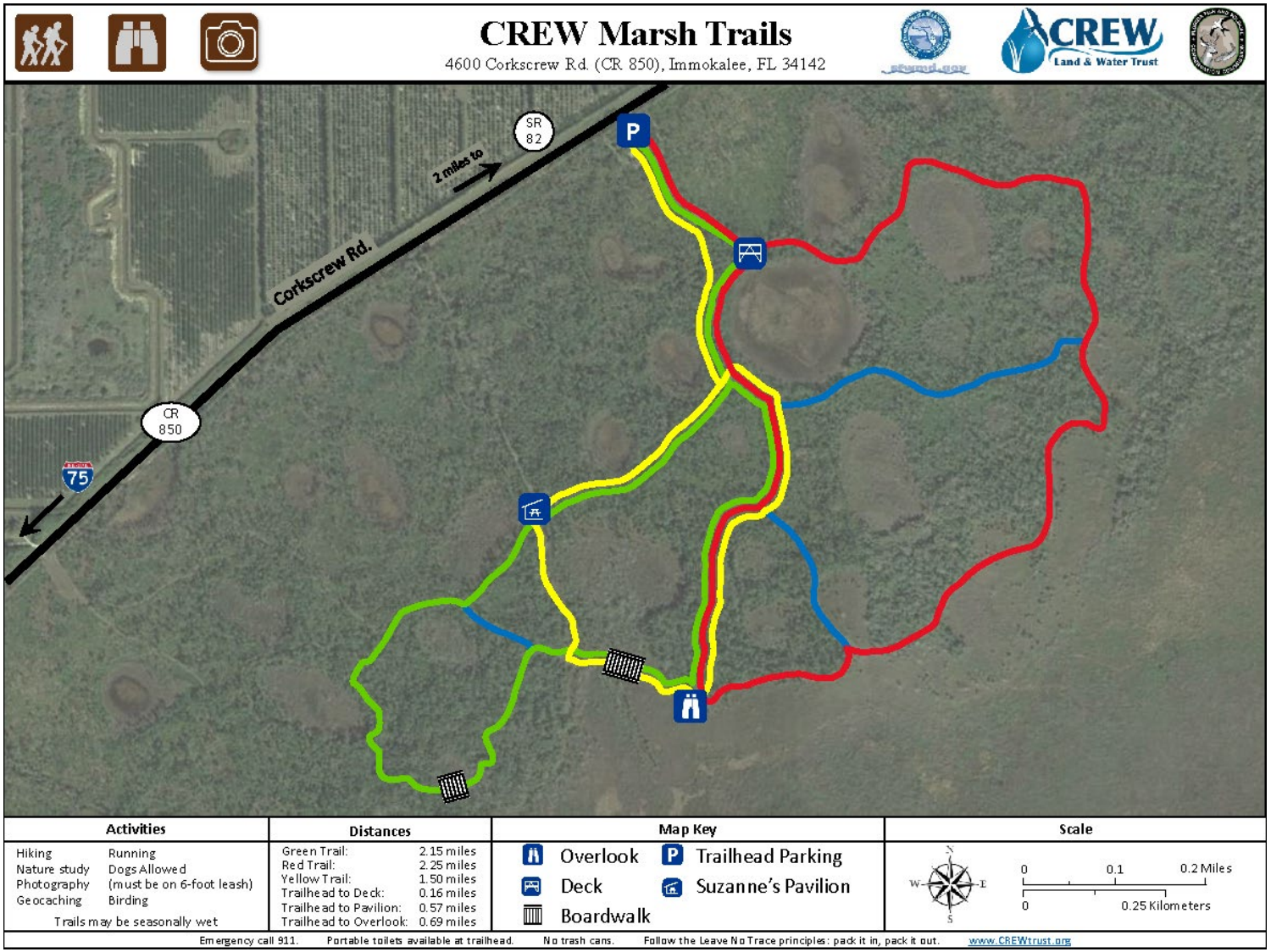
The District contracts with the CREW Trust to coordinate environmental education and public outreach at CREW MA. The Crew Trust develops and provides educational programs designed to promote increased visitor awareness and appreciation of natural areas and cultural resources. A central theme to these programs is the vital role of water management in maintaining resource viability and productivity. Students in the Lee and Collier County School Systems and other groups participate in these programs. Guided hikes and special events are also provided to the public on a regular basis. The CREW Trust also has an established volunteer program and utilizes student interns from Florida Gulf Coast University to assist with the education and outreach programs, interpretive signage, trail expansion, trail maintenance, invasive exotic plant control, water level monitoring, primitive campsite maintenance, equestrian trail maintenance and public outreach events.

Resource Protection

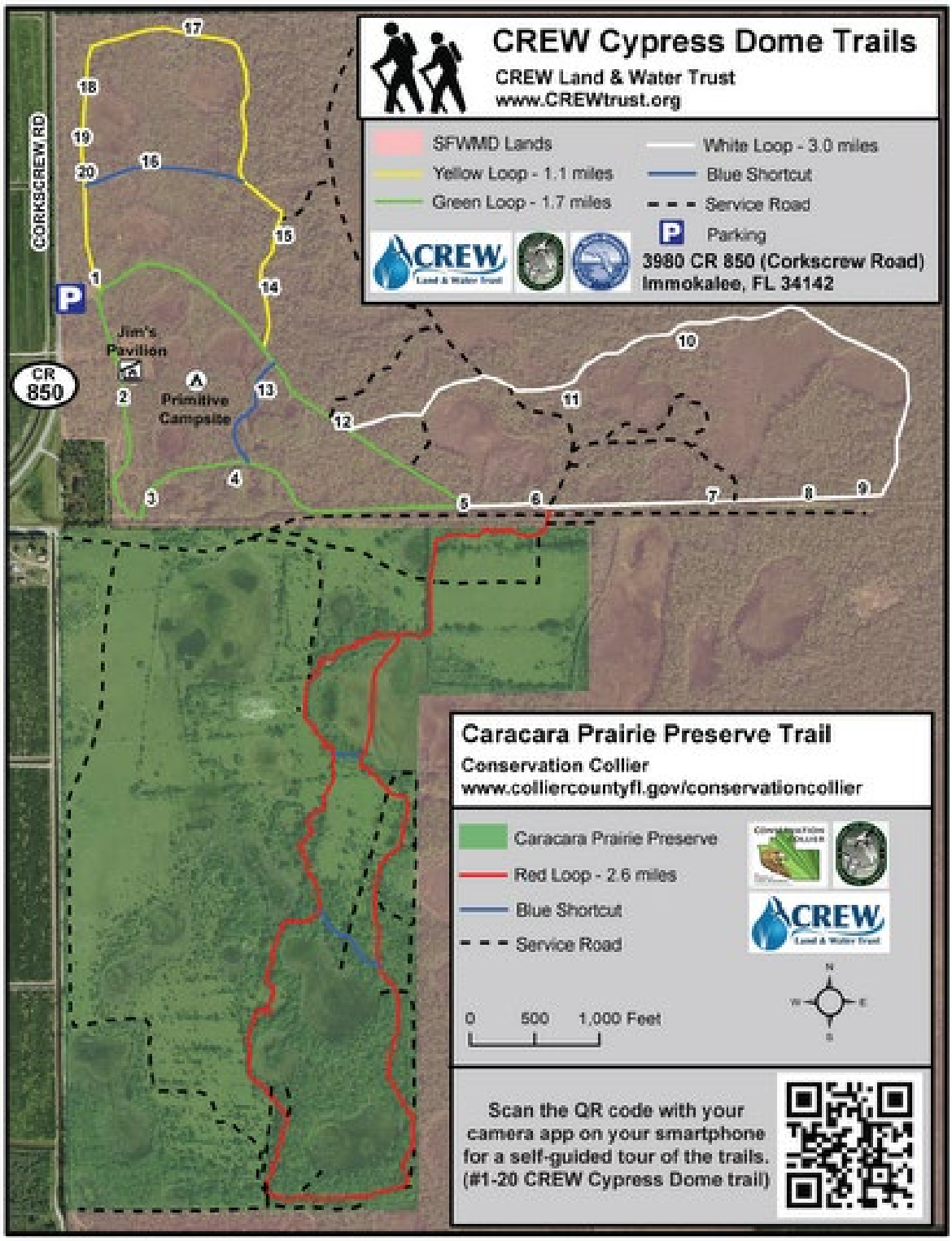
The FWC performs routine law enforcement patrols on portions of the CREW MA that have been established as a Wildlife and Environmental Area (CREW WEA) for public use and resource protection purposes. In addition to this primary level of security, the District has a contract with FWC to provide law enforcement services through the "enhanced patrol" program. The program provides funding for additional law enforcement patrols on the CREW MA throughout the year and to perform targeted operations to address specific law enforcement needs. The District also has an FWC Law Enforcement Officer who resides on the CREW MA, providing a constant presence on the area for deterrence and immediate response when needed. Law enforcement surveillance protects natural and cultural resources, deters vandalism, dumping, poaching and other illegal activities while safeguarding the public. Patrols are conducted with 4-wheel drive vehicles, all-terrain vehicles, aircraft and on foot. Resource protection is also enhanced by the presence and continual maintenance of posted boundary signs. The management area has been fenced where needed and the perimeter is posted as required to enforce management area rules and regulations as well as the District's Public Use Rule (Fla. Admin. Code Rule 40E-7 (2014)).



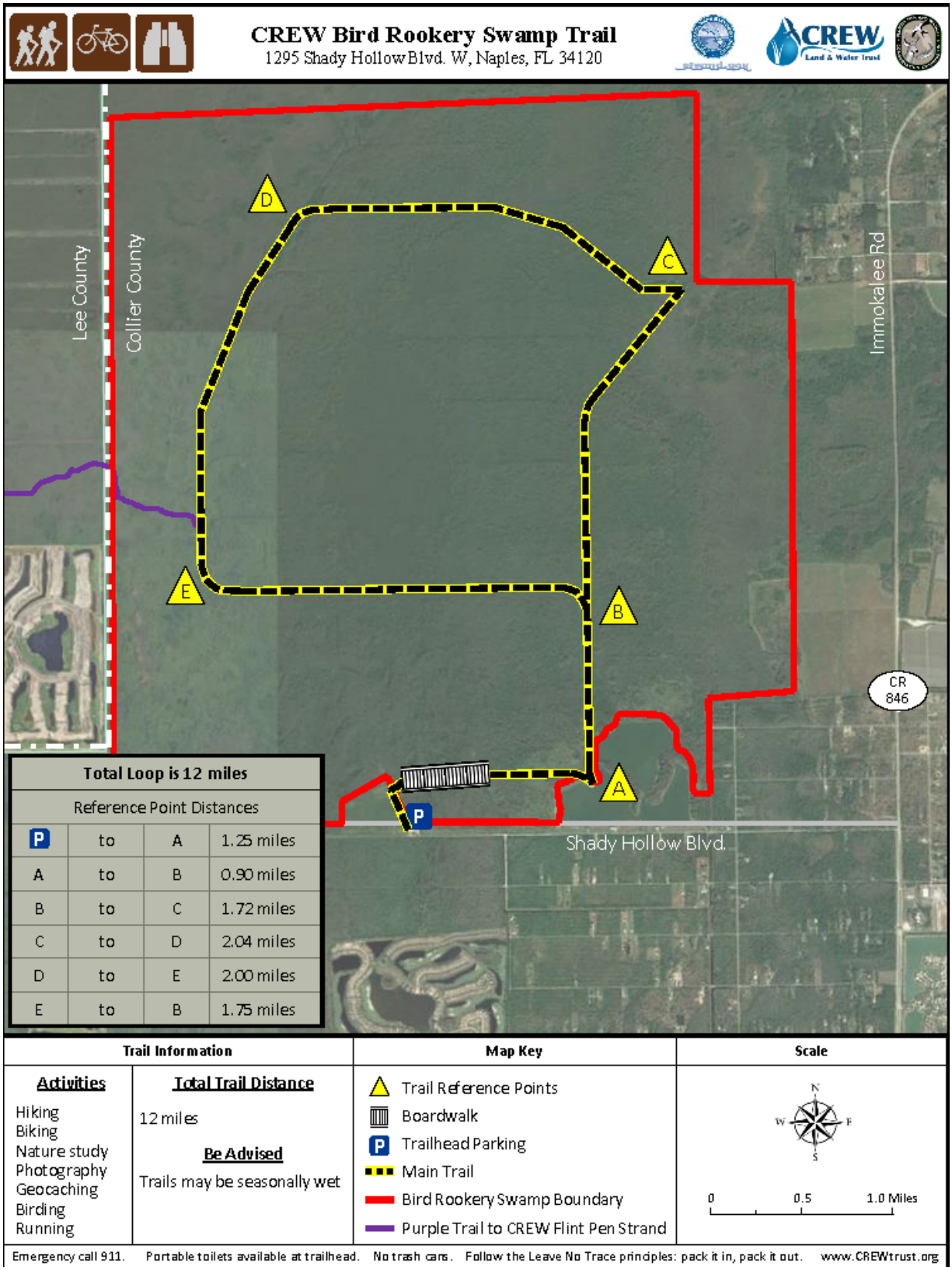
Map 15. CREW Management Area recreational access points.



Map 16. CREW Management Area Corkscrew Marsh trails.

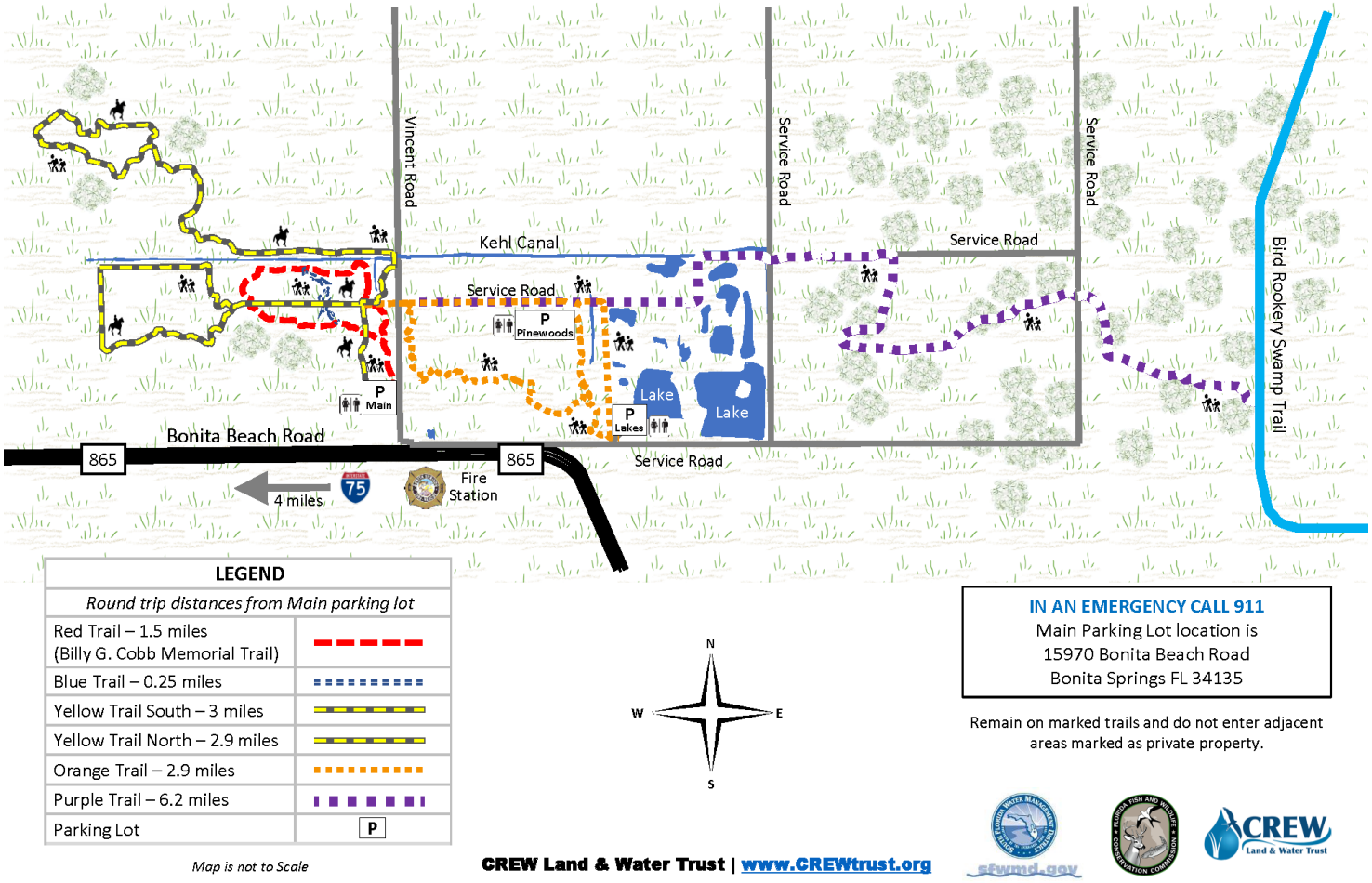


Map 17. CREW Management Area Cypress Dome trails.



Map 18. CREW Management Area Bird Rookery Swamp Trail.

CREW FLINT PEN STRAND TRAILS



Map 19. CREW Management Area Flint Pen Strand trails.

7. NATURAL RESOURCE MANAGEMENT

In order to keep native plant communities in a healthy and productive condition, District land managers take appropriate actions to compensate for the loss of natural processes. Several land management practices are utilized to preserve the ecological health and function of the management areas. These practices include prescribed burning fire-dependent plant communities with fire return intervals that mimic natural fire regimes; controlling non-native or invasive vegetation through the selective use of herbicides and biological control agents; restoring the physical structure of plant communities and biological diversity through mechanical vegetation management including mowing, chopping and shredding; and implementing hydrologic restoration activities where the natural hydrology has been altered through ditches, canals and other surface water drainage features.

7.1. Fire

Fire has shaped the distribution of plants in Florida's ecosystems. Historically, wildfires reduced fuel loads in natural communities. Due to habitat fragmentation and human suppression efforts, these fires no longer occur with historical frequency or extent, resulting in alteration to the natural community structure and function in fire-dependent communities. Most plant communities in Florida are adapted to periodic fire and rely on it to maintain their vegetative characteristics and biodiversity. Land Managers use prescribed burning to reduce hazardous buildup of vegetative fuel load, maintain plant species diversity, enhance wildlife habitat and encourage restoration of native plant communities. Land Stewardship recognizes the importance of fire as a management tool and has integrated prescribed fire into its land management strategy.

Fire History

The incidence of past fire use in the CREW MA has varied due to varying land uses prior to District acquisition. These uses ranged from agricultural row crops to logging and ranching. Wet and mesic flatwoods, as well as the open marsh, were probably burned to benefit cattle grazing. There are also signs of past fires in hammock areas and evidence of destructive fires in Bird Rookery Swamp and Flint Pen Strand, presumably occurring during times of prolonged drought. Land managers at CREW MA have been applying prescribed fire as a management tool since 1993, working closely with FWC, the Florida Forest Service (FFS), Corkscrew Swamp Sanctuary, and Collier and Lee Counties.

Prescribed Fire Planning

The fire management program includes wildfire prevention, detection and suppression, and prescribed burning. Prescribed burn standards and procedures are outlined in the Land Stewardship's Wildlands Fire Manual, which also serves as a centralized resource for information on fire management on District lands. The manual outlines the procedures that must be followed to ensure compliance with statutory requirements in §590 Fla. Stat. (2018) and Fla. Admin. Code R. 5I-2 (2021) & 62.256 (2014).

The CREW MA is divided into management units for the application of prescribed fire **(Maps**

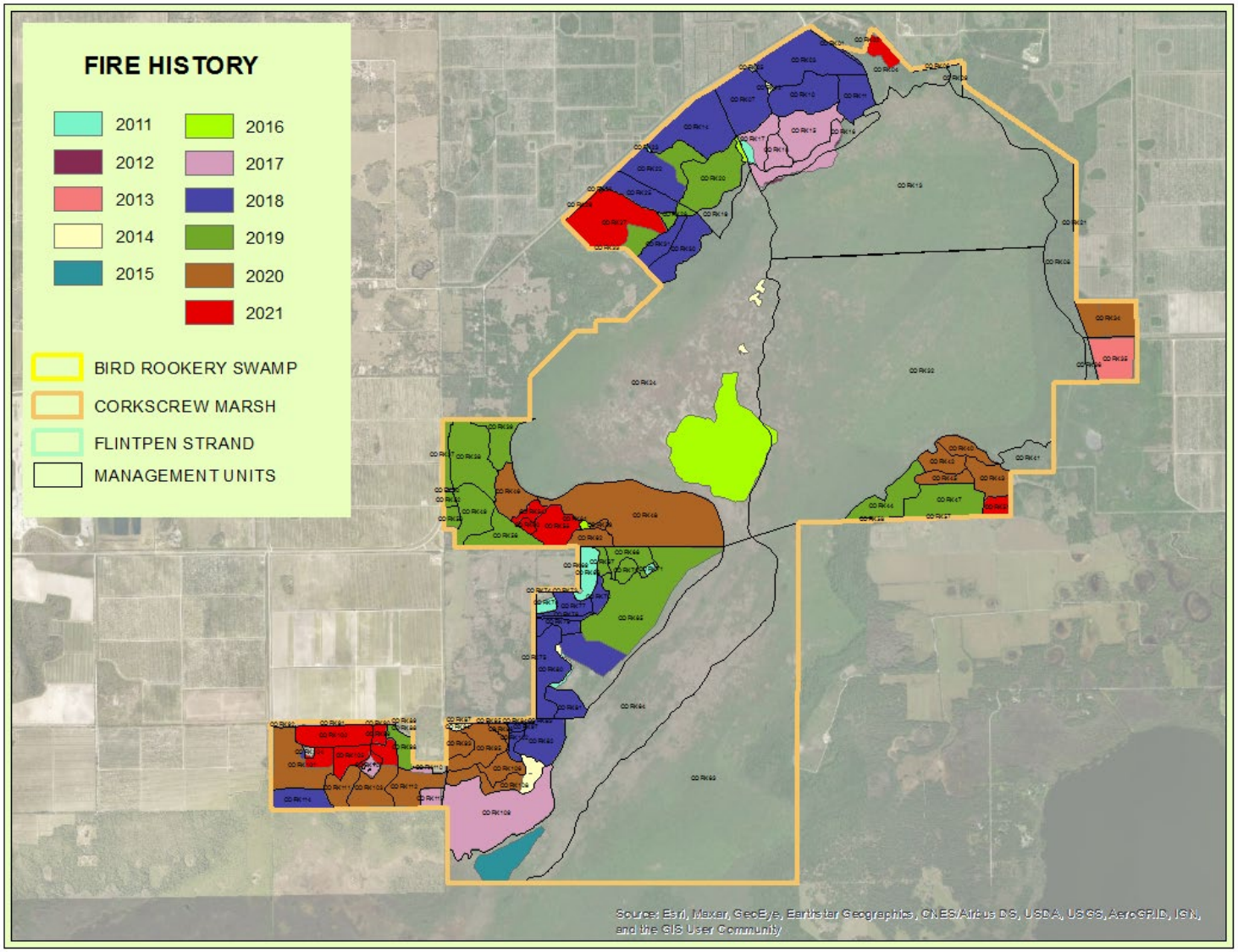
20 & 21). Existing roads and trails, disked fire lines and, where possible, natural firebreaks such as wetlands and ecotones determine the boundaries of these units. Challenges for a robust fire program include increased smoke management requirements near population centers, the increasing urban interface adjacent to the CREW MA, inholdings of private property in Flint Pen Strand and limited resources. Despite the added difficulties of prescribed burning in the area, fuel loads need to be maintained at low levels to protect the CREW MA from destructive wildfires.

Prescribed fire is applied with different management objectives based on plant community needs, wildlife utilization and specific species requirements. For instance, wiregrass requires spring burns to produce viable seeds and woody vegetation such as wax myrtle and saltbush are reduced by spring and summer burns. The desired fire-return frequency for management units with mesic and hydric flatwoods is currently 4 years, which promotes an open pineland structure. Prescriptions for these burns will identify the environmental conditions, return frequency and ignition techniques to provide for mosaic burns that do not remove all vegetation, while re-defining the boundaries of imbedded plant communities that are not fire maintained, such as hammocks or swamps.

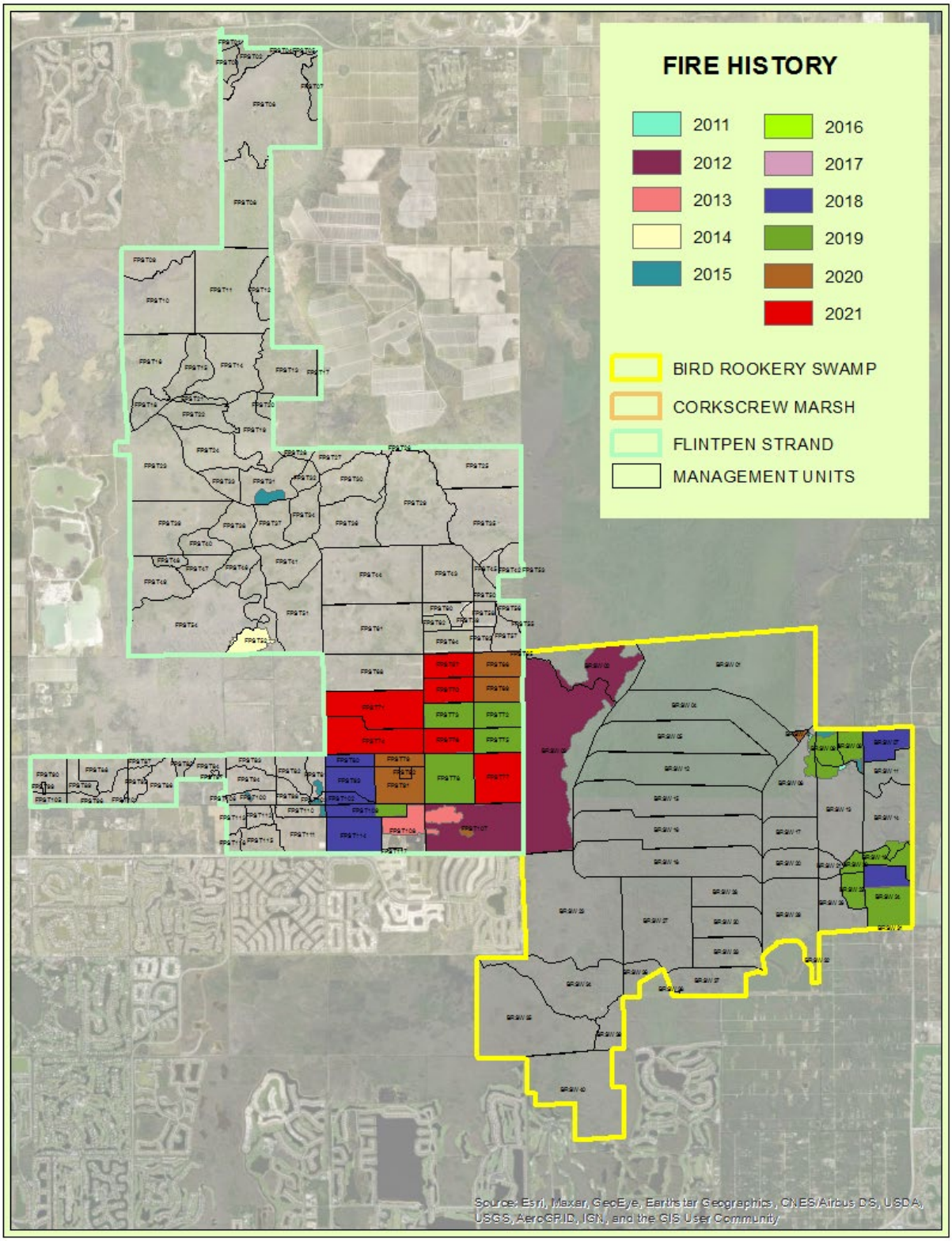
A healthy fauna in South Florida is integrally tied to fire return intervals, seasonality and intensities. Frequent fire tends to favor understory vegetation that provides essential forage and mobility for wildlife. Although high-intensity winter burns give the appearance of removing more fuels from the landscape, spring and summer burns achieve a more effective reduction of fuel and are preferred from a wildlife management and ecological perspective. Spring growing season burns provide a mosaic effect allowing for the retention of cover and foraging opportunities for wildlife that winter burns may temporarily eliminate. Although spring and summer burns can cause isolated instances of mortality to wildlife and their nests, some of these species will readily re-nest (i.e., quail, sparrows, Turkey, etc.) and the summer burns will produce ideal brood habitat for fledged young.

Lack of fire, combined with altered hydroperiod and elevated nutrients, in Corkscrew Marsh likely contributed to the displacement of the sawgrass vegetation by native willow. Efforts are ongoing to combine mechanical treatments with prescribed fires to improve the coverage of sawgrass in this system. The canopied slough of Bird Rookery Swamp is a climax community and not a fire-maintained habitat.

Meeting the prescribed fire goals and objectives for each fire-maintained community is largely dependent on weather conditions, personnel and statewide emergency situations such as wildfires, hurricanes and other natural disaster responses. Ideally, burn crews would consist of 6-8 or more individuals. With only 3 District Land Stewardship employees assigned to West Coast Region, conducting prescribed burns requires outside assistance to ensure it is conducted in a safe and effective manner. This assistance comes from other agencies (including FWC and local counties), other District staff and trained volunteers.



Map 20. Corkscrew Marsh management units and fire history.



Map 21. Bird Rookery Strand and Flint Pen Strand management units and fire history.

Fire Condition Class

The District developed a GIS-based program called "physical condition class" to monitor the status of plant communities based on the time since a physical treatment occurred. Although physical treatments can be mechanical or through cattle grazing, the main tool used by the District is fire due to the natural benefits fire provides. Physical condition class is used by the District to prioritize and plan the application of prescribed fire on individual management units.

Management units are delineated by prescribed-fire boundaries and the condition of each unit is classified based on fire history and the desired fire-return frequency using FNAI recommendations for the primary fire-dependent communities in each unit (**Maps 22-23**). Most plant communities in South Florida require fire every 4 years or less to remain healthy and productive, so this is the default return frequency assigned to each management unit. The eastern boundary of Bird Rookery Swamp will be maintained as sparrow habitat, requiring a 2-year fire return frequency. Cypress swamps and strands have a much longer return frequency (100 years+), so these areas are identified as not being actively maintained by prescribed fire. If a management unit has been burned within the identified return interval, that unit is identified as being in condition class 1. If the most recent fire in a management unit exceeded the identified return frequency, but less than twice this interval, that unit is identified as being in condition class 2. Condition class 3 includes those units having had fire more than 2 intervals ago but less than 3, and condition class 4 are those fire-dependent units than have not experienced fire for more than three of the recommended return intervals, or more than 12 years for most of the fire-dependent units in the CREW MA. This process is depicted in **Figure 2**.

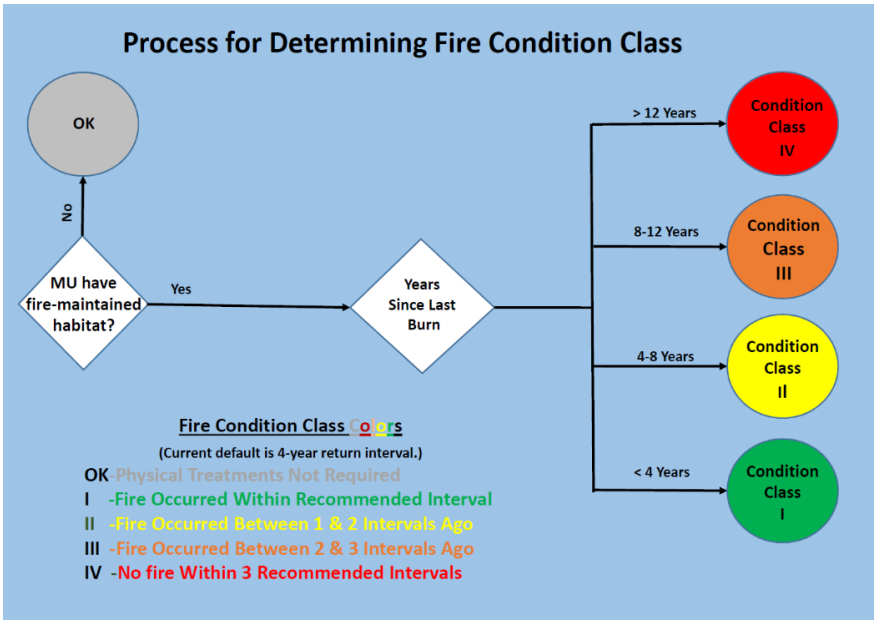
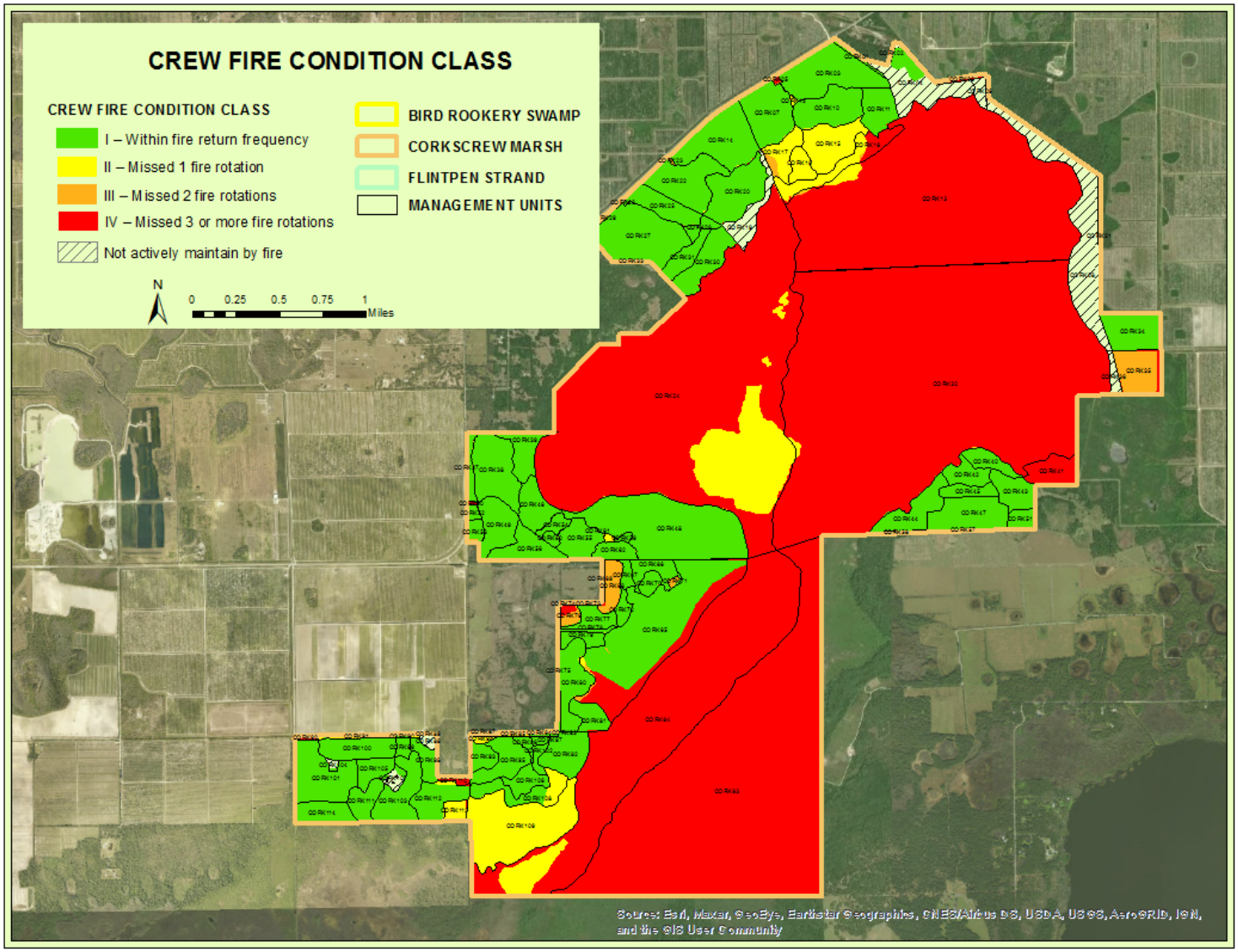
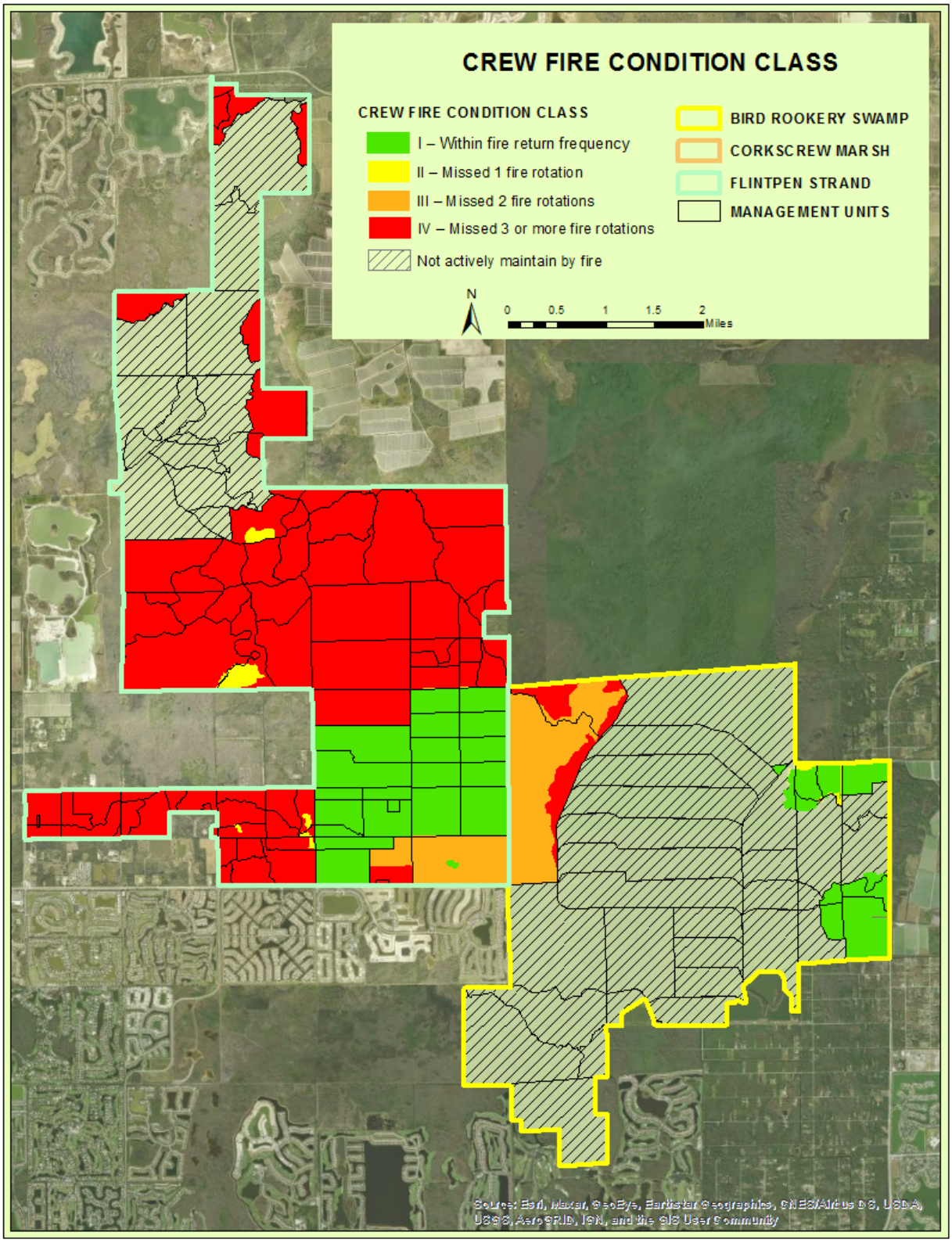


Figure 2. Flowchart illustrating the process for determining fire condition class.



Map 22. Corkscrew Marsh fire condition class.



Map 23. Bird Rookery Swamp and Flint Pen Strand fire condition class.

Wildfire Suppression

Wildfires ignited by lightning are a common occurrence throughout Florida and the CREW MA receives numerous lightning strikes. The FFS has the primary responsibility for prevention, detection and suppression of wildfires wherever they may occur in Florida (§590.01 Fla. Stat. (2017)). Maintaining fire-dependent habitats with frequent prescribed burns is the main way the District limits the negative impacts of wildfires and increases the ability of the FFS to successfully respond to wildfire events. When a wildfire is detected, the land manager immediately notifies FFS while the Land Stewardship staff responds and, if appropriate, begins fire suppression efforts. Upon arrival, FFS takes command of the fire and while the District continues to provide logistical and situational support as needed.

7.2. Control of invasive exotic plant species

The District's vegetation management program utilizes an Integrated Pest Management strategy to maintain exotic plant populations at the lowest feasible level. Integrated Pest Management is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through the combination of management techniques including prescribed fire, herbicide application, mechanical treatment, biological control and physical removal. Selection of control measures is dependent upon species type, environmental factors and natural communities impacted.

The District first treated the CREW MA for invasive exotic plants in 1990 using in-house personnel. This work was concentrated in the flatwoods around Corkscrew Marsh in partnership with Corkscrew Swamp Sanctuary volunteers and the CREW Trust. This cooperative effort continued through 1992. The District began using private contractors to control exotic invasive plant infestations in Flint Pen Strand in 1994 and has subsequently systematically swept portions of Bird Rookery Swamp, Corkscrew Marsh and Flint Pen Strand for invasive plant species. Additionally, the native but occasionally invasive Carolina willow in Corkscrew Marsh has been periodically treated since 2006 through aerial application of herbicides and, to a lesser extent, mechanical shredding. Presently, the main species being targeted for treatment include Lygodium spp., Brazilian pepper, melaleuca, earleaf acacia, downy rose myrtle, mission grass, cogon grass, Guinea grass, torpedo grass, climbing cassia and rosary pea. This exotic plant control treatment history for the CREW MA is identified in **Maps 24** and **25**.

Exotic plant control funding represents the single largest item in the Land Stewardship program annual budget. Land managers have developed management area specific treatment strategies that optimize invasive exotic plant control efforts. Although both Category I and II exotics are invasive and threaten the function and ecological stability of the natural communities, achieving maintenance on all species identified on these lists is currently not feasible with existing budgetary resources. The primary goals for the Land Stewardship's invasive exotic plant management program are to control the spread of 30 identified invasive species, in addition to area-specific priority species based on early detection/rapid response and locally significant impacts or potential for impacts.

Exotic treatment is primarily conducted by herbicide applicators contracted through the District's Vegetation Management Section. Supplemental efforts by District staff are also conducted on small or sporadically distributed infestations. Treatment areas are scheduled based on the severity of invasive and exotic plant infestation, time since last treatment, property access, groundwater conditions, avian nesting seasons and public use. All treatments follow herbicide best management practices and use the best available science. Treatment dates, locations and species treated are recorded in a GIS database. Herbicide use is recorded in the District's exotic invasive plant control database.

Invasive Exotic Plant Condition Class

The District developed a GIS-based program called "invasive exotic plant condition class" to monitor the status of plant communities based on the population status of prominent invasive exotic plant species. Invasive exotic plant condition class is used by the District to develop a strategy to treat the CREW MA for invasive exotic plants. The strategy prioritizes periodic treatments in management units once maintenance is achieved to keep the unit in maintenance status for specific species, expanding efforts to other areas or species only when available resources are sufficient to achieve and retain maintenance status.

The prevalence of invasive exotic plants within management units is estimated and assigned a condition class value (**Maps 26-27**). Each management unit is assigned an invasive plant condition class for 30 identified primary species (**Table 3**) based on the maturity of the population within each unit (**Table 4**). Annual work plans are developed with the objective of minimizing the ecological impacts of these invasive species in a cost-effective manner while minimizing the use of herbicides where practical.

Table 3. Land Stewardship Section invasive exotic plant control priority species.

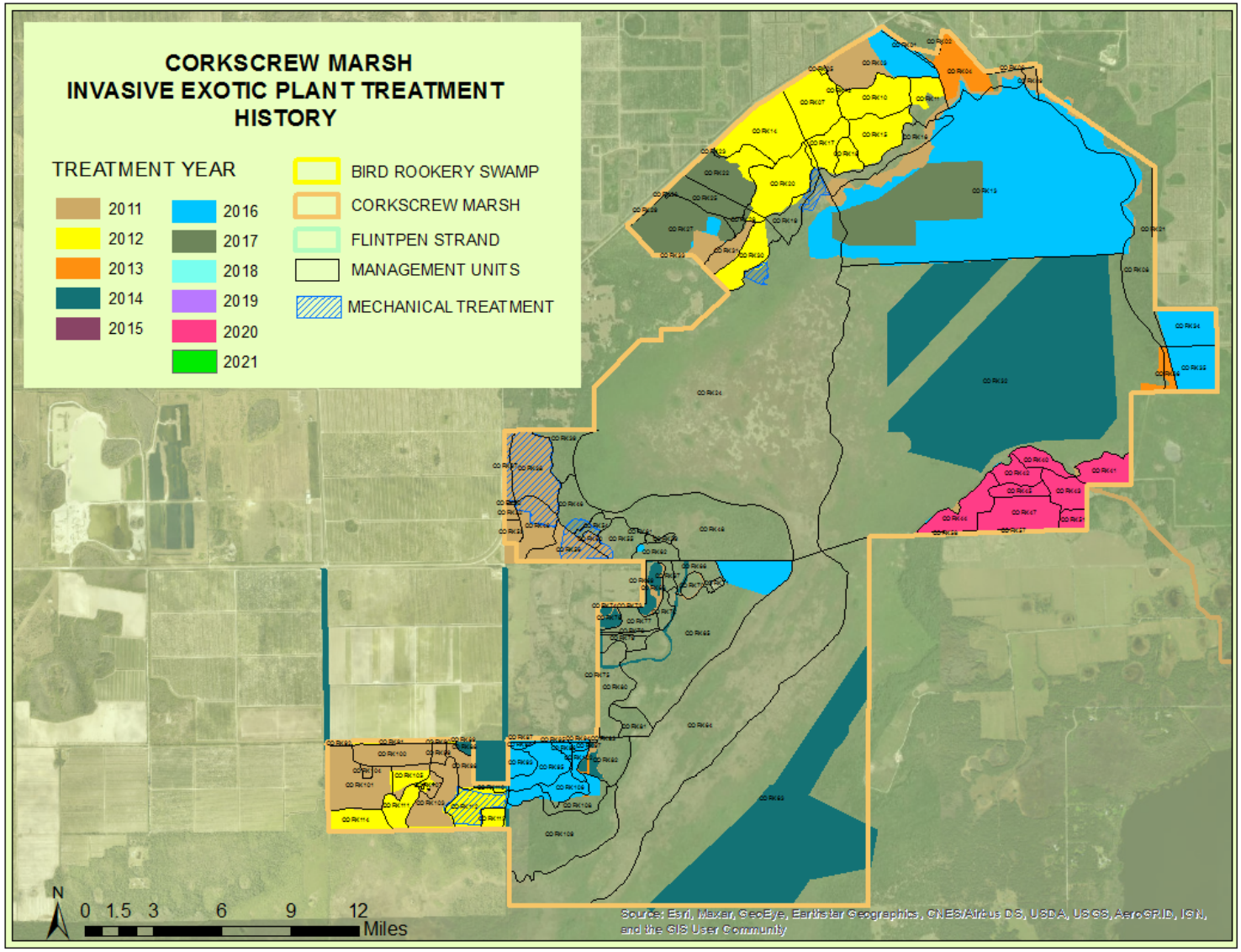
Scientific Name	Common Name	FLEPPC Category
Abrus precatorius	rosary pea	I
Acacia auriculiformis	earleaf acacia	I
Albizia julibrissin	mimosa, silk tree	I
Albizia lebbeck	woman's tongue	I
Ardisia crenata	coral ardisia, scratchthroat	I
Ardisia elliptica	shoebutton ardisia	I
Bischofia javanica	bishopwood	I
Casuarina cunninghamiana	river sheoak, Australian-pine	I
Casuarina equisetifolia	Australian-pine, beach sheoak	I
Casuarina glauca	suckering Australian-pine, gray sheoak	I
Colocasia esculenta	wild taro	I
Cupaniopsis anacardioides	carrotwood	I
Dioscorea alata	winged yam	I
Dioscorea bulbifera	air-potato	I

Table 3. (Continued). Land Stewardship Section exotic plant control priority species.

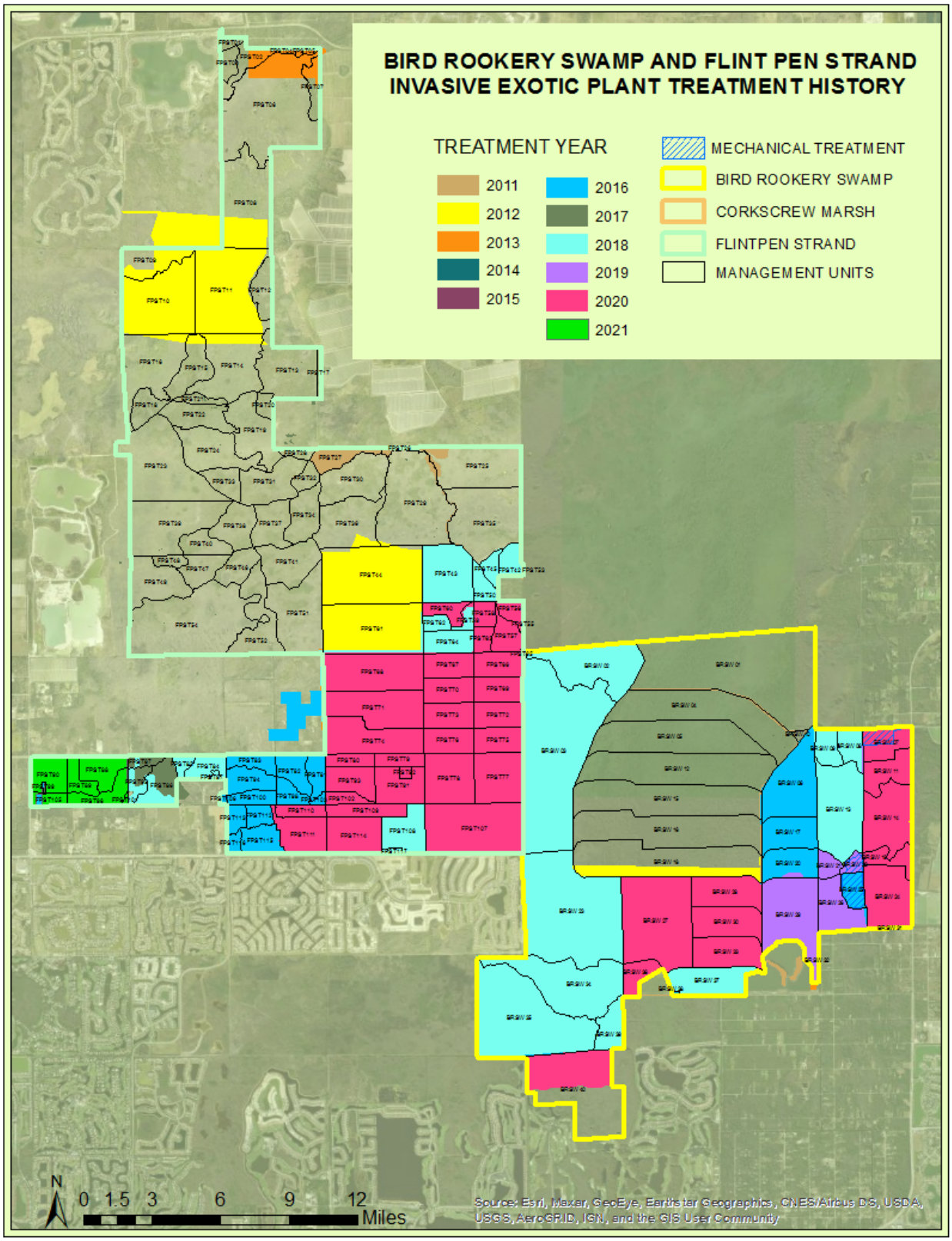
Scientific Name	Common Name	FLEPPC Category
Imperata cylindrica	cogon grass	I
Leucaena leucocephala	lead tree	II
Lygodium japonicum	Japanese climbing fern	I
Lygodium microphyllum	Old World climbing fern	I
Melaleuca quinquenervia	melaleuca, paper bark	I
Mikania micrantha	mile-a-minute vine	II
Mimosa pigra	catclaw mimosa	I
Rhodomyrtus tomentosa	downy rose-myrtle	I
Schefflera actinophylla	schefflera, australian umbrella tree; octopus tree	I
Schinus terebinthifolia	Brazilian pepper	I
Senna pendula var. glabrata	Christmas senna climbing cassia, Christmas cassia	I
Solanum diphyllum	twoleaf nightshade	II
Solanum tampicense	wetland nightshade, aquatic soda apple	I
Solanum viarum	tropical soda apple	I
Syzygium cumini	jambolan-plum, Java plum	I
Triadica sebifera	popcorn tree, Chinese tallow tree	I

Table 4. Invasive exotic plant population characteristics of target species used to assign condition class.

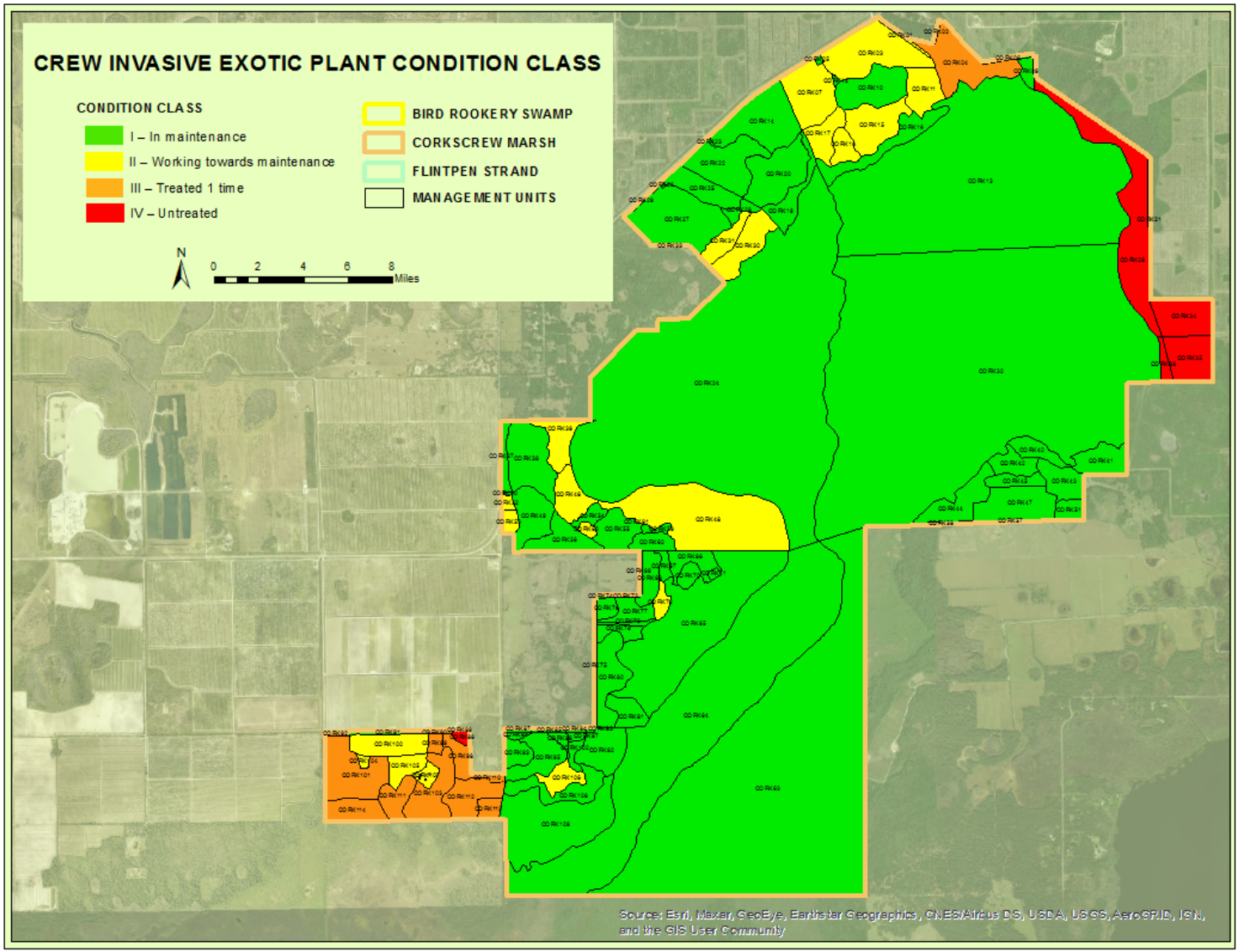
- **Woody vegetation (Melaleuca-Earleaf Acacia-Chinese Tallow-Brazilian Pepper-Ardisia-Senna-Downy Rose Myrtle-Carrotwood-Silk Tree-Mimosa Pigra-Schefflera-Java Plum-Lead Tree-Woman's Tongue)**
  - IV--Tall, dense, mature, many throughout landscape
  - III--Most mature dead, some regrowth/sprouting/isolated misses, many seedlings/suckers
  - II—All or nearly all mature dead, little regrowth, some seedlings
  - I----Occasional seedings or young plants
- **Vines (Lygodium-Air Potato-Winged Yam-Rosary Pea-Mile-A-Minute Vine)**
  - IV---Heavy blanket covering trees/bushes, dense, some throughout area
  - III---Most trellises dead, lots of sprouting/young plants, some clean areas
  - II----Trellises < 10' high, young plants tending towards "hot spots"
  - I-----Limited trellising, mostly young plants in isolated "hot spots"
- **Cogon Grass-Taro**
  - IV—Solid, Dense, Mature Stands
  - III---Main portion mostly dead, regrowth along edges and some internally
  - II----Outlying regrowth and isolated clumps
  - I-----Occasional dispersed clumps of fresh growth
- **Tropical Soda Apple**
  - IV---Thick & tall
  - III---Most dead in main concentrations, frequent outliers
  - II----Widely separated plants
  - I-----Occasional seedling plants



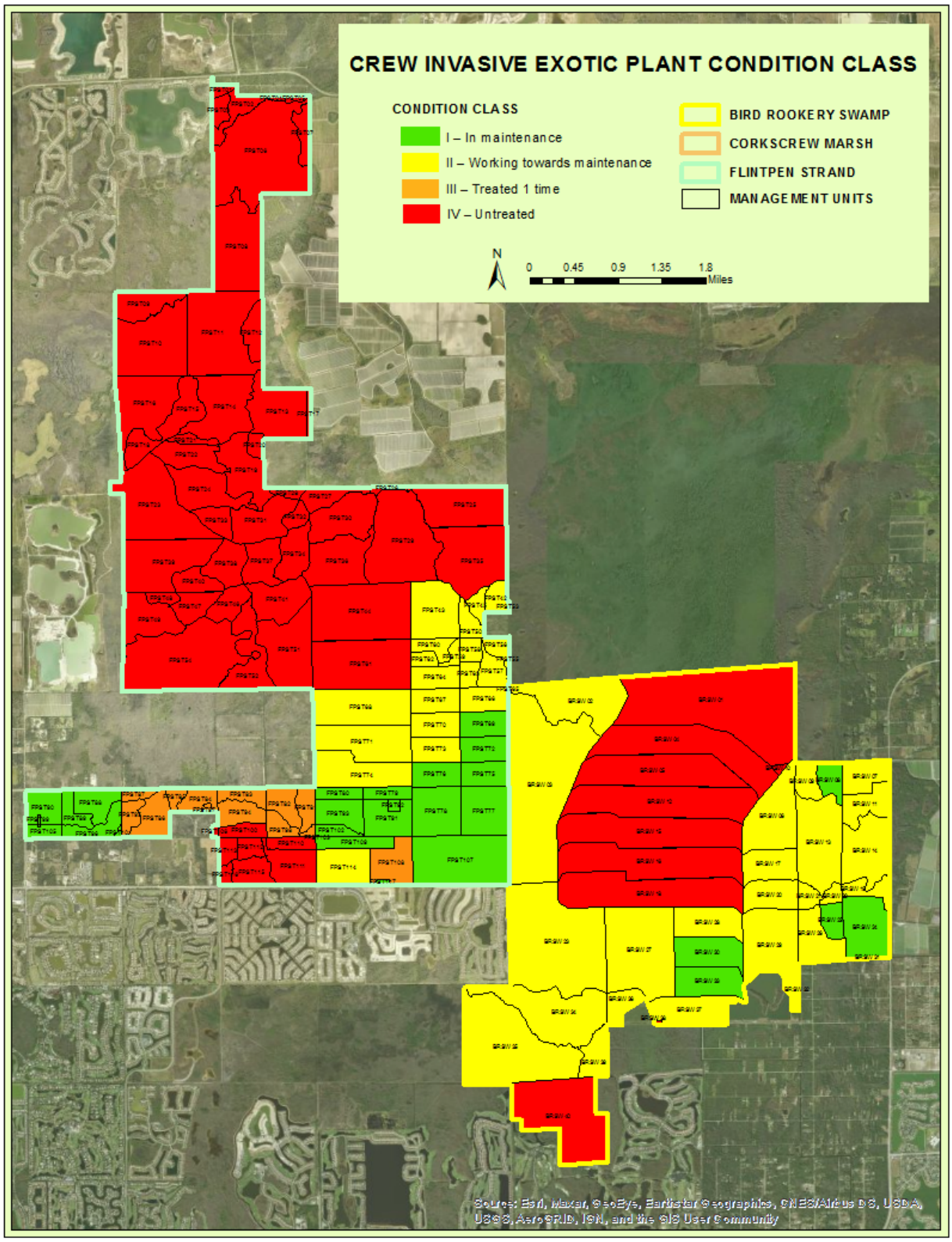
Map 24. Corkscrew Marsh invasive exotic plant treatment history.



Map 25. Bird Rookery Swamp and Flint Pen Strand invasive exotic plant treatment history.



Map 26. Corkscrew Marsh invasive exotic plant condition class.



Map 27. Bird Rookery Swamp and Flint Pen Strand invasive exotic plant condition class.

7.3. Wildlife Management

Wildlife management on the CREW MA relies on active habitat management that addresses the needs of all species present. The Land Stewardship program accomplishes this by:

- Performing land management activities that maintain and/or improve native wildlife habitat including prescribed fire and exotic invasive plant control;
- Conducting specific management activities that benefit protected species;
- Following management guidelines for listed species protection as determined by the South Florida Multi-Species Recovery Plan, Volume 1 (U.S. Fish and Wildlife Service (USFWS) 1999);
- Maintaining species lists of confirmed and potential wildlife species; and
- Working cooperatively with FWC to manage public hunts and address wildlife management issues.

Game Management

The District partners with FWC to manage game species and public hunting opportunities on District lands that have been established as Wildlife Management Areas (WMAs), WEAs, Small Game Hunting Areas and Public Use Areas. These designations allow FWC to utilize biological and law enforcement staff to assist in the management of wildlife on District lands and enforce wildlife and public use rules for resource protection purposes.

These designations also allow the FWC to establish hunting seasons and promulgate laws regulating public activities in these areas. The 2021-22 CREW WEA Regulations Summary and Area Map is presented in Appendix E and is available on the FWC web site at www.myFWC.com. Turkey, white-tail deer and the non-native feral hog are the three most popular big game species. Small game species that are commonly hunted on the area include gray squirrel, snipe and quail, marsh and cottontail rabbits.

7.4. Mechanical Vegetation Control

Prescribed fire is the most cost-effective and ecologically beneficial method of vegetation control for fire-maintained habitats in South Florida. In locations where prescribed fire cannot be used as a land management tool, such as urban interface zones or when other constraints prohibit the use of prescribed fire, mechanical vegetation control is an alternative method for reducing vegetation coverage and fuel loads. Mechanical vegetation control can reduce woody plant growth and increase plant species diversity through use of mowing, chopping and shredding. Selective forest thinning may also be used to improve natural environmental characteristics of certain habitats. On the previously farmed areas along the eastern boundary of Bird Rookery Swamp, open areas will be managed through mechanical treatment every two to three years to maintain their structural integrity and provide habitat for grasshopper, savannah and swamp sparrows.

Timber Harvest

Harvesting timber is another form of mechanical vegetation control. If the District determines that the ecological needs of an area require the timber stand to be thinned, a harvest may be designed for that purpose. However, many listed species depend upon mature pine trees for their survival, so often it is the smaller trees to be targeted. These trees tend to not have the marketability of larger trees, resulting in limited opportunities for a commercial harvest. All timber harvest operations on District lands will follow the silvicultural Best Management Practices (BMP) developed by the FFS. The areas in the CREW MA that have been identified as potentially benefitting from a stand thinning are in areas previously used for agricultural purposes that were subsequently planted in pines to improve habitat conditions for wildlife.

Grazing

The District uses cattle grazing as another method of vegetation control. This tool is most effective as an interim management tool for managing vegetation on project lands prior to the water resource project going into construction. On the CREW MA, cattle are not considered an appropriate land management tool due to limited graminoid forage, the majority of the area (83%) being classified as wetland habitat and the high-quality wetland features found on the CREW MA.

7.5. Hydrologic and Habitat Restoration

In the past ten years, the District has undertaken several restoration projects to improve the quality of wetland communities in the CREW MA. The most significant restoration effort was the Southern CREW restoration project completed in 2018.

The Southern CREW restoration project area encompassed 4,150 acres in Flint Pen Strand. The project was developed in response to severe flooding events that occurred in 1992 and 1995 in the City of Bonita Springs (**Figure 3**) and was incorporated into the Comprehensive Everglades Restoration Program. The goal of the project was to restore and improve the hydrology and ecological function of environmentally sensitive areas within the Southern CREW restoration project that had been previously impacted by residential development, roads and agricultural ditches. The project was designed to avoid off-site impacts and to not significantly increase or decrease peak discharges or flow depths in the Imperial River located west of and downstream from the project site.

Project construction started on February 29, 2016 and was completed in the spring of 2018. Construction of the project included removing approximately 10 miles of roads and spoil piles, degrading berms, filling drainage ditches and canals, and installing low water crossings through roadways to improve sheet flow across the site (**Map 28**). Habitat benefits associated with the project included creating 256 acres of functional wetlands, improving the hydrology on 1,520 acres of previously impacted wetland habitat, and treating heavy infestations of Melaleuca and Brazilian Pepper on over 2,500 areas of the restoration site.

Floodwater recedes, but fear remains in Bonita Springs

THE ASSOCIATED PRESS

BONITA SPRINGS — The scars from the floods of 1995 didn't disappear when the water abated in this Southwest Florida town.

Six months ago Saturday, the spirits and finances of more than 1,700 eastern Bonita Springs residents sank with their homes and roads under rapidly rising floodwater.

Children again play on those streets, and most of the Lee County residents are back in freshly painted houses with new carpeting, furniture and appliances.

"By the time I get done, it will be hurricane season again," Chapman Avenue resident Sue Little said. "If this happens again next summer, it will devastate everyone."

The only preventive measure that has been taken to avoid a repeat is last week's cleaning of the Imperial River to allow floodwater to recede a bit faster.

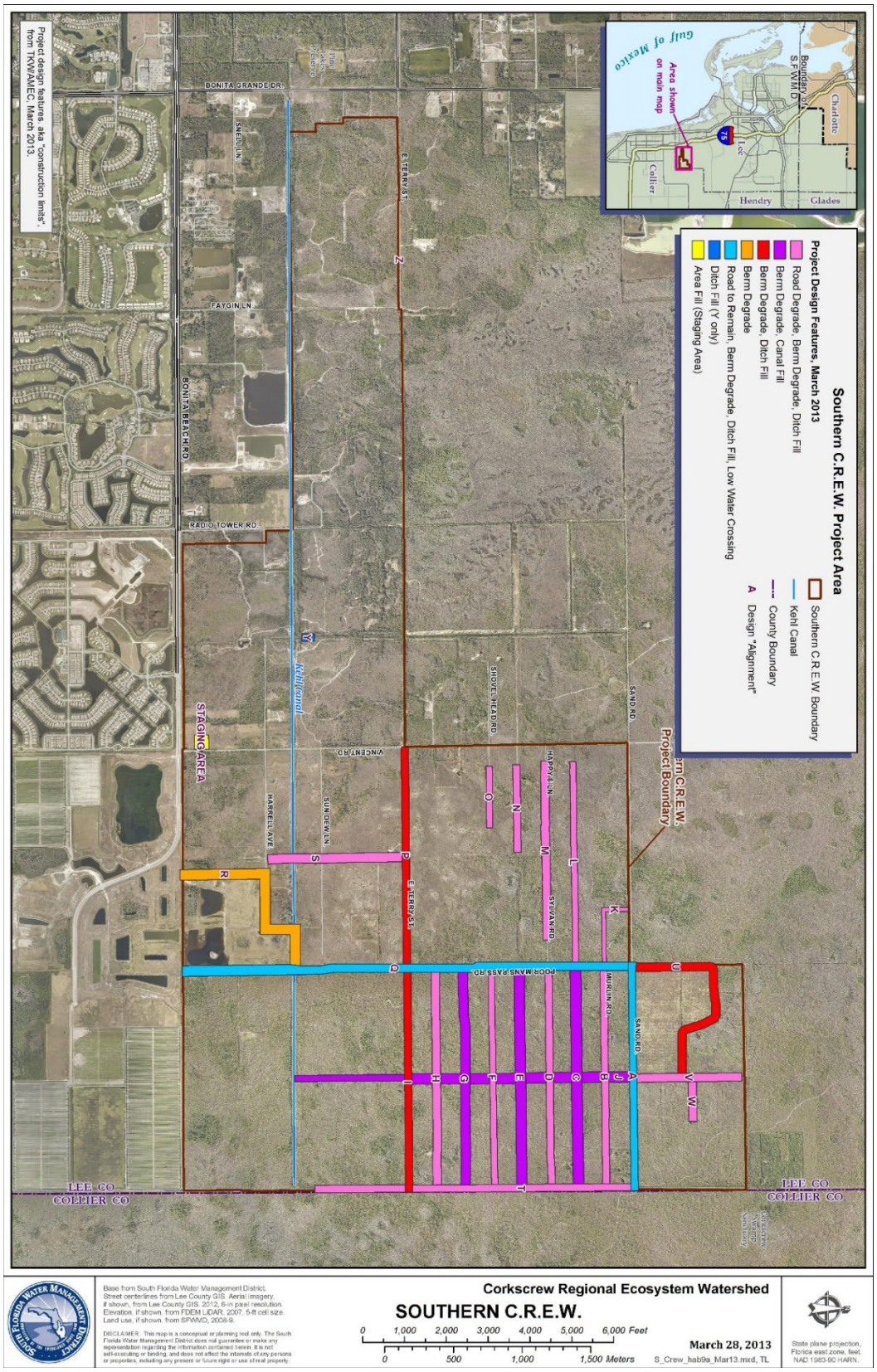
That won't stop floods from coming as they did last summer and fall, when more than 1,700 people were forced to evacuate as Tropical Storm Jerry, Hurricane Opal and an unnamed, monsoon-like storm sent torrential rains ripping into Bonita Springs.

Residents still are reeling from the disaster. From farming to fishing, finances to fears, the floods continue to take their toll.

Nancy and Gene Proper still are flood refugees more than three months after the water finally receded. They are living at a relative's home and work all day at their jobs and all night repairing their waterlogged home.

"We're looking at another six to eight weeks before we're home," Gene Proper said. "We get up, go to work, come here, work until 10 or 10:30, go home, go to bed and start all over the next day. We don't like it, but we don't have much choice."

Figure 3. 1995 flooding event in Bonita Springs prompting the Southern CREW restoration project.



Map 28. Southern CREW restoration project design.

7.6. Research and Monitoring

Tracking environmental responses to land management activities provides valuable information on progress toward management objectives and is used to make ecologically based management decisions.

Wildlife Monitoring

FWC wildlife biologists funded by the District and assigned to the CREW MA are responsible for monitoring wildlife in the CREW MA as well as some surrounding habitats. Data from the monitoring surveys are analyzed and incorporated in studies and statewide reports and are used to determine management needs. Several wildlife monitoring surveys have been designed and implemented since the last management plan update (**Appendix E**). Monitoring surveys planned for the 2021 to 2031 management period include a continuation of the swallow-tailed kite nest and roost surveys, breeding bird surveys, bat monitoring acoustical surveys, Florida panther capture efforts, and wading bird nesting, foraging and roosting surveys.

Vegetation Monitoring

Land managers for the CREW MA monitor natural communities for exotic invasive plant species while conducting management activities and during routine inspections. Additional monitoring efforts include several vegetation monitoring photo points established and monitored by FWC, including photo points established in the Corkscrew Marsh sawgrass areas with the assistance of CREW Trust in 2005. These photo points were expanded to the Corkscrew Marsh Cypress Dome Trailhead area and the southern portion of Flint Pen Strand in 2011 and 2012. Additional monitoring photos are taken to document mechanical treatment or prescribed burning effects.

Photo monitoring is completed by taking five photos at each of the 30 photo points twice a year (January and July). One photograph is taken in each cardinal direction at each stationary point and then a panorama is taken. Additionally, a densiometer is used to record canopy cover and water levels are also recorded. The monitoring objectives are designed to establish baselines, document current vegetative conditions in the management area, monitor vegetation changes over time and document changes after prescribed burns, mechanical and herbicide treatments. Photo monitoring plots in Flint Pen Strand will provide a pre- and post-condition assessment for the Southern CREW restoration project.

Hydrologic Monitoring

FWC has been collecting daily rainfall data within the CREW MA since 2011. A water level monitoring program was also initiated through volunteer efforts in 2015. Four staff gauges were installed in Corkscrew Marsh to measure surface water levels and have been used to establish long-term monitoring of surface water levels within CREW. This data is used for wildlife management reports and establishes a baseline for the northeastern section of CREW MA where water monitoring stations do not exist. Weekly monitoring is conducted during the rainy season in coordination with FWC biologists, CREW Trust staff and District staff. In 2016, the District

installed two water monitoring stations in Flint Pen Strand as a regulatory requirement for the Southern CREW restoration project. The water monitoring stations are required to be operated for five (5) years to evaluate the effectiveness of the hydrologic restoration project.

Research

Most of the monitoring efforts on the CREW MA have been designed to answer specific questions to help guide management actions, although some of the information collected has significance beyond the boundaries of the CREW MA. **Table 5** summarizes on-going research activities on the CREW MA.

Table 5. Summary of research studies on the CREW MA.

Species	Topic	Researcher	Value	Level of Significance
Swallow-tailed Kite	Nest & roost surveys	Resident FWC Biologists	Habitat preference and population trends	Population natural history
Wading Birds	Nest, forage & roost surveys	Regional FWC & District Biologists	Population trends	Part of region-wide long-term studies
Nesting birds	Breeding bird survey	Resident FWC & District Biologists	Population trends	Part of nation-wide long-term studies
Quail	Breeding call survey	Resident FWC Biologists	Habitat use	Local management
Mourning Doves	Banding survey	Resident FWC & District Biologists	Migration and population information	USFWS project
Sparrows	Banding survey	Resident FWC & District Biologists	Wintering population information	Population natural history
Florida grasshopper sparrow	Acoustic Recording survey	Resident FWC Biologist	Population status	Population range
Gopher tortoise	Burrow transects	FWC Resident Biologist	Population status	Local management
Big Cypress fox squirrel	Nest surveys	Resident FWC Biologist	Location information	Local management
Big Cypress fox squirrel	Camera and hair snare surveys	University of Arizona	Population occupancy study	Population natural history

Table 5 (continue). Summary of research studies on the CREW MA.

Species	Topic	Researcher	Value	Level of Significance
Bats	Acoustic survey	Resident FWC & District Biologists	Location information	Local management pre-construction
Bats	Acoustic survey	Resident FWC Biologist	Population information	Part of state- and nation-wide programs
Bats	Mist netting	Resident FWC Biologist	Population information	Local management
Frogs	Call survey	Resident FWC Biologist	Population information	Regional citizen's science project
Herptofauna	Drift fence survey	Resident FWC Biologists	Population information	Local management
Frogs	Acoustical survey	Resident FWC Biologist	Population information	Local management
Marsh vegetation	Woody vegetation control tests	Resident FWC Biologist	Vegetation encroachment control	Compare management techniques
Florida panther	Camera survey	University of Central Florida & Florida Wildlife Federation	document road crossings/habitat use	Plan corridors and bridge placement/design
Florida panther	Camera survey	FWC Biologists	Population information, document movement, and monitor for feline leukomyelopathy (FLM)	Local and state management
Florida panther & bobcats	Capture & release – genetic sampling, collaring	FWC Biologists	Population information, genetic sampling, monitor for FLM	Local and state management
Fish	Combination of passive and active sampling techniques	Resident FWC Biologists	Population information	Local management
Vegetation	Photo points	Resident FWC Biologists	Temporal change	Local management

Table 5 (continue). Summary of research studies on the CREW MA.

Species	Topic	Researcher	Value	Level of Significance
Bear	Hair snares	FWC Biologists	Population information	Regional population estimates
Deer	Camera survey	FWC Biologists	Population information	Local management
Hog	Camera survey	FWC Biologists	Population information	Local management
Sherman's short-tailed shrew	Drift fence and pitfall traps	FWC Biologists	Population information	Local and statewide management
marsh rice rat & hispid cotton rat	Live traps	FWC Biologists	Population information	Local and statewide management

8. ADMINISTRATION

Administration of District lands are directed through the Land Stewardship Section within the Land Resources Bureau and Division of Real Estate and Land Management. Policy decisions, planning and budgeting, procurement of personnel and equipment, contract administration and issues of program development are administrative tasks coordinated through the Land Stewardship Section. Input is provided from regional land managers located over the 16-county area. Regional land managers handle regular administrative duties from their field locations to assure quick response to local concerns and management issues. Administrative activities are handled through the District's field office at the CREW MA and the District's headquarters in West Palm Beach.

8.1. Planning and Budgeting

Planning is a major component of the Land Stewardship Section and is critical to maintain proper program focus, direction and coordination with other agencies. This document forms the framework to prioritize and create targeted plans for the activities to be conducted during the next 10 years within the appropriated budget.

The principal sources of funding for land management operations on the CREW MA include lease revenue, mitigation funds, and ad valorem tax revenue. Overall funding availability determines management activities. Budget distribution among the District's five land management regions is based on a programmatic prioritization of management activities. Operational funds are distributed to accomplish the management objectives of each management area most effectively. The continued operation and maintenance of the CREW MA includes costs to cover staffing, ongoing operational and land management expenses and capital refurbishment/replacement of aging infrastructure. Capital infrastructure needs are determined by current condition and

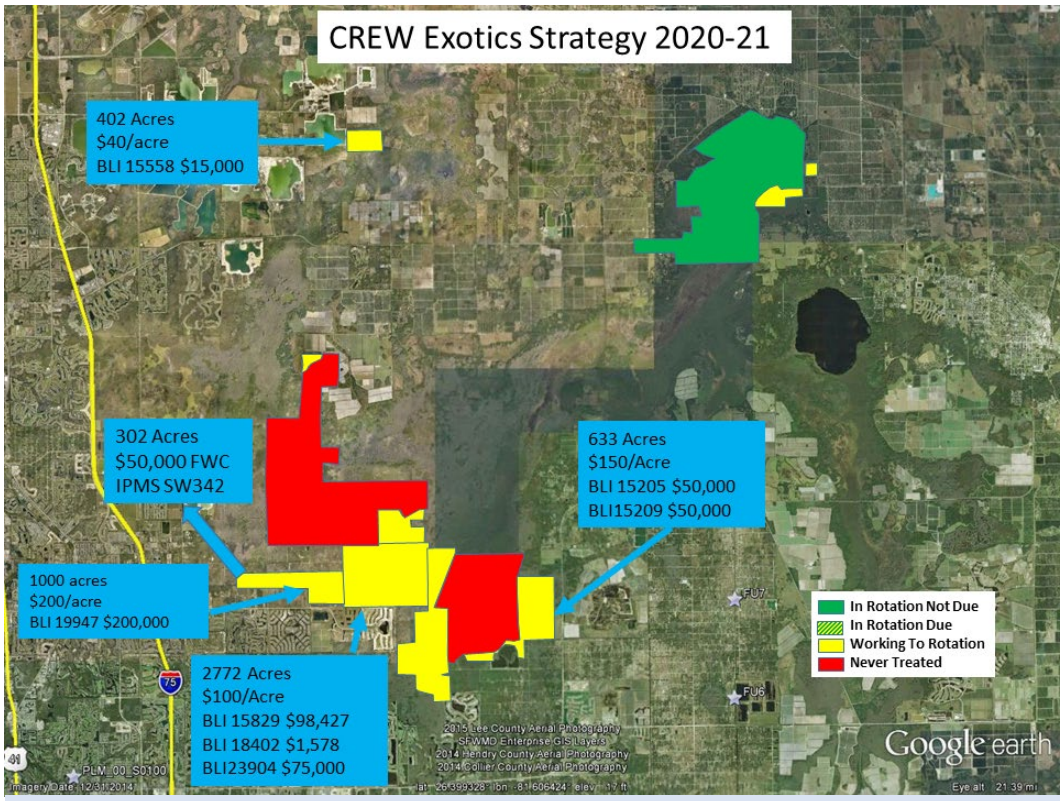
anticipated serviceability. Priorities for capital refurbishment/replacement are made on a Districtwide basis. The CREW MA FY2021 budget (**Table 6**) identifies area-specific funding availability. Utilities and operational expenses include supplies, electric service, business travel and safety equipment. Public use costs include maintenance costs for public use facilities. Base level funding needs may increase in the future in response to increasing operational expenses including fuel costs, contracted exotic plant control needs, equipment and infrastructure repairs, and increasing public expectations. Specific projects on which to spend these funds are prioritized annually to address each management goal.

The 2020-21 invasive exotic plant control strategy for the CREW MA (**Figure 4**) identifies how exotic invasive plant control funding was distributed to achieve the control of invasive exotic plants based on current and expected future invasive exotic plant condition classes for each management unit. Through this process, efforts are directed towards maintaining invasive exotic plant infestations at the most cost-effective levels while minimizing negative impacts to natural communities. This strategy also minimizes the use of herbicides by keeping populations of invasive exotic plants at low levels in areas of maintenance.

Similarly, strategies prioritizing equipment and infrastructure replacement (including fencing, public use facilities, administrative structures, hydrologic components), areas for prescribed fire, and public use needs are also updated annually. These strategies and budgets are developed in concert with District-wide operational priorities and budgetary cycles and prioritized across all areas managed by the Land Stewardship Section.

Table 6. CREW MA budget, FY2020-21.

Management Activities	Cost
Contracted Land Management Services	$257,272.00
Utilities and Operational Expenses	$31,250.00
Equipment and Infrastructure Maintenance	$111,610.00
Exotic Species Control (noncapital)	$326,035.00
Vegetation Management	$0.00
Public Use	$95,948.00
Site Security	$90,000.00
Total	**$912,115.00**



CREW Exotic Plant Control Strategy

FY 2020-21

- **What have we done so far?**
  - Corkscrew Marsh has achieved maintenance control.
  - Recent target Bird Rookery Swamp due to proximity to Audubon's Corkscrew Swamp.
- **What are the main species we are targeting?**
  - Melaleuca, Lygodium and Brazilian pepper, earleaf acacia.
  - DRM, Burma reed, Napier grass, Cogon grass, and Java plum are also treated.
- **What costly species remain to be targeted?**
  - Creeping signal grass
- **What are we doing this year?**
  - Systematically treat areas in eastern Bird Rookery that were previously treated and are due for rotational treatments.
  - Treat FGCU property with recurring mitigation funding.
  - Continue treating Melaleuca in western Flint Pen Strand.
  - Continue to treat disturbed areas created by Southern Critical CREW Restoration efforts.
- **Where are we going?**
  - Ensure areas previously treated are priority for retreatments until they are in maintenance.
  - The goal of this process is to have SFWMD properties adjacent to Corkscrew Swamp Sanctuary in maintenance rotation in the next 2-3 years.
  - Move to the more remote and costly portions of Bird Rookery and Flint Pen if funds are available.
- **What do we need to be careful of? Challenges to treatment?**
  - Access issues-buggy needed and long swamp walks, annual flooding.
  - Ghost orchids.
  - Disturbed areas created by Critical CREW restoration.

Figure 4. CREW FY2020-21 invasive plant control strategy.

8.2. Personnel and Equipment

The Land Stewardship Section is separated into five geographic regions. Each region is assigned a Senior Scientist (Land Manager), one to three Land Management Technicians and based on the need in some areas, a Land Management Assistant, Scientist III and/or Scientist IV position. A Section Leader provides direct oversight and supervision for the land managers. Additional leadership and assistance come from the Land Stewardship Section Administrator, Wildlife and Public Use Section, Vegetation Management Section and other support personnel at District headquarters in West Palm Beach, and the Clewiston Field. Management of the CREW MA property is the primary responsibility of the West Coast region's Senior Scientist and two land management technicians.

Staff have access to tools, supplies, four-wheel drive vehicles, fire suppression trucks, all-terrain vehicles, swamp buggies and other heavy equipment. This equipment is maintained through the Clewiston Field Station. Equipment from the other regions as well as leased equipment are also available if needed.

8.3. Volunteers

§373.1391, Fla. Stat. (2020) encourages the District to use volunteers for land stewardship and other services. The District recognizes the merits of volunteerism and welcomes participation in activities appropriate for public involvement. In Fiscal Year 2021, District lands benefited from 4839 volunteer hours, or $127,362 worth of volunteer services (using a $26.32/hour Florida average for the value of volunteer service). Volunteer coordination is provided by the CREW Trust and overseen by the Public Use Section. Volunteer events and projects at CREW have included:

- Monitoring CREW lands
- Guides for day and full moon hikes
- Trail maintenance
- Assistance with field trips
- Adopt-a-Road
- Assistance with grants and office work

8.4. Contractual Management

Effective operation and management of District properties requires the services and cooperation of private organizations, other governmental agencies and volunteers. Contractual management is authorized through a management agreement signed by both the District and contracting entity with the document defining responsibilities of each party. The District has established the following agreements to assist with management of the CREW MA:

Lease Agreement

The District has a 50-year lease on those properties within the CREW MA that were purchased by TIITF. The District and the Department agreed to enter into a management agreement for the property in 1993 because of its proximity to the District's Management Area boundary. Under the agreement, the District manages these lands that are contiguous with the CREW MA. In accordance with the lease agreement, the Division of State Lands can perform a management review of the leased premises every five years. The Division of State Lands also receives notification of all public notices relating to the development of the site. The current lease agreements (Lease No. 3981 & 4223) are provided in **Appendix F**.

FWC Agreement

Since 1991, cooperative agreements have been executed between the District and FWC to provide public use and land management services on District acquired properties. These agreements have provided cost-effective public use and land management support on District managed lands. The agreement for the CREW WEA (Contract Number 4600000961-A06) was originally executed on 9/6/1994 and has been amended several times. The current agreement funds the salaries and operational expenses of two full time wildlife biologists whose services are directed towards monitoring wildlife populations, managing public use activities, and performing land management functions on the CREW WEA.

The District also contracts FWC for enhanced law enforcement services (Contract Number 3600000000-A14/4600003773). These services cover areas throughout the District and include supplemental patrols on the CREW MA. The District's resource protection coordinator schedules patrols with input from the Management Area's land manager and FWC.

CREW Trust Agreement

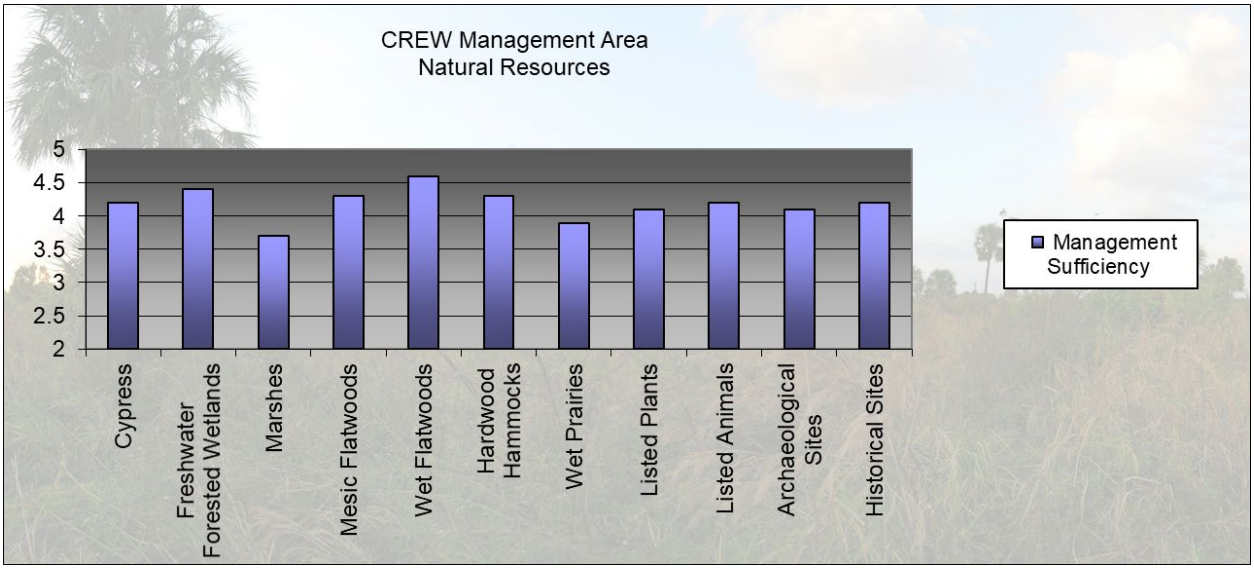
The District has a contract with the CREW Trust (Contract Number 4600003156-A04) for environmental education, coordination of volunteers, and assistance with public use and land management functions on the CREW MA.

9. MANAGEMENT REVIEW

On July 22 & 23, 2021, a land management review was conducted to update the 2011-2021 CREW MA GMP. The review team consisted of representatives from the Department of Environmental Protection, Florida Forest Service, Fish and Wildlife Conservation Commission, Lee County and Collier Counties, Collier Soil and Water Conservation District, South Florida Water Management District, Corkscrew Swamp Sanctuary and the CREW Trust (as per §373.591, Fla. Stat. (2011)). The management assessment reviewed both management actions in the field and the written GMP to assure they were consistent with acquisition intent and program objectives.

After two days of reviewing on-going land management practices on the CREW MA land management activities and the draft GMP, the review team commended staff for the prescribed fire program, implementation of condition class and availability of public use opportunities. The review team had overall positive comments on the land management practices including ecosystems restoration and resource protection, and the presence of public use facilities, interpretive signage, and outreach information. These comments focused on the dedication and performance of the land management staff and the collaborative partnerships with other state and private entities. The review also included comments by several team members that additional staffing and increased funding would be beneficial for the overall management and public use opportunities provided on the property. Some suggested expanding invasive exotic plant control and prescribed fire efforts, while others promoted enhancing perimeter barriers and increasing law enforcement patrols in Flint Pen Strand. Several suggested edits to the GMP were incorporated into the final draft, making it an improved manuscript.

The review team ranked management actions taken and proposed goals and objectives for the next 10 year on a scale of “1” (poorest) to “5” (best). An average score of less than “3” was considered insufficient management and requires the District provide a written explanation and proposed corrective actions. None of the categories averaged below a “3” ranking. The categories ranked included Natural Resources, Resource Management, Resource Protection, Multiple Use, Assessments, Public Use, Budget, and Goals and Objectives. The average score for each evaluation criteria is identified on the graphs below.



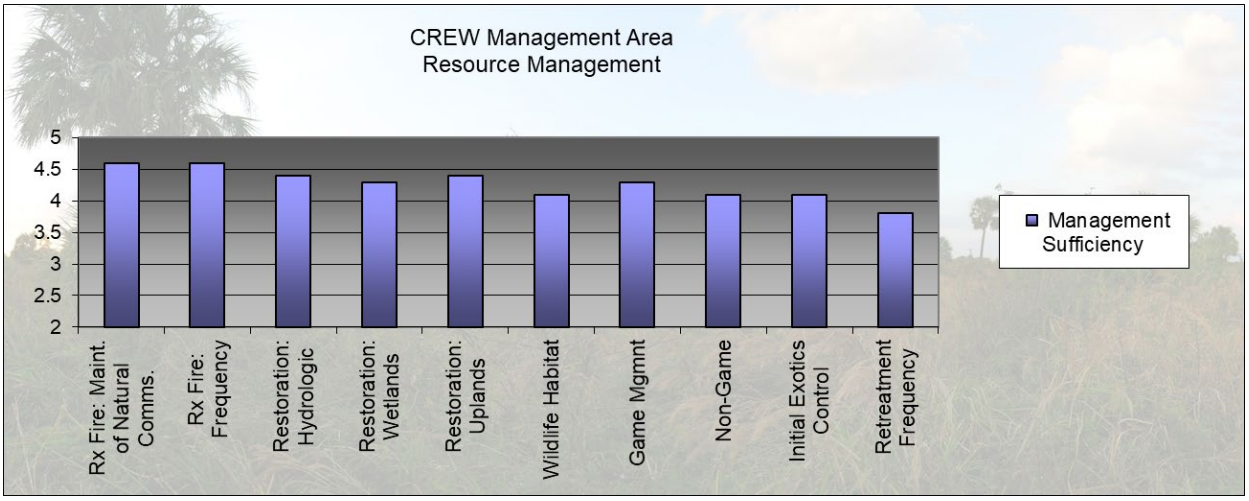
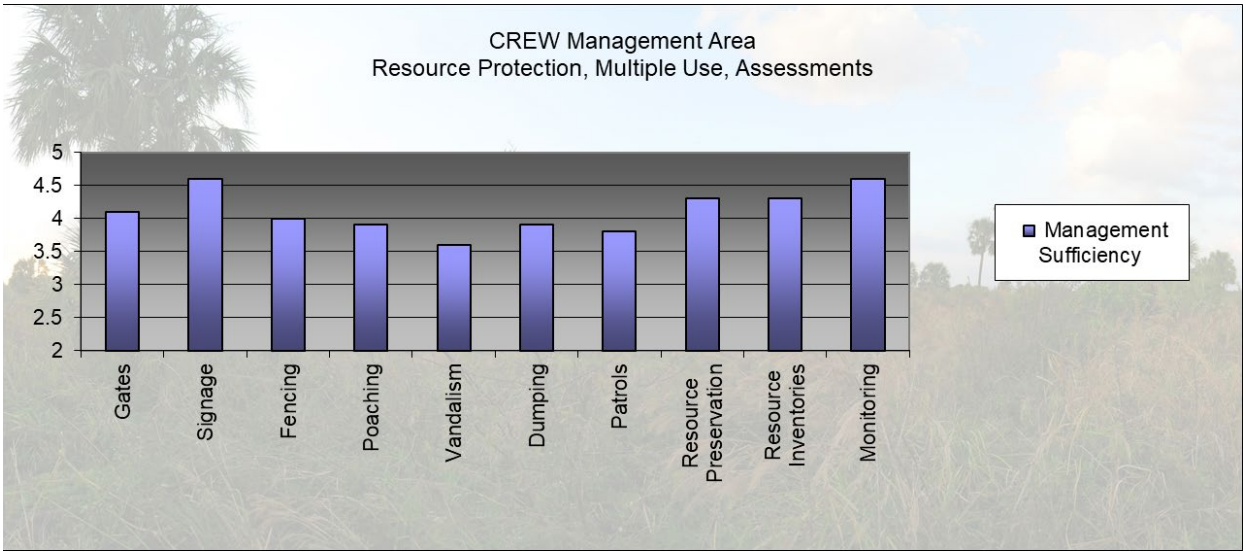


Figure 5. *2021 Land Management Review Results.*



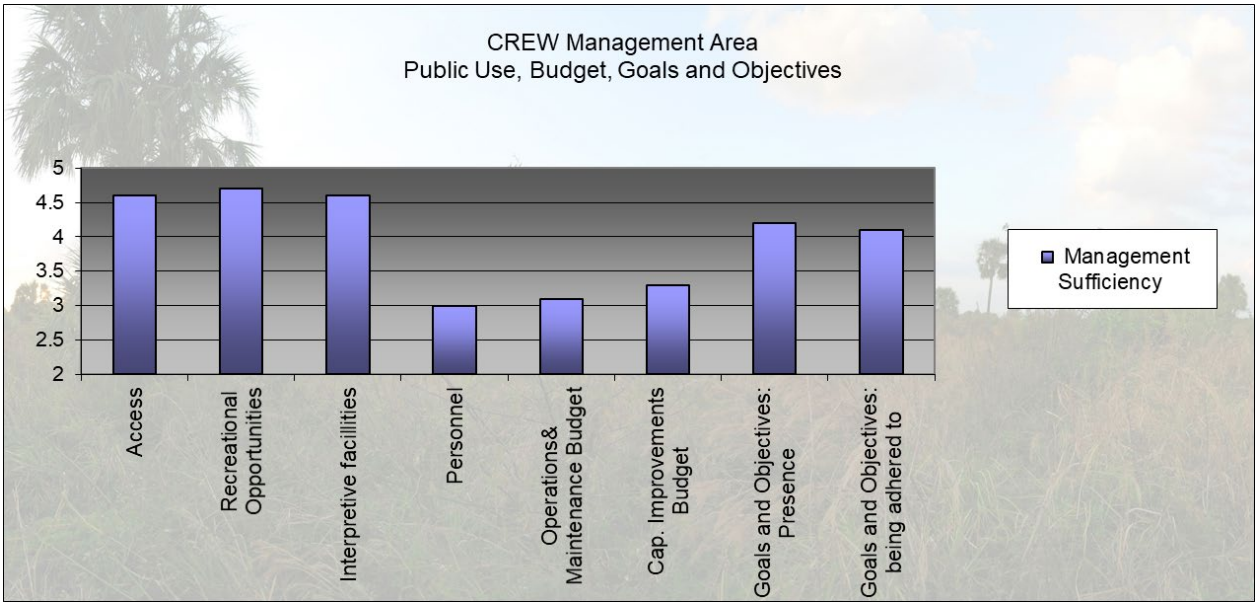


Figure 6 (Continued). *2021 Land Management Review Results.*

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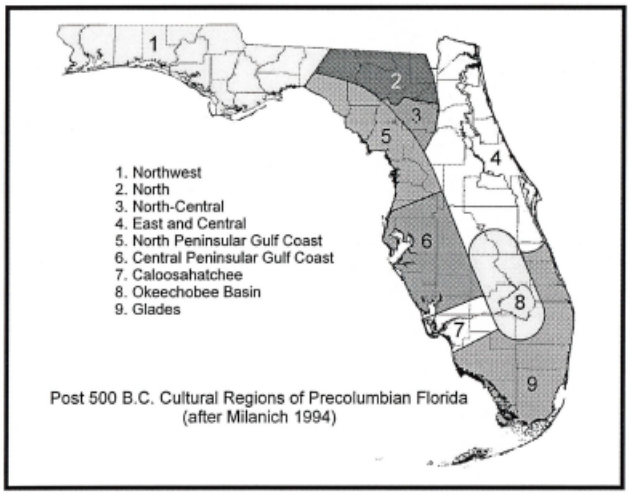
Appendix A. CREW Site History

PREHISTORIC OVERVIEW

Archaeologically, the CREW project area is included within what has been termed the Caloosahatchee culture area (**Map 1**). It is one of several sub-areas in south Florida that shares Glades cultural traditions. The Caloosahatchee area extends from southern Sarasota County south to a point north of Marco Island in Collier County. The area's western boundary is the Gulf barrier islands and the eastern boundary is approximately 90 km east of the coast (Widmer 1988). This boundary refers to both a geographic region and a regional culture. Beginning around 500 B.C., specific cultural traits are recognized as belonging to distinctive culture periods or traditions and are often correlated with environmental conditions or geographical regions. Specific pottery designs and manufacturing techniques are most often used to identify cultural affiliation. Prior to 500 B.C. there are two major cultural traditions, Paleoindian and Archaic, which are found throughout the state.



Map 1. Culture Areas of Florida (after Milanich 1994).

Paleoindian (ca. 12,000 B.C. - 7,500 B.C.)

The earliest evidence of human occupation in Florida dates to around 12,000 years ago and is termed the Paleoindian Period. It is characterized by a fisher-hunter-gatherer population. Evidence from several sites indicates that Paleoindians hunted now extinct Pleistocene megafauna (e.g., mammoth, bison), as well as species common today. They also fished and gathered wild plants and shellfish. The environmental conditions during Paleoindian times were different from present day, as many of today's lakes, rivers, and estuaries had not yet developed and freshwater sources were often limited to springs and sinkholes. Many Paleoindian sites are found around these water sources in areas of karstic, tertiary limestone formations. Our knowledge of the period is primarily limited to stone tools and the by-products of stone tool production.

While most Paleoindian sites are recorded in northern Florida, two important sites are found in Sarasota County. The Little Salt Spring and Warm Mineral Springs sites have provided a good deal of information about Paleoindians in southern Florida. No Paleoindian period sites have been found on CREW lands.

Archaic (ca. 7,500 B.C. - 500 B.C.)

The climatic and environmental changes that took place at the close of the Pleistocene epoch brought with them changes in the types and distribution of game animals available to prehistoric hunters. It was during the late Archaic Period that the Everglades and associated aquatic systems of southern Florida developed. Adapting to their new environment, Archaic peoples began to exploit a wider range of food sources, including smaller game, fish, mollusks and nuts, and became increasingly more sedentary than their predecessors. The tool kit used by these people became more varied and complex over time.

The Archaic is traditionally divided into three periods – Early, Middle and Late – based upon stylistic changes in tools and the eventual presence of fiber-tempered pottery. Early and Middle Archaic period sites in southwest Florida are relatively rare. The Bay West Site (8CR200) in Collier County provides one of the richest sources of Middle Archaic period traditions in this area of Florida. It is a mortuary site located in a cypress pond. The pond's peat preserved human remains, wooden tools and posts, botanical remains, antler, lithics, and shell (Beriault et al. 1981).

The earliest pottery, known as Orange, is a marker for the Late Archaic. Its diagnostic feature is a fibrous material used in the temper. During the firing process, the fiber was burned away, leaving distinctive hollow areas visible on the vessel surface. The pottery appears at sites in Florida around 4,000 years ago. Late Archaic sites in southwest Florida that contain fiber tempered pottery include Marco Island, Horr' s Island, and Cape Haze. These sites also possessed aceramic cultural material below Orange phase deposits, suggesting that their occupation may have extended as far back as the Middle Archaic period (Dickel and Carr 1991).

Post-500 B.C. Regional Cultures

By about 500 B.C., the introduction of ceramics, as well as increased sedentism among aboriginal peoples, made it possible for distinct regional cultures to develop. These cultures were highly adapted to particular ecological niches and may be distinguished archaeologically by differences in site location, subsistence strategies, belief systems, and ceramic types, among other differences.

In the Caloosahatchee area, the period from around 500 B.C. to the time of Spanish contact has been divided into five periods, each represented by the appearance or disappearance of diagnostic artifacts (Marquardt 1992). Caloosahatchee I (500 B.C.-A.D. 650) is marked by a thick sand-tempered plain pottery with round and chamfered lips. Belle Glade ceramics first appear during Caloosahatchee II (A.D. 650-1200) and continued to be a prominent ceramic type for many years. Caloosahatchee III (AD. 1220-1350) is marked by the appearance of St. Johns Check Stamped and Englewood ceramics. The appearance of Safety Harbor, Pinellas Plain, and Glades Tooled ceramics marks the beginning of Caloosahatchee IV. European artifacts, such as beads, metal and olive jar sherds appear at sites around 1500. The appearance of these artifacts and Leon-Jefferson pottery marks the Caloosahatchee V period

(Griffin 1988). The Calusa, a powerful tribe centered in the Charlotte Harbor/Estero Bay area, are associated with this historic period.

Many of the documented sites in the immediate area have been identified as black dirt middens, and while their cultural affiliations have not been substantiated based on excavation, it is likely that the sites represent occupation by people of the Caloosahatchee culture. The same is true of the prehistoric sites identified on the Corkscrew Marsh Unit. The lack of diagnostic artifacts makes identification difficult, but the site types and the site locations are representative of the Caloosahatchee.

HISTORICAL OVERVIEW

Three European nations (Spain, France, and Britain) settled and controlled all or parts of Florida during the Colonial Period (1513 - 1821). The area around CREW included lands that had been controlled by Spain and Britain.

Table 1. Historical Chronology of Florida.

Period	Date Range
Colonial	
First Spanish	1513 - 1763
British	1763 - 1783
Second Spanish	1783 - 1821
American	
Territorial	1821 - 1845
Antebellum	1845 - 1860
Civil War	1860 - 1865
Late 19th/Early 20th Century	1865 - 1917
20th Century	1917 -present

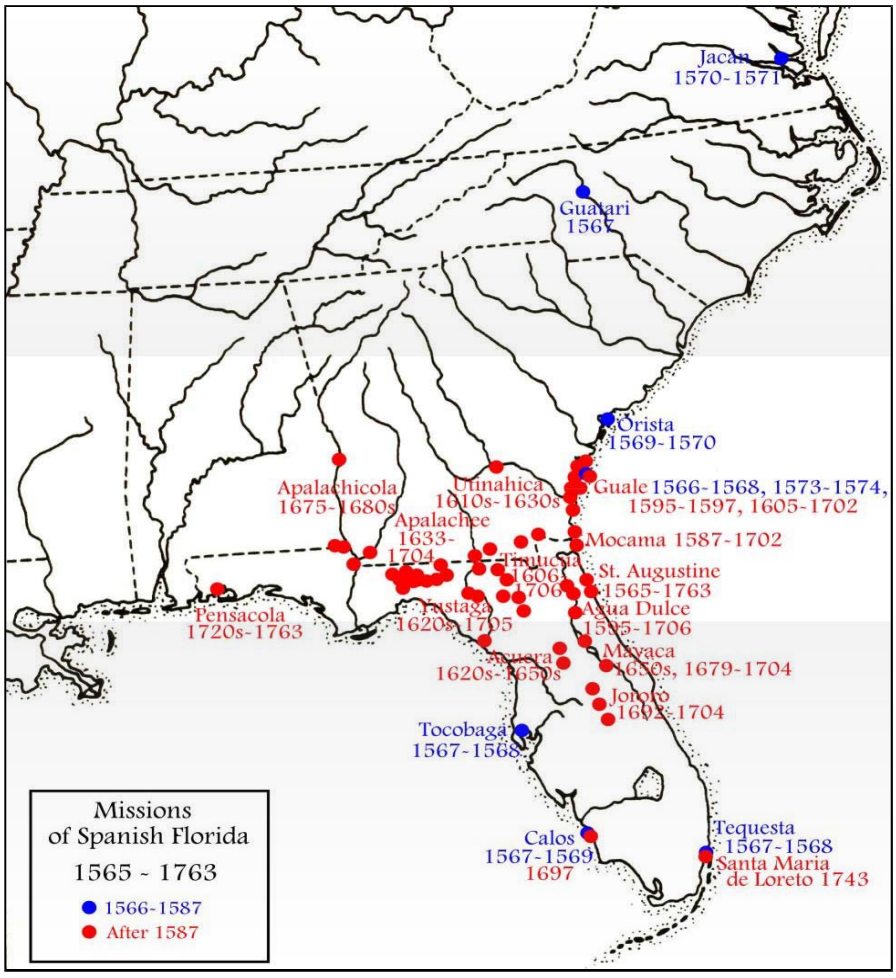
Colonial Period

After the initial European discovery of Florida by Ponce de Leon in 1513, several Spanish explorers traversed Florida, including Panfilo de Narvaez in 1528 and Hernando De Soto in 1539. No historical or archaeological evidence exists indicating that the early Spanish explorers visited the CREW area. Their presence, however, was undoubtedly known in south Florida (Hudson et. al. 1989). Spanish chroniclers noted that encounters between the Spanish and native populations were often violent, as witnessed by apparent sword wounds on bones found in the Tatham Mound in Citrus County (Mitchem 1989). Diseases introduced by the Spanish proved more destructive, however, decimating Indian populations throughout Florida.

The Spanish established the first permanent European settlement in Florida at St. Augustine in 1565 (Lyon 1976). Shortly after the establishment of St. Augustine, Spanish missionaries began a mission system in Florida that would last until the siege of St. Augustine by the British and their Creek allies in 1702, and all missions were virtually destroyed by 1704 (McEwan 1993).

It has been estimated that between 4,000 and 7,000 people lived in southwest Florida at the time of European contact. Estimates of 1,000 people living at Calos, what is believed to be the Calusa capital at Mound Key, and as many as 50 villages being subject to the rulers of the region, are not unusual (Widmer 1988). According to Widmer (1988), many of the cultural pattern characteristic of the Calusa sociopolitical system can be found as early as A.D. 800 in southwestern Florida. The presence of non-mortuary ceremonial mounds, evidence of dense population, and indications of burial hierarchy all point to the existence of a chiefdom level society.

By the 1600's, the native population was greatly reduced until, by the middle of the eighteenth century, little trace of the original inhabitants could be found. At that time, the coastal area was inhabited by seasonal fishermen from Cuba and other areas. Fishing ranchos along the coast in areas such as Boca Grande, Useppa Island, Punta Rassa, and San Carlos Bay were established (Hammond 1973).



Map 2. Spanish Missions in Florida [long-term Spanish missions were not established in southern Florida (UWF-Archaeology Dept.)]

The Calusa

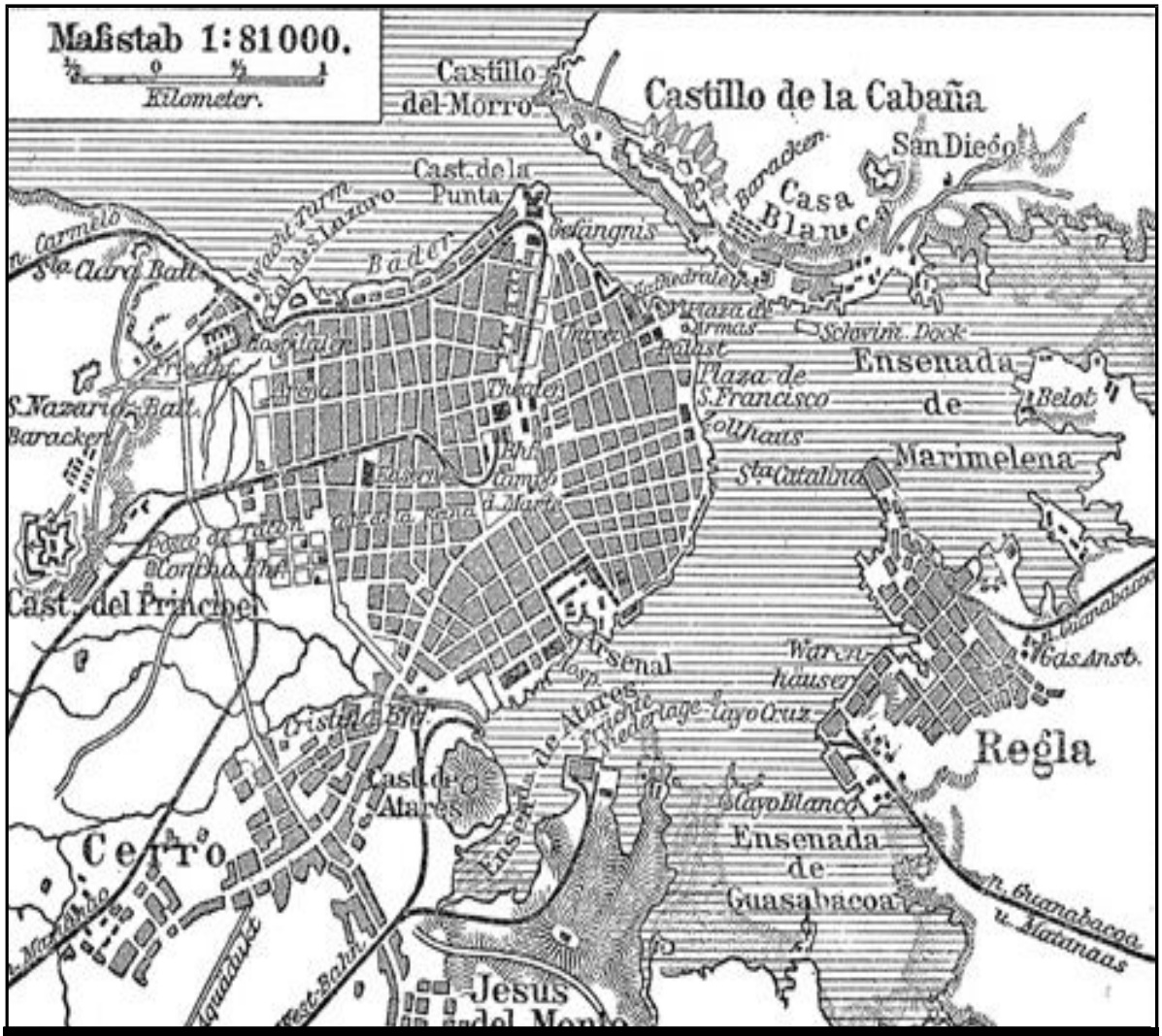
The CREW Area has been inhabited by humans for at least 2000 and possibly up to 10,000 years. At the time the Spanish arrived in SW Florida in 1513, they were met by the powerful and populous Calusa nation. The Calusa were forewarned of the Spanish plans of conquest by many refugees from present-day Cuba who had fled to SW Florida. The Calusa were spread over as much as 10,000 square miles in over 50 pueblos. These villages were concentrated heavily along the coast and were home to between 700 and 1000 people each. The interior settlements, including those in and around the vicinity of CREW, were much smaller, typically with less than 100 residents.

The Calusa were aggressively isolationist during the first 175 years of Spanish rule in Florida. For their part, the Spanish regarded South Florida as not being worth the trouble of subjugating either from a military or resource standpoint, so they did not press the issue. Spanish missions in South Florida typically did not last more than a year. The Calusa's isolation broke in the 1688, when the Calusa chief converted to Christianity and allowed a group of his people to live near Havana for a year to evaluate the living conditions and to see how they would be treated. Visitation to Cuba by the Calusa increased through the 1690s. The timing proved fortuitous because Carolinian allied Yamasee Indians began conducting slaving raids deep into Calusa territory in the early 1700s (**Map 3**). By 1711 most of the Calusa had evacuated to the Keys, including the Calusa Chief and most of his surviving vassals. Hundreds of the surviving Calusa evacuated to Cuba over the next few years and settled in the vicinity of La Cabaña, a small area northeast of downtown Havana, immediately across the harbor entrance (**Map 4**).

Some Calusa may have been able to return to their homes in the interlude between the collapse of the Indian slave trade (1715) and the start of the Seven Years' War in 1756 (AKA the French and Indian War), when British-allied Creeks invaded and took over the interior of Florida, leading to the complete occupation of the peninsula. The remaining Calusa refugees in Key West evacuated to Cuba. After the British siege of Havana in 1762, most of the Calusa in Havana moved to Guanabacoa, Southeast of downtown Havana, to make room for the construction of the Castillo de La Cabaña that was constructed to defend the harbor entrance.

Map 3. A map of a 1708 British-led Yamassee slave raid waged against Florida Indians and describing contact with the Calusa in the vicinity of CREW.

The commander's notes: H. Place where they swam over a Deep River [Caloosahatchee]. I. The same River is here Brackish. K. Place where they took 29 slaves. L. Here they took 6 slaves. M. Here they took and killed 33 Men at 1 o'clock the same day, numerous body of Indians came against them. They being but 33 men, yet put them presently to flight; they having no arms but Harpoons made of Iron and Fish bones; they were all painted.



Map 4. An 18th century map of Havana, the Calusa predominately migrated to La Cabaña (NE quadrant), and then later to Guanabacoa (SE quadrant) after the land at La Cabaña was needed for a large fortification.

Figure 1. A representation of the Calusa royal court in Mound Key, the exhibit is located in the Florida Museum of Natural History in Gainesville.

British Period 1763-1783

During the British period, beginning in 1763, the region saw a large in-migration of Creek. Many of the surviving members of the coastal tribes evacuated to Cuba with the Spanish when the British took over. In 1765 the Treaty of Picolata (today Palatka) recognized all of the interior of Florida as belonging to the Lower Creeks, a territory that would have followed a line from the west bank of the St. John's River following it to its source in St. Lucie County, then south to Cape Sabal on the southern tip of the Florida Peninsula. The coastal areas, defined by the landward extent of brackish water, were ceded by the Creeks to the British, with British law recognizing the interior of Florida being the legal possession of the Creeks. British law also held that the ultimate fee-title to the property laid with the Crown. The Creeks were entitled to own, occupy, and enjoy the entirety of their possessions; however, they could not dispose of their property without having it cleared by the delegated authority of the Crown. Similarly, the British could not legally dispossess the Creeks of their property without their consent.

Throughout the second half of the 18th century, the Creeks who lived along the length of the Florida Peninsula (the Seminoles) grew culturally and politically distinct from the Alabama Creeks. The Seminoles incorporated large numbers of black refugees from the southern U.S. into their population. By the end of the British period, in 1783, the Creek

Confederacy and Seminoles no longer had a cognizable political affiliation and were by all accounts distinct and independent tribes.

Second Spanish Period (retrocession) 1783-1821

Throughout the Second Spanish Period, following the post-revolution departure of the British, the Spanish Monarchy felt their hold on the territory was tenuous at best. They faced increasing unregulated migration from northern settlers and constant violations of their sovereignty by armed parties seeking the return of slaves, many of whom had found a home among the Seminoles or had been given legal asylum by the Spanish in their coastal cities after swearing an oath of loyalty to the Spanish Crown. The recognition by the British that the interior land belonged to the Seminoles was preserved by the Spanish, through the Treaty of Pensacola in 1784, and the Treaty of Walnut Hills in 1793. Spanish law, at that time, recognized a tribal right to property on par with that of a young don who inherited an estate before coming of age. The Seminoles were the legal owner of the land but required Spanish permission to sell their land.

The post-revolution relationship between the U.S. and the Creeks quickly splintered and deteriorated. The U.S. signed a treaty with a faction of the Creeks in 1790, to which the Seminoles were not a party, that included a provision for the return of any former slaves or their children. Private Georgia militias used this treaty as a justification for raiding Seminole towns throughout northern Florida and abducting black Seminoles. The raids drove many bands of Seminoles south, where they settled in large numbers in the uplands bordering CREW. Their numbers swelled following the U.S. – Creek War in Alabama and Tennessee (1813-1814), that sent many Creek refugees to Florida.

Territorial/Early American Period

The Seminole Wars

Disputes between the Seminole Indians and white settlers led to three successive wars. The first took place predominately in the northern part of Florida between 1817 and 1818. Not long afterward in 1823, the Seminoles were encouraged to sign the Treaty of Moultrie Creek, which provided for the removal of the Seminoles to lands in the west. Some Seminoles did not agree with the terms of this treaty, however, and by 1835 the Florida territory again erupted with hostilities.

The Second Seminole War (1835-1842) took place primarily in southern Florida. In the years leading up to the Second Seminole War, there was a significant in-migration of Seminole Indians into the area. These were both Seminoles who had been living in Florida for many years as well as new arrivals following the Creek War of 1813-1814. After the First Seminole War, the Indians had been gradually pushed south of the Caloosahatchee River from north-central Florida. Several forts, satellite camps, and temporary supply depots were established in present day Lee and Collier counties at the onset of the second wave of hostilities.

During the progression of the second Seminole war the military established a series of frontier

outposts, intended to be approximately 20 miles apart, as an attempt to effectively contain the Seminoles to areas south of the Lake Okeechobee and away from the coasts (**Maps 5 – 6**). The military campaign against the Seminoles in Collier County intensified between November 1841 and February 1842 when Captain George Wright organized a series of river and land expeditions into the interior of the county. Starting from coastal points such as Goodland Point and Big Marco Pass, expeditions were initiated in search of any remaining Seminole Indians. Although the attempts to locate Seminole forces were unsuccessful, it gave the U.S. government an opportunity to explore the county's interior and coastal fringe for the first time (Tebeau 1966). Following the unilateral cessation of the campaign by the U.S. Military, a few hundred Seminoles lived in the vicinity of CREW and Big Cypress, including Billy Bowlegs II's large band who were the focus of the short-lived Third Seminole war, and who relocated to Oklahoma in 1858 after that war.

Map 5. 1839 Military Map of the area around CREW

Map 6. 1856 Military Map of the area around CREW

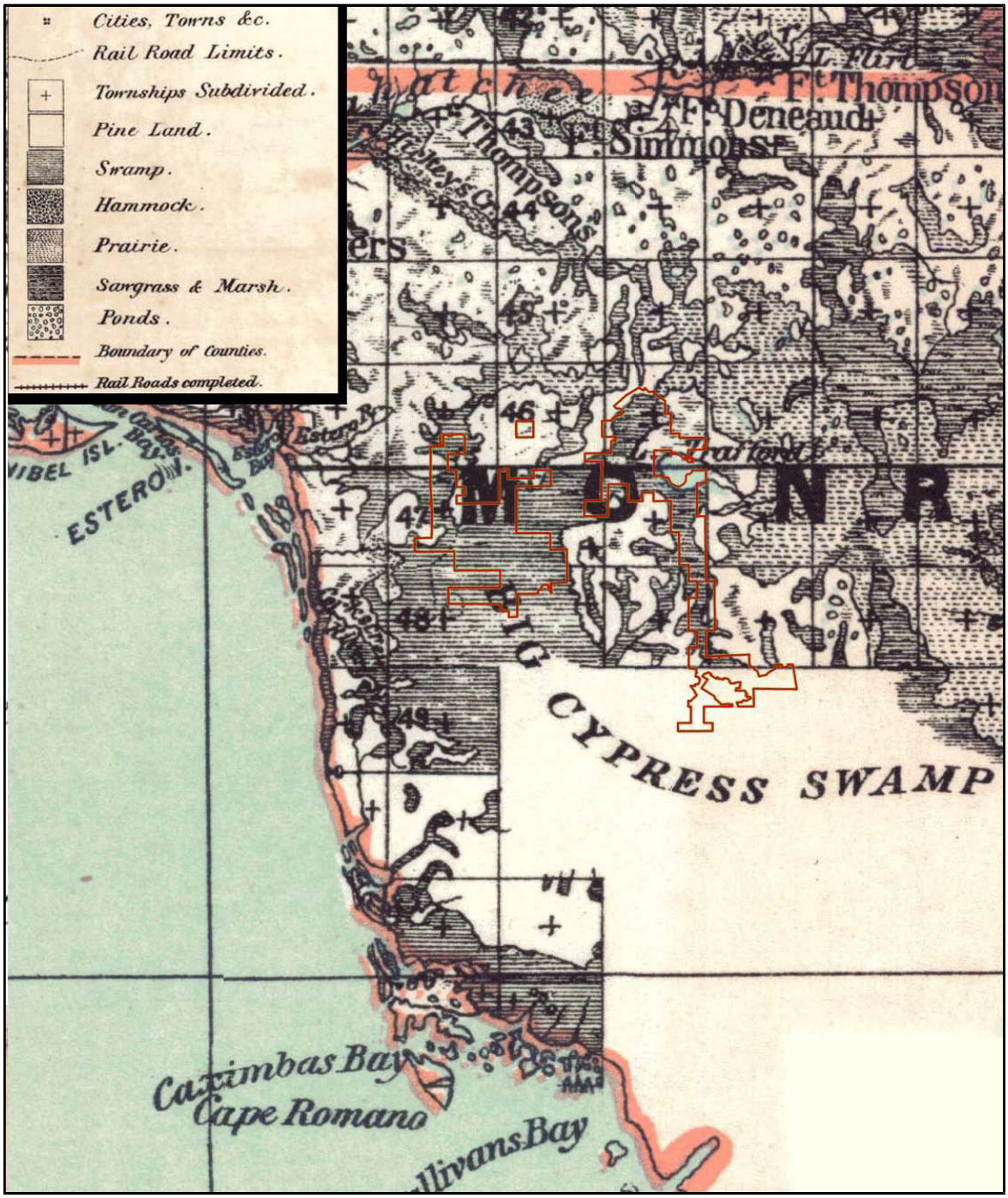
Late 19th/Early 20th - Century Settlement

1850s – 1900

The latter half of the 19th century saw the region around CREW develop as an eclectic mix of outcasts, outlaws, deserters, Seminole Indians, and entrepreneur settlers. Homesteading settlers began trickling into the area around CREW during the 1860's and lived mainly off the land with their own small vegetable plots. The government would grant 160-acre tracts to single men or heads of households through successive acts of Congress, such as the Armed Occupation Act of 1842. This act granted 160 acres to anyone who submitted a permit to the regional land office to build and live in a house on the parcel and cultivate at least 5 acres of it for at least 5 years. Many settlers were veterans of the Second Seminole War who had familiarized themselves with choice parcels during their routine patrols. However, these early settlers were few and far between, the U.S. Government had only authorized 1,250 homesteads for the entire peninsula south of Palatka. During the Civil War, the southern part of the Florida peninsula became home to many deserting confederate soldiers. During this time, several Seminole families moved back into the area around Lake Trafford (in 1893 the Women's National Indian Association set up an outreach service in present-day Immokalee, where the Seminole Tribe of Florida still holds a small reservation).

Figure 2. The Widow McLean, emblematic of the eclectic mix of late 19th century settlement of the countryside around CREW. Standing over six feet tall, she was 200 pounds of pure orneriness, when asked if she had ever been scared living alone in the swamps and wilds she replied "Never have been, and

A remarkably precise natural communities map completed in 1879 (**Map 7**), shows the pre-logging, pre-ranching, and pre-drainage detail of the ecological landscape prior to extensive settlement. With the CREW boundary overlaid, it depicts the historic extent of the swamp, sloughs, prairies, and the surrounding pinelands.



Map 7. Detail of an 1879 Florida map showing natural communities with a present-day Management Area boundary overlay

20th Century

Feather trade – Audubon Wardens

CREW was the epicenter of the both the contentious feather adornment trade, and the efforts to end the practice. Near the end of the 19th century tens of millions of wild birds were killed to meet the demand for feather adornments on high-end clothing. Herons and egrets, with their long, delicate bridal veil breeding plumage were among the most prized for the fashion industry. The plumage hunters targeted the largest rookeries where they could take the greatest number of birds in their breeding plumage. CREW was home to several such rookeries, the most well-known of which gave Bird Rookery Swamp in southwestern CREW its name. By the turn of the century, the population of these plumage birds had collapsed, leading to the passage of the Weeks–McLean migratory bird act in 1913 (which was held unconstitutional and replaced by the Migratory Bird Treaty Act of 1918). Following the passage of the Weeks–McLean Act, the Audubon Society hired seasonal wardens to guard prominent rookeries, including the corkscrew rookery. The photo below (1913) shows the warden camp at the Corkscrew Swamp rookery within a pine flatwood (foreground), marsh (intermediate), and the corkscrew cypress strand (background), and illustrates the condition of the land prior to the large-scale land conversion of the 20th century. The knee-high palmettos, scorch marks on the pines, and lack of shrubs in the marsh are clear indicators of a landscape that burned frequently.

CAMP OF RHETT GREEN, WARDEN OF CORKSCREW ROOKERY, FLORIDA
The Rookery begins in cypress swamp, shown in background, and extends for four miles deep into the "Big Cypress." Photographed by T. Gilbert Pearson

Figure 3. Camp of Rhett Green

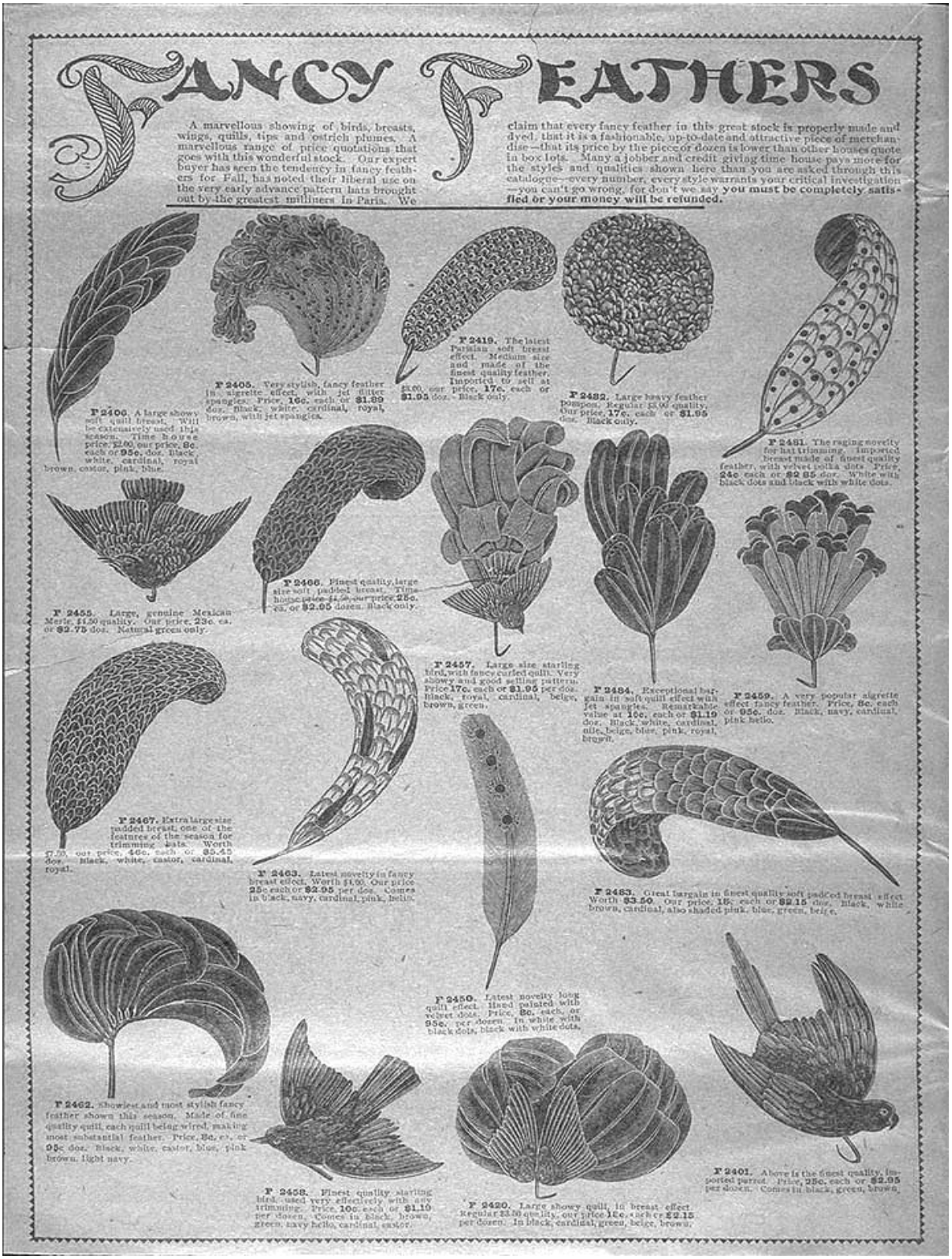


Figure 4. An advertisement from a 19th century feather accessory catalog.

The 20th century brought alterations to the natural communities including logging, cattle grazing, fire suppression, and both urban and rural development in the surrounding landscape. The first commercial citrus groves were planted in the first years of the 20th century and were bearing fruit by 1915. Early pine logging was completed by teams with oxen that would haul felled trees to small mill towns. Barron Collier acquired 1.4 million acres of land between 1911 and 1925, and the arrival of the Atlantic Coast Line railway in 1928 enabled the wholesale harvesting of hardwoods and virgin cypress. By 1945 most of the narrow-gauge tram roads (which can be explored from the Bird Rookery Swamp trailhead) through the hardwood hammocks and cypress had been constructed making industrial scale logging possible. Much of the lumber from the historic Big Cypress Swamp was harvested under government and international contracts to help rebuild post-war Europe. The last virgin cypress stand in the area was preserved in 1955 when the Lee Cypress Company and the Collier Companies donated and sold 6,000 acres of land to the National Audubon Society for the Corkscrew Swamp Sanctuary. Since its creation, the sanctuary has provided bird watchers and amateur enthusiasts with world-class wildlife viewing opportunities. Over 90,000 visitors enjoy the unique natural features of this sanctuary annually.

In the latter half of the 20th century additional commercial activities occurred. Cattle, timber, oil exploration, and recreational hunting became important activities within CREW. A number of cattle operations were in operation, including the Flint family cattle ranch in Flint Pen Strand. Other landowners, such as Alico Inc. and Collier, leased land for grazing and hunting. Logging for pine and cypress removed most of the commercial grade timber. Lee-Tidewater Cypress, a forestry operation based in Copeland, Florida, logged cypress from Bird Rookery Swamp. Alico Inc. harvested pine from the flatwoods of the Corkscrew Marsh Unit in the 1940's, 1970's and again in 1989. Florida's first commercial oil was produced from the Sunniland Oil Field in 1943, the first of 11 commercial oil fields. The West Felda oil field (1966) and Lake Trafford oil field (1969) are near CREW. The Lake Trafford field includes wells and production pads east and west of Corkscrew Marsh.

In 1981, the Florida Legislature established the Save Our Rivers (SOR) program authorizing the five water management districts to acquire environmentally sensitive land. The legislation (373.59 F.S.) produced the Water Management Lands Trust Fund and empowered the water management districts to acquire lands needed to manage, protect, and conserve the state's water resources. Once acquired, the lands were to be managed in an environmentally acceptable manner and restored to their natural state. The Districts were authorized to make certain capital improvements, i.e., fencing, access roads/trails, and provide basic public facilities. In addition, habitat management such as control of exotic species and prescribed burning were to be conducted. The legislation also required the Districts to develop appropriate public use.

The National Audubon Society and The Conservancy of Southwest Florida nominated Bird Rookery Swamp for acquisition under the SOR Program in 1986. Lee County proposed SOR acquisition of Flint Pen the following year. In 1989 Bird Rookery Swamp and the Flint Pen Strand were combined and additional land was added to the proposed acquisition project. The larger project was given the name Corkscrew Regional Ecosystem Watershed, or

CREW. CREW was added to the Florida Department of Environmental Protection (FDEP's) Conservation and Recreation Lands (CARL) list in 1990.

Four sections, located south of the original Flint Pen boundary, were added to the CREW project in 1995, and became known as the Flint Pen Addition. Four sections were added in 1998. This land was purchased in response to the 1995 Imperial River floods in the Bonita Springs area, located west of Flint Pen. These eight sections were subdivided into 2.5 and 5 acre lots under the now defunct Sun Coast Acres development in the early 1960's.

Figure 5. Tram Logging: 1) scouting parties girdle virgin cypress up to a year before logging to allow the stored water to drain out; 2) tram roads are created with a diesel dragline that dredges adjacent soil and muck to build up the road bed; 3) narrow gauge rails are laid on the tram roads, called "dummylines"; 4) logging teams fell the trees; 5) rail cars forming a train; 6) steam skidder loading cypress logs; 7) measuring the diameter of felled logs; and 8) hauling the trees to a local mill which, at its peak, was producing 100,000 board feet of lumber a day.

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Appendix B.
CREW Natural Communities

The CREW MA is comprised of eight distinct natural communities and five altered landcover types based on a combination of vegetation, landscape position, and hydrology (FNAI 2010). Below is an abbreviated excerpt from the FNAI *Guide to the natural communities of Florida* and the Florida Land Cover Classification System (Kawula and Redner 2018). These communities are managed through achieving and maintaining optimal fire return intervals for fire dependent communities; control of non-native plant and animal species; maintenance of natural hydrological functions; maintenance of proper vegetative structure that represents the natural diversity of the community; maintenance of healthy populations of plant and wildlife species (including those that are imperiled or endemic); and maintenance of intact ecotones between natural communities across the landscape.

The following modifications to the FNAI classifications were made:

- Cypress – Originally classified as Cypress/Tupelo by FNAI. Better classified as Cypress due to the lack of Tupelo (FNAI Natural Community Guide 2010 and Kawula and Redner 2018)).
- Hardwood Hammock – Originally classified as Mixed Hardwood-Coniferous. Better classified as hardwood hammock due to its composition of flora.
- Wet Prairie – Originally classified as Prairies and Bogs by FNAI. Better classified as Wet Prairie. (FNAI Natural Community Guide 2010).

The habitats within the CREW MA are classified as follows:

- Hardwood Hammock
- Freshwater Forested Wetlands
- Mesic Flatwoods
- Wet Flatwoods
- Palmetto Prairie
- Marshes
- Mixed Scrub-Shrub Wetland
- Cypress
- Altered Landcovers

Natural Community Description and Assessment

Hardwood Hammock (0.67%)

In the CREW MA, this community encompasses approximately 189 acres on the west side of the Corkscrew Marsh between the mesic flatwoods and sawgrass marsh. Canopy species in the hardwood hammock system include live oak (*Quercus virginiana*) and cabbage palm, scattered slash pine (Pinus elliottii var. densa), with occasional swamp laurel oak (*Quercus laurifolia*) in lower elevations. An abundance of epiphytes, including listed species, are found in mature canopy trees. The hardwood hammocks in the Management Area have a sparse understory due to over-story shading. Typical understory vegetation includes wax myrtle (*Myrica cerifera*), marlberry (*Ardisia escallonioides),* wild coffee (*Psychotria nervosa*), beautyberry (*Callicarpa americana*), Simpson's stopper (*Myrcianthes fragrans*), gallberry (*Ilex glabra*), hog plum (*Ximenia americana*), common persimmon (*Diospyros virginiana*), Darrow's blueberry (*Vaccinium darrowii*), Shiny blueberry (*Vaccinium myrsinites),* myrsine (*Rapanea punctata*), and saw palmetto (*Serenoa repens*).

Hardwood hammock in the CREW MA provides valuable habitat for denning bears and panthers due to the thick vegetation. Acorns are important forage for a variety of wildlife, including black bears and white-tailed deer. Efforts will continue to minimize soil disturbance by restricting fire where appropriate and treating for non-native invasive plant species within hammock areas. Feral hogs are the primary cause of disturbances in this community.

Freshwater Forested Wetlands (16%)

In the CREW Management Area, this community is subclassified as mixed wetland hardwood and mixed hardwood-coniferous swamp (canopied slough).

The mixed wetland hardwood community in the CREW MA encompasses approximately 1,900 acres and occur in Corkscrew Marsh and Bird Rookery Swamp. In the Corkscrew Marsh, mixed wetland hardwoods occur as patches on the east and west sides of the unit and forms a transition between the marsh and flatwoods. Typical plants in this area include cabbage palm, red maple *(Acer rubrum*), swamp bay (*Persea palustris*), sweetbay (*Magnolia virginiana*)*,* wax myrtle, saw palmetto, dahoon holly (*Ilex cassine*), myrsine, royal fern (*Osmunda regalis*), and marsh fern (*Thelyptris sp*.). The largest portion of mixed wetland hardwood is in the Bird Rookery Swamp where it forms an elongated ridge between the cypress and mixed hardwood coniferous swamp. The vegetation in the Bird Rookery Swamp is dominated by red maple and has a diverse mixture of other hardwoods including red and swamp bay*,* myrsine, dahoon holly (*Ilex cassine*), pond apple (*Annona glabra*), cabbage palm (*Sabal palmetto*), strangler fig (*Ficus aurea*) and pop ash (*Fraxinus caroliniana*). Cypress is also present but represents a relatively inconspicuous part of the flora. FNAI ranks hydric hammocks as apparently secure in its range globally and statewide (G4/S4).

The mixed hardwood-coniferous swamp (canopied slough) community encompasses approximately 2,755 acres and occurs in Bird Rookery Swamp. The mixed hardwood-coniferous

swamp in Bird Rookery Swamp is characterized by various canopy species including pond apple, Carolina willow, buttonbush, and pop ash. The associated emergent herbs and floating aquatic plants include alligator flag, golden canna (*Canna flaccida*), giant cutgrass (*Zizaniopsis miliancea*), big floating heart (*Nymphoides aquatica*), duckweed (*Lemna sp*.), bladderworts, pickerelweed, arrowhead, and lizard's tail (*Saururus cernuus*). The mixed hardwood-coniferous swamp community is often aligned with the lowest linear depressions in the underlying limestone bedrock. Soils are peat, unless removed by catastrophic fire. Natural fire is infrequent and generally results in a temporary reduction of hardwoods. Canopied sloughs are ranked as vulnerable globally and statewide (G3/S3) due to either a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

Mixed wetland hardwood in the CREW MA provides valuable habitat for nesting birds and mast feeders. Management targets protecting these areas from destructive fires and not doing any mechanical work in them other than that required for treating non-native invasive plant species. Feral hogs are the primary cause of disturbances in this community. Mixed hardwood-coniferous swamp in the CREW MA provides food, cover, roosting, and nesting sites to a wide variety of bird species and supports a variety of mammals, fishes, aquatic macroinvertebrates, and herptofauna. Efforts will continue to minimize the occurrence of non-native invasive plant species within the canopied sloughs.

Mesic Flatwoods (4%)

In the CREW MA, this community encompasses approximately 1,106 acres and is the dominant upland community in Corkscrew Marsh along the north, west, and east sides of the sawgrass marsh. A few isolated pockets of mesic flatwoods are also found in the eastern and western portions of Bird Rookery Swamp and portions of Flint Pen Strand within larger matrices of wet flatwoods and mixed shrub habitats. In CREW MA, slash pine dominates the canopy and gallberry, saw palmetto and fetterbush (*Lyonia lucida*) occur in the understory. Other typical plants include St. Johns-wort (*Hypericum sp.*), dwarf huckleberry (*Gaylussacia dumosa*), coastal-plain staggerbush (*Lyonia fruticosa*), blueberry (*Vaccinium sp.*), Wiregrass (*Aristida stricta var. beyrichiana*), gopher apple (*Lycania michauxi*), tarflower (*Bejaria racemosa*), bog buttons (*Lachnocaulon sp*.), blackroot (*Pterocaulon pycnostachyum*), and yellow-eyed grass (*Xyris sp*). Natural fire frequency in mesic flatwoods is one to eight years. FNAI ranks mesic flatwoods as apparently secure in its range globally and statewide (G4/S4).

Mesic flatwoods in the CREW MA provides valuable habitat for swallow-tail kites, who concentrate their nests in the dense pine stands. Much of the mesic flatwoods community was logged prior to the acquisition of the property in 1989. Shrub densities have increased due to fire exclusion. Prescribed fire, supported by targeted mechanical treatments if needed, will be used to manage these areas. Cabbage Palm has invaded areas east and west of the central portion of the marsh. Cabbage Palm are highly volatile and carry fire into the canopy, increasing pine mortality during prescribed burns. Mechanical treatments will be required to significantly reduce cabbage palm abundance in this location.

Wet Flatwoods (15%)

In the CREW MA, this community encompasses approximately 4,379 acres and occurs in small areas of less than 100 acres on either side of the cypress strand in Bird Rookery Swamp and west of the central marsh in the Corkscrew Marsh. In the Flint Pen Strand, the wet flatwoods community is larger, more widespread and interspersed within the mosaic of strand swamp and mixed scrub-shrub wetlands. Wet flatwoods are characterized by a moderate canopy of slash pine with an understory of low to dense shrub coverage and dense groundcover vegetation. Other plants associated with this habitat type include wax myrtle, beakrush (*Rhynchospora sp*.), St. John's-wort, xyris sp., and blue maidencane (*Amphicarpum muehlenbergianum*). Small inclusions of saw palmetto prairies are scattered in slightly elevated areas, but overall negligible in size (~0.1%). Natural fire frequency in wet flatwoods is three to ten years. FNAI ranks wet flatwoods as apparently secure in its range globally and statewide (G4/S4).

Wet flatwoods in the CREW MA provide valuable habitat for a variety of wildlife, including Florida panther, black bears, fox squirrels, white-tailed deer, tree-cavity dependent species, and tree-nesting species. In the southern half of the Flint Pen Strand, where roads and canals bisected the habitat, an altered hydrology has allowed pine and cabbage palm to invade the strand swamp, causing this community to transition into wet flatwoods. Notable recruitment of cypress seedlings has been observed since the removal of these alterations and recent hydrologic restoration, thus suggesting that the dominance of the cypress species in these areas may be restored in the future. Management of wet pine flatwoods includes the appropriate application of prescribed fire, although private inholdings within the southern half of the Flint Pen Strand complicate the use of prescribed fire.

Marshes (18%)

In the CREW MA, this community is subclassified as depression marshes and slough marshes and encompasses approximately 5,161 acres. Depression and slough marshes are long hydroperiod ecosystem dominated by grasses, sedges, broadleaf emergent, and floating aquatics. Depression marshes are scattered within larger landscapes of pine flatwoods, mixed hardwood-coniferous, and mixed shrubs matrices throughout the western portion of Corkscrew Marsh Unit. A few depression marshes are also scattered within the Flint Pen Strand and Bird Rookery Swamp. The coverage of woody vegetation varies from sparse to densely vegetated depending on hydrologic fluctuations and fire regimes. Typical plants found in these depression marshes include bladderwort (*Utricularia sp*.), American white waterlily (*Nymphaea odorata*), arrowhead (*Sagittaria lancifolia*), pickerelweed (*Pontederia cordata*), maidencane (*Panicum hemitomon*), sawgrass (*Cladium jamaicense*), St. John's Wort species, spikerush (*Eleocharis sp*.), yellow-eyed grass species, chain fern (*Woodwardia sp*.), primrose willow (*Ludwigia peruviana*), wax myrtle, buttonbush, and Carolina coastal-plain willow (*Salix caroliniana*). A large slough marsh system dominated by sawgrass marsh make up 70% of Corkscrew Marsh. While the dominant vegetation in this community is sawgrass, Carolina willow has been spreading throughout Corkscrew Marsh and is rapidly shifting the marsh into a shrubby system. Other common herbaceous species includes arrowhead, pickerelweed, cattail, buttonbush, American white waterlily, water primrose (*Ludwigia sp*.), and bladderwort. Slough marsh needs light ground fires at a return interval of one

to five years to prevent Carolina willow and buttonbush from dominating the system. FNAI ranks depression marshes as apparently secure in its range globally and statewide (G4/S4). FNAI ranks slough marshes as 'G3?' and 'S3' both statewide and globally. The G3?/S3 ranking indicates that this community is vulnerable globally and statewide due to either a restricted range (relatively few populations often 80 or fewer), recent and widespread declines, or other factors, but additional research is required for a definitive global classification for this community.

Marshes in the CREW MA supports a variety of fauna including birds, mammals, fishes, aquatic macroinvertebrates, and herptofauna. The increase in shrub density in the depression and slough marshes are linked to the exclusion of fire. Prescribed fire, supported by targeted mechanical treatments, will be used to manage these areas.

Wet Prairie (9%)

In the CREW MA, this community encompasses approximately 2,488 acres. Common vegetation includes, saltbush, wax myrtle, red maple, elderberry, laurel oak, and Carolina willow, with the occurrence of widely scattered pine and cypress seedlings. Pockets of wet prairies occurring between the marsh and flatwoods in Corkscrew Marsh and Bird Rookery Swamp are dominated by Carolina willow. In the south portion of Flint Pen Strand and the east side of Bird Rookery Swamp, where the natural community has been disturbed, wet prairies are recruiting in the midst of scattered pine and occasional cypress. With the recent hydrologic restoration in Flint Pen Strand and increased fire frequency, the density of shrub species is expected to decrease, and the natural prairie flora restored in the future. FNAI ranks wet prairies as the second most endangered level both statewide and globally (G2/S2).

Wet Prairies in the CREW MA provides valuable habitat for white-tailed deer, and numerous bird species. Management of the wet prairie system includes the appropriate application of prescribed fire, treatment of non-native invasive plant species, and mechanical treatments as needed.

Cypress (33%)

In the CREW MA, this community is subclassified as dome and strand swamps and encompasses approximately 9,524 acres. The dome swamp community is approximately 373 acres and is bordered by the flatwoods in Bird Rookery Swamp, Flint Pen Strand, and to a lesser extent in Corkscrew Marsh. Dome swamps in the CREW MA are dominated by cypress, red maple, dahoon holly, pop ash and pond apple, with sawgrass, alligator flag (*Thalia geniculata*), maidencane, arrowhead, and pickerelweed in the center. Other common plants include swamp bay, sweetbay, Virginia willow (*Itea virginica*), fetterbush, chain fern (Woodwardia sp.), wild pine (*Tillandsia sp*.), royal fern, Carolina willow, wax myrtle, orchids (*Encyclia sp. and Epidendrum sp*.), St. John's-wort, lizard's tail, Mexican primrose willow (*Ludwigia octovalvis*), redroot (*Lachnanthes caroliana*), floating heart, buttonbush (*Cephalanthus occidentalis*), and green arum (*Peltandra virginica*). The strand swamp community is approximately 9,151 acres and is represented by a closed canopy cypress dominated wetland in Flint Pen Strand and the eastern and western boundaries of Bird Rookery Swamp. Slash pine and cabbage palm have also established

in the strand swamps in Flint Pen Strand due to the alterations in the hydrology. Maple is also prominent in the strand swamp in Bird Rookery Swamp, mainly in the transitional areas between the cypress dominated strand and the hydric hammocks and canopied slough. Other variable woody understory occurring in the strand includes a mixture of pond apple, swamp laurel oak, cabbage palm, strangler fig, swamp bay, Carolina willow, buttonbush, and American elm (*Ulmus Americana*). The groundcover vegetation includes swamp lily, giant leather fern, swamp fern (*Telmatoblechnum serrulatum)*, royal fern, primrose willow (*Ludwigia sp.*), smartweed (*Polygonum sp*.) and green arum, and sawgrass. Natural fire is infrequent in strand swamps, occurring on a cycle of 30 to 200 years. Dome Swamps are ranked statewide and globally as apparently secure (G4/S4), though it may be quite rare in parts of its range, especially at the periphery. Strand swamps are ranked as the second most endangered level both statewide and globally (G2/S2).

Cypress in the CREW MA provides valuable habitat and supports a variety of fauna including birds, mammals, fishes, aquatic macroinvertebrates, and herptofauna including state and federally listed species such as Florida panther, wood stork, and Big Cypress fox squirrel. Management of the cypress community will continue though non-native invasive species eradication and maintaining and/or improving the hydrology.

Altered Landcover Types (3%)

Several abandoned pasture areas are located within the management area. These areas were improved pasture prior to the acquisition of the property. Opportunistic woody native and invasive exotic vegetation has encroached into these areas. There are also several areas where row crops were grown are located within the Corkscrew Marsh Unit.

Approximately 14 acres within CREW MA are borrow lakes. The littoral shelves surrounding the borrow lakes has invasive exotic plants and weedy native species. Pockets are still devoid of vegetation. The littoral shelves around the borrow lake will be allowed to recruit native vegetation. Efforts to control the non-native invasive species will continue. Many of the canals and ditches have been filled and the hydrology restored with the completion of the Southern CREW Restoration project. Remnant canals and wading bird pools left within the system provide a deep-water habitat for various types of wildlife including American alligator, turtles, snakes, wood storks, great egret, snowy egret, tricolored heron, and many freshwater fish. The remaining canals and ditches within the management area are necessary for drainage and flood control for the region.

Utility easements, land management structures and recreational facilities primarily support the public use program for this management area. These facilities include boardwalks, a raised observation deck, and an observation tower within the Corkscrew Marsh; the trail system, and boardwalks within the Bird Rookery Swamp and Flint Pen Strand; and the trail heads supporting these areas. Many of the roads built during the period of timber removal and subsequent development expansion have been removed, while the railroad tram has been left to augment the trails system. Many of areas are now maintained as fire breaks or access roads for visitors

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Appendix C. Species List

Table 1. List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Abrus precatorius	Rosary Pea	Not Native[1]	Fabaceae
Acacia auriculiformis	Earleaf Acacia	Not Native[1]	Fabaceae
Acalypha gracilens	Slender Threeseed Mercury	Native	Euphorbiaceae
Acer rubrum	Red Maple	Native	Sapindaceae
Acmella oppositifolia	Oppositeleaf Spotflower	Native	Asteraceae
Acrostichum danaeifolium	Giant Leather Fern	Native	Pteridaceae
Aeschynomene americana	Shyleaf	Native	Fabaceae
Agalinis fasciculata	Beach False Foxglove	Native	Orobanchaceae
Agalinis linifolia	Flaxleaf False Foxglove	Native	Orobanchaceae
Agalinis purpurea	Purple False Foxglove	Native	Orobanchaceae
Aletris lutea	Yellow Colicroot	Native	Nartheciaceae
Amaranthus hybridus	Slim Amaranth; Pigweed	Not Native	Amaranthaceae
Ambrosia artemisiifolia	Common Ragweed	Native	Asteraceae
Amorpha fruticosa	Bastard False Indigo	Native	Fabaceae
Ampelopsis arborea	Peppervine	Native	Vitaceae
Amphicarpum muehlenbergianum	Blue Maidencane	Native	Poaceae
Andropogon brachystachyus	Shortspike Bluestem	Native	Poaceae
Andropogon glomeratus	Bushy Bluestem	Native	Poaceae
Andropogon gyrans	Elliott's Bluestem	Native	Poaceae
Andropogon ternarius	Splitbeard Bluestem	Native	Poaceae
Andropogon virginicus var. glaucus	Chalky Bluestem	Native	Poaceae
Andropogon virginicus var. virginicus	Broomsedge Bluestem	Native	Poaceae
Anemia adiantifolia	Maidenhair Pineland Fern	Native	Schizaeaceae
Annona glabra	Pond Apple	Native	Annonaceae
Apios americana	Groundnut	Native	Fabaceae
Ardisia escallonioides	Marlberry	Native	Myrsinaceae
Aristida patula	Tall Threeawn	Native, Endemic	Poaceae
Aristida purpurascens var. purpurascens	Arrowfeather Threeawn	Native	Poaceae
Aristida spiciformis	Southern Threeawn	Native	Poaceae
Aristida stricta	Wiregrass	Native	Poaceae
Arnoglossum floridanum	Florida Indian Plantain	Native, Endemic	Asteraceae
Arnoglossum ovatum	Ovateleaf Indian Plantain	Native	Asteraceae
Asclepias curassavica	Tropical Milkweed	Not Native	Apocynaceae
Asclepias incarnata	Swamp Milkweed	Native	Apocynaceae
Asclepias lanceolata	Fewflower Milkweed	Native	Apocynaceae
Asclepias longifolia	Longleaf Milkweed	Native	Apocynaceae
Asclepias pedicellata	Savannah Milkweed	Native	Apocynaceae
Asclepias tuberosa	Butterflyweed; Butterfly Milkweed	Native	Apocynaceae
Asemeia violacea	Showy Milkwort	Native	Polygalaceae
Asimina reticulata	Netted Pawpaw	Native	Annonaceae
Axonopus furcatus	Big Carpetgrass	Native	Poaceae
Azolla filiculoides	Mosquito Fern; American Waterfern	Native	Azollaceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Baccharis glomeruliflora	Silverling	Native	Asteraceae
Bacopa caroliniana	Lemon Bacopa	Native	Plantaginaceae
Bacopa monnieri	Herb-of-Grace	Native	Plantaginaceae
Bejaria racemosa	Tarflower	Native	Ericaceae
Berchemia scandens	Rattan Vine	Native	Rhamnaceae
Bidens alba	Beggartick; Spanish Needles	Native	Asteraceae
Bidens laevis	Burrmarigold	Native	Asteraceae
Bidens mitis	Smallfruit Beggarticks	Native	Asteraceae
Bigelowia nudata subsp. australis	Rayless Goldenrod	Native, Endemic	Asteraceae
Blechnum serrulatum	Swamp Fern	Native	Blechnaceae
Bletia purpurea	Pinepink	Native, ST	Orchidaceae
Boehmeria cylindrica	False Nettle; Bog Hemp	Native	Urticaceae
Boltonia diffusa	Doll's Daisy	Native	Asteraceae
Buchnera americana	American Bluehearts	Native	Orobanchaceae
Bulbostylis ciliatifolia	Capillary Hairsedge	Native	Cyperaceae
Bursera simaruba	Gumbo Limbo	Native	Burseraceae
Callicarpa americana	American Beautyberry	Native	Lamiaceae
Callisia cordifolia	Florida Roseling	Native	Commelinaceae
Callisia ornata	Florida Scrub Roseling	Native, Endemic	Commelinaceae
Calopogon barbatus	Bearded Grasspink	Native	Orchidaceae
Calopogon multiflorus Lindl.	Manyflowered Grasspink	Native, ST	Orchidaceae
Calopogon pallidus	Pale Grasspink	Native	Orchidaceae
Calopogon tuberosus var. tuberosus	Tuberous Grasspink	Native	Orchidaceae
Calopogon tuberosus var. simpsonii	Simpson's Grasspink	Native	Orchidaceae
Campanula floridana	Florida Bellflower	Native, Endemic	Campanulaceae
Campyloneurum phyllitidis	Strap Fern	Native	Polypodiaceae
Canna flaccida	Golden Canna	Native	Cannaceae
Caperonia castaneifolia	Chestnutleaf False Croton	Native	Euphorbiaceae
Carex longii	Long's Sedge	Native	Cyperaceae
Carex lupuliformis	False Hop Sedge	Native	Cyperaceae
Carphephorus corymbosus	Florida Paintbrush	Native	Asteraceae
Carphephorus odoratissimus var. subtropicanus	Pineland Purple; False Vanillaleaf	Native, Endemic	Asteraceae
Carphephorus paniculatus	Hairy Chaffhead	Native	Asteraceae
Cassytha filiformis	Love Vine	Native	Lauraceae
Celtis laevigata	Sugarberry; Hackberry	Native	Cannabaceae
Cenchrus spinifex	Coastal Sandbur	Native	Poaceae
Centella asiatica	Coinwort; Spadeleaf	Native	Araliaceae
Centrosema virginianum	Spurred Butterfly Pea	Native	Fabaceae
Cephalanthus occidentalis	Common Buttonbush	Native	Rubiaceae
Ceratophyllum demersum	Coontail	Native	Ceratophyllaceae
Chamaecrista fasciculata	Partridge Pea	Native	Fabaceae
Chamaecrista nictitans var. aspera	Sensitive Pea	Native	Fabaceae
Chaptalia tomentosa	Pineland Daisy	Native	Asteraceae
Chiococca alba	Snowberry; Milkberry	Native	Rubiaceae
Chrysobalanus icaco	Cocoplum	Native	Chrysobalanaceae
Chrysophyllum oliviforme	Satinleaf	Native, ST	Sapotaceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Chrysopsis subulata	Scrubland Goldenaster	Native, Endemic	Asteraceae
Cicuta maculata	Spotted Water Hemlock	Native	Apiaceae
Cirsium horridulum	Purple Thistle	Native	Asteraceae
Cirsium nuttallii	Nuttall's Thistle	Native	Asteraceae
Cissus sicyoides	Seasonvine; Possum Grape	Native	Vitaceae
Citrus aurantium	Sour Orange	Not Native	Rutaceae
Cladium jamaicense	Sawgrass	Native	Cyperaceae
Clematis baldwinii	Pine-Hyacinth	Native, Endemic	Ranunculaceae
Cnidoscolus stimulosus	Tread-Softly; Finger-Rot	Native	Euphorbiaceae
Coelorachis rugosa	Wrinkled Jointtail Grass	Native	Poaceae
Coleataenia rigidula	Redtop Panicum	Native	Poaceae
Coleataenia tenera	Bluejoint Panicum	Native	Poaceae
Commelina diffusa var. diffusa	Common Dayflower	Not Native	Commelinaceae
Commelina erecta	Whitemouth Dayflower	Native	Commelinaceae
Conoclinium coelestinum	Blue Mistflower	Native	Asteraceae
Conyza canadensis	Canadian Horseweed; Sneezeweed	Native	Asteraceae
Corchorus aestuans	Jute	Not Native	Malvaceae
Coreopsis leavenworthii	Leavenworth's Tickseed	Native	Asteraceae
Cornus foemina	Swamp Dogwood	Native	Cornaceae
Crinum americanum	Seven-Sisters; String-Lily	Native	Amaryllidaceae
Crotalaria rotundifolia	Rabbitbells	Native	Fabaceae
Crotalaria spectabilis	Showy Rattlebox	Not Native	Fabaceae
Croton glandulosus var. septentrionalis	Vente Conmigo	Native	Euphorbiaceae
Ctenitis sloanei	Florida Tree Fern; Red-Hair Comb Fern	Native, SE	Dryopteridaceae
Cuphea carthagenensis	Colombian Waxweed	Not Native	Lythraceae
Cuscuta compacta	Compact Dodder	Native	Convolvulaceae
Cuscuta gronovii	Scaldweed	Native	Convolvulaceae
Cyanthillium cinereum	Little Ironweed	Not Native	Asteraceae
Cyclopogon cranichoides	Cranichis Ladiestresses	Native	Orchidaceae
Cynanchum blodgettii/Metastelma blodgettii	Blodgett's Swallowwort	Native, ST	Apocynaceae
Cynanchum scoparium/Orthosia scoparia	Leafless Swallowwort	Native	Apocynaceae
Cynodon dactylon	Bermuda Grass	Not Native	Poaceae
Cyperus esculentus	Yellow Nutgrass	Not Native	Cyperaceae
Cyperus filiculmis	Wiry Flatsedge	Native	Cyperaceae
Cyperus haspan	Haspan Flatsedge	Native	Cyperaceae
Cyperus ligularis	Swamp Flatsedge	Native	Cyperaceae
Cyperus odoratus	Fragrant Flatsedge	Native	Cyperaceae
Cyperus ovatus	Pinebarren Flatsedge	Native	Cyperaceae
Cyperus polystachyos	Manyspike Flatsedge	Native	Cyperaceae
Cyperus pumilus	Low Flatsedge	Not Native	Cyperaceae
Cyperus surinamensis	Tropical Flatsedge	Native	Cyperaceae
Dactyloctenium aegyptium	Durban Crowfootgrass	Not Native[2]	Poaceae
Dalea carnea var. carnea	Prairie Clover; Whitetassels	Native	Fabaceae
Damburneya coriacea	Lancewood	Native	Lauraceae
Dendrophylax porrectus	Jingle Bell Orchid; Needleroot Orchid	Native, ST	Orchidaceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Desmodium incanum	Zarzabacoa Comun	Not Native	Fabaceae
Desmodium triflorum	Threeflower Ticktrefoil	Not Native	Fabaceae
Dichanthelium aciculare	Needleleaf Witchgrass	Native	Poaceae
Dichanthelium commutatum	Variable Witchgrass	Native	Poaceae
Dichanthelium ensifolium var. ensifolium	Cypress witchgrass	Native	Poaceae
Dichanthelium erectifolium	Erectleaf Witchgrass	Native	Poaceae
Dichanthelium laxiflorum	Openflower Witchgrass	Native	Poaceae
Digitaria ciliaris	Southern Crabgrass	Native	Poaceae
Diodia teres	Poor Joe	Native	Rubiaceae
Diodia virginiana	Virginia Buttonweed	Native	Rubiaceae
Diospyros virginiana	Common Persimmon	Native	Ebenaceae
Diplachne fusca subsp. fasciclaris	Bearded Sprangletop	Native	Poaceae
Disakisperma dubium	Green Sprangletop	Native	Poaceae
Drosera brevifolia	Dwarf Sundew	Native	Droseraceae
Drosera capillaris	Pink Sundew	Native	Droseraceae
Drymaria cordata	West Indian Chickweed	Not Native	Caryophyllaceae
Dryopteris ludoviciana	Southern Wood Fern	Native	Dryopteridaceae
Dyschoriste angusta	Pineland Twinflower	Native	Acanthaceae
Dyschoriste oblongifolia	Oblongleaf Twinflower	Native	Acanthaceae
Echinochloa colona	Jungle Rice	Not Native	Poaceae
Echinochloa crus-galli	Barnyard Grass	Not Native	Poaceae
Echinochloa muricata	Rough Barnyardgrass	Native	Poaceae
Echinochloa paludigena	Florida cockspur	Native, Endemic	Poaceae
Echinochloa walteri	Coast Cockspur	Native	Poaceae
Eclipta prostrata	False Daisy	Native	Asteraceae
Edrastima uniflora	Clustered Mille Graines	Native	Rubiaceae
Eichhornia crassipes	Common Water Hyacinth	Not Native[1]	Pontederiaceae
Eleocharis baldwinii	Baldwin's Spikerush	Native	Cyperaceae
Eleocharis cellulosa	Gulf Coast Spikerush	Native	Cyperaceae
Eleocharis geniculata	Canada Spikerush	Native	Cyperaceae
Eleocharis interstincta	Knotted Spikerush	Native	Cyperaceae
Eleocharis vivipara	Viviparous Spikerush	Native	Cyperaceae
Elephantopus elatus	Tall Elephantsfoot	Native	Asteraceae
Eleusine indica	Indian Goosegrass	Not Native	Poaceae
Elytraria caroliniensis var. angustifolia	Carolina Scalystem	Native	Acanthaceae
Emilia fosbergii	Florida Tasselflower	Not Native	Asteraceae
Encyclia tampensis	Butterfly Orchid	Native	Orchidaceae
Epidendrum anceps	Dingy-Flowered Star Orchid	Native, SE	Orchidaceae
Epidendrum nocturnum	Night-Scented Orchid	Native, SE	Orchidaceae
Epidendrum rigidum	Stiff-Flower Star Orchid	Native, SE	Orchidaceae
Eragrostis ciliaris	Gophergrass Lovegrass	Not Native	Poaceae
Eragrostis elliottii	Elliott's Lovegrass	Native	Poaceae
Eragrostis spectabilis	Purple Lovegrass	Native	Poaceae
Erechtites hieraciifolius	American Burnweed; Fireweed	Native	Asteraceae
Erigeron quercifolius	Oakleaf Fleabane	Native	Asteraceae
Erigeron vernus	Early Whitetop Fleabane	Native	Asteraceae
Eriocaulon compressum	Flattened Pipewort	Native	Eriocaulaceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Eriocaulon decangulare	Tenangle Pipewort	Native	Eriocaulaceae
Eryngium baldwinii	Baldwin's Eryngo	Native	Apiaceae
Eryngium yuccifolium	Button Rattlesnake Master	Native	Apiaceae
Erythrina herbacea	Coralbean; Cherokee Bean	Native	Fabaceae
Eugenia axillaris	White Stopper	Native	Myrtaceae
Eulophia alta	Wild Coco	Native	Orchidaceae
Eupatorium capillifolium	Dog Fennel	Native	Asteraceae
Eupatorium leptophyllum	False Fennel	Native	Asteraceae
Eupatorium mikanioides	Semaphore Thoroughwort	Native, Endemic	Asteraceae
Eupatorium mohrii	Mohr's Thoroughwort	Native	Asteraceae
Eupatorium rotundifolium	Roundleaf Thoroughwart; False Horehound	Native	Asteraceae
Euphorbia heterophylla	Fiddler's Spurge; Mexican Fireplant	Native	Euphorbiaceae
Euphorbia hirta	Pillpod Sandmat	Native	Euphorbiaceae
Euphorbia hypericifolia	Graceful Sandmat	Native	Euphorbiaceae
Euphorbia hyssopifolia	Hyssopleaf Sandmat	Native	Euphorbiaceae
Euphorbia maculata	Spotted Sandmat	Native	Euphorbiaceae
Euphorbia polyphylla	Lesser Florida Spurge	Native, Endemic	Euphorbiaceae
Euploca polyphylla	Pineland Heliotrope	Native	Boraginaceae
Eustachys petraea	Pinewoods Fingergrass	Native	Poaceae
Euthamia caroliniana	Slender Flattop Goldenrod	Native	Asteraceae
Evolvulus sericeus	Silver Dwarf Morning-Glory	Native	Convolvulaceae
Ficus aurea	Strangler Fig	Native	Moraceae
Fimbristylis autumnalis	Slender Fimbry	Native	Cyperaceae
Fimbristylis littoralis	Fringe Rush; Grasslike Fimbry	Not Native	Cyperaceae
Flaveria linearis	Narrowleaf Yellowtops	Native	Asteraceae
Fraxinus caroliniana	Pop Ash	Native	Oleaceae
Fuirena breviseta	Saltmarsh Umbrella Sedge	Native	Cyperaceae
Fuirena scirpoidea	Southern Umbrella Sedge	Native	Cyperaceae
Galactia elliottii	Elliott's Milkpea	Native	Fabaceae
Galactia volubilis	Eastern Milkpea	Native	Fabaceae
Galium tinctorium	Stiff Marsh Bedstraw	Native	Rubiaceae
Gamochaeta antillana	Caribbean Purple Everlasting; Delicate Everlasting	Native	Asteraceae
Gamochaeta purpurea	Spoonleaf Purple Everlasting; Spoonleaf Cudweed	Native	Asteraceae
Gaylussacia dumosa	Dwarf Huckleberry	Native	Ericaceae
Geobalanus oblongifolius	Gopher Apple	Native	Chrysobalanaceae
Gonolobus suberosus	Angularfruit Milkvine; Angle Pod	Native, ST	Apocynaceae
Gratiola ramosa	Branched Hedgehyssop	Native	Plantaginaceae
Habenaria floribunda	Toothpetal False Reinorchid; Mignonette Orchid	Native	Orchidaceae
Habenaria quinqueseta	Michaux's Orchid	Native	Orchidaceae
Habenaria repens	Waterspider False Reinorchid	Native	Orchidaceae
Hamelia patens var. patens	Firebush	Native	Rubiaceae
Helenium pinnatifidum	Southeastern Sneezeweed	Native	Asteraceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Helianthus agrestis	Southeastern Sunflower	Native	Asteraceae
Helianthus angustifolius	Narrowleaf Sunflower; Swamp Sunflower	Native	Asteraceae
Helianthus floridanus	Florida Sunflower	Native	Asteraceae
Heterotheca subaxillaris	Camphorweed	Native	Asteraceae
Hibiscus coccineus	Scarlet Rosemallow	Native	Malvaceae
Hibiscus grandiflorus	Swamp Rosemallow	Native	Malvaceae
Hieracium megacephalon	Coastal Plain Hawkweed	Native	Asteraceae
Houstonia procumbens	Innocence; Roundleaf Bluet	Native	Rubiaceae
Hydrocotyle umbellata	Manyflower Marshpennywort	Native	Araliaceae
Hydrocotyle verticillata var. verticillata	Whorled Marshpennywort	Native	Araliaceae
Hydrolea corymbosa	Skyflower	Native	Hydroleaceae
Hymenachne amplexicaulis	Trompetilla; West Indian Marshgrass	Not Native[1]	Poaceae
Hymenocallis palmeri	Alligatorlily	Native, Endemic	Amaryllidaceae
Hyparrhenia rufa	Jaragua grass	Not Native	Poaceae
Hypericum cistifolium	Roundpod St. John's-Wort	Native	Clusiaceae
Hypericum fasciculatum	Sandweed	Native	Clusiaceae
Hypericum hypericoides	St. Andrew's Cross	Native	Clusiaceae
Hypericum mutilum	Dwarf St. John's-Wort	Native	Clusiaceae
Hypericum myrtifolium	Myrtleleaf St. John's-Wort	Native	Clusiaceae
Hypericum tetrapetalum	Fourpetal St. John's-Wort	Native	Clusiaceae
Hypoxis juncea	Fringed Yellow Stargrass	Native	Hypoxidaceae
Hyptis alata	Musky Mint	Native	Lamiaceae
Hyptis verticillata/Condea verticillata	John Charles	Not Native	Lamiaceae
Ilex cassine	Dahoon	Native	Aquifoliaceae
Ilex glabra	Gallberry; Inkberry	Native	Aquifoliaceae
Imperata cylindrica	Cogon Grass	Not Native[1]	Poaceae
Indigofera hirsuta	Hairy Indigo	Not Native	Fabaceae
Ipomoea alba	Moonflower	Native	Convolvulaceae
Ipomoea indica	Oceanblue Morning-Glory	Native	Convolvulaceae
Ipomoea sagittata	Saltmarsh Morning-Glory	Native	Convolvulaceae
Ipomoea violacea	Beach Moonflower; Heavenlyblue Morning-Glory	Native	Convolvulaceae
Iresine diffusa	Juba's Bush	Native	Amaranthaceae
Iris savannarum	Savanna Iris; Prairie Iris	Native	Iridaceae
Iris virginica	Virginia Iris; Blue Flag Iris	Native	Iridaceae
Itea virginica	Virginia Willow	Native	Iteaceae
Iva microcephala	Piedmont Marsh Elder	Native	Asteraceae
Juncus effusus subsp. solutus	Soft Rush	Native	Juncaceae
Juncus megacephalus	Bighead Rush	Native	Juncaceae
Justicia angusta	Pineland Waterwillow	Native	Acanthaceae
Kellochloa verrucosa	Warty Panicgrass	Native	Poaceae
Kosteletzkya pentacarpos	Virginia Saltmarsh Mallow	Native	Malvaceae
Lachnanthes caroliana	Carolina Redroot	Native	Haemodoraceae
Lachnocaulon anceps	Whitehead Bogbutton	Native	Eriocaulaceae
Lactuca graminifolia	Grassleaf Lettuce	Native	Asteraceae
Lantana strigocamara	Shrub Verbena; Lantana	Not Native[1]	Verbenaceae
Lasiacis divaricata	Smallcane; Florida Tibisee	Native	Poaceae
Lechea torreyi	Piedmont Pinweed	Native	Cistaceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Leersia hexandra	Southern Cutgrass	Native	Poaceae
Lemna aequinoctialis	Lesser Duckweed	Native	Araceae
Lepidium virginicum	Virginia Pepperweed	Native	Brassicaceae
Liatris chapmanii	Chapman's Gayfeather	Native	Asteraceae
Liatris gracilis	Slender Gayfeather	Native	Asteraceae
Liatris spicata	Dense Gayfeather	Native	Asteraceae
Liatris tenuifolia var. quadriflora	Shortleaf Gayfeather	Native	Asteraceae
Lilium catesbaei Walter	Catesby's Lily; Pine Lily	Native, ST	Liliaceae
Limnobium spongia	American Spongeplant; Frog's-bit	Native	Hydrocharitaceae
Limnophila sessiliflora	Asian Marshweed	Not Native[2]	Plantaginaceae
Linaria canadensis	Canadian Toadflax	Native	Plantaginaceae
Lindernia grandiflora	Savannah False Pimpernel	Native	Linderniaceae
Linum floridanum	Florida Yellow Flax	Native	Linaceae
Linum medium var. texanum	Stiff Yellow Flax	Native	Linaceae
Lippia stoechadifolia	Southern Fogfruit; Southern Matchsticks	Native, SE	Verbenaceae
Lobelia feayana	Bay Lobelia	Native	Campanulaceae
Lobelia glandulosa	Glades Lobelia	Native	Campanulaceae
Lobelia paludosa	White Lobelia	Native	Campanulaceae
Ludwigia alata	Winged Primrosewillow	Native	Onagraceae
Ludwigia curtissii	Curtiss' Primrosewillow	Native	Onagraceae
Ludwigia decurrens	Wingleaf Primrosewillow	Native	Onagraceae
Ludwigia leptocarpa	Anglestem Primrosewillow	Native	Onagraceae
Ludwigia maritima	Seaside Primrosewillow	Native	Onagraceae
Ludwigia microcarpa	Smallfruit Primrosewillow	Native	Onagraceae
Ludwigia octovalvis	Mexican Primrosewillow	Native	Onagraceae
Ludwigia peruviana	Peruvian Primrosewillow	Not Native[1]	Onagraceae
Ludwigia repens	Creeping Primrosewillow	Native	Onagraceae
Ludwigia virgata	Savannah Primerosewillow	Native	Onagraceae
Luziola fluitans	Southern Watergrass	Native	Poaceae
Lycopodiella caroliniana	Slender Club-Moss	Native	Lycopodiaceae
Lygodesmia aphylla	Roserush	Native	Asteraceae
Lygodium japonicum	Japanese Climbing Fern	Not Native[1]	Schizaeaceae
Lygodium microphyllum	Small-Leaf Climbing Fern	Not Native[1]	Schizaeaceae
Lyonia fruticosa	Coastal Plain Staggerbush	Native	Ericaceae
Lyonia lucida	Fetterbush	Native	Ericaceae
Lythrum alatum var. lanceolatum	Winged Loosestrife	Native	Lythraceae
Macroptilium lathyroides	Wild Bushbean; Phasey bean	Not Native[2]	Fabaceae
Magnolia virginiana	Sweetbay	Native	Magnoliaceae
Mecardonia acuminata subsp. peninsularis	Axilflower	Native, Endemic	Plantaginaceae
Melaleuca quinquenervia	Punktree	Not Native[1]	Myrtaceae
Melanthera nivea	Snow Squarestem	Native	Asteraceae
Melinis repens	Rose Natalgrass	Not Native[1]	Poaceae
Melochia corchorifolia	Chocolateweed	Not Native	Malvaceae
Melochia spicata	Bretonica Peluda	Native	Malvaceae
Melothria pendula	Creeping Cucumber	Native	Cucurbitaceae
Mikania cordifolia	Florida Keys Hempvine	Native	Asteraceae
Mikania scandens	Climbing Hempvine	Native	Asteraceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Mitreola petiolata	Lax Hornpod	Native	Loganiaceae
Mitreola sessilifolia	Swamp Hornpod	Native	Loganiaceae
Momordica charantia	Balsam Pear	Not Native[2]	Cucurbitaceae
Morella cerifera	Wax Myrtle; Southern Bayberry	Native	Myricaceae
Morus rubra	Red Mulberry	Native	Moraceae
Muhlenbergia capillaris var. filipes	Gulf Hairawn Muhly	Native	Poaceae
Myrcianthes fragrans	Twinberry; Simpson's Stopper	Native, ST	Myrtaceae
Myrsine cubana	Myrsine; Colicwood	Native	Myrsinaceae
Nekemias arborea	Peppervine	Native	Vitaceae
Nephrolepis biserrata	Giant Sword Fern	Native, ST	Nephrolepidaceae
Nephrolepis exaltata	Boston Fern; Sword Fern	Native	Nephrolepidaceae
Nymphaea elegans	Tropical Royalblue Waterlily	Native	Nymphaeaceae
Nymphaea mexicana	Yellow Waterlily	Native	Nymphaeaceae
Nymphaea odorata	American White Waterlily	Native	Nymphaeaceae
Nymphoides aquatica	Big Floatingheart	Native	Menyanthaceae
Oclemena reticulata	Whitetop Aster; Pinebarren Aster	Native	Asteraceae
Ocotea coriacea/Damburneya coriacea	Lancewood	Native	Lauraceae
Oenothera simulans	Southern Beeblossom	Native	Onagraceae
Edrastima uniflora	Clustered Mille Graines	Native	Rubiaceae
Ophioglossum palmatum	Hand Fern	Native, SE	Ophioglossaceae
Oplismenus hirtellus	Woodsgrass; Basketgrass	Not Native	Poaceae
Opuntia austrina	Devil's Tongue	Native, Endemic	Cactaceae
Orontium aquaticum	Golden Club; Neverwet	Native	Araceae
Osmunda regalis	Royal Fern	Native	Osmundaceae
Oxalis corniculata	Creeping Woodsorrel; Common Yellow Woodsorrel	Native	Oxalidaceae
Cyperus blepharoleptos	Cuban bulrush	Not Native	Cyperaceae
Packera glabella	Butterweed	Native	Asteraceae
Palafoxia feayi	Feay's Palafox	Native, Endemic	Asteraceae
Panicum hemitomon	Maidencane	Native	Poaceae
Panicum repens	Torpedograss	Not Native[1]	Poaceae
Panicum virgatum	Switchgrass	Native	Poaceae
Parietaria floridana	Florida Pellitory	Native	Urticaceae
Parthenocissus quinquefolia	Virginia Creeper	Native	Vitaceae
Paspalidium geminatum	Kissimmee Grass; Egyptian Paspalidium	Native	Poaceae
Paspalum caespitosum	Blue Crowngrass	Native	Poaceae
Paspalum conjugatum	Sour Paspalum; Hilograss	Native	Poaceae
Paspalum monostachyum	Gulfdune Paspalum	Native	Poaceae
Paspalum notatum var. notatum	Bahiagrass	Not Native	Poaceae
Paspalum repens	Water Paspalum	Native	Poaceae
Paspalum setaceum	Thin Paspalum	Native	Poaceae
Paspalum urvillei	Vaseygrass	Not Native	Poaceae
Passiflora ciliata	Fringed Passionflower	Not Native	Passifloraceae
Passiflora suberosa	Corkystem Passionflower	Native	Passifloraceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Pecluma dispersa	Widespread Polypody; Widespread Rockcap Fern	Native, SE	Polypodiaceae
Pecluma plumula	Plume Polypody; Plumed Rockcap Fern	Native, SE	Polypodiaceae
Pecluma ptilota var. bourgeauana	Comb PolyPody; Swamp Plume Polypod; Palmleaf Rockcap Fern	Native, SE	Polypodiaceae
Pectis linearifolia	Florida Cinchweed	Native, Endemic	Asteraceae
Peltandra virginica	Green Arrow Arum	Native	Araceae
Pennisetum polystachion	West Indian Pennisetum; Missiongrass	Not Native[2]	Poaceae
Penstemon multiflorus	Manyflower Beardtongue	Native	Plantaginaceae
Pentalinon luteum	Wild Allamanda; Hammock Viperstail	Native	Apocynaceae
Persea borbonia var. borbonia	Red Bay	Native	Lauraceae
Persea palustris	Swamp Bay	Native	Lauraceae
Persicaria glabra	Denseflower Knotweed	Native	Polygonaceae
Persicaria hydropiperoides	Mild Waterpepper; Swamp Smartweed	Native	Polygonaceae
Persicaria punctata	Dotted Smartweed	Native	Polygonaceae
Phlebodium aureum	Golden Serpent Fern; Golden Polypody	Native	Polypodiaceae
Phoradendron leucarpum	Oak Mistletoe	Native	Viscaceae
Phragmites australis	Common Reed	Not Native	Poaceae
Phyla nodiflora	Turkey Tangle Fogfruit; Capeweed	Native	Verbenaceae
Phyllanthus caroliniensis var. saxicola	Rock Carolina Leafflower	Native	Phyllanthaceae
Physalis angulata	Cutleaf Groundcherry	Native	Solanaceae
Physalis walteri	Walter's Groundcherry	Native	Solanaceae
Phytolacca americana	American Pokeweed	Native	Phytolaccaceae
Piloblephis rigida	Wild Pennyroyal	Native	Lamiaceae
Pinguicula caerulea	Blueflower Butterwort	Native, ST	Lentibulariaceae
Pinguicula lutea	Yellow Butterwort; Yellow-Flowered Butterwort	Native, ST	Lentibulariaceae
Pinguicula pumila	Small Butterwort	Native	Lentibulariaceae
Pinus elliottii	Slash Pine	Native	Pinaceae
Piptochaetium avenacioides	Florida Needlegrass	Native, Endemic	Poaceae
Piriqueta cistoides subsp. caroliniana	Pitted Stripeseed	Native	Turneraceae
Pistia stratiotes	Water Lettuce	Not Native[1]	Araceae
Pityopsis graminifolia	Narrowleaf Silkgrass	Native	Asteraceae
Pleopeltis polypodioides	Tropical Resurrection Fern	Native	Polypodiaceae
Pluchea baccharis	Rosy Camphorweed	Native	Asteraceae
Pluchea foetida	Stinking Camphorweed	Native	Asteraceae
Polygala balduinii	Baldwin's Milkwort	Native	Polygalaceae
Polygala boykinii	Boykin's Milkwort	Native	Polygalaceae
Polygala cruciata	Drumheads	Native	Polygalaceae
Polygala incarnata	Procession Flower	Native	Polygalaceae
Polygala lutea	Orange Milkwort	Native	Polygalaceae
Polygala nana	Candyroot	Native	Polygalaceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Polygala ramosa	Low Pinebarren Milkwort	Native	Polygalaceae
Polygala rugelii	Yellow Milkwort	Native, Endemic	Polygalaceae
Polygala verticillata	Whorled Milkwort	Native	Polygalaceae
Polygonum hydropiperoides	Mild Waterpepper; Swamp Smartweed	Native	Polygalaceae
Polystachya concreta	Greater Yellowspike Orchid	Native, SE	Orchidaceae
Pontederia cordata	Pickerelweed	Native	Pontederiaceae
Potamogeton illinoensis	Illinois Pondweed	Native	Potamogetonaceae
Proserpinaca palustris	Marsh Mermaidweed	Native	Haloragaceae
Proserpinaca pectinata	Combleaf Mermaidweed	Native	Haloragaceae
Prosthechea cochleata	Clamshell Orchid; Flordia Cockleshell Orchid	Native, SE	Orchidaceae
Pseudognaphalium obtusifolium	Sweet Everlasting; Rabbit Tobacco	Native	Asteraceae
Psidium cattleianum	Strawberry Guava	Not Native[1]	Myrtaceae
Psidium guajava	Guava	Not Native[1]	Myrtaceae
Psilotum nudum	Whisk Fern	Native	Psilotaceae
Psychotria ligustrifolia	Bahama Wild Coffee	Native, SE	Rubiaceae
Psychotria nervosa	Wild Coffee	Native	Rubiaceae
Psychotria tenuifolia	Shortleaf Wild Coffee	Native	Rubiaceae
Pteridium aquilinum var. caudatum/Pteridium caudatum	Lacy Bracken Fern	Native	Dennstaedtiaceae
Pteris vittata	Chinese Ladder Brake	Not Native[2]	Pteridaceae
Pterocaulon pycnostachyum	Blackroot	Native	Asteraceae
Ptilimnium capillaceum	Mock Bishopsweed	Native	Apiaceae
Quercus geminata	Sand Live Oak	Native	Fagaceae
Quercus laurifolia	Laurel Oak	Native	Fagaceae
Quercus minima	Dwarf Live Oak	Native	Fagaceae
Quercus virginiana	Virginia Live Oak	Native	Fagaceae
Rhexia cubensis	West Indian Meadowbeauty	Native	Melastomataceae
Rhexia mariana	Pale Meadowbeauty	Native	Melastomataceae
Rhexia nuttallii	Nuttall's Meadowbeauty	Native	Melastomataceae
Rhodomyrtus tomentosa	Downy Rose-myrtle	Not Native[1]	Myrtaceae
Rhus copallinum	Winged Sumac	Native	Anacardiaceae
Rhynchospora baldwinii	Baldwin's Beaksedge	Native	Cyperaceae
Rhynchospora colorata	Starrush Whitetop	Native	Cyperaceae
Rhynchospora corniculata	Shortbristle Horned Beaksedge	Native	Cyperaceae
Rhynchospora divergens	Spreading Beaksedge	Native	Cyperaceae
Rhynchospora fascicularis	Fascicled Beaksedge	Native	Cyperaceae
Rhynchospora inundata	Narrowfruit Horned Beaksedge	Native	Cyperaceae
Rhynchospora latifolia	Giant Whitetop	Native	Cyperaceae
Rhynchospora microcarpa	Southern Beaksedge	Native	Cyperaceae
Rhynchospora miliacea	Millet Beaksedge	Native	Cyperaceae
Rhynchospora tracyi	Tracy's Beaksedge	Native	Cyperaceae
Riccia sp.	Riccia (Floating Liverwort)	Native	Ricciaceae
Rorippa teres	Southern Marsh Yellowcress	Native	Brassicaceae
Rotala ramosior	Toothcup; Lowland Rotala	Native	Lythraceae
Rubus trivialis	Southern Dewberry	Native	Rosaceae
Rudbeckia hirta	Blackeyed Susan	Native	Asteraceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Ruellia blechum	Green Shrimp Plant; Browne's Blechum	Not Native[2]	Acanthaceae
Ruellia caroliniensis	Carolina Wild Petunia	Native	Acanthaceae
Ruellia succulenta	Thickleaf Wild Petunia	Native, Endemic	Acanthaceae
Rumex verticillatus	Swamp Dock	Native	Polygonaceae
Sabal palmetto	Cabbage Palm	Native	Arecaceae
Sabatia decandra	Bartram's Rosegentian	Native	Gentianaceae
Sabatia grandiflora	Largeflower Rosegentian	Native	Gentianaceae
Sabatia stellaris	Rose-of-Plymouth; Marsh Pink	Native	Gentianaceae
Saccharum giganteum	Sugarcane Plumegrass	Native	Poaceae
Sacciolepis indica	Indian Cupscale	Not Native	Poaceae
Sacciolepis striata	American Cupscale	Native	Poaceae
Sacoila lanceolata var. lanceolata	Leafless Beaked Ladies Tresses; Leafless Beaked Orchid	Native, ST	Orchidaceae
Sacoila lanceolata var. paludicola	Leafy Beaked Ladies Tresses	Native, ST	Orchidaceae
Sagittaria filiformis	Threadleaf Arrowhead	Native	Alismataceae
Sagittaria graminea var. graminea	Grassy Arrowhead	Native	Alismataceae
Sagittaria graminea var.chapmanii	Chapman's Arrowhead	Native	Alismataceae
Sagittaria lancifolia	Bulltongue Arrowhead	Native	Alismataceae
Sagittaria latifolia	Duck Potato; Broadleaf Arrowhead; Common Arrowhead	Native	Alismataceae
Salix caroliniana	Coastal Plain Willow; Carolina Willow	Native	Salicaceae
Salvia lyrata	Lyreleaf Sage	Native	Lamiaceae
Salvia serotina	Littlewoman	Native	Lamiaceae
Salvinia minima	Water Spangles	Not Native[1]	Salviniaceae
Sambucus nigra subsp. canadensis	Elderberry; American Elder	Native	Adoxaceae
Samolus ebracteatus	Water Pimpernel	Native	Samolaceae
Samolus valerandi subsp. parviflorus	Pineland Pimpernel; Seaside Brookweed	Native	Samolaceae
Saururus cernuus	Lizard's Tail	Native	Saururaceae
Schinus terebinthifolia	Brazilian Pepper	Not Native[1]	Anacardiaceae
Schizachyrium sanguineum	Crimson Bluestem	Native	Poaceae
Schizachyrium stoloniferum	Creeping Little Bluestem	Native	Poaceae
Schoenolirion albiflorum	White Sunnybell	Native	Hyacinthaceae
Schoenoplectus californicus	California Bulrush; Giant Bulrush	Native	Cyperaceae
Schoenus nigricans	Black Bogrush	Native	Cyperaceae
Scirpus californicus/Schoenoplectus californicus	Giant Bulrush	Native	Cyperaceae
Scleria baldwinii	Baldwin's Nutrush	Native	Cyperaceae
Scleria triglomerata	Whip Nutrush; Tall Nutgrass	Native	Cyperaceae
Scleria verticillata	Low Nutrush	Native	Cyperaceae
Scoparia dulcis	Sweetbroom; Licoriceweed	Native	Plantaginaceae
Senna obtusifolia	Sicklepod; Coffeeweed	Native	Fabaceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Serenoa repens	Saw Palmetto	Native	Arecaceae
Sericocarpus tortifolius	Dixie Aster; Whitetop Aster	Native	Asteraceae
Sesbania herbacea	Danglepod	Native	Fabaceae
Setaria magna	Giant Bristlegrass	Native	Poaceae
Setaria parviflora	Knotroot Foxtail; Yellow Bristlegrass	Native	Poaceae
Sida rhombifolia	Indian Hemp; Cuban Jute	Native	Malvaceae
Sida ulmifolia	Common Wireweed	Native	Malvaceae
Sideroxylon foetidissimum	False Mastic	Native	Sapotaceae
Sideroxylon reclinatum subsp. reclinatum	Florida Bully	Native	Sapotaceae
Sisyrinchium angustifolium	Narrowleaf Blue-Eyed Grass	Native	Iridaceae
Smilax auriculata	Earleaf Greenbrier	Native	Smilacaceae
Smilax bona-nox	Saw Greenbrier	Native	Smilacaceae
Smilax havanensis	Everglades Greenbrier	Native, ST	Smilacaceae
Smilax laurifolia	Bamboo Vine	Native	Smilacaceae
Smilax tamnoides	Bristly Greenbrier; Hogbrier	Native	Smilacaceae
Solanum americanum	American Black Nightshade	Native	Solanaceae
Solanum capsicoides	Cockroach Berry; Soda Apple	Not Native	Solanaceae
Solanum viarum	Tropical Soda Apple	Not Native[1]	Solanaceae
Solidago fistulosa	Pinebarren Goldenrod	Native	Asteraceae
Solidago odora var. chapmanii	Chapman's Goldenrod	Native	Asteraceae
Solidago sempervirens	Seaside Goldenrod	Native	Asteraceae
Solidago stricta	Wand Goldenrod	Native	Asteraceae
Sonchus asper	Spiny Sowthistle	Not Native	Asteraceae
Sonchus oleraceus	Common Sowthistle	Not Native	Asteraceae
Sophronanthe hispida	Rough Hedgehyssop	Native	Plantaginaceae
Sorghastrum secundum	Lopsided Indiangrass	Native	Poaceae
Spartina bakeri	Sand Cordgrass	Native	Poaceae
Spermacoce prostrata	Prostrate False Buttonweed	Native	Rubiaceae
Spermacoce remota	Woodland False Buttonweed	Native	Rubiaceae
Spermacoce verticillata	Shruby False Buttonweed	Not Native[2]	Rubiaceae
Spermolepis divaricata	Roughfruit Scaleseed	Native	Apiaceae
Spiranthes laciniata	Lacelip Ladies Tresses	Native, ST	Orchidaceae
Spiranthes odorata	Fragrant Ladies Tresses	Native	Orchidaceae
Spiranthes praecox	Greenvein Ladies Tresses	Native	Orchidaceae
Spiranthes triloba	Three-lobed Ladies Tresses; Panther Ladies Tresses	Native, Endemic	Orchidaceae
Spiranthes vernalis	Spring Ladies Tresses	Native	Orchidaceae
Sporobolus domingensis	Coral Dropseed	Native	Poaceae
Sporobolus indicus	Smutgrass	Not Native	Poaceae
Sporobolus junceus	Pineywoods Dropseed	Native	Poaceae
Stenandrium dulce	Sweet Shaggytuft	Native	Acanthaceae
Stillingia aquatica	Water Toothleaf; Corkwood	Native	Euphorbiaceae
Stillingia sylvatica	Queen's Delight	Native	Euphorbiaceae
Symphyotrichum adnatum	Scaleleaf Aster	Native	Asteraceae
Symphyotrichum carolinianum	Climbing Aster	Native	Asteraceae
Symphyotrichum concolor	Eastern Silver Aster	Native	Asteraceae
Symphyotrichum dumosum	Rice Button Aster	Native	Asteraceae
Symphyotrichum elliottii	Elliott's Aster	Native	Asteraceae
Symphyotrichum expansum	Southwestern Annual Saltmarsh Aster	Native	Asteraceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Syngonanthus flavidulus	Yellow Hatpins	Native	Eriocaulaceae
Syngonium podophyllum	American Evergreen	Not Native[1]	Araceae
Syzygium jambos	Rose Apple; Malabar Plum	Not Native[2]	Myrtaceae
Taxodium distichum	Bald-Cypress	Native	Cupressaceae
Tephrosia chrysophylla	Scurf Hoarypea	Native	Fabaceae
Tephrosia florida	Florida Hoarypea	Native	Fabaceae
Tephrosia hispidula	Sprawling Hoarypea	Native	Fabaceae
Teucrium canadense	Wood Sage	Native	Lamiaceae
Thalia geniculata	Alligator Flag; Fire Flag	Native	Marantaceae
Thelypteris augescens	Abrupt-Tip Maiden Fern	Native, ST	Thelypteridaceae
Thelypteris dentata	Downy Maiden Fern	Not Native	Thelypteridaceae
Thelypteris interrupta	Hottentot Fern	Native	Thelypteridaceae
Thelypteris kunthii	Southern Shield Fern; Widespread Maiden Fern	Native	Thelypteridaceae
Thelypteris ovata	Ovate Marsh Fern	Native	Thelypteridaceae
Thelypteris palustris var. pubescens	Marsh Fern	Native	Thelypteridaceae
Tiedemannia filiformis subsp. filiformis	Water Cowbane	Native	Apiaceae
Tillandsia balbisiana	Northern Needleleaf	Native, ST	Bromeliaceae
Tillandsia fasciculata	Cardinal Airplant; Common Wild Pine; Stiff-Leaved Wild Pine	Native, SE	Bromeliaceae
Tillandsia flexuosa	Twisted Airplant	Native, ST	Bromeliaceae
Tillandsia paucifolia	Potbelly Airplant	Native	Bromeliaceae
Tillandsia recurvata	Ball Moss	Native	Bromeliaceae
Tillandsia setacea	Southern Needleleaf	Native	Bromeliaceae
Tillandsia usneoides	Spanish Moss	Native	Bromeliaceae
Tillandsia utriculata	Giant Airplant	Native, SE	Bromeliaceae
Tillandsia variabilis	Leatherleaf Airplant	Native, ST	Bromeliaceae
Torenia crustacea	Malaysian False Pimpernel	Not Native	Linderniaceae
Toxicodendron radicans	Eastern Poison Ivy	Native	Anacardiaceae
Trema micranthum	Nettletree	Native	Cannabaceae
Tripsacum dactyloides	Eastern Gamagrass; Fakahatcheegrass	Native	Poaceae
Typha domingensis	Southern Cattail	Native	Typhaceae
Typha latifolia	Broadleaf Cattail	Native	Typhaceae
Ulmus americana	American Elm	Native	Ulmaceae
Urena lobata[1]	Caesar Weed	Not Native	Malvaceae
Urochloa plantaginea	Creeping Signalgrass; Plantain Signalgrass	Not Native	Poaceae
Utricularia cornuta	Horned Bladderwort	Native	Lentibulariaceae
Utricularia foliosa	Leafy Bladderwort	Native	Lentibulariaceae
Utricularia gibba	Humped Bladderwort	Native	Lentibulariaceae
Utricularia inflata	Floating Bladderwort	Native	Lentibulariaceae
Utricularia purpurea	Eastern Purple Bladderwort	Native	Lentibulariaceae
Utricularia radiata	Little Floating Bladderwort	Native	Lentibulariaceae
Utricularia resupinata	Lavender Bladderwort	Native	Lentibulariaceae
Utricularia simulans	Fringed Bladderwort	Native	Lentibulariaceae
Utricularia subulata	Zigzag Bladderwort	Native	Lentibulariaceae
Vaccinium darrowii	Darrow's Blueberry	Native	Ericaceae
Vaccinium myrsinites	Shiny Blueberry	Native	Ericaceae

Table 1 (continued). List of plant species documented on the CREW Management Area[a,1,2]

Scientific Name	Common Name	Status	Family
Verbesina virginica	White Crownbeard; Frostweed	Native	Asteraceae
Vernonia blodgettii	Florida Ironweed	Native	Asteraceae
Vicia acutifolia	Fourleaf Vetch	Native	Fabaceae
Vigna luteola	Hairypod Cowpea	Native	Fabaceae
Viola lanceolata	Bog White Violet	Native	Violaceae
Viola palmata	Early Blue Violet	Native	Violaceae
Viola primulifolia	Primroseleaf Violet	Native	Violaceae
Viola sororia	Common Blue Violet	Native	Violaceae
Vitis rotundifolia	Muscadine	Native	Vitaceae
Vitis shuttleworthii	Calloose Grape	Native, Endemic	Vitaceae
Vittaria lineata	Shoestring Fern	Native	Pteridaceae
Waltheria indica	Sleepy Morning	Native	Malvaceae
Woodwardia virginica	Virginia chain fern	Native	Blechnaceae
Ximenia americana	Tallow Wood; Hog Plum	Native	Ximeniaceae
Vicia acutifolia	Fourleaf Vetch	Native	Fabaceae
Vigna luteola	Hairypod Cowpea	Native	Fabaceae
Viola lanceolata	Bog White Violet	Native	Violaceae
Xyris brevifolia	Shortleaf Yelloweyed Grass	Native	Xyridaceae
Xyris elliottii	Elliott's Yelloweyed Grass	Native	Xyridaceae
Xyris floridana	Florida Yelloweyed Grass	Native	Xyridaceae
Xyris jupicai	Richard's Yelloweyed Grass	Native	Xyridaceae
Xyris smalliana	Small's Yelloweyed Grass	Native	Xyridaceae
Zanthoxylum fagara	Wild Lime	Native	Rutaceae
Zephyranthes simpsonii	Simpson's Zephyrlily	Native, ST	Amaryllidaceae
Zeuxine strateumatica	Soldier Orchid; Lawn Orchid	Not Native	Orchidaceae
Zizaniopsis miliacea	Southern Wild Rice; Giant Cutgrass	Native	Poaceae

a. Key to abbreviations: Species listed by the State of Florida as Federally-designated Endangered (FE), Federally-designated Threatened (FT), State-designated Threatened (ST), State-designated Endangered (SE).
1. Florida Exotic Pest Plant Council (FLEPPC) Category I listed Species - Species that are invading and disrupting native plant communities.
2. FLEPPC Category II listed species - Species that have shown a potential to disrupt native plant communities.

Table 2. List of bird species documented on the CREW Management Area*

Common Name	Scientific Name	Status
ACCIPITRIDAE- Hawks, Eagles, Kites		
Bald Eagle	*Haliaeetus leucocephalus*	
Broad-Winged Hawk	*Buteo platypterus*	
Cooper's Hawk	*Accipiter cooperii*	
Everglade Snail Kite	*Rostrhamus sociabilis plumbeus*	FE
Mississippi Kite	*Ictinia mississippiensis*	
Northern Harrier	*Circus cyaneus*	
Red-Shouldered Hawk	*Buteo lineatus*	
Red-Tailed Hawk	*Buteo jamaicensis*	
Sharp-Shinned Hawk	*Accipiter striatus*	
Short-Tailed Hawk	*Buteo brachyurus*	
Swallow-Tailed Kite	*Elanoides forficatus*	
ALCEDINIDAE - Kingfishers		
Belted Kingfisher	*Megaceryle alcyon*	
ANATIDAE – Ducks, Geese		
Black-Bellied Whistling Duck	*Dendrocygna autumnalis*	
Blue-Winged Teal	*Anas discors*	
Green-Winged Teal	*Anas crecca*	
Hooded Merganser	*Lophodytes cucullatus*	
Mallard Duck	*Anas platyrhynchos*	
Mottled Duck	*Anas fulvigula*	
Muscovy Duck*	*Cairina moschata*	Non-native
Northern Shoveler	*Spatula clypeata*	
Ring-necked Duck	*Aythya collaris*	
Wood Duck	*Aix sponsa*	
ANHINGIDAE – Anhingas		
Anhinga	*Anhinga anhinga*	
ARDEIDAE - Herons, Egrets, Bitterns		
American Bittern	*Botaurus lentiginosus*	
Black-crowned Night Heron	*Nycticorax nycticorax*	
Cattle Egret	*Bubulcus ibis*	
Great Blue Heron	*Ardea herodias*	
Great White Heron	*Ardea herodias occidentalis*	
Great Egret	*Ardea alba*	
Green Heron	*Butorides virescens*	
Least Bittern	*Ixobrychus exilis*	
Little Blue Heron	*Egretta caerulea*	ST
Snowy Egret	*Egretta thula*	
Tricolored Heron	*Egretta tricolor*	ST
Yellow-crowned Night Heron	*Nyctanassa violacea*	
APODIDAE – Swifts		
Chimney Swift	*Chaetura pelagica*	
ARAMIDAE – Limpkins		
Limpkin	*Aramus guarauna*	

Table 2 (continued). List of bird species documented on the CREW Management Area*

Common Name	Scientific Name	Status
BOMBYCILLIDAE - Waxwings		
Cedar Waxwing	*Bombycilla cedrorum*	
CATHARTIDAE - New World Vultures		
Black Vulture	*Coragyps atratus*	
Turkey Vulture	*Cathartes aura*	
CAPRIMULGIDAE – Nightjars, Allies		
Chuck-Will's-Widow	*Antrostomus carolinensis*	
Common Nighthawk	*Chordeiles minor*	
Eastern Whip-poor-will	*Antrostomus vociferus*	
CARDINALIDAE - Cardinals		
Blue Grosbeak	*Passerina caerulea*	
Indigo Bunting	*Passerina cyanea*	
Northern Cardinal	*Cardinalis cardinalis*	
Painted Bunting	*Passerina ciris*	
Rose-Breasted Grosbeak	*Pheucticus ludovicianus*	
Scarlet Tanager*	*Piranga olivacea*	
Summer Tanager	*Piranga rubra*	
CHARADRIIDAE - Plovers, Lapwings		
Black-Bellied Plover	*Pluvialis squatarola*	
Killdeer	*Charadrius vociferus*	
CICONIIDAE – Storks		
Wood Stork	*Mycteria americana*	FT
COLUMBIDAE – Pigeons, Doves		
Common Ground-Dove	*Columbina passerina*	
Eurasian Collared Dove	*Streptopelia decaocto*	Non-native
Mourning Dove	*Zenaida macroura*	
White-Winged Dove	*Zenaida asiatica*	Non-native
CORVIDAE - Crows, Magpies, Jays		
American Crow	*Corvus brachyrhynchos*	
Blue Jay	*Cyanocitta cristata*	
Fish Crow	*Corvus ossifragus*	
CUCULIDAE - Cuckoos, Roadrunners, Anis		
Yellow-Billed Cuckoo	*Coccyzus americanus*	
FALCONIDAE – Falcons, Caracaras		
Crested Caracara	*Caracara cheriway*	FT
Merlin	*Falco columbarius*	
Peregrine Falcon	*Falco peregrinus*	
Southeastern American Kestrel	*Falco sparverius paulus*	ST
FRINGILLIDAE – Finches		
American Goldfinch	*Spinus tristis*	
GRUIDAE – Cranes		
Florida Sandhill Crane	*Grus canadensis pratensis*	ST
HIRUNDINIDAE - Swallows		
Bank Swallow	*Riparia riparia*	
Barn Swallow	*Hirundo rustica*	
Cave Swallow	*Petrochelidon fulva*	

Table 2 (continued). List of bird species documented on the CREW Management Area*

Common Name	Scientific Name	Status
Cliff Swallow	*Petrochelidon pyrrhonota*	
Northern Rough-Winged Swallow	*Stelgidopteryx serripennis*	
Purple Martin	*Progne subis*	
Tree Swallow	*Tachycineta bicolor*	
ICTERIIDAE – Blackbirds, Orioles		
Baltimore Oriole	*Icterus galbula*	
Boat-Tailed Grackle	*Quiscalus major*	
Bobolink	*Dolichonyx oryzivorus*	
Brown-Headed Cowbird*	*Molothrus ater*	
Common Grackle	*Quiscalus quiscula*	
Eastern Meadowlark	*Sturnella magna*	
Red-Winged Blackbird	*Agelaius phoeniceus*	
Shiny Cowbird*	*Molothrus bonariensis*	
Yellow-Breasted Chat	*Icteria virens*	
LANIIDAE – Shrikes		
Loggerhead Shrike	*Lanius ludovicianus*	
LARIDAE - Gulls, Terns		
Black Skimmer	*Rynchops niger*	ST
Forster's Tern	*Sterna forsteri*	
Royal Tern	*Thalasseus maximus*	
MIMIDAE – Mockingbirds, Thrashers		
Brown Thrasher	*Toxostoma rufum*	
Gray Catbird	*Dumetella carolinensis*	
Northern Mockingbird	*Mimus polyglottos*	
PANDIONIDAE – Ospreys		
Osprey	*Pandion haliaetus*	
PELECANIDAE – Pelicans		
American White Pelican	*Pelecanus erythrorhynchos*	
PARIDAE – Chickadees, Titmice		
Tufted Titmouse	*Baeolophus bicolor*	
PARULIDAE – New World Warblers		
American Redstart	*Setophaga ruticilla*	
American Yellow Warbler	*Setophaga petechia*	
Bay-Breasted Warbler	*Setophaga castanea*	
Black-and-White Warbler	*Mniotilta varia*	
Blackburnian Warbler	*Setophaga fusca*	
Blackpoll Warbler	*Setophaga striata*	
Black-Throated Blue Warbler	*Setophaga caerulescens*	
Black-Throated Green Warbler	*Setophaga virens*	
Blue-Winged Warbler*	*Vermivora cyanoptera*	
Chestnut-Sided Warbler	*Setophaga pensylvanica*	
Common Yellowthroat	*Geothlypis trichas*	
Hooded Warbler	*Setophaga citrina*	
Louisiana Waterthrush	*Parkesia motacilla*	
Magnolia Warbler	*Setophaga magnolia*	
Northern Parula	*Setophaga americana*	

Table 2 (continued). List of bird species documented on the CREW Management Area*

Common Name	Scientific Name	Status
Northern Waterthrush	*Parkesia noveboracensis*	
Orange-Crowned Warbler	*Vermivora celata*	
Ovenbird	*Seiurus aurocapilla*	
Palm Warbler	*Setophaga palmarum*	
Pine Warbler	*Setophaga pinus*	
Prairie Warbler	Setophaga discolor	
Prothonotary Warbler	*Protonotaria citrea*	
Tennessee Warbler	*Leiothlypis peregrina*	
Worm-Eating Warbler	*Helmitheros vermivorum*	
Yellow-Rumped Warbler	*Setophaga coronata*	
Yellow-Throated Warbler	*Setophaga dominica*	
PASSERELLIDAE – New World Sparrows		
Chipping Sparrow	*Spizella passerina*	
Eastern Towhee	*Pipilo erythrophthalmus*	
Grasshopper Sparrow	*Ammodramus savannarum pratensis*	
LeConte's Sparrow	*Ammodramus leconteii*	
Savannah Sparrow	*Passerculus sandwichensis*	
Swamp Sparrow	*Melospiza georgiana*	
White-Throated Sparrow*	*Zonotrichia albicollis*	
PHALACROCORACIDAE - Cormorants		
Double-Crested Cormorant	*Phalacrocorax auritus*	
PHASIANIDAE – Pheasants, Grouse		
Wild Turkey (Florida Wild Turkey)	*Meleagris gallopavo osceola*	
PHOENICOPTERIDAE - Flamingos		
American Flamingo	*Phoenicopterus ruber*	
PICIDAE – Woodpeckers		
Downy Woodpecker	*Picoides pubescens*	
Hairy Woodpecker	*Leuconotopicus villosus*	
Northern Flicker	*Colaptes auratus*	
Pileated Woodpecker	*Dryocopus pileatus*	
Red-bellied Woodpecker	*Melanerpes carolinus*	
Red-headed Woodpecker	*Melanerpes erythrocephalus*	
Yellow-Bellied Sapsucker	*Sphyrapicus varius*	
PODICIPEDIDAE - Grebes		
Pied-Billed Grebe	*Podilymbus podiceps*	
POLIOPTILIDAE - Gnatcatchers		
Blue-Gray Gnatcatcher	*Polioptila caerulea*	
ODONTOPHORIDAE - New World Quail		
Northern Bobwhite	*Colinus virginianus*	
RALLIDAE - Rails, Gallinules, Coots		
American Coot	*Fulica americana*	
Clapper Rail	*Rallus crepitans*	
Common Gallinule	*Gallinula galeata*	
King Rail	*Rallus elegans*	
Purple Gallinule	*Porphyrio martinicus*	
Sora	*Porzana carolina*	

Table 2 (continued). List of bird species documented on the CREW Management Area*

Common Name	Scientific Name	Status
RECURVIROSTRIDAE - Stilts, Avocets		
American Avocet	*Recurvirostra americana*	
Black-Necked Stilt	*Himantopus mexicanus*	
SCOLOPACIDAE - Sandpipers, Allies		
American Woodcock	*Scolopax minor*	
Dunlin	*Calidris alpina*	
Greater Yellowlegs	*Tringa melanoleuca*	
Least Sandpiper	*Calidris minutilla*	
Lesser Yellowlegs	*Tringa flavipes*	
Short-Billed Dowitcher	*Limnodromus griseus*	
Solitary Sandpiper	*Tringa solitaria*	
Spotted Sandpiper	*Actitis macularia*	
Wilson's Snipe	*Gallinago delicata*	
SITTIDAE – Nuthatches		
Brown-Headed Nuthatch	*Sitta pusilla*	
STRIGIDAE – Owls		
Barred Owl	*Strix varia*	
Eastern Screech Owl	*Megascops asio*	
Great Horned Owl	*Bubo virginianus*	
STURNIDAE – Starlings, Mynas		
European Starling	*Sturnus vulgaris*	Non-native
THRESKIORNITHIDAE – Ibises, Spoonbills		
Glossy Ibis	*Plegadis falcinellus*	
Roseate Spoonbill	*Platalea ajaja*	ST
White Ibis	*Eudocimus albus*	
TROCHILIDAE - Hummingbirds		
Ruby-Throated Hummingbird	*Archilochus colubris*	
TROGLODYTIDAE - Wrens		
Carolina Wren	*Thryothorus ludovicianus*	
House Wren	*Troglodytes aedon*	
Marsh Wren	*Cistothorus palustris*	
Sedge Wren	*Cistothorus stellaris*	
TURDIDAE – Thrushes		
American Robin	*Turdus migratorius*	
Eastern Bluebird	*Sialia sialis*	
Hermit Thrush	*Catharus guttatus*	
Swainson's Thrush*	*Catharus ustulatus*	
Veery	*Catharus fuscescens*	
TYRANNIDAE - Tyrant Flycatchers		
Acadian Flycatcher*	*Empidonax virescens*	
Eastern Kingbird	*Tyrannus tyrannus*	
Eastern Phoebe	*Sayornis phoebe*	
Eastern Wood Pewee	*Contopus virens*	
Great Crested Flycatcher	*Myiarchus crinitus*	
Hammond's Flycatcher*	*Empidonax hammondii*	
Western Kingbird	*Tyrannus verticalis*	

Table 2 (continued). List of bird species documented on the CREW Management Area*

Common Name	Scientific Name	Status
TYTONIDAE - Barn Owls		
Barn Owl	*Tyto alba*	
VIREONIDAE – Vireos		
Black-Whiskered Vireo	*Vireo altiloquus*	
Blue-Headed Vireo	*Vireo solitarius*	
Red-Eyed Vireo	*Vireo olivaceus*	
White-Eyed Vireo	*Vireo griseus*	
Yellow-Throated Vireo	*Vireo flavifrons*	
MISCELLANEOUS		
Peacock	*Pavo cristatus*	Non-native
Pekin Duck	*Anas platyrhynchos domesticus*	Non-native

*Species was not documented on the CREW Management Area, but it was documented within in the greater CREW area

Table 3. List of mammals documented on the CREW Management Area [a]

Common Name	Scientific Name	Family	Status
ARTIODACTYLA - Even-Toed Ungulates			
Feral Hog	*Sus scrofa*	*Suidae*	
White-Tailed Deer	*Odocoileus virginianus*	*Cervidae*	
CARNIVORA - Carnivores			
Coyote	Canis latrans	Canidae	
Gray Fox	Urocyon cinereoargenteus	Canidae	
Bobcat	Felis rufus	Felidae	
Florida Panther	Puma conolor coryi	Felidae	FE
Eastern Spotted Skunk	Spilogale putorius	Mephitidae	
North American River Otter	Lontra canadensis	Mustelidae	
Raccoon	Procyon lotor	Procyonidae	
Florida Black Bear	Ursus americanus	Ursidae	
CHIROPTERA - Bats			
Florida Bonneted Bat	*Eumops floridanus*	*Molossidae*	FE
Brazilian Free-Tailed Bat	*Tadarida brasiliensis*	*Molossidae*	
Rafinesque's Big-Eared Bat	*Corynorhinus rafinesquii*	*Vespertillonidae*	
Big Brown Bat	*Eptesicus fuscus*	*Vespertillonidae*	
Northern Yellow Bat	*Lasiurus intermedius floridanus*	*Vespertillonidae*	
Seminole Bat	*Lasiurus seminolus*	*Vespertillonidae*	
Evening Bat	*Nycticeius humeralis*	*Vespertillonidae*	
Tricolored Bat	*Perimyotis subflavus*	*Vespertillonidae*	

Table 3 (continue). List of mammals documented on the CREW Management Area [a]

Common Name	Scientific Name	Family	Status
CINGULATA - New World Placental Mammals			
Nine-Banded Armadillo	*Dasypus novemcinctus*	*Dasypodidae*	
DIDELPHIMORPHIA - American Marsupials			
Virginia Opossum	*Didelphis virginiana*	*Didelphidae*	
EULIPOTYPHLA - Shrews, Moles, Hedgehogs			
Least Shrew	*Cryptotis parva*	*Soricidae*	
Southern Short-Tailed Shrew^	*Blarina carolinensis*	*Soricidae*	
LAGOMORPHA - Rabbits, Hares			
Eastern Cottontail Rabbit	*Sylvilagus floridanus*	*Leporidae*	
Marsh Rabbit	*Sylvilagus palustris*	*Leporidae*	
RODENTIA - Rodents			
Round-Tailed Muskrat	*Neofiber alleni*	*Cricetidae*	
Cotton Mouse	*Peromyscus gossypinus*	*Cricetidae*	
Hispid Cotton Rat	*Sigmodon hispidus*	*Cricetidae*	
House Mouse	*Mus musculus*	*Muridae*	
Norway Rat	*Rattus norvegicus*	*Muridae*	
Black Rat	*Rattus rattus*	*Muridae*	
Big Cypress Fox Squirrel	*Sciurus niger avicennia*	*Sciuridae*	ST
Eastern Gray Squirrel	*Sciurus carolinensis*	*Sciuridae*	

a. Key to abbreviations: ^ unable to determine subspecies.

Table 4. List of herptofauna documented on the CREW Management Area. [a]

Common Name	Scientific Name	Family	Status
ANURA - Frogs, Toads			
Southern Toad	*Anaxyrus terrestris*	Bufonidae	
Oak Toad	*Bufo quercicus*	Bufonidae	
Greenhouse Frog	*Eleutherodactylus planirostris*	Eleutherodactylidae	Non-Native
Florida Cricket Frog	*Acris gryllus dorsalis*	Hylidae	
Green Treefrog	*Hyla cinerea*	Hylidae	
Pinewoods Treefrog	*Hyla femoralis*	Hylidae	
Barking Treefrog	*Hyla gratiosa*	Hylidae	
Squirrel Treefrog	*Hyla squirella*	Hylidae	
Cuban Treefrog	*Osteopilus septentrionalis*	Hylidae	Non-Native
Southern Chorus Frog	*Pseudacris nigrita*	Hylidae	
Little Grass Frog	*Pseudacris ocularis*	Hylidae	
Eastern Narrowmouth Toad	*Gastrophryne carolinensis*	Microhylidae	
Southern Leopard Frog	*Lithobates sphenocephalus*	Ranidae	
Pig Frog	*Rana grylio*	Ranidae	
Eastern Spadefoot Toad	*Scaphiopus holbrookii*	Scaphiopodidae	
CROCODILIA - Crocodilians			
American Alligator	*Alligator mississippiensis*	Alligatoridae	FT/(S/A)
SQUAMATA - Lizards			
Eastern Glass Lizard	*Ophisaurus ventralis*	Anguidae	
Green Anole	*Anolis carolinensis*	Dactyloidae	
Cuban Brown Anole	*Anolis sagrei*	Dactyloidae	Non-Native
Mediterranean Gecko	*Hemidactylus turcicus*	Gekkonidae	Non-Native
Southeastern Five-Lined Skink	*Plestiodon inexpectatus*	Scincidae	
Broad-Headed Skink	*Plestiodon laticeps*	Scincidae	
Ground Skink	*Scincella lateralis*	Scincidae	
Six-Lined Racerunner	*Aspidoscelis sexlineata*	Tilidae	
Argentine Black and White Tegu	*Salvator merianae*	Tilidae	Non-Native
SQUAMATA - Snakes			
Boa Constrictor	*Boa constrictor*	Boidae	Non-Native
Florida Scarlet Snake	*Cemophora coccinea coccinea*	Colubridae	
Southern Black Racer	*Coluber constrictor priapus*	Colubridae	
Southern Ringneck Snake	*Diadophis punctatus punctatus*	Colubridae	
Yellow Rat Snake	*Elaphe obsoleta quadrivittata*	Colubridae	
Eastern Mud Snake	*Farancia abacura*	Colubridae	
Scarlet Kingsnake	*Lampropeltis elapsoides*	Colubridae	
Eastern Coachwhip	*Masticophis flagellum flagellum*	Colubridae	
Florida Banded Water Snake	*Nerodia fasciata pictiventris*	Colubridae	
Florida Green Water Snake	*Nerodia floridana*	Colubridae	
Florida Rough Greensnake	*Opheodrys aestivus carinatus*	Colubridae	
Red Rat Snake (Corn Snake)	*Elaphe guttata guttata*	Colubridae	
Striped Crayfish Snake	*Regina alleni*	Colubridae	

Table 4 (continued). List of herptofauna documented on the CREW Management Area [a]

Common Name	Scientific Name	Family	Status
Southern Florida Swamp Snake	*Seminatrix pygaea cyclas*	Colubridae	
Florida Brown Snake	*Storeria dekayi victa*	Colubridae	
Florida Crowned Snake	*Tantilla relicta*	Colubridae	
Peninsula Ribbon Snake	*Thamnophis sauritus sackenii*	Colubridae	
Eastern Garter Snake	*Thamnophis sirtalis sirtalis*	Colubridae	
Eastern Coral Snake	*Micrurus fulvius*	Elapidae	
Brahiny Blindsnake	*Indotyphlops braminus*	Typhlopidae	Non-Native
Eastern Diamondback Rattlesnake	*Crotalus adamanteus*	Viperidae	
Dusky Pygmy Rattlesnake	*Sistrurus miliarius*	Viperidae	
TESTINUDES - Turtles, Tortoises			
Florida Snapping Turtle	*Chelydra serpentina*	Chelydridae	
Chicken Turtle	*Deirochelys reticularia*	Emydidae	
Peninsula Cooter	*Pseudemys floridana peninsularis*	Emydidae	
Florida Red-Bellied Turtle	*Pseudemys nelsoni*	Emydidae	
Florida Box Turtle	*Terrapene carolina bauri*	Emydidae	
Striped Mud Turtle	*Kinosternon baurii*	Kinosternidae	
Florida Mud Turtle	*Kinosternon subrubrum steindachneri*	Kinosternidae	
Common Musk (Stinkpot) Turtle	*Sternotherus odoratus*	Kinosternidae	
Gopher Tortoise	*Gopherus polyphemus*	Testudinidae	ST
Red-Footed Tortoise	*Chelonoidis carbonaria*	Testudinidae	Non-Native
Florida Softshell Turtle	*Apalone ferox*	Trionychidae	
URODELA - Salamanders			
Two-Toed Amphiuma	*Amphiuma means*	Amphiumidae	
Peninsular Newt	*Notophthalmus viridescens*	Salamandridae	
Eastern Lesser Siren	*Siren intermedia*	Sirenidae	
Greater Siren	*Siren lacertina*	Sirenidae	

a. Key to abbreviations: Species listed by the State of Florida as Federally-designated Threatened because of similarity of appearance [FT(S/A)]

Table 5. List of Fish documented on the CREW Management Area*

Common Name	Scientific Name	Family	Status
AMIIFORMES			
Bowfin	*Amia calva*	Amiidae	
ATHERINIFORMES - Sliversides			
Brook Silverside	*Labidesthes sicculus*	Atherinopsidae	
CYPRINODONTIFORMES			
Lake Chubsucker	*Erimyzon sucetta*	Catostormidae	
Golden Shiner	*Notemigonus crysoleucas*	Cyprinidae	
Flagfish	*Jordanella floridae*	Cyprinodontidae	
Golden Topminnow	*Fundulus chrysotus*	Funduliidae	
Marsh Killifish	*Fundulus confluentus*	Funduliidae	
Seminole Killifish	*Fundulus seminolis*	Funduliidae	
Bluefin Killfish	*Lucania goodei*	Funduliidae	
Mosquito Fish	*Gambusia affinis*	Poeciliidae	
Least Killifish	*Heterandria formosa*	Poeciliidae	
Pike Killifish	*Belonesox belizanus*	Poeciliidae	Non-native
Sailfin Molly	*Poecilia latipinna*	Poeciliidae	
Taillight Shiner	*Notropis maculatus*	Leuciscidae	
LEPISOSTEIFORMES			
Florida Gar	*Lepisosteus platyrhincus*	Lepisosteidae	
PERCIFORMES			
Everglades Pygmy Sunfish	*Elassoma evergladei*	Centrarchidae	
Warmouth	*Lepomis gulosus*	Centrarchidae	
Bluegill	*Lepomis macrochirus*	Centrarchidae	
Dollar Sunfish	*Lepomis marginatus*	Centrarchidae	
Spotted Sunfish	*Lepomis punctatus*	Centrarchidae	
Largemouth Bass	*Micropterus salmoides*	Centrarchidae	
Black Crappie	*Pomoxis nigromaculatus*	Centrarchidae	
Oscar*	*Astronotus ocellatus*	Cichlidae	Non-native
Blue Tilapia	*Oreochromis aureus*	Cichiidae	Non-native
Nile Tilapia	*Oreochromis niloticus*	Cichiidae	Non-native
Spotted Tilapia	*Pelmatolapia mariae*	Cichiidae	Non-native
Black Acara	*Cichlasoma bimaculatum*	Cichiidae	Non-native
African Jewelfish	*Hemichromis bimaculatus*	Cichiidae	Non-native
SILURIFORMES - Catfish			
Brown Hoplo	*Hoplosternum littorale*	Caliichthyidae	Non-native
Walking Catfish	*Clarias batrachus*	Clariidae	Non-native
Yellow Bullhead	*Ameiurus natalis*	Ictaluridae	
Brown Bullhead	*Ameiurus nebulosus*	Ictaluridae	
Tadpole Madtom	*Noturus gyrinus*	Ictaluridae	
Sailfin Catfish	*Pterygoplichthys multiradiatus*	Loricariidae	Non-native

*Species was not documented on the CREW Management Area, but it was documented within in the greater CREW area.

Table 6. List of insects documented on the CREW Management Area

Common Name	Scientific Name	Family	Status
ARACHNIDA - Spiders			
Black-and-Yellow Argiope (or Garden Spider)	*Argiope aurantia*	Araneidae	
Colonial Tentweb Orbweaver	*Cyrtophora citricola*	Araneidae	Non-native
Tropical Orbweaver	*Eriophora ravilla*	Araneidae	
Spiny-Backed Orbweaver	*Gasteracantha cancriformis*	Araneidae	
Basilica Orbweaver	*Mecynogea lemniscata*	Araneidae	
Golden Silk Orbweaver	*Trichonephila clavipes*	Araneidae	
Triangle Orbweaver	*Verrucosa arenata*	Araneidae	
Sheetweb Weaver	*Linyphiidae* (Family)	Linyphiidae	
Wolf Spider	*Lycosidae* (Family)	Lycosidae	
Woodland (Sylvana) Jumping Spider	*Colonus sylvanus*	Salticidae	
Green Lynx Spider	*Peucetia viridans*	Oxyopidae	
White-Banded Fishing Spider	*Dolomedes albineus*	Pisauridae	
Okeefenokee Fishing Spider	*Dolomedes okefinokensis*	Pisauridae	
Six-Spotted Fishing Spider	*Dolomedes triton*	Pisauridae	
Nursery Web Spider	*Pisaurina mira*	Pisauridae	
Magnolia Green Jumping Spider	*Lyssomanes viridis*	Salticidae	
Eastern Harvestman Spider	*Leiobunum vittatum*	Sclerosomatidae	
Huntsman Spider	*Heteropoda venatoria*	Sparassidae	
Orchard Orbweaver	*Leucauge argyrobapta*	Tetragnathidae	
Pale Long-Jawed Orbweaver	*Tetragnatha pallescens*	Tetragnathidae	
Venusta Orchard Spider	*Leucauge venusta*	Tetragnathidae	
Southern Black Widow	*Latrodectus mactans*	Theridiidae	
COLEOPTERA - Beetles			
Metallic Woodborer Beetle	Buprestidae (Family)	Buprestidae	
Ground Beetle	Carabidae (Family)	Carabidae	
Big-Headed Ground Beetle	*Scarites subterraneus*	Carabidae	
Cottonwood Leaf Beetle	*Chrysomela scripta*	Chrysomelidae	
Whirlagig Beetle	Gyrinidae (Family)	Gyrinidae	
Nine-Spotted Lady Beetle	*Coccinella novemnotata*	Coccineliidae	
Twelve-spotted Lady Beetle	*Coleomegilla maculata*	Coccineliidae	
Spotless Lady Beetle	*Cycloneda sanguinea*	Coccineliidae	
Multicolored Asian Lady Beetle	*Harmonia axyridis*	Coccineliidae	Non-native
Mexican Bromeliad Weevil	*Metamasius callizona*	Curculionidae	Non-native
Predacious Diving Beetle	*Cybister fimbriolatus*	Dytiscidae	
Eyed Click Beetle	*Alaus oculatus*	Elateridae	
Firefly	Lampryridae (Family)	Lampryridae	
Blister Beetle	*Zonitis* spp.	Meloidae	
Rainbow Scarab Beetle	*Phanaeus vindex*	Scarabaeidae	
Delta Flower Scarab Beetle	*Trigonopeltastes delta*	Scarabaeidae	
American Carrion Beetle	*Necrophila americana*	Silphidae	
DIPTERA - Flies			
Robber Fly	Asilidae (Family)	Asilidae	

Table 6 (continued). List of insects on the CREW Management Area

Common Name	Scientific Name	Family	Status
Lovebug	*Plecia nearctica*	Bibionidae	
Tiger Bee Fly	*Xenox tigrinus*	Bombyliidae	
Common Green Bottle Fly	*Lucilia sericata*	Calliphoridae	
Biting Midge (No-see-um)	*Culicoides* spp.	Ceratopogonidae	
Eye Gnat	*Liohippelates* spp.	Chloropidae	
Long-Legged Fly	Dolichopodidae(Family)	Dolichopidae	
Housefly	*Musca domestica*	Muscidae	
Mydas Fly	Mydidae (Family)	Mydidae	
Hover Fly or Common Oblique Syrphid	*Allograpta obliqua*	Syrphidae	
Green Hover Fly	*Ornidia obesa*	Syrphidae	
Deer Fly	*Chrysops* spp.	Tabanidae	
Yellow Fly	*Diachloris ferrugatus*	Tabanidae	
Black Horse Fly	*Tabanus atratus*	Tabanidae	
Crane Fly	Tipulidae (Family)	Tipulidae	
DIPTERA - Mosquitoes			
Yellow Fever Mosquito	*Aedes aegypti*	Culicidae	
Asian Tiger Mosquito	*Aedes albopictus*	Culicidae	Non-native
Marsh Mosquito	*Anopheles* spp.	Culicidae	
HEMIPTERA - True Bugs			
Aphid	Aphidoidea (Superfamily)	Aphidoidea	
Palmetto Bug (Florida Woods Cockroach)	*Eurycotis floridana*	Blattidae	
Cicada	Cicadoidea (Superfamily)	Cicadoidea	
Giant Leaf-Footed Bug	*Acanthocephala declivis*	Coreidae	
Florida Leaf-Footed Bug	*Acanthocephala femorata*	Coreidae	
Citron Bug	*Leptoglossus gonagra*	Coreidae	
Milkweed Bug	*Oncopeltus fasciatus*	Lygaeidae	
Southern Water Scorpion	*Ranatra australis*	Nepidae	
Florida Predatory Stink Bug	*Euthrhynchus floridanus*	Pentatomidae	
Rough Stink Bug	*Brochymena* spp.	Pentatomidae	
Spined Soldier Bug	*Podisus maculiventris*	Pentatomidae	
Wheel Bug	*Arilus cristatus*	Reduviidae	
Kissing Bug	*Triatoma rubida*	Reduviidae	
HOMOPTERA - Leafhoppers, Planthoppers, and Treehoppers			
Red-lined Leafhopper	*Erythroneura reflecta*	Cicadellidae	
Citrus Planthopper	*Metcalfa pruinosa*	Flatidae	
Flatid Planthopper	*Ormenaria rufifascia*	Flatidae	
HYMENOPTERA - Ants			
Florida Carpenter Ant	*Camponotus floridanus*	Formicidae	
Florida Harvester Ant	*Pogonomyrmex badius*	Formicidae	
Red Imported Fire Ant	*Solenopsis invicta*	Formicidae	
HYMENOPTERA - Bees and Wasps			
European Honey Bee	*Apis mellifera*	Apidae	
Bumble Bee	*Bombus* spp.	Apidae	
Green Orchid Bee	*Euglossa dilemma*	Apidae	Non-native
Mason Wasp	*Pseudodynerus quadrisectus*	Eumeninae	
Pimpla marginella (No Common Name)	*Pimpla marginella*	Ichneumonidae	
Leafcutting Bee	*Megachile* spp.	Megachiliidae	

Table 6 (continued). List of insects on the CREW Management Area

Common Name	Scientific Name	Family	Status
Red Velvet Ant	*Dasymutilla occidentalis occidentalis*	Mutillidae	Red Velvet Ant
Blue Metallic Mud Dauber	*Chalybion californium*	Sphecidae	
Black and Yellow Mud Dauber	*Sceliphron caementarium*	Sphecidae	
HYMENOPTERA - Bees and Wasps			
Great Golden Digger Wasp	*Sphex ichneumoneus*	Sphecidae	
Black-and-White Wasp	*Euodynerus megaera*	Vespidae	
Paper Wasp	*Polistes carolina*	Vespidae	
Florida Yellowjacket	*Vespula squamosa*	Vespidae	
LEPIDOPTERA - Butterflies			
Red-banded Hairstreak	*Calycopis cecrops*	Lycaenidae	
Fulvous Hairstreak	*Electrostrymon angelia*	Lycaenidae	
Ceraunus Blue	*Hemiargus ceraunus*	Lycaenidae	FT (S/A)
Cassius Blue	*Leptotes cassius*	Lycaenidae	
White Hairstreak	*Parrhasius m-album*	Lycaenidae	
Mallow Scrub Hairstreak	*Strymon istapa*	Lycaenidae	
Gray Hairstreak	*Strymon melinus*	Lycaenidae	
Gulf Fritillary	*Agraulis vanillae*	Nymphalidae	
White Peacock	*Anartia jatrophae*	Nymphalidae	
Soldier	*Danaus eresimus*	Nymphalidae	
Queen	*Danaus gilippus*	Nymphalidae	
Monarch	*Danaus plexippus*	Nymphalidae	
Julia	*Dryas iulia*	Nymphalidae	
Variegated Fritillary	*Euptoieta claudia*	Nymphalidae	
Zebra Longwing	*Heliconius charithonia*	Nymphalidae	
Common Buckeye	*Junonia coenia*	Nymphalidae	
Viceroy	*Limenitis archippus*	Nymphalidae	
Ruddy Daggerwing	*Marpesia petreus*	Nymphalidae	
Mourning Cloak	*Nymphalis antiopa*	Nymphalidae	
Phaon Crescent	*Phyciodes phaon*	Nymphalidae	
Pearl Crescent	*Phyciodes tharos*	Nymphalidae	
Red Admiral	*Vanessa atalanta*	Nymphalidae	
American Lady	*Vanessa virginiensis*	Nymphalidae	
Pipevine Swallowtail	*Battus philenor*	Papilionidae	
Zebra Swallowtail	*Eurytides marcellus*	Papilionidae	
Giant Swallowtail	*Papilio cresphontes*	Papilionidae	
Eastern Tiger Swallowtail	*Papilio glaucus*	Papilionidae	
Palamedes Swallowtail	*Papilio palamedes*	Papilionidae	
Black Swallowtail	*Papilio polyxenes*	Papilionidae	
Spicebush Swallowtail	*Papilio troilus*	Papilionidae	
Great Southern White	*Ascia monuste*	Pieridae	
Barred Yellow	*Eurema daira*	Pieridae	
Orange-Barred Sulphur	*Phoebis philea*	Pieridae	
Cloudless Sulphur	*Phoebis sennae*	Pieridae	
Little Metalmark	*Calephelis virginiensis*	Riodinidae	
Delaware Skipper	*Anatrytone logan*	Hesperiidae	
Least Skipper	*Ancyloxypha numitor*	Hesperiidae	
Sachem Skipper	*Atalopedes campestris*	Hesperiidae	

Table 6 (continued). List of insects on the CREW Management Area

Common Name	Scientific Name	Family	Status
Brazilian Skipper	*Calpodes ethlius*	Hesperiidae	
Southern Skipperling	*Copaeodes minima*	Hesperiidae	
Three-Spotted Skipper	*Cymaenes tripunctus*	Hesperiidae	
Silver-Spotted Skipper	*Epargyreus clarus*	Hesperiidae	
Horace's Duskywing	*Erynnis horatius*	Hesperiidae	
Palmetto Skipper	*Euphyes arpa*	Hesperiidae	
Dun Skipper	*Euphyes vestris*	Hesperiidae	
Fiery Skipper	*Hylephila phyleus*	Hesperiidae	
Clouded Skipper	*Lerema accius*	Hesperiidae	
Eufala Skipper	*Lerodea eufala*	Hesperiidae	
Twin-Spot Skipper	*Oligoria maculata*	Hesperiidae	
Ocola Skipper	*Panoquina ocola*	Hesperiidae	
Baracoa Skipper	*Polites baracoa*	Hesperiidae	
Whirlabout	*Polites vibex*	Hesperiidae	
Byssus Skipper	*Problema byssus*	Hesperiidae	
Tropical Checkered Skipper	*Pyrgus oileus*	Hesperiidae	
Dorantes Longtail	*Urbanus dorantes*	Hesperiidae	
Long-Tailed Skipper	*Urbanus proteus*	Hesperiidae	
Southern Broken-Dash	*Wallengrenia otho*	Hesperiidae	
LEPIDOPTERA - Moths			
Lantana Leaftier Moth	*Salbia haemorrhoidalis*	Crambidae	
Red-Waisted Florella Moth	*Syngamia florella*	Crambidae	
Salt Marsh Moth	*Estigmene acrea*	Erebidae	
Isabella Tiger Moth	*Pyrrharctia isabella*	Erebidae	
Polka Dot Wasp Moth	*Syntomeida epilais*	Erebidae	
Bella Moth	*Utetheisa bella*	Erebidae	
Orange Virbia Moth	*Virbia aurantica*	Erebidae	
Forest Tent Caterpillar Moth	*Malacosoma disstria*	Lasiocarmpidae	
Polyphemus Moth	*Antheraea polyphemus*	Saturniidae	
Io Moth	*Automeris io*	Saturniidae	
Imperial Moth	*Eacles imperialis*	Saturniidae	
Buck Moth	*Hemileuca maia*	Saturniidae	
Southern Pine Sphinx Moth	*Lapara coniferarum*	Sphingidae	
LEPIDOPTERA - Moth (caterpillar stage only)			
Wooly Bear (Giant Leopard Moth)	*Hypercompe scribonia*	Arctiidae	
Wooly Bear (Great Tiger Moth)	*Arctia caja*	Erebidae	
Wooly Bear (Virgin Tiger Moth)	*Grammia virgo*	Erebidae	
Fall Webworm	*Hyphantria cunea*	Erebidae	
White-Marked Tussock Moth	*Orgyia leucostigma*	Erebidae	
Yellow Bear (Virginian Tiger Moth)	*Spilosoma virginica*	Erebidae	
Cypress Looper (Cypress Emerald Moth)	*Nemoria elfa*	Geometridae	
Saddleback Caterpillar	*Acharia stimulea*	Limacodidae	
Eight-Spotted Forester	*Alypia octomaculata*	Noctuidae	
Convict Caterpillar (Spanish Moth)	*Xanthopastis regnatrix*	Noctuidae	
Major Datana	*Datana major*	Notodontidae	
Orange-Humped Mapleworm	*Symmerista leucitys*	Notodontidae	
Bagworm Caterpillar	*Thyridopteryx ephemeraeformis*	Psychidae	

Table 6 (continued). List of insects on the CREW Management Area

Common Name	Scientific Name	Family	Status
Giant Sphinx Moth	*Cocytius antaeus*	Sphingidae	
Banded Sphinx Moth	*Eumorpha fasciata*	Sphingidae	
Pine Sphinx Moth	*Lapara coniferarum*	Sphingidae	
Tobacco Hornworm (Carolina Sphinx Moth)	*Manduca sexta*	Sphingidae	
Fig Sphinx Moth	*Pachylia ficus*	Sphingidae	
Blinded Sphinx Moth	*Paonias excaecata*	Sphingidae	
MANTODES - Mantids			
Carolina Mantis	*Stagmomantis carolina*	Mantdae	
Grizzled Mantis	*Gonatista grisea*	Mantdae	
ODONATA - Dragonflies, Damselflies			
Common Green Darner	*Anax junius*	Aeshnidae	
Regal Darner	*Coryphaeschna ingens*	Aeshnidae	
Twilight Darner	*Gynacantha nervosa*	Aeshnidae	
Cyrano Darner	*Nasiaeschna pentacantha*	Aeshnidae	
Eastern Red Damsel	*Amphiagrion saucium*	Coenagrionidae	
Cherry Bluet	*Enallagma concisum*	Coenagrionidae	
Atlantic Bluet	*Enallagma doubledayi*	Coenagrionidae	
Citrine Forktail	*Ischnura hastata*	Coenagrionidae	
Fragile Forktail	*Ischnura posita*	Coenagrionidae	
Furtive Forktail	*Ischnura prognata*	Coenagrionidae	
Rambur's Forktail	*Ischnura ramburii*	Coenagrionidae	
Four-Spotted Pennant	*Brachymesia gravida*	Libelluiidae	
Calico Pennant	*Celithemis elisa*	Libelluiidae	
Halloween Pennant	*Celithemis eponina*	Libelluiidae	
Pin-Tailed Pondhawk	*Erythemis plebeja*	Libelluiidae	
Eastern Pondhawk	*Erythemis simplicicollis*	Libelluiidae	
Great Pondhawk	*Erythemis vesiculosa*	Libelluiidae	
Little Blue Dragonlet	*Erythrodiplax minuscula*	Libelluiidae	
Band-Winged Dragonlet	*Erythrodiplax umbrata*	Libelluiidae	
Golden-Winged Skimmer	*Libellula auripennis*	Libelluiidae	
Slaty Skimmer	*Libellula incesta*	Libelluiidae	
Needham's Skimmer	*Libellula needhami*	Libelluiidae	
Great Blue Skimmer	*Libellula vibrans*	Libelluiidae	
Roseate Skimmer	*Orthemis ferruginea*	Libelluiidae	
Blue Dasher	*Pachydiplax longipennis*	Libelluiidae	
Eastern Amberwing	*Perithemis tenera*	Libelluiidae	
Carolina Saddlebags	*Tramea carolina*	Libelluiidae	
Black Saddlebags	*Tramea lacerata*	Libelluiidae	
ORTHOPTERA - Crickets, Grasshoppers, and Katydids			
Short-Horned Grasshopper	Acrididae (Family)	Acrididae	
Green Slant-Faced Grasshopper	*Dichromorpha viridis*	Acrididae	
Southern Red-Legged Grasshopper	*Melanoplus propinquus*	Acrididae	
Sand Field Cricket	*Gryllus firmus*	Gryllidae	
Southeastern Field Cricket	*Gryllus rubens*	Gryllidae	
Southern Two-Striped Walkingstick	*Anisomorpha buprestoides*	Pseudophasmatidae	
Southeastern Lubber Grasshopper	*Romalea guttata*	Romaleidae	
Florida Oblong-Winged Katydid	*Amblycorypha floridana*	Tettigoniidae	

Table 6 (continued). List of insects on the CREW Management Area

Common Name	Scientific Name	Family	Status
Gladiator Katydid	*Orchelimum gladiator*	Tettigoniidae	
MISCELLANEOUS			
Mayfly	Ephemeroptera (Order)	(only identified to Order)	
Water Strider	Gerridae (Family)	Gerridae	
American Dog Tick (Wood Tick)	*Dermacentor variabilis*	Ixodidae	
Lone Star Tick	*Amblyomma americanum*	Ixodidae	
Antlion	Myrmeleontidae (Family)	Myrmeleontidae	
Green Lacewing	Chrysopidae (Family)	Chrysopidae	
Chigger (Red Bug)	Trombiculidae (Family)	Trombiculidae	
Silverfish	*Lepisma saccarina*	Lepismatidae	

Table 7. List of invertebrates and crustaceans on the CREW Management Area

Common Name	Scientific Name	Family	Status
ARCHITAENIOGLOSSA - Snails			
Florida Apple Snail	*Pomacea paludosa*	Ampullariidae	
Island Apple Snail	*Pomacea maculata*	Ampullariidae	Non-native
BASOMMATOPHORA - Snails, Slugs			
Giant Ramshorn Snail	*Marisa cornuarietis*	Planorbidae	Non-native
DECAPODA - Crustaceans			
Everglades Crayfish	*Procambarus alleni*	Cambaridae	
Slough Crayfish	*Procambarus fallax*	Cambaridae	
Eastern Grass Shrimp	*Palaemonetes paludosus*	Palaemonidae	
STYLOMMATOPHORA - Snails, Slugs			
Master Treesnail	*Drymaeus dominicus*	Bulimulidae	
Cuban Brown Snail	*Zachrysia provisoria*	Camaenidae	Non-native
Carolina Mantleslug	*Philomycus carolinians*	Philomycidae	
Florida Flatcoil Snail	*Polygyra septemvolva*	Polygyridae	
Vagrant Scrubsnail	*Praticolella griseola*	Polygyridae	
Florida Leatherleaf Slug	*Leidyula floridana*	Veronicellidae	
TRICLADIDA - Planarians			
Land Planarian (Hammerhead Worm)	*Bipalium kewense*	Geoplanidae	Non-Native

Table 8. List of fungi and lichens documented on the CREW Management Area*

Common Name	Scientific Name	Family	Status
Common Puffball	*Lycoperdon perlatum*	Agaricaceae	
Chanterelle	*Cantharellus cibarius*	Cantharellaceae	
Orange Jelly or Orange Witches' Butter ^	*Dacrymyces* spp.	Dacrymycetaceae	
Artist's Conk ^ (Bracket)	*Ganoderma applanatum*	Ganodermataceae	
Reishi Mushroom ^	*Ganoderma sessile* or *Ganoderma curtisii*	Ganodermataceae	
Summer Oyster Mushroom	*Pleurotus pulmonarius*	Pleurotaceae	
Poroid Fungi	*Microporellus* spp.	Polyporaceae	
White Maze Polypore	*Lenzites* spp.	Polyporaceae	
Gilled Mushroom ^ (Group)	*Gymnopilus* spp.	Strophariaceae	
Red Blanket Lichen	*Herpothallon (Chiodecton) rubrocinta*	Arthoniaceae	
Beard Lichen (Old Man's Beard)	*Usnea spp.*	Parmeliaceae	

a. Key to abbreviations: ^ unable to determine species or subspecies.

Appendix D
Summary of research and monitoring conducted on the CREW Management Area from 2011 to 2021

The following is a summary of the monitoring research and wildlife surveys conducted on CREW MA.

Annual Bird Surveys

Swallow-tailed Kite Nest and Roost Surveys

FWC has been conducting swallow-tailed kite nest surveys on CREW MA and monitoring swallow-tailed kite activities adjacent lands since in 2015. The ground surveys occur from February through the nesting season and document nesting density and locations, nest use between years, nest success and pre-migratory roosts. Survey efforts are primarily concentrated in the CREW Cypress Dome Trailhead area in Corkscrew Marsh and in the Flint Pen Strand. Trails in the Bird Rookery Swamp and other adjacent properties such as the Musca parcel, the northern boundary of the Corkscrew Swamp, and other public and private lands adjacent to the CREW MA are included as resources allowed.

Methods: Nests are located using behavioral cues, including adults soaring and repeatedly circling a location, perching, diving and vocalizing, carrying nest material and/or building nests, delivering food to a nest, copulating, and chick vocalizations. When a soaring kite is located, observers follow the bird to the nest location and monitor its behavior. Nests are identified as active when at least one Swallow-tailed kite is laying prone on the nest. Active nests are visually monitored every 1-3 weeks, with more frequent checks during the nest building and fledging stages. Fledging is defined as no activity at the nest, behavioral cues and the estimated age of the chick. Nests are presumed to have failed when adults and nestlings are absent at the nest site when the nestlings were too young to fly. The nest tree is tagged with a unique number, and the tree height, species, diameter at breast height, nest height, and nesting material documented.

Results: Total nests documented between 12 and 70 nests annually varied from 2016 and 2020, with no nests identified in 2015. A recent analysis of the data by Smith et al. (unpublished) indicates that during the 2018-19 season period, the survival rate through the 68-day nest cycle was 57.7% (95% CI: 44.5-68.9). The analysis also found that nest survival rate was negatively correlated with ordinal date and positively correlated with nest tree DBH. The mean nest tree DBH for fledged nests was 34.1 cm ± 0.7 SE and 31.7 cm + 1.0 SE for failed nests. Of the routinely surveyed areas, the Cypress Dome Trailhead area consistently had the highest density of nesting swallow-tailed kites (average18 nests per year from 2016 - 2019), whereas Flint Pen Strand had the lowest nest density (average 2 nests per year from 2016 - 2019).

Further analysis will investigate prescribed fire implications both on habitat choice and nesting

success. Existing research suggests that kites prefer mosaic burns with dense understory and midstory to protect adults and young from detection and predation (Meyer 1998).

Wading Bird Nesting, Foraging, and Roosting Surveys

FWC has been conducting wading bird surveys to document nesting, foraging and roosting wading birds in the CREW MA and Corkscrew Swamp since 2012 as part of SFWMD South Florida Wading Bird Annual Report. Survey months and methods varies among years as noted in **Table 1**.

Table 1. Summary of CREW Management Area wading bird survey months, years, and method.

Survey Months/Years	Method	Comments
November-July 2012/13 – 2016/17	Cessna 182 (fixed-wing aircraft)	Began surveys with fixed-wing aircraft due to budget constraints.
January-June 2017 – 2019	R66 (helicopter)	Regional aerial flights combined into one purchased order, therefore helicopter required.
January-March 2020	Cessna 172 (fixed-wing aircraft)	No flights after March 2020 due to Covid-19 pandemic. Regional helicopter flight purchase order not available until April.
January-June 2021	Not applicable	No flights due to Covid-19 pandemic.

Methods: Systematic aerial surveys are conducted monthly with northeast-southwest transects every 1.48 km (0.8 nautical mi) at an altitude of 244 m (800 ft) with observers on both sides of the aircraft. Transects alternate in-flight direction, with the survey route reversed on sequential flights to minimize temporal bias. When an aggregation or colony is observed, flight altitude is reduced to 152 m (500 ft), the birds are is circled until an adequate number of photos are taken with a 70-300 mm lens, and Global Positioning System (GPS) coordinates recorded. Photos are digitally marked by each foraging or roosting bird or active nest using Adobe® Photoshop Elements 14 or 15 to avoid double-counting. Subcolony designations are assigned to WOST to improve accuracy of locating birds and counting nests. Groupings such as small white (SMWH), large white (LGWH), small dark (SMDA) and large dark (LGDA) are assigned when the bird cannot be identified down to species level. Observed nesting effort and peak nesting number (PNN) are recorded by colony and species.

Results: Three colony locations have been routinely documented during the surveys, including one in the CREW MA and two on adjacent private property (Alico Orange Grove and Cypress East). Over the last eight years, the CREW colony has documented nesting by Cattle egrets, Little blue herons, Snowy egrets, Tricolored herons, Anhingas, and Great egrets, with PNN ranging from 46-414 nests/year. The Orange Grove colony PNN ranged from 36-78 nests/year and recorded Great egrets, Anhinga, Snowy egrets, Little blue herons and Tricolored herons. The Cypress East colony nested every year except 2018. The Cypress East colony PNN ranged from 0-97 nests/year and recorded Great egret, Anhinga, Snowy egret, and Roseate spoonbill nesting. Wood stork have successfully nested in Corkscrew Swamp four of the last eight years (2014, 2017, 2018 and 2019).

A variety of foraging aggregations and roosting colonies have documented mainly in Corkscrew Marsh and Corkscrew Swamp's central marsh, with roosting locations varying annually (refer to the SFWMD South Florida Wading Bird Report for more details).

Breeding Bird Surveys

FWC has been conducting breeding bird surveys in the CREW MA since 2012. Survey dates, units and routes are summarized below (**Table 2**).

Table 2. Summary of the CREW Management Area breeding bird surveys by unit and year.

Survey Year	Unit	Number of Routes/Unit	Number of Points
2014	Bird Rookery Swamp	2	6 (EBRS) and 5 (WBRS)
2015	Bird Rookery Swamp	2	6 (EBRS) and 5 (WBRS)
2016	Bird Rookery Swamp	2	6 (EBRS) and 5 (WBRS)
2016	CREW Marsh	1	6
2016	Flint Pen Strand	1	8
2017	CREW Cypress Dome Trails	1	6
2017	Flint Pen Strand	1	7 (removed 1 point)
2018	Bird Rookery Swamp	2	6 (EBRS) and 5 (WBRS)
2018	CREW Marsh	1	6
2019	Cypress Dome Trails	1	6
2019	Flint Pen Strand	1	7
2020	Bird Rookery Swamp	2	6 (EBRS) and 5 (WBRS)
2020	CREW Marsh	1	6

Methods: Surveys are conducted between sunrise and 9:00 A.M. by one observer three times between April and June. Each survey lasting 2.5 - 4 hours is separated from the others by at least 2 weeks, and each sampling point is at least 1609 m (1 mile) from another. In 2014 the survey was conducted twice. Observers record all birds seen or heard during a 6-minute listening period and note whether birds are located within a 50-m radius of the sampling point, outside the 50-m radius, or between sampling points.

Results: The data from the monitoring 2014 survey was analyzed by month, point and season using the adjusted Simpson's Index (Collier and Schwertner 2012). The resident breeding bird population in Bird Rookery Swamp was estimated at 30,239 ± 398 SE individuals in 2014. Diversity was considered high (0.80 on a scale of 0 to 1, with 1 being highest diversity) among all points and habitat types. Data in successive years were summarized with descriptive statistics by species and survey route (fixed and unlimited data were pooled).

Overall, the East Bird Rookery Swamp route produced the highest species richness (n=50) while the CREW Cypress Dome Trailhead area lowest species richness (n=29), possibly because it was surveyed more often than other units (**Table 3**). The Flint Pen Strand unit had the highest number of individuals per year, likely due to the higher number of survey points in that unit.

Table 3. Summary of the CREW Management Area breeding bird species and individuals by unit

Route	Total Number of Individuals Observed	Number of Individuals Observed Per Survey Year	Total Number of Species Observed	Number of Years Surveyed
CREW Cypress Dome Trails	517	259	29	2
CREW Marsh	707	236	36	3
Flint Pen Strand	782	260	48	3
E. Bird Rookery Swamp	1114	223	50	5
W. Bird Rookery Swamp	817	163	32	5

Quail Call Count Surveys

FWC conducted quail call count surveys in the CREW MA in the spring of 2011 and 2012 in three units of the CREW MA to document bobwhite quail presence.

Methods: Stationary listening points in the Corkscrew marsh (8 points), CREW Cypress Dome Trailhead area (7 points), and southern Flint Pen Strand (12 points) were sampled between mid-April and mid-June, with each point sampled twice (on consecutive days). Three replications of each paired survey were conducted for each unit and spaced approximately two weeks apart.

Results: Few quail were heard during the two years of surveys, therefore FWC subsequently combined the quail surveys into the breeding bird point count surveys that began in 2014.

Mourning Dove Banding

The mourning dove banding program at the CREW MA is part of the USFWS National Mourning Dove Strategic Harvest Management Plan. USFWS used a variety of indices to determine nationwide mourning dove populations and movement. These indices included call count surveys, breeding bird surveys, harvest information and band recovery data. To assist the USFWS band recovery program, mourning doves were banded by FWC biologists at two separate locations in the management area from mid-July through mid-August 2012-2015. Doves were sexed, aged and banded with numbered bands. The data was provided to USFWS. Banding was eliminated from FWC work plan after 2015 due to limited staff time and other priority projects.

Sparrow Surveys

Sparrow Mist Netting and Banding

The SFWMD and FWC have conducted mist-netting and banding of grasshopper (*Ammodramus savannarum*), savannah (*Passerculus sandwichensis*) and swamp sparrows (*Melospiza georgiana*) on the CREW MA since 2017 - 2021 on the Gargiulo property (629 acres), which was purchased by the State of Florida in 2015 and is part of the TIITF property managed by the District under a lease agreement. This property is split into one abandoned agricultural field grassland of approximately 101 ha (250 ac) (Gargiulo South) and another of approximately 49 ha (120 ac) (Gargiulo North). Gargiulo South was surveyed all years and Gargiulo North was surveyed in 2018/19 and 2019/20.

Methods: Netting and banding occurred between November and March. Six times a month two lines of eight mist nets each were opened between sunrise and 2.5-hours after sunrise. Participants used a 61-meter (200 ft) rope to flush birds toward the 2 lines; each line of nets contained 96 meters (315 ft) of net. Captured sparrows were held in individual cloth capture bags until processed, banded and released.

Results: This project banded 648 sparrows in Gargiulo South (414 Grasshopper sparrows, 193 Savannah sparrows, and 41 Swamp sparrows) and 86 sparrows in Gargiulo North (53 Grasshopper sparrows, 28 Savannah sparrows, and 5 Swamp sparrows) between January 2017 and March 2020. Wintering population is approximately 350 Grasshopper sparrows on the Gargiulo Property (250 on Gargiulo South and 100 on Gargiulo North). Mean annual return rates were 27.3% for Grasshopper sparrow and 23.1% for Savannah sparrow. There has been only one return of a Swamp sparrow. No Florida grasshopper sparrows (*Ammodramus savannarum floridanus*) were found on the property.

Among the 80 Grasshopper sparrow returns, 81.3% (n=65) returned to the same net lane from their last capture the previous year and their first capture the following year. Among the 10 examples of gap-year birds, 90% (n=9) returned to the same net lane two seasons later. Among the 28 returns of Savannah sparrows, 10.7% (n=3) returned to the same net lane from their last capture the previous year to their first capture the following year. One of the three gap-year birds returned to the same net lane, two seasons later. For Savannah sparrows, site persistence (the percent of recaptures for bird banded in a previous session over the same season) approximately doubled each year. Mean site persistence was 44.4% for Grasshopper sparrows, and 35.5% for Savannah sparrows.

Return rates and recapture data at Gargiulo South suggest high site and patch fidelity for Grasshopper sparrow, suggesting limited movement within the site and some degree of winter season territoriality. The recapture data also suggest high site persistence, especially for Grasshopper sparrows. Although Savannah sparrows also exhibit relatively high site fidelity, they show little to no patch fidelity. The Gargiulo Property supports a stable wintering population that has limited to no movement between sites.

The large increase in Grasshopper sparrow captures in the first-year post-burn reflected an increase in reproduction rather than immigration. Most significantly, new birds selected the burned habitat over the unburned habitat.

Florida Grasshopper Sparrow Listening and Playback Surveys

FWC conducted Florida grasshopper sparrow (FGSP) (*Ammodramus savannarum floridanus*) surveys on the Gargiulo property between May and June 2017 using FWC's 2016 FGSP Standard Monitoring Protocol to visually and auditorily locate individuals to determine FGSP presence during the breeding season.

Methods: Survey points were spaced 200 m (656 ft) apart in a grid pattern on the 105 ha Gargiulo property (260 ac). Grids were positioned as far from Immokalee Road as possible to improve auditory sparrow detection, although traffic noise remained audible from all points. Surveys were conducted on May 17, May 31, and June 14, 2017 on both the north and south portions of the property (six surveys). The surveys were conducted between 30 minutes before sunrise and two hours after sunrise. At each sample point, observers played a 15-second recording of FGSP warbling or buzzing vocalizations followed by 1 minute watching and listening towards each cardinal direction for a total sample time of 5 minutes.

Results: No FGSP were seen or heard during the surveys. Therefore, FGSP were assumed to be absent from the property.

Gopher Tortoise Surveys

Gopher Tortoise Pilot Surveys

The FWC conducted gopher tortoise (*Gopherus polyphemus*) line transect distance sampling (LTDS) pilot surveys near Gates 1 through 3 and Gate 5 by Corkscrew Marsh in 2015 to determine the effort needed for a full survey.

Methods: A total of nine transects were sampled near the CREW Marsh Trails covering 3000 m (1.86 mi) and seven transects were sampled near the CREW Cypress Dome Trailhead covering 2000 m (1.24 mi). Three observers surveyed the unburned areas. When a tortoise burrow was located, biologists scoped each burrow with an infrared camera attached to a video monitor to identify tortoise-occupied burrows. If a gopher tortoise was found, a GPS point was taken to mark its location.

Results: Four gopher tortoises were detected in the Cypress Dome Trail areas yielding a 500 m/tortoise encounter rate. The full survey transect length needed to adequately survey the CREW Cypress Dome Trailhead area was between 66,667 m (CV = 15%) and 37,500 m (CV = 20%). No gopher tortoises were detected near Gates 1 through 3, which had chest-high saw palmetto that made detectability difficult. Therefore, an encounter rate or the transect length for the full survey was not able to be determined.

Gopher Tortoise Population Survey

The FWC conducted a complete gopher tortoise LTDS population survey on 33 ha (82 ac) of the CREW MA 2016.

Methods: Two observers walked transects 54 m (177 ft) apart looking for gopher tortoise burrows, which were then scoped using an infrared camera on a flexible hose. Once scoped,

burrows were given a label of occupied, unoccupied, or undetermined. DISTANCE 6.2 software was used to estimate the density and abundance estimates with associated confidence intervals. Due to the low number of tortoise observations, a conventional distance sampling engine (CDS) was used along with cluster analysis to incorporate all useable burrows (occupied, unoccupied, and undetermined). This analysis used the number of burrow observations to provide increased precision for the detection function.

Results: Of the 77 gopher tortoise burrows sampled, twenty gopher tortoises were observed either in burrows (n=19) or above ground (n=1). The tortoise density estimate was 0.79 tortoise/ha (0.32 tortoises/ac) (95% CI = 0.45-1.41) and the tortoise abundance estimate was 26 (95% CI = 15-47). The low gopher tortoise density and abundance estimates were expected based on anecdotal observations and the results of the 2015 LTDS pilot surveys. The results of a cluster analysis indicated that this area met the minimum viable population (MVP) based on density (>0.4 tortoises/ha) but not the MVP for the population size estimates (N>250 tortoises).

The fragmented tortoise population in the management area is primarily limited by suitable habitat. These fragmented populations highlight the importance of high quality, consistent land management activities to sustain its tortoise populations. Fire return intervals of 4 years or less and possible mechanical treatments of saw palmetto in areas of high tortoise density can maintain and improve the remaining habitat.

Big Cypress Fox Squirrel Surveys

Big Cypress Fox Squirrel (BCFS) Survey - Southern Critical CREW Pre-Construction

FWC biologists conducted a BCFS nest survey in Flint Pen Strand in 2016 conducted a BCFS survey in the Flint Pen Strand Unit as part of the Southern Critical CREW Hydrologic Restoration project regulatory. If potential nests were located, they were flagged and avoided during construction. The Big Cypress fox squirrel (*Sciurus niger avicennia*) (BCFS) is a subspecies of the eastern fox squirrel (*Sciurus niger*) and is considered a state threatened species by the FWC. The main threats to the BCFS are loss, fragmentation, and degradation of habitat as a result of development or conversion of land to other uses such as agriculture. Peak breeding season and subsequent nest use for the BCFS occurs between November and February (peaking in December) and between April and July (peaking in June), although breeding can occur year-round.

Methods: Transects perpendicular to ditches being removed and twice the estimated width of the project impacts were sampled from the ground between February 15 and May 19, 2016. Transect spacing varied from 45 m (150 ft) to 91 m (300 ft) depending on habitat thickness and canopy cover. When suspected nests were located, nest trees were marked with orange flagging, a GPS location was collected, multiple photographs were taken and additional data about the nest tree and surrounding habitats were recorded.

Results: A total of 114 suspected BCFS nests were located along the construction alignments. Seventy-eight percent of nests were found in bald cypress trees. The remaining nests were found in South Florida slash pine (20%), Sweetbay (1%), and Myrsine (1%). Marked nest trees were preserved during construction.

State Wildlife Grant Big Cypress Fox Squirrel Survey – University of Arizona Research

The University of Arizona conducted a landscape-scale occupancy study on 60,000 ha (148,264 acres) of public lands in southwest Florida, including on the CREW MA and 18 other properties from January 01, 2017 through January 31, 2019. Wildlife cameras and hair snare tubes were used to: 1) determine the status and extent of occurrence of BCFS on public lands, 2) identify habitat characteristics associated with Big Cypress Fox Squirrel presence, 3) define effects of habitat fragmentation on BCFS movements and dispersal and 4) generate defensible science-based habitat management recommendations.

Bat Surveys

Bat Acoustical Surveys

Florida Bonneted Bat Acoustical Surveys - Flint Pen Strand

Acoustical surveys for Florida bonneted bat (*Eumops floridanus*), a federally endangered species, were conducted in 2015 as part of the Southern CREW Hydrologic Restoration project regulatory requirements.

Methods: Two, 16-bit full spectrum acoustical bat detectors (Wildlife Acoustics Song Meter SM2Bat+) equipped with ultrasonic omnidirectional microphones (SM3-U1) were rotated among seven locations throughout the southern portion of Flint Pen Strand between December 19, 2014 and July 23, 2015; each location was surveyed three times. Microphones were attached to the top of a 3 m-high (10 ft) metal painter's pole and positioned above the water. The conservative detection distance of the SM3-U1 microphone between 30 m (98 ft) and 100 m (328 ft), with the sensitivity of the recording frequencies declining at 8 kHz.

The Wildlife Acoustics Kaleidoscope Pro 3 software program was used to prepare files for analysis by splitting files into a maximum duration of eight seconds and to potentially filter out bat calls above 20 kHz. The frequency filter did not reliably filter calls below 20 kHz for analysis, therefore main files and noise files were analyzed using the Sonobat acoustical software program. All calls were manually vetted FWC biologists. Calls below 20 kHz were compared to known reference calls of the Florida bonneted bat. In addition, most files that were thought to contain Florida bonneted bats were sent independently to two bat researchers for confirmation before determining that bonneted bats were present.

Results: A total of 202,327 bat acoustical files was analyzed from 324 survey nights. Of those, 28 files contained Florida bonneted bat acoustical calls. Florida bonneted bat presence was confirmed at all seven bat acoustical detector locations. As a result of the detection of Florida bonneted bats, additional surveys were conducted by SFWMD as the construction progressed and potential roost trees were flagged prior to construction.

Bat Acoustical Surveys- Bird Rookery Swamp

Acoustical surveys for Florida bonneted bat (*Eumops floridanus*) were conducted at three locations opportunistically along the Bird Rookery tram between May 4, 2017 and June 30, 2017 to determine presence of Rafinesque's big-eared bat (*Corynorhinus rafinesquii*).

Methods: Two, 16-bit full spectrum acoustical bat detectors (Wildlife Acoustics Song Meter SM2Bat+) equipped with ultrasonic omnidirectional microphones (SM3-U1) were deployed at three locations along the Bird Rookery Swamp tram. The minimum trigger on the SM2Bat+ was lowered to 15dB (from a default of 18 dB) to increase the probability of capturing Rafinesque's big-eared bat, and detectors were set to record a minimum frequency of 8kHz to allow for the detection of Florida bonneted bats. One detector location (Site 1) was chosen on the east tram because one Rafinesque's big-eared bat was previously captured at that location in November 2012. The other two locations were located near water features along the tram (one on the south tram and one on the northeast tram). Microphones were attached to the top of a 3 m-high (10 ft) metal painter's pole and positioned over the water. The conservative detection distance of the SM3-U1 microphone was between 30 m (98 ft) and 100 m (328 ft), with the sensitivity of the recording frequencies declining at 8 kHz. Acoustical data were analyzed using Wildlife Acoustics Kaleidoscope automatic identification software (version 5.3.9) and calls of interest (Rafinesque's big-eared bat and Florida bonneted bat) were then manually vetted by the FWC biologist to ensure reliable identification by the auto identification software.

Results: After 32 nights of sampling, 18 Rafinesque's big-eared bat calls were recorded, including 13 from Site 1 in May. The five remaining Rafinesque's big-eared bat files were collected at the other 2 sites. No Florida bonneted bat calls were recorded. Additionally, big brown bat (*Eptesicus fuscus*), Seminole/red bat (*Lasiurus seminolus/borealis*), northern yellow bat (*Lasiurus intermedius*), evening bat (*Nycticeius humeralis*), tricolored bat (*Perimyotis subflavus*), and the Brazilian free-trailed bat (*Tadarida brasiliensis*) were recorded, with Brazilian-free tailed and evening bats being the most frequently recorded.

Additional acoustical surveys are recommended to determine the seasonality and frequency of Rafinesque's big-eared bats in Bird Rookery Swamp.

Statewide Florida Long-Term Bat Monitoring Project – Annual Acoustical Surveys

Bat acoustical data has been collected in Bird Rookery Swamp since January 2019 as part of FWC's long-term statewide bat monitoring project monitoring trends in species presence, bat health, and abundance. The project is patterned after and compatible with the North American Bat (NABat) Monitoring Protocol Program.

Methods: Three acoustical detectors (Wildlife Acoustics Song Meter SM2Bat+ with SM3-U1 microphone or the Song Meter MiniBat) are used to sample along the Bird Rookery Swamp tram, in the Gargiulo property, and in the Musca tract. The sites were selected based on NABat grid cells that were overlaid on the CREW Management Area and vehicle accessibility. Data are collected for nine consecutive nights four times per year (January, May, August, and October/November).

Results: Of the 123,288 files collected between January 2019 to present, 35,646 files were automatically identified as files containing bats using Wildlife Acoustics Kaleidoscope Pro

software program. These files were analyzed primarily by auto-identification with manually vetting. Processed data are uploaded to the NABat website for comparison across regions, states, and countries.

Rafinesque's big-eared bat, evening bat, Seminole/red bat, tricolored bat, northern yellow bat, big brown bat, Brazilian free-tailed bat, and the southeastern myotis (*Myotis austroriparius*) have been recorded to-date, although the southeastern myotis identification has not been manually vetted. Southeastern myotis are not known to be common in the area and are often confused with the Seminole/red bat or tricolored bat when auto identified. Evening bats are the species most frequently recorded and the Rafinesque's big-eared bat and Florida bonneted bat were recorded least based on present data. There are likely more Rafinesque's big-eared bats present than indicated in these surveys because the statewide minimum trigger setting was uniformly chosen to be 18dB, higher than the smaller amplitude calls for Rafinesque's big-eared bats (the recommended setting would be 15-16 dB).

Bat Mist Netting Surveys

FWC conducted opportunistic bat mist netting in Bird Rookery Swamp and Flint Pen Strand between February 2011 and November 2018 to identify species presence and morphological data.

Methods: One to three triple-high mist net sets were erected at each netting location starting 15 minutes before sunset. Nets were checked every 5 minutes for 2 to 3 hours after dark. Bats were processed and sex, age, reproduction, capture time, forearm length, mass, ear length and any adverse wing condition was noted.

Results: Rafinesque's big-eared bat, evening bat, Seminole bat, and big brown bat were captured. The capture of the Rafinesque's big-eared bat was one of only 3 documented Rafinesque's big-eared bat sightings in Collier County. The capture of 10 big brown bats, most of which were pregnant or lactating females, was noteworthy as Big brown bats, although ubiquitous throughout most of the U.S., are not as common in the natural areas of southwest Florida.

Additional bat mist netting in Bird Rookery Swamp is recommended as the tram provides well-established vegetative corridors that prove effective to mist net bats.

Herpetofaunal Surveys

Frog Watch Surveys

FWC has conducted anuran call monitoring near CREW WEA since 2014 as part of Frog Watch – The Southwest Florida Amphibian Monitoring Network's citizen science project initiated by John Cassani of Lee County Hyacinth Control in 2000 with assistance from the CREW Trust and other citizen scientist volunteers.

Methods: Listening surveys are conducted monthly at 10 points along Corkscrew Road (CR 850) between June and September. Observers listen for 5 minutes at each location and record frog species and call intensity (on a scale from 0-3). Only the first 3 minutes are analyzed to make methods compatible with other Frog Watch survey routes. Calling intensities is used to estimate of relative abundance. CREW route data were analyzed from 2008-2017 using binomial regression where the response was the number of stops where frogs were heard (binary) divided by the total

number of stops for that month. The same binomial regression was used to test for trends in intensities of 2 or 3.

Results: Fifteen species of frogs and toads have been detected including the little grass frog (*Pseudacris ocularis*), barking treefrog (*Hyla gratiosa*), and pinewoods treefrog (*Hyla femoralis*). Other species include the southern cricket frog (*Acris gryllus*), southern leopard frog (*Lithobates sphenocephalus*), southern toad (*Anaxyrus terrestris*), eastern narrowmouth toad (*Gastrophryne carolinensis*), pig frog (*Rana grylio*), green treefrog (*Hyla cinereal*), squirrel treefrog (*Hyla squirella*), non-native Cuban tree frog (*Osteopilus septentrionalis*), non-native greenhouse frog (*Eleutherodactylus planirostris*), eastern spadefoot toad (*Scaphiopus holbrookii*), oak toad (*Anaxyrus quercicus*), and southern chorus frog (*Pseudacris nigrita*). Pig frog, southern cricket frog, and greenhouse frog showed a significant increase over time on the CREW route. Pine woods treefrog increased but only for high intensity calls. The squirrel frog has had a significant decline over the last 10 years. Poisson regression showed that native species detected has not changed over time at CREW. No cane toads (*Rhinella marina*) have been detected. Florida Gulf Coast University produced two peer-reviewed manuscripts based on analysis of this data (http://frogwatch.net/ - see website for data and reports). The data assist in identifying long-term trends in species composition changes due to habitat alteration or climate change.

Herpetofaunal Drift Fence Surveys

Herpetofaunal drift fence surveys were conducted in 1995-97 (Joe Bozzo, Dwight Meyers, and Jim Schortemeyer - FWC) and again in 2010-2011 (John Cassani - Lee County Hyacinth Control) in CREW MA to identify shifts in community structure over time.

Methods: Nine drift fence arrays were placed in four habitat types: mesic flatwood, mesic hammock, depression marsh and wet prairie. Trapping occurred daily for one week during 7-8 sampling runs in each period. Hierarchical cluster analysis indicated the expected similarity within habitat types while significant dissimilarity between sampling periods indicated recent shifts in community composition.

Results: Analysis of individual species contribution to overall similarity across habitats indicated a shift from dominance of native species in the 1990s to increased importance of exotics (Cuban brown anole and greenhouse frog) in 2010-11. Species richness was maintained in mesic hammock habitats but declined or was variable in the remaining habitats. Catch rate of several native species (southern toad, pig frog, green anole (*Anolis carolinensis*), banded watersnake (*Nerodia fasciata*)) declined significantly. Other native species (southern leopard frog, greater siren (*Siren lacertina*) and peninsula newt (*Notophthalmus viridescens*)), abundant in 1995-97, declined by greater than 50%. Catch rate of only two species (the exotic Cuban brown anole (*Anolis sagrei*) and the native ringneck snake (*Diadophis punctatus*)) increased significantly, but two others (the exotic greenhouse frog and the native oak toad) became considerably more important. These data document significant and notable changes in the herpetofauna resulting from subtle shifts in community structure and illustrate the value of repeating studies through time to detect trends in biodiversity.

Anuran Acoustical Surveys

FWC conducted passive frog and toad acoustical surveys in Flint Pen Strand and the Corkscrew Marsh between May and October 2016, to gather anuran spatial and temporal data prior to and during the Southern CREW hydrologic restoration project.

Methods: Three acoustical microphones, each attached to an acoustical detector (Wildlife Acoustics, SM2+Bat), were rotated among nine stationary survey locations within the management area. Detectors recorded for seven consecutive nights at each of the nine locations. Data were collected nightly for five continuous minutes at the beginning of each hour between sunset and sunrise. Corresponding water level, temperature, and humidity data were also collected at each location to provide covariates for analysis.

Results: The results of the study are in development.

Fish Surveys

FWC implemented a variety of sampling methods to sample fish populations in December 2020 in throughout the CREW MA and estimate available forage biomass for avian predators. Temporal variations and shifts in community structure will also be investigated by comparing results to data collected from surveys conducted in 1996, 2000, and 2007.

Methods: Sampling techniques include minnow traps, throw traps, fyke nets, dip nets, and electroshocking. Where appropriate, these techniques will be deployed in three different locations and three different habitat types to capture information about spatial variation. Specific methods are still being refined. Native fish and invertebrates collected during sampling will be identified and released on site, while non-natives kept and humanely euthanized. Biologists will identify, weigh and measure species on site or at the CREW office.

Results: No results are available at this time.

Small Mammal Surveys

Passive Small Mammal Sampling

Opportunistic small mammal surveys were conducted from February 2014 through May 2016 in and around the CREW MA to detect the presence of small mammals, particularly the Sherman's short-tailed shrew (*Blarina carolinensis shermani*).

Methods: Barn owls (*Tyto alba*) pellets from the pole barn at the CREW office were collected monthly from February 2014 through July 2014. Pellets were collected from January 2015 through May 2016 at the CREW office and the Corkscrew Regional Mitigation Bank shed. Pellets were dissected and identified by the CREW Trust, although pellet contents should be verified by an agency expert.

Results: In 2014 thirty 30 least shrews (*Cryptotis parva*), three short-tailed shrews (*Blarina carolinensis*), and nine Hispid cotton rats (*Sigmodon hispidus*) were identified, while 2015-2016 produced 36 shrews (11 of which appeared to be least shrews), and 21 other unidentified rodents. None of the three short-tailed shrew skulls determined to be subspecies *shermani*.

Sherman's Short-Tailed Shrew Surveys

2011 Surveys

FWC conducted Sherman's short-tailed shrew (SSTS) surveys between May and June 2011 because SSTS has a small range, is highly vulnerable to extinction and its presence at CREW MA has not been confirmed in years. Survey objectives were to detect the presence of the SSTS and collect tissue for genetic analysis to document the continued existence of the animal and to confirm its taxonomic uniqueness.

Methods: Surveys were conducted on 12 conservation properties (including the CREW MA) from North Fort Myers to south Naples. Pitfall traps set along drift fences (made of 10-inch aluminum flashing or plastic lawn edging) and natural habitat features to funnel shrews into the traps with cover boards or natural vegetation above to prevent desiccation in traps deter predators. Un-baited Sherman live traps were also used in some habitats. Numbers of traps and distribution was determined by available trapping sites in suitable habitat, with at least 10 traps used in each location for a minimum of five nights. Traps were opened early in the evening and checked and closed each morning, several hours after sunrise. At pitfall traps with cover boards, the cover boards were lowered to prevent incidental daytime captures. Few captures were expected, and trapping was discontinued at any site once two specimens were trapped in order to minimize mortality for this rare species.

Shrews do not survive long in traps due to their high metabolism, so few animals were captured alive. Collected specimens were frozen until deposition into museum collections, and tissue samples (ventral skin) were collected and stored in 95% ethanol for later genetic analysis. Animals were released only if several others had been collected. For released animals, a genetic sample (toe or tail snip) would be collected for future genetic analysis. Capture date and location (latitude-longitude), habitat description (with photo), and standard measurements (length, weight, and, if apparent, sex) were recorded. Robert Timm of the University of Kansas conducted genetic and additional morphometric analyses on any specimens captured.

Results: A total of 1170 trap nights yielded no short-tailed shrews and four least shrews.

2015 Surveys

FWC conducted additional surveys for the Sherman's short-tailed shrew on the CREW MA between March 2015 and February 2017.

Methods: Ten drift fence arrays with multiple pitfalls were set along natural runways (e.g., downed logs). An array consisted of two 30 m (9.8 ft) stretches of fencing in a cross shape with 13, 5-gallon buckets per array. Five additional 1-gallon buckets were placed along downed logs and at the base of trees within 50 m (164 ft) of the center of the array. Arrays were checked a minimum of twice per week. Arrays that resulted in SSTS captures were closed immediately after specimen(s) collected to prevent unnecessary mortalities.

Results: A total of 10 least shrews and one short-tailed shrew were collected. The short-tailed shrew was sent for genetic analysis to determine if it was a SSTS. Genetic results were never received despite several attempts to obtain the results.

White-Tailed Deer Surveys

FWC conducted white-tailed deer (*Odocoileus virginianus*) surveys in Corkscrew Marsh and Flint Pen Strand in 2013 using remote sensing cameras to evaluate hunting restrictions and opportunities.

Methods: Population factors, Jacobson model population estimates and occupancy modeling (assuming detection as constant) were used to evaluate results from trail camera photographs of individually unique and identifiable bucks.

Results: Four identifiably unique bucks were photographed in Corkscrew Marsh and one in Flint Pen Strand between July-August 2013, yielding a population factor of 0.01 for both areas. The Jacobsen model estimated populations in Corkscrew Marsh and Flint Pen Strand of 2.65 (1.02 km^2) and 0.53 (0.20 km^2) deer per square mile, respectively. The occupancy modeling, with detection assumed to be constant, estimated 16 (9-29) bucks and 7 (3-16) does. Estimated occupancy for bucks was 65% and 38% for does. Detection, across all camera sites, was 11% for bucks and 8% for does.

In December 2013, two unique bucks were photographed in Corkscrew Marsh and Flint Pen Strand yielding a population factor of 0.07 and 0.22, respectively. Deer density estimates for Corkscrew Marsh and Flint Pen Strand were 4.38 (11.34 km^2) and 259.86 (673.03 km^2) deer per square mile, respectively. The number of observations was too low to run an occupancy model for bucks in Flint Pen Strand and for any age/sex class in Corkscrew Marsh. Population estimates for Flint Pen Strand were 24 (15-40) does and 39 (20-76) fawns. Estimated occupancy For Corkscrew Marsh was 80% for does and 92% for fawns. Detection, across all camera sites, was 11% for does and 5% for fawns.

Although population estimates were determined, their accuracy and consistency were not valid due to the violation of assumptions for both models. Surveys were discontinued.

Florida Black Bear Hair Snare Population Estimate Surveys

FWC conducted hair snare population estimates for black Bears between 2014 and 2015 as part estimating Florida's black bear population in the largest five subpopulations (Big Cypress, Ocala/St. John's, Osceola, Apalachicola, and Eglin), last estimated in 2002.

Methods: Hair samples were collected from barbed wire hair snares to conduct a spatially explicit capture-mark-recapture study. A total of three clusters of hair snares were established In the CREW MA: one cluster in the Cypress Dome Trailhead, one cluster in Flint Pen Strand, and one in the Musca tract. Sites were arranged in a 3 x 3 cluster spaced 2 km (1.2 mi) apart within each cluster. Clusters were spaced 16 km (9.9 mi) apart from the center (Humm et al. 2017).

Results: Big Cypress population (including the CREW Management Area) increased 49% from 2002 to 2015 (700 bears to 1,040 bears).

Florida Panther Capture Efforts

Remote sensing cameras have documented wildlife use (including Florida panthers) and instances of feline leukomyelopathy (FLM) since 2015, including panther adults and young. Video cameras in the Cypress Dome Trailhead and the Marsh Trail area in June 2019 documented FLM in both panther and bobcat. The FWC monitored the panther population through mark-recapture and telemetric collars. **Table 4** below summarizes the panther captures in and around the CREW Management Area over the last 10 years.

Table 4. Florida panther captures in and around CREW Management Area from 2010-2020.

Animal ID	Sex	Capture Year	Capture Location	Age (Yrs)	Comments
FP197	M	2012	Airport Mitigation Property	4	Initial collaring.
FP198	F	2012	Panther Island Mitigation Bank	4	Initial collaring.
FP159	M	2012	Lee County Port Authority	10	Recollar.
-	-	2013	-	-	No panther captures attempted on CREW in 2013.
-	-	2014	-	-	No panther captures attempted on CREW in 2014.
FP236	M	2015	CREW - Flint Pen Strand	6 or 7	Initial collaring. Ringworm.
FP237	M	2015	CREW - Flint Pen Strand	10-12 mo.	Initial collaring.
FP198	F	2015	Lee County Port Authority		Recollar.
-	-	2016	-	-	No panther captures attempted on CREW in 2016.
-	-	2017	-	-	No panther captures attempted on CREW in 2017.
-	-	2018	-	-	No panther captures attempted on CREW in 2018.
FP256	F	2019	CREW - Cypress Dome Trails	2	Removed from wild due to failing health related to feline leukomyelopathy (FLM). Euthanized, examined for ongoing FLM investigation.

Artificial Nest Box Monitoring

Up to 14 bat boxes per year were monitored quarterly between 2012 and 2020. No bats were documented.

Six wood duck boxes at the ponds near the Lakes parking lot in the Flint Pen Strand were monitored twice each year. When the 6 boxes were replaced with 3 in 2019, three groups of unfertile wood duck eggs or shells were observed in three of the six wood duck boxes.

Up to 12 bluebird boxes in the Cypress Dome Trailhead area in Corkscrew Marsh and near the CREW office were monitored periodically between 2014 and 2020. No bluebirds occupied the boxes, but red-bellied woodpeckers (*Melanerpes carolinus*) and Cuban tree frogs have used the boxes. Five of these boxes were relocated to Flint Pen Strand in 2019/2020 because bluebirds had been observed in the southern portion of Flint Pen Strand.

Vegetation

CREW Sawgrass Marsh Vegetation Treatment Experiments

In 2013, FWC biologists began experimental treatments of woody vegetation in Corkscrew Marsh funded through an Aquatic Habitat Restoration/Enhancement Funding (AHRE). A total of 1,229 acres of the Carolina willow, cattail and Peruvian primrose willow was treated in 2014 (**Table 5**). The experiment evaluated the effectiveness of three different concentrations of glyphosate and imazapyr mixtures on three plots with varying maturities of willow. An additional 320 acres were treated in May 2015. Control plots were established next to each of the three treatment plots to provide an untreated comparison. Pre- and post-treatment vegetation transects 0.32 km (0.2 mi) were established in the treatment and control plots and surveyed by airboat. The results of the pre- and post-vegetation surveys indicated that Carolina willow was effectively treated during the aerial treatment, but sawgrass also exhibited a high degree of mortality, reducing the ability to follow-up with fire treatments. Follow-up willow spot treatments were also not possible due to the impacts of the remaining large willow stumps on access, and less desirable vegetation emerged after the aerial herbicide treatment. In 2015, 720 acres of cattail and Peruvian primrose willow were aerially treated with imazamox in the northern portion of the sawgrass marsh with additional AHRE's funding. This treatment was effective in reducing and or eliminating most of the cattail and some of the Peruvian primrose willow in the treatment area.

In 2017, FWC secured funding and implemented an experimental treatment with volunteer assistance to evaluate the efficacy of imazamox in selectively killing Carolina willow in sawgrass. The experiment was based on promising results from the St. John's Water Management District (SJWMD) which suggested imazamox might effectively reduce or eliminate willow and preserve sawgrass. A total of 160 acres was aerially treated with imazamox in August 2017 and August 2018. Twenty-five (25) treatment plots were established in the northern portion of the sawgrass marsh. Pre- and post-treatment vegetation surveys of Carolina willow and sawgrass were conducted from August 2017 - August 2019. The results of the vegetation survey indicated that imazamox preserved the sawgrass but did not effectively treat the willow. In 2020, FWC biologists sought additional AHRE's funds to mechanically shred 100 acres of willow in the sawgrass marsh.

Mechanical treatments are scheduled to be conducted in 2021 and 2022. The results of the treatments will be studied to evaluate the short and long-term benefits of the mechanical treatment.

Table 5. CREW Management Area Corkscrew Marsh willow treatments, 2014-2020.

TARGET SPECIES	DENSITY	TRMT MONTH	TRMT YEAR	ACRES (ac)	TREATMENT	RATE (ac-oz)	CHEMICAL
SALIX & *TYPHA* SPP.	MEDIUM	August	2018	160	AERIAL	48	IMAZAMOX/MSO
SALIX & *TYPHA* SPP.	MEDIUM	August	2017	160	AERIAL	48	IMAZAMOX/MSO
TYPHA & *LUDWIGIA* SPP.	MEDIUM/LOW	September	2015	720	AERIAL	32-16	IMAZAMOX/MSO
SALIX SPP.	MEDIUM	May	2015	292	AERIAL	96-16	GLYPHOSATE/ IMAZAPYR
SALIX SPP.	MEDIUM	May	2015	28	AERIAL	96-16	GLYPHOSATE/ IMAZAPYR
SALIX SPP.	HIGH	September	2014	125	AERIAL	120-64	GLYPHOSATE/ IMAZAPYR
SALIX SPP.	HIGH	August	2014	727	AERIAL	80-24	GLYPHOSATE/ IMAZAPYR
SALIX SPP.	HIGH	August	2014	377	AERIAL	96-16	GLYPHOSATE/ IMAZAPYR

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APPENDIX E

CREW
Wildlife and Environmental Area
Hunting Regulations Summary and Area Map

Florida Fish and Wildlife Conservation Commission
myfwc.com

South Florida Water Management District
sfwmd.gov

Collier County
colliercountyfl.gov

CREW

Wildlife and Environmental Area

Regulations Summary and Area Map
July 01, 2021 - June 30, 2022

2021-2022 Hunting Season

This brochure is designed to provide the public with information and a summary of regulations pertaining to hunting and other recreational use on the CREW Wildlife and Environmental Area. **Regulations that are new or differ substantially from last year are shown in bold print.** Area users should familiarize themselves with all regulations. For exact wording of the wildlife laws and regulations, see the Florida Fish and Wildlife Conservation Commission's wildlife code, on file with the Secretary of State and state libraries. This brochure, the Florida Hunting Regulations handbook, and quota permit worksheets should provide the information necessary for you to plan your hunting activities. These publications are available at MyFWC.com.

Persons using wildlife and environmental areas are required to have appropriate licenses, permits, and stamps. The following persons are exempt from all license and permit requirements (except for quota permits when listed as "no exemptions," recreational use permits, antlerless deer permits and the Migratory Bird Hunting and Conservation Stamp [federal duck stamp]): Florida residents who are 65 years of age or older; residents who possess a Florida Resident Disabled Person Hunting and Fishing Certificate; residents in the U.S. Armed Forces, not stationed in Florida, while home on leave for 30 days or less, upon submission of orders; and children under 16 years of age. Children under 16 years of age also are exempt from the federal duck stamp. Anyone born on or after June 1, 1975 and 16 years of age or older must have passed a Commission-approved hunter-safety course prior to being issued a hunting license, except the Hunter Safety Mentoring exemption allows anyone to purchase a hunting license and hunt under the supervision of a licensed hunter, 21 years of age or older.

Youth and mentor license holders are required to be accompanied by a supervisor during any hunt. A youth hunter (less than 16 years of age) must be supervised by a person at least 18 years of age. A mentor license holder must be supervised by a licensed hunter at least 21 years of age. Unless exempt, only those supervisors with proper licenses and permits may hunt.

Licenses and permits may be purchased from county tax collectors, license agents, by telephone at 888-486-8356, or at GoOutdoorsFlorida.com. A no-cost Migratory Bird Permit is available when purchasing a hunting license. Any waterfowl hunter 16 years of age or older must possess a federal duck stamp.

Quota Permit Information:
Archery - 25 (Corkscrew Marsh Unit), 30 (Flint Pen Strand/western Bird Rookery Swamp units), no-cost, quota permits (no exemptions).
Muzzleloading Gun - 25 (Corkscrew Marsh Unit), 30 (Flint Pen Strand/western Bird Rookery Swamp units), no-cost, quota permits (no exemptions).
General Gun - 25 (Corkscrew Marsh Unit), 30 (Flint Pen Strand/western Bird Rookery Swamp units), no-cost, quota permits (no exemptions).
Spring Turkey - 5 (Corkscrew Marsh Unit), 5 (Flint Pen Strand/western Bird Rookery Swamp units), no-cost, quota permits (no exemptions) for each of 2 hunts.

Permit applications: Hunters must submit electronic applications for quota and special-opportunity permits at GoOutdoorsFlorida.com. Worksheets listing hunts, application periods, deadlines, and instructions are available at county tax collector's offices, FWC offices, or MyFWC.com. Quota application periods occur throughout the year beginning April 1; please refer to the hunting handbook or MyFWC.com for specific dates. Worksheets will be available about 2 weeks prior to each application period.

Guest hunters: For each non-transferable archery, muzzleloading gun, general gun, wild hog, spring turkey, and mobility-impaired quota permit issued through GoOutdoorsFlorida.com, a quota permit holder (host) may take a guest hunter by obtaining a guest permit. A guest hunter must possess a completed guest permit while hunting, except the following persons may be a guest hunter without a guest permit: a youth under 16 years of age, a youth supervisor, a mentor license holder, or a mentor license supervisor. A host may only bring 1 guest hunter at a time and may only use 1 guest permit per day. The following persons are not considered to be guest hunters: other quota permit holders, non-hunters, and exempt hunters (on areas and during seasons that allow exemptions). The guest hunter and host must enter and exit the area together and must share a street-legal vehicle while hunting on the area. The guest hunter may hunt only while the host is on the area. Refer to the quota hunt worksheets for additional information.

Youth and mentor license holders: If a youth or mentor supervisor is hunting during any hunt for which quota permits are issued, at least 1 person in the party must possess a quota permit.

Transfer of permits: Quota and guest permits are not transferable. A positive form of identification is required when using a non-transferable permit, except for a youth under 16 years of age. The sale or purchase of any quota permit or guest permit is prohibited.

General Area Regulations:
All general laws and regulations relating to wildlife and fish shall apply unless specifically exempted for this area. Hunting or the taking of wildlife or fish on this area shall be allowed only during the open seasons and in accordance with the following regulations:
1. Any person hunting deer or accompanying another person hunting deer shall wear at least 500 square inches of daylight fluorescent-

orange material as an outer garment, above the waistline. These provisions are not required when hunting with a bow and arrow during archery season.
2. Taking of spotted fawn, swimming deer, or roosted turkey is prohibited.
3. It is illegal to hunt over bait or place any bait or other food for wildlife on this area.
4. Driving a metal object into any tree, or hunting from a tree into which a metal object has been driven, is prohibited.
5. No person shall cut, damage, or remove any natural, man-made, or cultural resource without written authorization of the landowner or primary land manager.
6. Taking or attempting to take any game with the aid of live decoys, recorded game calls or sounds, set guns, artificial light, net, trap, snare, drug, or poison is prohibited. Recorded calls and sounds can be used to hunt furbearers, wild hog, and crows.
7. The wanton and willful waste of wildlife is prohibited.
8. Hunting, fishing, or trapping is prohibited on any portion of the area posted as closed to those activities.
9. People, dogs, vehicles, and other recreational equipment are prohibited in areas posted as "Closed to Public Access" by FWC administrative action.
10. Taking or herding wildlife from any motorized vehicle, aircraft, or boat which is under power is prohibited, until power and movement from that power, has ceased.
11. Most game may be hunted from ½ hour before sunrise until ½ hour after sunset (see exceptions under each season).
12. The release of any animal is prohibited, except by permit from FWC or written authorization from the landowner or primary land manager.
13. The head and evidence of sex may not be removed from the carcass of any deer or turkey on the area.
14. Wild hog may not be transported alive.
15. A hunting license is not required to hunt wild hog.
16. Littering is prohibited.
17. Fires other than campfires at approved campsites are prohibited
18. A Law Enforcement Officer may search any camp, vehicle, or boat in accordance with law.
19. Planting of trees, shrubs, or other vegetation is prohibited without written authorization from the landowner or the Commission.
20. Falconers may hunt during the statewide falconry season anytime a management area is open for public access. Falconers are not exempt from quota permits during hunts requiring them.

Public Access and Vehicles:
1. Open to public access year-round but only from 2 hours before sunrise until 2 hours after sunset, unless camping at a designated campsite.
2. All persons shall enter and exit the area at a designated entrance.
3. **The designated entrance at the intersection of Sand and Vincent roads is closed to all public access, except for individuals in possession of a valid quota permit and their guests.**
4. The use of ATVs, swamp buggies, tracked vehicles, vessels (except canoes or kayaks), or unlicensed and unregistered motorcycles is prohibited, except swamp buggies may be operated only by individuals participating in a quota hunt.
5. Vehicles may be operated only on named roads designated for vehicles, except during archery, muzzleloading gun, general gun, and spring turkey seasons. Beginning at 8 a.m. the day prior to the opening of each season, vehicles may also be operated on designated trails, but only by individuals participating in a quota hunt.
6. Parked vehicles may not obstruct a road, gate, or firelane.
7. No motor vehicle shall be operated in areas designated as closed to vehicular traffic.
8. The use or possession of horses is prohibited, except by Special-Use License (SUL) from the South Florida Water Management District (SFWMD). To apply for and receive an SUL by email, visit www.sfwmd.gov/sul. To receive an SUL by U.S. Mail, contact SFWMD at 1-866-433-6312 (allow 7-10 business days). For those persons with a valid SUL, horses are only allowed on trails designated with yellow markers in the Flint Pen Strand and trails designated with blue, green, white, or yellow markers for the Cypress Dome trails at Gate 5.
9. Trailers and trailer parking are prohibited, except at the Flint Pen Strand and Gate 5 check stations, where trailer parking (including equestrian trailers) is allowed in the adjoining parking lots.

Hunters, Check Stations, and Harvest Reporting:
1. Hunting equipment may not be taken onto the WEA until after 8 a.m. the day before the opening of a season and shall be removed by 6 p.m. 1 day after the end of the season.
2. Hunters are required to enter and exit the area at a designated entrance and hunters entering or exiting the Corkscrew Marsh Unit must use Gate 5.
3. During periods when check stations are staffed, hunters must check in at a check station upon entering and leaving the area and check all harvested game.
4. During periods when check stations are staffed, no deer or turkey shall be dismembered until checked at a check station.
5. In addition to checking all game at the check station, all hunters must log their harvested deer prior to moving it and report their harvested deer within 24 hours. See Florida Hunting Regulations handbook or MyFWC.com for deer harvest reporting instructions.

Guns:
1. Hunting east of or within ¼-mile of the Western North/South Tram, south of Bonita Beach Road in the Bird Rookery Swamp Unit, or in any other areas designated as "Closed to Hunting" is prohibited.
2. Hunting with centerfire or rimfire rifles is prohibited.
3. Hunting at night with a gun is prohibited.
4. Muzzleloading guns used for taking deer must be .30 caliber or larger, if firing a single bullet, or be 20 gauge or larger if firing 2 or more balls.
5. Hunting deer with non-expanding, full metal jacket (military ball) ammunition is prohibited.
6. Hunting wildlife (other than migratory birds) with airguns is allowed. See Florida Hunting Regulations handbook for details.
7. Hunting deer with airguns is prohibited, except pre-charged pneumatic (PCP) airguns propelling a bolt, arrow or bullet .30 caliber or larger are allowed.
8. Hunting turkey with airguns is prohibited, except PCP airguns propelling a bolt or arrow are allowed.

9. Children under the age of 16 hunting with a firearm or airgun must be in the presence of a supervising adult.
10. No person shall discharge a firearm or have a loaded firearm in hand while under the influence of alcohol or drugs.
11. For hunting non-migratory game, only shotguns, pistols, airguns, bows, crossbows, or muzzleloading guns may be used.
12. For hunting migratory game, only shotguns, bows, or crossbows may be used. Shotguns must be 10 gauge or smaller and incapable of holding more than 3 shells in the magazine and chamber combined.
13. Hunting with full-automatic firearms, explosive or drug-injecting devices, or set guns is prohibited.
14. The discharge of a firearm outside of periods open to hunting or in areas closed to hunting is prohibited per s.790.15 FS.

Dogs:
1. Hunting with dogs is prohibited, except bird dogs and retrievers may be used during general gun season and any dog may be used to hunt gray squirrel, migratory birds, quail, and rabbits during small game season.
2. No person shall allow any dog to pursue or molest any wildlife during any period in which the taking of wildlife by the use of dogs is prohibited.
3. Dogs on leashes may be used for trailing wounded game.
4. For purposes other than hunting, dogs are allowed, but must be kept under physical restraint at all times.

Camping:
1. Camping is allowed only at designated sites by Special-Use License (SUL) from the South Florida Water Management District (SFWMD). To apply for and receive an SUL by email, visit www.sfwmd.gov/sul. To receive an SUL by U.S. Mail, contact SFWMD at 1-866-433-6312 (allow 7-10 business days). NOTE: Hunters will need an SUL to camp during quota hunts.
2. No persons shall bring building materials onto the area or erect permanent or semi-permanent structures.
3. Quiet hours: From 11 p.m. until 7 a.m. loud music, barking dogs, or any other activity causing excessive noise is prohibited in camping areas.
4. Pets must be physically restrained and under control within camping areas.

Bag and Possession Limits:
A guest hunter must share the host's bag limit, and the host is responsible for violations that exceed the bag limit.
1. Deer - No person shall exceed statewide bag limits.
   A. Area limits - 1 antlered deer per quota permit (Flint Pen Strand and Western Bird Rookery Swamp units). The take of deer is prohibited in the Corkscrew Marsh Unit.
   B. Statewide limits - Annual limit 5 deer (only 2 of which may be antlerless), daily limit 2, possession limit 4.
   C. As part of the statewide annual deer limit, youth less than 16 years of age may harvest 1 deer annually not meeting antler point requirements but having at least 1 antler 5 inches or more in length.
2. Turkey - No person shall exceed statewide bag limits.
   A. Area limits - 1 per spring turkey quota permit.
   B. Statewide limits - Spring season limit 2, daily limit 2, possession limit 2.
3. Wild hog - No bag limits or size restrictions.
4. Gray squirrel and rabbits - Daily limit 12 per person, possession limit 24 for each.
5. Quail - Daily limit 12, possession limit 24.
6. Armadillo, beaver, coyote, nutria, opossum, raccoon, and skunk - No bag limits.
7. Bobcat and otter - Prohibited.
8. Migratory birds - See Florida Hunting Regulations handbook.
9. Non-native reptiles - No bag limits.

Archery Season:
August **7**-**15**
Permit, Stamp, and License Requirements - Quota permit, hunting license, management area permit, archery permit, deer permit (if hunting deer), and migratory bird permit (if hunting migratory birds).
Legal to Hunt - Antlered deer having at least one antler with three or more points (each point being one inch or more in length) OR a main beam of 10 inches or more in length, wild hog, gray squirrel, quail, rabbits, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria, and migratory birds in season.
Regulations Unique to Archery Season -
1. Hunting deer is prohibited in the Corkscrew Marsh Unit.
2. Only archery equipment may be used for hunting, except that centerfire shotguns are allowed for hunting migratory birds. Hunting with crossbows is prohibited (except by disabled crossbow permit).

Muzzleloading Gun Season:
September **4**-**6**
Permit, Stamp, and License Requirements - Quota permit, hunting license, management area permit, muzzleloading gun permit, deer permit (if hunting deer), and migratory bird permit (if hunting migratory birds).
Legal to Hunt - Antlered deer having at least one antler with three or more points (each point being one inch or more in length) OR a main beam of 10 inches or more in length, wild hog, gray squirrel, quail, rabbits, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria, and migratory birds in season.
Regulations Unique to Muzzleloading Gun Season -
1. Hunting deer is prohibited in the Corkscrew Marsh Unit.
2. Hunting with archery equipment or guns other than muzzleloading guns is prohibited, except that centerfire shotguns are allowed for hunting migratory birds.

General Gun Season:
November **20**-**28**
Permit, Stamp, and License Requirements - Quota permit, hunting license, management area permit, deer permit (if hunting deer),

migratory bird permit (if hunting migratory birds), and state waterfowl permit and federal duck stamp (if hunting waterfowl).
Legal to Hunt - Antlered deer having at least one antler with three or more points (each point being one inch or more in length) OR a main beam of 10 inches or more in length, wild hog, gray squirrel, quail, rabbits, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria, and migratory birds in season.
Regulations Unique to General Gun Season -
1. Hunting deer is prohibited in the Corkscrew Marsh Unit.
2. Hunting with bird dogs or retrievers is allowed.
3. Hunting with centerfire or rimfire rifles is prohibited.

Small Game Season:
December **4** - January **2**
Permit, Stamp, and License Requirements - Hunting license, management area permit, migratory bird permit (if hunting migratory birds), and state waterfowl permit and federal duck stamp (if hunting waterfowl).
Legal to Hunt - Gray squirrel, quail, rabbits, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria, and migratory birds in season.
Regulations Unique to Small Game Season -
1. Dogs may be used to hunt gray squirrel, migratory birds, quail, and rabbits only.
2. Hunting with centerfire or rimfire rifles is prohibited.

Trapping:
Prohibited.

Spring Turkey Season:
March **5**-**8**, **9**-**13**
Permit, Stamp, and License Requirements - Quota permit, hunting license, management area permit, and wild turkey permit.
Legal to Hunt - Gobbler or Bearded turkey.
Regulations Unique to Spring Turkey Season -
1. Legal shooting hours are ½ hour before sunrise until sunset.
2. Hunting other animals is prohibited.
3. Only bows, crossbows, PCP airguns propelling a bolt or arrow, and shotguns using #2 or smaller shot size may be used for hunting.

Migratory Bird Season:
Migratory game birds and crows may be hunted during statewide seasons that coincide with the seasons in this brochure for which migratory birds are listed as legal to hunt. See migratory bird hunting regulations.
Permit, Stamp, and License Requirements - Quota permit (if hunting during a quota period), hunting license, management area permit, migratory bird permit, and state waterfowl permit and federal duck stamp (if hunting waterfowl).
Legal to Hunt - See migratory bird season dates, bag limits, and regulations.
Regulations Unique to Migratory Bird Seasons - All Migratory Bird Regulations shall apply.
1. Hunting ducks, geese, or coot with lead shot is prohibited.
2. Centerfire shotguns are allowed for hunting migratory birds during established area seasons when migratory birds are legal to hunt.
3. Shooting hours for mourning and white-winged doves are noon until sunset during Phase 1 and ½ hour before sunrise until sunset during phases 2 and 3.

Fishing and Frogging:
Allowed year-round, but only from 2 hours before sunrise until 2 hours after sunset.
Permit, Stamp, and License Requirements - Fishing license (if fishing) or management area permit (if frogging).
Legal to Take - See Florida Freshwater Fishing Regulations Summary.
Regulations Unique to Fishing and Frogging - All General Freshwater Fishing Regulations shall apply. Shooting frogs is allowed only during the listed open hunting seasons and only with the legal methods of take during each particular season. Frogs may be taken by firearm during daylight hours only.

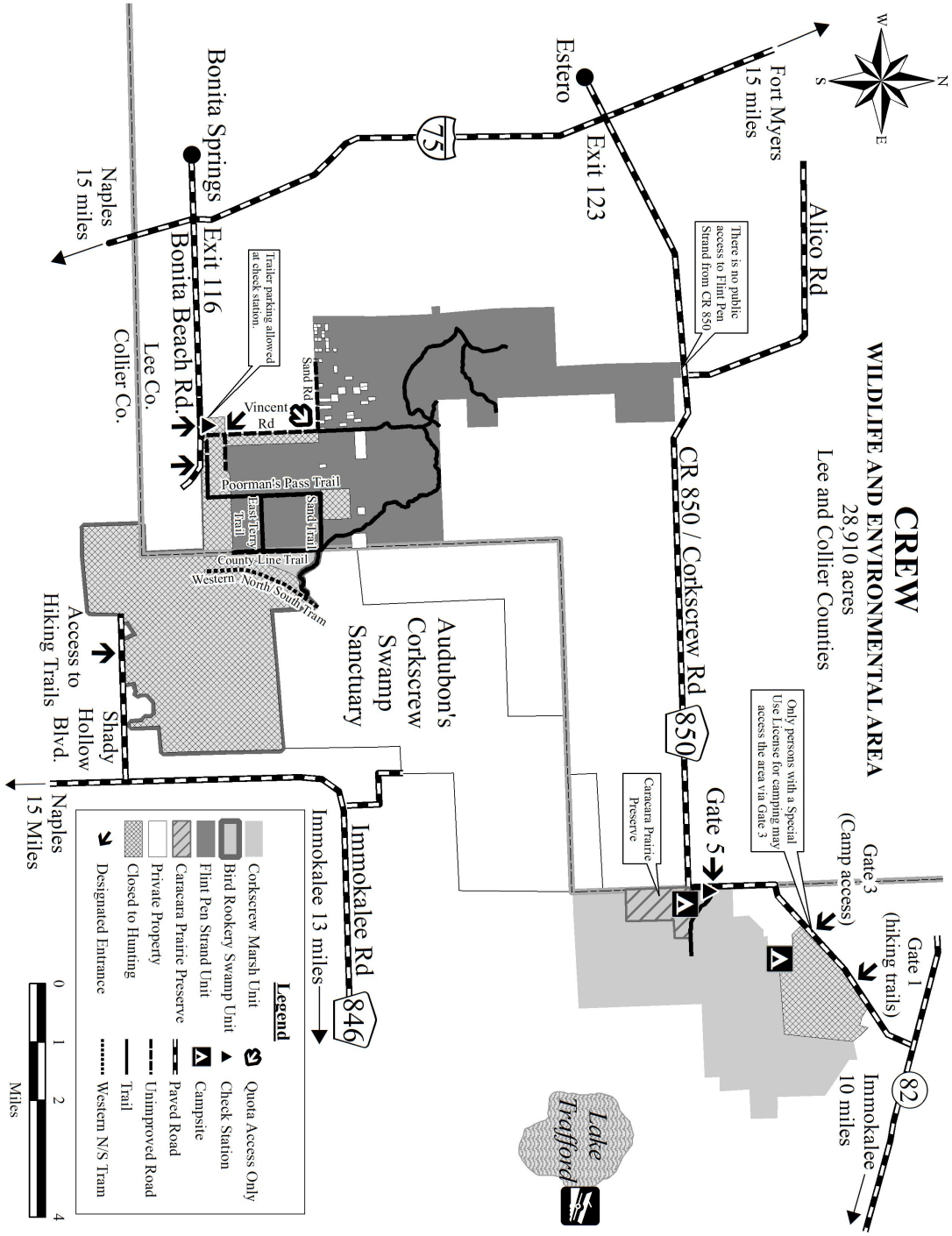
Non-Native Reptiles:
Allowed year round.
Permit, Stamp, and License Requirements - None.
Legal to take - Non-native reptiles including, but not limited to, Conditional and Prohibited reptiles such as the Argentine black and white tegu, green iguana, and Burmese python. Note: Conditional and Prohibited reptiles shall not be removed from the area alive.
Regulations unique to removal of non-native reptiles -
1. Non-native reptiles may be taken by methods other than firearms year-round.
2. Firearms (as allowed by season) may be used to take non-native reptiles only during open hunting seasons summarized in this brochure.
3. Conditional and Prohibited reptiles shall not be removed from the area alive.
4. Shooting hours are ½ hour before sunrise until ½ hour after sunset.
5. Please report take and sightings of non-native reptiles at 888-IVE-GOT1 (888-483-4681) or online at IveGot1.org.

General Information:
1. Information for persons with disabilities can be found at MyFWC.com/ADA.
2. If you have any questions about this material, please call the FWC at 561-625-5122 (TDD 800-955-8771).
3. The FWC is not responsible for protection of personal property and will not be liable for theft of or damage to personal property.
4. Please report the location of any sick or extremely skinny deer to the Chronic Wasting Disease hotline, toll free at 866-293-9282.

South Florida Water Management District Information:
This land was acquired under the Save Our Rivers program. The purpose of Save Our Rivers is to conserve and protect unique and irreplaceable lands, restore areas to their original condition as much as possible, and allow controlled multiple recreational and educational

uses consistent with this purpose.

Cooperation Requested:
*If you see law violators or suspicious activities, contact your nearest Commission regional office or call 888-404-FWCC (*FWC or #FWC may also be used depending on your phone service provider). You may qualify for a cash reward from the Wildlife Alert Reward Association.*
The U.S. Department of the Interior prohibits discrimination on the basis of race, color, national origin, age, sex or disability. If you believe that you have been discriminated against in any program, activity or facility as described above, or if you desire further information, please write to: The Office for Human Resources, U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C. 20240. The project described in this publication is part of a program funded by federal dollars under the Wildlife Restoration Act. Federal funds pay 20 percent of the cost of the program.



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APPENDIX F

Lease Agreement and Legal Description of Leased Premises

CUL Cover Sheet

DM ID _____

Document Type: Current Uplands Leases

Instrument: [X] Parent Lease [ ] Amendment to Lease [ ] Assignment of Lease

[ ] Release [ ] Partial Release [ ] Easement [ ] Use Agreement [ ] Sublease

[ ] Amendment to Sublease [ ] Release of Sublease [ ] Other

Lease Number: 003981

Document Date: 12 - 15 - 1993

Original County: Collier

Section: 34 and 03

Township: 47 S 48 S

Range: 27 E 27 E

Total Area / Area Unit: 640. (A) Acreage (S) Square Feet

County Book / Page / Type: _____ / B _____ / P _____ / _____

Instrument Number: _____

Comments:

The information on this page was collected during the prep phase of scanning and is an aide for data entry. Please refer to the document for actual information.

(1) 3981

OAL8101

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND
OF THE STATE OF FLORIDA

LEASE AGREEMENT

Lease No. 3981

THIS LEASE AGREEMENT, made and entered into this 15th day of December 19 93, between the BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA hereinafter referred to as "LESSOR", and the SOUTH FLORIDA WATER MANAGEMENT DISTRICT, hereinafter referred to as "LESSEE".

LESSOR, for and in consideration of mutual covenants and agreements hereinafter contained, does hereby lease to said LESSEE the lands described in paragraph 2 below, together with the improvements thereon, and subject to the following terms and conditions:

1. DELEGATIONS OF AUTHORITY: LESSOR'S responsibilities and obligations herein shall be exercised by the Division of State Lands, Department of Environmental Protection.

2. DESCRIPTION OF PREMISES: The property subject to this lease, is situated in the County of Collier, State of Florida and is more particularly described in Exhibit "A" attached hereto and hereinafter referred to as the "leased premises".

3. TERM: The term of this lease shall be for a period of fifty (50) years commencing on December 1, 1993 and ending on November 30, 2043, unless sooner terminated pursuant to the provisions of this lease.

4. PURPOSE: The LESSEE shall manage the leased premises only for the establishment and operation of the Corkscrew Regional Ecosystem Watershed (CREW) Save Our Rivers Project, along with other related uses necessary for the accomplishment of this purpose as designated in the Management Plan required by paragraph 8 of this lease.

5. QUIET ENJOYMENT AND RIGHT OF USE: LESSEE shall have the right of ingress and egress to, from and upon the leased

premises for all purposes necessary to the full quiet enjoyment by said LESSEE of the rights conveyed herein.

6. UNAUTHORIZED USE: LESSEE shall, through its agents and employees, prevent the unauthorized use of the leased premises or any use thereof not in conformance with this lease.

7. ASSIGNMENT: This lease shall not be assigned in whole or in part without the prior written consent of LESSOR. Any assignment made either in whole or in part without the prior written consent of LESSOR shall be void and without legal effect.

8. MANAGEMENT PLAN: LESSEE shall prepare and submit a Management Plan for the leased premises, in accordance with Chapters 18-2 and 18-4, Florida Administrative Code, within 12 months of the effective date of this lease. The Management Plan shall be submitted to LESSOR for approval through the Division of State Lands. The leased premises shall not be developed or physically altered in any way other than what is necessary for security and maintenance of the leased premises without the prior written approval of LESSOR until the Management Plan is approved. LESSEE shall provide LESSOR with an opportunity to participate in all phases of preparing and developing the Management Plan for the leased premises. The Management Plan shall be submitted to LESSOR in draft form for review and comments within ten months of the effective date of this lease. LESSEE shall give LESSOR reasonable notice of the application for and receipt of any state, federal or local permits as well as any public hearings or meetings relating to the development or use of the leased premises. LESSEE shall not proceed with development of said leased premises including, but not limited to, funding, permit application, design or building contracts, until the Management Plan required herein has been submitted and approved. Any financial commitments made by LESSEE which are not in compliance with the terms of this lease shall be done at LESSEE'S own risk. The Management Plan shall emphasize the original management concept as approved by LESSOR on the effective date of this lease which established the primary public purpose for which the leased premises are to be managed. The approved Management Plan shall

provide the basic guidance for all management activities and shall be reviewed jointly by LESSEE and LESSOR at least every five (5) years. LESSEE shall not use or alter the leased premises except as provided for in the approved Management Plan without the prior written approval of LESSOR. The Management Plan prepared under this lease shall identify management strategies for exotic species, if present. The introduction of exotic species is prohibited, except when specifically authorized by the approved Management Plan.

9. EASEMENTS: All easements including, but not limited to, utility easements are expressly prohibited without the prior written approval of LESSOR. Any easement not approved in writing by LESSOR shall be void and without legal effect.

10. SUBLEASES: This agreement is for the purposes specified herein and subleases of any nature are prohibited, without the prior written approval of LESSOR. Any sublease not approved in writing by LESSOR shall be void and without legal effect.

11. RIGHT OF INSPECTION: LESSOR or its duly authorized agents, representatives or employees shall have the right at any and all times to inspect the leased premises and the works and operations of LESSEE in any matter pertaining to this lease.

12. PLACEMENT AND REMOVAL OF IMPROVEMENTS: All buildings, structures, improvements, and signs shall be constructed at the expense of LESSEE in accordance with plans prepared by professional designers and shall require the prior written approval of LESSOR as to purpose, location and design. Further, no trees, other than non-native species, shall be removed or major land alterations done without the prior written approval of LESSOR. Removable equipment and removable improvements placed on the leased premises by LESSEE which do not become a permanent part of the leased premises will remain the property of LESSEE and may be removed by LESSEE upon termination of this lease.

13. INSURANCE REQUIREMENTS: During the term of this lease LESSEE shall procure and maintain policies of fire, extended risk, and liability insurance coverage. The extended risk and

fire insurance coverage shall be in an amount equal to the full insurable replacement value of any improvements or fixtures located on the leased premises. The liability insurance coverage shall be in amounts not less than $100,000.00 per occurrence and $200,000.00 per accident for personal injury, death, and property damage on the leased premises. Such policies of insurance shall name LESSOR, the State of Florida and LESSEE as co-insureds. LESSEE shall submit written evidence of having procured all insurance policies required herein prior to the effective date of this lease and shall submit annually thereafter, written evidence of maintaining such insurance policies to the Bureau of Land Management Services, Division of State Lands, Department of Environmental Protection, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399. LESSEE shall purchase all policies of insurance from a financially-responsible insurer duly authorized to do business in the State of Florida. LESSEE shall immediately notify LESSOR and the insurer of any erection or removal of any building or other improvement on the leased premises and any changes affecting the value of any improvements and shall request the insurer to make adequate changes in the coverage to reflect the changes in value. In the alternative LESSEE may, at LESSEE'S option, self-insure all improvements and fixtures located upon the leased premises on an "all risk" basis, based upon full insurable replacement value, and may also self-insure as to liability coverage in accordance with Section 768.28, Florida Statutes, in amounts of not less than $100,000 per person and $200,000 per occurance for injury, death and property damage. The LESSEE shall provide the LESSOR with a certificate of self-insurance reflecting such coverage. LESSEE shall be financially responsible for any loss due to failure to obtain or provide adequate insurance coverage, and the failure to maintain such policies or certificate in the amounts set forth shall constitute a breach of this lease.

14. LIABILITY: To the extent permitted by Florida Law, LESSEE shall assist in the investigation of injury or damage claims either for or against LESSOR or the State of Florida

pertaining to LESSEE'S respective areas of responsibility under this lease or arising out of LESSEE'S respective management programs or activities and shall contact LESSOR regarding the legal action deemed appropriate to remedy such damage or claims.

15. PAYMENT OF TAXES AND ASSESSMENTS: LESSEE shall assume full responsibility for and shall pay all liabilities that accrue to the leased premises or to the improvements thereon, including any and all ad valorem taxes and drainage and special assessments or taxes of every kind and all mechanic's or materialman's liens which may be hereafter lawfully assessed and levied against the leased premises.

16. NO WAIVER OF BREACH: The failure of LESSOR to insist in any one or more instances upon strict performance of any one or more of the covenants, terms and conditions of this lease shall not be construed as a waiver of such covenants, terms or conditions, but the same shall continue in full force and effect, and no waiver of LESSOR of any of the provisions hereof shall in any event be deemed to have been made unless the waiver is set forth in writing, signed by LESSOR.

17. TIME: Time is expressly declared to be of the essence of this lease.

18. NON DISCRIMINATION: LESSEE shall not discriminate against any individual because of that individual's race, color, religion, sex, national origin, age, handicap, or marital status with respect to any activity occurring within the leased premises or upon lands adjacent to and used as an adjunct of the leased premises.

19. UTILITY FEES: LESSEE shall be responsible for the payment of all charges for the furnishing of gas, electricity, water and other public utilities to the leased premises and for having all utilities turned off when the leased premises are surrendered.

20. MINERAL RIGHTS: This lease does not cover petroleum or petroleum products or minerals and does not give the right to LESSEE to drill for or develop the same, and LESSOR specifically reserves the right to lease the leased premises for purpose of

exploring and recovering oil and minerals by whatever means appropriate; provided, however, that LESSEE named herein shall be fully compensated for any and all damages that might result to the leasehold interest of said LESSEE by reason of such exploration and recovery operations.

21. RIGHT OF AUDIT: LESSEE shall make available to LESSOR all financial and other records relating to this lease, and LESSOR shall have the right to either audit such records at any reasonable time or require the submittal of an annual independent audit by a Certified Public Accountant during the term of this lease. This right shall be continuous until this lease expires or is terminated. This lease may be terminated by LESSOR should LESSEE fail to allow public access to all documents, papers, letters or other materials made or received in conjunction with this lease, pursuant to the provisions of Chapter 119, Florida Statutes.

22. CONDITION OF PREMISES: LESSOR assumes no liability or obligation to LESSEE with reference to the condition of the leased premises. The leased premises herein are leased by LESSOR to LESSEE in an "as is" condition, with LESSOR assuming no responsibility for the care, repair, maintenance or improvement of the leased premises for the benefit of LESSEE.

23. COMPLIANCE WITH LAWS: LESSEE agrees that this lease is contingent upon and subject to LESSEE obtaining all applicable permits and complying with all applicable permits, regulations, ordinances, rules, and laws of the State of Florida or the United States or of any political subdivision or agency of either.

24. NOTICE: All notices given under this lease shall be in writing and shall be served by certified mail including, but not limited to, notice of any violation served pursuant to 253.04, Florida Statutes, to the last address of the party to whom notice is to be given, as designated by such party in writing. LESSOR and LESSEE hereby designate their address as follows:

LESSOR: Department of Environmental Protection
Division of State Lands
Bureau of Land Management Services
3900 Commonwealth Boulevard
Tallahassee, Florida 32399

LESSEE: South Florida Water Management District
Land Management Department
Real Estate Division
3301 Gun Club Road
Post Office Box 24680
West Palm Beach, Florida 33416-4680

25. BREACH OF COVENANTS, TERMS, OR CONDITIONS: Should LESSEE breach any of the covenants, terms, or conditions of this lease, LESSOR shall give written notice to LESSEE to remedy such breach within sixty (60) days of such notice. In the event LESSEE fails to remedy the breach to the satisfaction of LESSOR within sixty (60) days of receipt of written notice, LESSOR may either terminate this lease and recover from LESSEE all damages LESSOR may incur by reason of the breach including, but not limited to, the cost of recovering the leased premises and attorneys' fees or maintain this lease in full force and effect and exercise all rights and remedies herein conferred upon LESSOR.

26. DAMAGE TO THE PREMISES: LESSEE agrees that it will not do, or suffer to be done, in, on or upon the leased premises or as affecting said leased premises, any act which may result in damage or depreciation of value to the leased premises, or any part thereof. LESSEE shall not dispose of any contaminants including, but not limited to, hazardous or toxic substances, chemicals or other agents used or produced in LESSEE'S operations, on the leased premises or on any adjacent state land or in any manner not permitted by law.

27. SURRENDER OF PREMISES: Upon termination or expiration of this lease, LESSEE shall surrender the leased premises to LESSOR. In the event no further use of the leased premises or any part thereof is needed, LESSEE shall give written notification to LESSOR and the Bureau of Land Management Services, Division of State Lands, Department of Environmental Protection, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399 at least six (6) months prior to the release of any or all of the leased premises. Notification shall include a legal description, this lease number, and an explanation of the release. The release shall only be valid if approved by LESSOR

through the execution of a release of lease instrument with the same formality as this lease. Upon release of all or any part of the leased premises or upon termination or expiration of this lease, all improvements, including both physical structures and modifications to the leased premises shall become the property of LESSOR, unless LESSOR gives written notice to LESSEE to remove any or all such improvements at the expense of LESSEE. The decision to retain any improvements upon termination or expiration of this lease shall be at LESSOR'S sole discretion. Prior to surrender of all or any part of the leased premises a representative of the Division of State Lands shall perform an on-site inspection and the keys to any building on the leased premises shall be turned over to the Division. If the improvements, do not meet all conditions as set forth in paragraphs 19 and 35 herein, LESSEE shall pay all costs necessary to meet the prescribed conditions.

28. BEST MANAGEMENT PRACTICES: LESSEE shall implement applicable Best Management Practices for all activities conducted under this lease in compliance with paragraph 18-2.004(1)(d), Florida Administrative Code, which have been selected, developed, or approved by LESSOR or other land managing agencies for the protection and enhancement of the leased premises.

29. PROHIBITIONS AGAINST LIENS OR OTHER ENCUMBRANCES: Fee title to the leased premises is held by LESSOR. LESSEE shall not do or permit anything to be done which purports to create a lien or encumbrance of any nature against the real property contained in the leased premises including, but not limited to, mortgages or construction liens against the leased premises or against any interest of LESSOR therein.

30. PARTIAL INVALIDITY: If any term, covenant, condition or provision of this lease shall be ruled by a court of competent jurisdiction, to be invalid, void, or unenforceable, the remainder shall remain in full force and effect and shall in no way be affected, impaired or invalidated.

31. ARCHAEOLOGICAL AND HISTORIC SITES: Execution of this lease in no way affects any of the parties' obligations pursuant

to Chapter 267, Florida Statutes. The collection of artifacts or the disturbance of archaeological and historic sites on state-owned lands is prohibited unless prior authorization has been obtained from the Department of State, Division of Historical Resources. The Management Plan prepared pursuant to Chapters 18-2 and 18-4, Florida Administrative Code, shall be reviewed by the Division of Historical Resources to insure that adequate measures have been planned to locate, identify, protect and preserve the archaeological and historic sites and properties on the leased premises.

32. SOVEREIGNTY SUBMERGED LANDS: This Lease does not authorize the use of any lands located waterward of the mean or ordinary high water line of any lake, river, stream, creek, bay, estuary, or other water body or the waters or the air space thereabove.

33. DUPLICATE ORIGINALS: This lease is executed in duplicate originals each of which shall be considered an original for all purposes.

34. ENTIRE UNDERSTANDING: This lease sets forth the entire understanding between the parties and shall only be amended with the prior written approval of LESSOR.

35. MAINTENANCE OF IMPROVEMENTS: LESSEE shall maintain the real property contained within the leased premises and any improvements located thereon, in a state of good condition, working order and repair including, but not limited to, keeping the leased premises free of trash or litter, maintaining all planned improvements as set forth in the approved Management Plan, meeting all building and safety codes in the location situated and maintaining any and all existing roads, canals, ditches, culverts, risers and the like in as good condition as the same may be on the effective date of this lease.

36. GOVERNING LAW: This lease shall be governed by and interpreted according to the laws of the State of Florida.

37. SECTION CAPTIONS: Articles, subsections and other captions contained in this lease are for reference purposes only and are in no way intended to describe, interpret, define or

limit the scope, extent or intent of this lease or any provisions thereof.

IN WITNESS WHEREOF, the parties have caused this lease to be executed on the day and year first above written.

(SEAL)

Odessa Hunter
Witness

Witness

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA

By: Daniel T. Crabb (SEAL)
CHIEF, BUREAU OF LAND MANAGEMENT SERVICES, DIVISION OF STATE LANDS, DEPARTMENT OF ENVIRONMENTAL PROTECTION

"LESSOR"

STATE OF FLORIDA
COUNTY OF LEON

The foregoing instrument was acknowledged before me this 15th day of December 1993, by Daniel T. Crabb, as Chief, BLMS, Division of State Lands, Department of Environmental Protection, personally known to me and who did not take an oath.

Sylvia V. Scott
Notary Public, State of Florida
Printed, typed or stamped name: Sylvia V. Scott
Commission No. CC295550
My Commission Expires: July 25, 1997

SYLVIA V. SCOTT NOTARY PUBLIC STATE OF FLORIDA MY COMMISSION EXPIRES JUN 25 1997 BONDED THRU TROY FAIN INSURANCE, INC.

BOARD OF SOUTH FLORIDA WATER MANAGEMENT DISTRICT STATE OF FLORIDA SEAL Established 1949 GOVERNING

Approved as to Form and Legality
By: Susan Brandes
DEP Attorney

Witness

Witness

Attest:
Assistant, SECRETARY

SOUTH FLORIDA WATER MANAGEMENT DISTRICT, BY ITS GOVERNING BOARD

By: Valerie Boyd (SEAL)
VALERIE BOYD, CHAIRMAN

STATE OF FLORIDA
COUNTY OF PALM BEACH

The foregoing instrument was acknowledged before me this 14th day of October 1993, by Valerie Boyd, as Chairman Of The Governing Board of the South Florida Water Management District, who is/are personally known to me and who did/(did not) take an oath.

(SEAL)

Doris E. Gash
Notary Public, State of Florida
Printed, typed or stamped name: Doris E. Gash
Commission No. CC124465
My Commission Expires:

NOTARY PUBLIC STATE OF FLORIDA MY COMMISSION EXP. AUG. 11,1995 BONDED THRU GENERAL INS. UND.

Approved as to Form and Legality
By: Scott A. Glass 9/22/93

My Commission Expires:

EXHIBIT "A"

LEGAL DESCRIPTION OF THE LEASED PREMISES

The West ½ of Section 34, Township 47 South, Range 27 East; and the West ½ of Section 03, Township 48 South, Range 27 East, containing approximately 640 acres, more or less.

110270.0
110280.0

LEGAL DESCRIPTION
APPROVED Betty Lou Dankman
DATE September 20, 1993

This instrument prepared by:
Jay Sircy,
Department of Environmental Protection
Bureau of Public Administration
Division of State Lands
3900 Commonwealth Blvd. MS 130
Tallahassee, Florida 32399-3000
AID #25069
ATL1
[620.05 acres]

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA

AMENDMENT NUMBER ONE TO LEASE NUMBER 3981

THIS LEASE AMENDMENT is entered into this 6 day of July, 2015, by and between the **BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA**, hereinafter referred to as "LESSOR" and the **SOUTH FLORIDA WATER MANAGEMENT DISTRICT**, a government entity created by Chapter 373, Florida Statutes, hereinafter referred to as "LESSEE";

WITNESSETH:

WHEREAS, LESSOR, by virtue of Section 253.03, Florida Statutes, holds title to certain lands and property for the use and benefit of the State of Florida; and

WHEREAS, on December 15, 1993, LESSOR and LESSEE entered into Lease Number 3981 (the "lease"); and

WHEREAS, LESSOR and LESSEE desire to amend the lease to add land to the leased premises.

NOW THEREFORE, in consideration of the mutual covenants and agreements contained herein, the parties hereto agree as follows:

1. The legal description of the leased premises set forth in Exhibit "A" of Lease Number 3981 is hereby amended to include the real property described in Exhibit "A1", hereby created and made a part of this Amendment Number ONE.

2. It is understood and agreed by LESSOR and LESSEE that in each and every respect the terms of Lease Number 3981, except as amended, shall remain unchanged and in full force and effect and the same are hereby ratified, approved and confirmed by LESSOR and LESSEE as of the date of this amendment.

3. It is understood and agreed by LESSOR and LESSEE that this Amendment Number ONE to Lease Number 3981 is hereby binding upon the parties hereto and their successors and assigns.

[*Remainder of page intentionally left blank; Signature page follows*]

IN WITNESS WHEREOF, the parties have caused this easement to be executed on the day and year first above written.

WITNESSES:

Dave Fewell
Original Signature

DAVE FEWELL
Print/Type Name of Witness

Kelley C Griffin
Original Signature

Kathy C Griffin
Print/Type Name of Witness

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA

(SEAL)

BY: Cheryl CMC Call

Cheryl C. McCall, Chief, Bureau of Public Land Administration, Division of State Lands, State of Florida Department of Environmental Protection, as agent for and on behalf of the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida

"LESSOR"

STATE OF FLORIDA
COUNTY OF LEON

The foregoing instrument was acknowledged before me this 6th day of July, 2015, by Cheryl C. McCall, Chief, Bureau of Public Land Administration, Division of State Lands, State of Florida Department of Environmental Protection, as agent for and on behalf of the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida. She is personally known to me.

APPROVED SUBJECT TO PROPER EXECUTION:

6/15/15
DEP Attorney Date

David Lee Fewell
Notary Public, State of Florida

Printed, Typed or Stamped Name

My Commission Expires:

DAVID LEE FEWELL
MY COMMISSION # FF 039635
EXPIRES: July 24, 2017
Bonded Thru Notary Public Underwriters

Commission/Serial No.

WITNESSES:

Original Signature

Typed/Printed Name of Witness

Original Signature

Typed/Printed Name of Witness

SOUTH FLORIDA WATER MANAGEMETN DISTRICT,
a government entity created by Chapter 373, Florida Statutes

BY: _____
Dan O'Keefe, Chairman

"LESSEE"

STATE OF LORIDA
COUNTY OF PALM BEACH

The foregoing instrument was acknowledged before me this 26th day of June, 2015, by Dan O'Keefe, Chairman, who is personally known to me or has produced N/A, as identification, for and on behalf of the South Florida Water Management District, a government entity created by Chapter 373, Florida Statutes.

My Commission Expires:

BRENDA E. LOW
MY COMMISSION EXPIRES
February 27, 2019
#FF 176176
Bonded thru
Troy Fain-Insurance
NOTARY PUBLIC STATE OF FLORIDA

Commission/Serial No. _____

Signature of Notary Public

Notary Public, State of FLORIDA

Brenda E Low
Printed, Typed or Stamped Name

SFWMD PROCUREMENT APPROVED _____ 6/17/15

SFWMD OFFICE OF COUNSEL APPROVED _____

x 6260

EXHIBIT " A"

This [redacted]nstrument Prepared By and Please Return To:
Joseph R. Boyd, Esquire
Tallahassee Title Group, LLC
1407 Piedmont Drive East
Tallahassee, Florida 32308

INSTR 5078766 OR 5116 PG 1389
RECORDED 1/29/2015 3:22 PM PAGES 5
DWIGHT E. BROCK, CLERK OF THE CIRCUIT COURT
COLLIER COUNTY FLORIDA
DOC@.70 $0.00 REC $44.00
CONS $9,765,000.00

THIS INSTRUMENT IS EXEMPT FROM DOCUMENTARY STAMP TAXES PURSUANT TO CHAPTER 201.02(6), FLORIDA STATUTES.

WARRANTY DEED
(STATUTORY FORM - SECTION 689.02, F.S.)

THIS INDENTURE, made this 28th day of January, A.D. 2015, between **THE TRUST FOR PUBLIC LAND, a non-profit California corporation**, whose address is 306 N. Monroe St., Tallahassee, FL 32301, grantor, and the **BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA**, whose post office address is c/o Florida Department of Environmental Protection, Division of State Lands, 3900 Commonwealth Boulevard, Mail Station 115, Tallahassee, FL 32399-3000, grantee.

(Wherever used herein the terms "grantor" and "grantee" include all the parties to this instrument and their heirs, legal representatives, successors and assigns. "Grantor" and "grantee" are used for singular and plural, as the context requires and the use of any gender shall include all genders.)

WITNESSETH: That the said grantor, for and in consideration of the sum of Ten Dollars and other good and valuable considerations, to said grantor in hand paid by said grantee, the receipt whereof is hereby acknowledged, has granted, bargained and sold to the said grantee, and grantee's successors and assigns forever, the following described land situate, lying and being in Collier County, Florida, to-wit:

See Exhibit "A" attached hereto and by reference made a part hereof.

Property Appraiser's Parcel Identification Number: 00113400005 and 00209280003

This conveyance is subject to easements, restrictions, limitations and conditions of record if any now exist, but any such interests that may have been terminated are not hereby re-imposed.

This property is not the homestead property of the grantor, nor contiguous to homestead property, as such homestead is defined under Florida law.

AND the said grantor does hereby fully warrant the title to said land, and will defend the same against the lawful claims of all persons whomsoever.

IN WITNESS WHEREOF the grantor has hereunto set grantor's hand and seal, the day and year first above written.

Signed, sealed and delivered in the presence of:

(signature)
(Signature of first Witness)

J. Alex Gaid
(Printed, typed or stamped name of first Witness.)

(signature)
(Signature of second Witness)

Stacy S. Gaylhart
(Printed, typed or stamped name of second witness)

THE TRUST FOR PUBLIC LAND, a non-profit California corporation

BY: Peter Fodor

Peter Fodor
Division Legal Director

(CORPORATE SEAL)

Page 4 of 8
Amendment Number One to Lease No. 3981
Revised 05/13

STATE OF FLORIDA _____
COUNTY OF LEON _____

The foregoing instrument was acknowledged before me this 28th day of January, 2015, by **Peter Fodor as Division Legal Director of THE TRUST FOR PUBLIC LAND, a non-profit California corporation, on behalf of said corporation.** Such person(s) (Notary Public must check applicable box):

[X] is personally known to me.
[ ] produced a current driver license.
[ ] produced as identification.

(SEAL)

Stacy S Gayhart
Notary Public
Stacy S Gayhart
(Printed, Typed or Stamped Name of Notary Public
Commission No.: 1389/6
My Commission Expires: 10-31-2018

STACY SAVOIE GAYHART
Notary Public - State of Florida
My Comm. Expires Oct 31, 2018
Commission # FF 138916
Bonded Through National Notary Assn.

Exhibit "A"

LEGAL DESCRIPTION

The East 1/2 of Section 34, Township 47 South, Range 27 East, and the East 1/2 of Section 3, Township 48 South, Range 27 East, Collier County, Florida less the East 50 feet thereof.

GSM APPROVED By JA Date 1/20/15

ASSIGNMENT OF LEASE

THIS ASSIGNMENT OF LEASE dated as of the 28th day of January, 2015, by and between **THE TRUST FOR PUBLIC LAND, a California non-profit corporation** ("Assignor"), and **BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA** ("Assignee").

WITNESSETH

WHEREAS, Jeffrey D. Gargiulo, as Trustee of the Trust Agreement dated May 17, 1990 ("Gargiulo"), entered into that certain Cattle Grazing Lease (the "Lease") over certain real property more particularly described therein (the "Property"), dated January 1, 2015, attached hereto as Exhibit "A" and by this reference made a part of this Assignment of Lease, and

WHEREAS, Gargiulo conveyed to Assignor the fee simple title to the Property and simultaneously assigned Gargiulo's interest in the Lease to Assignor, and

WHEREAS, in connection with a sale of the Property by Assignor to Assignee, Assignor desires to assign to Assignee, and Assignee hereby agrees to assume all rights and obligations of the Assignor, if any, under the Lease arising on or after the date hereof; and

WHEREAS, Assignee and its successors or assigns, acknowledge and agree that Assignor makes no warranty of any kind, express or implied regarding the Lease or any interests related thereto. The intent of this assignment of lease is simply to transfer any interest Assignor may have in the agreement, and Assignee hereby acknowledges that Assignor may have no interest in the lease.

NOW, THEREFORE, for and in consideration of the sum of Ten Dollars ($10.00) and other valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Assignor hereby unconditionally sets over, transfers, and assigns to Assignee all of Assignor's right, title and interest in and to the Lease.

TO HAVE AND TO HOLD unto the said Assignee and Assignee's successors and assigns forever.

IN WITNESS WHEREOF, Assignor and Assignee have hereunto set their hands and seals effective on the day and year first above mentioned.

Signed, sealed and delivered
in the presence of:

Signature of First Witness

J. ALEX GRID
Printed Name of First Witness

Signature of Second Witness

Shirley S. Graybart
Printed Name of Second Witness

ASSIGNOR:
The Trust for Public Land, a nonprofit California corporation

By: Peter Fodor
Its: Division Legal Director

1/28/15

Signed, sealed and delivered
in the presence of:

Signature of First Witness

Printed Name of First Witness

Signature of Second Witness

Printed Name of Second Witness

ASSIGNEE:
Board of Trustees of the Internal
Improvement Trust Fund of the State of Florida

By Division of State Lands of the Florida
Department of Environmental Protection

By: Kelley Boree
Its: Director

STATE OF FLORIDA
COUNTY OF LEON

The foregoing instrument was sworn to, subscribed and acknowledged before me this 28th day of January, 2015 by Peter Fodor, as Division Legal Director of The Trust for Public Land, on behalf of said corporation. He is personally known to me or has produced N/A as identification.

STACY SAVOIE GAYHART
Notary Public - State of Florida
My Comm. Expires Oct 31, 2018
Commission # FF 138916
Bonded Through National Notary Assn.

Notary Public

(Notary Public Seal)

STATE OF FLORIDA
COUNTY OF LEON

The foregoing instrument was sworn to, subscribed and acknowledged before me this 28 day of January, 2015 by Kelley Boree as Director of Division of State Lands. He is personally known to me or has produced as identification.

Notary Public

(Notary Public Seal)

SHERYL P. BOUTIN
Commission # EE 852257
Expires May 3, 2015
Bonded Thru Troy Fain Insurance 800-385-7019

C-12548

OAL2

260 Acres

BOARD OF TRUSTEES OF THE INTERNAL
IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA

LEASE AGREEMENT

CORKSCREW REGIONAL ECOSYSTEM WATERSHED

Lease No. 4223

THIS LEASE AGREEMENT, made and entered into this 29th day of November 2000, by and between the BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA hereinafter referred to as "LESSOR," and the SOUTH FLORIDA WATER MANAGEMENT DISTRICT, hereinafter referred to as "LESSEE."

LESSOR, for and in consideration of mutual covenants and agreements hereinafter contained, does hereby lease to said LESSEE, the lands described in paragraph 2 below, together with the improvements thereon, and subject to the following terms and conditions:

1. DELEGATIONS OF AUTHORITY: LESSOR'S responsibilities and obligations herein shall be exercised by the Division of State Lands, Department of Environmental Protection.

2. DESCRIPTION OF PREMISES: The property subject to this Lease, is situated in the County of Lee, State of Florida and is more particularly described in Exhibit "A" attached hereto and hereinafter called the "Leased Premises".

LESSOR AND LESSEE acknowledged and agree that, during the term of this Lease (i) LESSOR may acquire additional lands located within the boundaries of the Corkscrew Regional Ecosystem Watershed (hereinafter referred to as the "Project), which lands are not included in the legal description of the Leased Premises attached hereto as Exhibit "A", and (ii) the parties hereto may desire to amend this Lease to include such additional lands within the Leased Premises. In order to provide for the interim management by LESSEE of such additional lands prior to a formal amendment of this Lease to include such lands within the Leased Premises, LESSOR and LESSEE agree that LESSEE shall manage the additional

properties pursuant to the terms and conditions set forth in Exhibit "B" attached hereto (hereinafter referred to as the "Management Agreement"). Notwithstanding anything contained herein to the contrary, LESSEE's interim management of the additional properties pursuant to the Management Agreement shall commence upon the acquisition by LESSOR of such properties and terminate upon the earlier of (i) the amendment of the Lease to include such properties within the Leased Premises as provided in paragraph 42 hereinafter or (ii) one year from the date of Lessor's acquisition of each such property, unless extended in writing by LESSOR and LESSEE. LESSOR and LESSEE hereby agree that this Lease may be amended annually, commencing one year after the effective date of this Lease, to include within the Leased Premises those properties located within the Project boundaries that have been acquired by LESSOR during the previous calendar year.

3. TERM: The term of this Lease shall be for a period of fifty (50) years commencing on November 29, 2000 and ending on November 28, 2050 unless sooner terminated pursuant to the provisions of this Lease.

4. PURPOSE: LESSEE shall manage the Leased Premises only for the conservation and protection of natural and historical resources and for resource based public outdoor activities and education which are compatible with the conservation and protection of these public lands, as set forth in subsection 259.032(11), Florida Statutes, along with other related uses necessary for the accomplishment of this purpose as designated in the Management Plan required by paragraph 8 of this Lease.

5. QUIET ENJOYMENT AND RIGHT OF USE: LESSEE shall have the right of ingress and egress to, from and upon the Leased Premises for all purposes necessary to the full quiet enjoyment by said LESSEE of the rights conveyed herein.

6. UNAUTHORIZED USE: LESSEE shall, through its agents and employees, use its best efforts to prevent the unauthorized use of the Leased Premises or any use thereof not in conformity with this Lease.

7. ASSIGNMENT: This Lease shall not be assigned in whole or in part without the prior written consent of LESSOR, which consent shall not be unreasonably withheld. Any assignment made either in whole or in part without the prior written consent of LESSOR shall be void and without legal effect.

8. MANAGEMENT PLAN: LESSEE shall prepare and submit a Management Plan for the Leased Premises hereinafter referred to as "Management Plan," which satisfies the requirements for such plans as set forth in subsection 18-2021(4), Florida Administrative Code, within twelve months of the effective date of this Lease. The parties hereto acknowledge and agree that submittal by LESSEE to LESSOR (through the Division of State Lands, Department of Environmental Protection as provided hereinbelow) of LESSEE'S existing Management Plan for the Corkscrew Regional Ecosystem Watershed, dated _____ within such twelve month period shall satisfy LESSEE's responsibility to submit a Management Plan to LESSOR as provided above. The Management Plan shall be submitted to LESSOR for approval through the Division of State Lands, Department of Environmental Protection. The Leased Premises shall not be developed or physically altered in any way other than what is necessary for security and maintenance of the Leased Premises without the prior written approval of LESSOR until the Management Plan is approved. LESSEE shall provide LESSOR with an opportunity to participate in all phases of preparing and developing the Management Plan for the Leased Premises. The Management Plan shall be submitted to LESSOR in draft form for review and comments within ten months of the effective date of this Lease. LESSEE shall give LESSOR reasonable notice of the application for and receipt of any state, federal or local permits as well as any public hearings or meetings relating to the development or use of the Leased Premises. LESSEE shall not proceed with development of said Leased Premises including, but not limited to, funding, permit applications, design or building contracts until the Management Plan required herein has been submitted and approved. Any financial commitments made by LESSEE which are not in compliance with the terms of this Lease shall be done at LESSEE'S own risk. The Management Plan shall emphasize the original management concept as approved by LESSOR at the time of acquisition, which established the primary public purpose for which the Leased Premises were acquired. The approved Management Plan shall provide the basic guidance for all management activities and shall be reviewed jointly by LESSEE and LESSOR at least every five years. LESSEE shall not use or alter the Leased Premises except as provided for in the approved Management Plan without the prior written approval

of LESSOR. The Management Plan prepared under this Lease shall identify management strategies for exotic species, if present. The introduction of exotic species is prohibited, except when specifically authorized by the approved Management Plan.

9. EASEMENTS: All easements including, but not limited to, utility easements are expressly prohibited without the prior written approval of LESSOR, which approval shall not be unreasonably withheld. Any easement not approved in writing by LESSOR shall be void and without legal effect.

10. SUBLEASES: This Lease is for the purposes specified herein and subleases of any nature are prohibited without the prior written approval of LESSOR, which approval shall not be unreasonably withheld. Any sublease not approved in writing by LESSOR shall be void and without legal effect.

11. RIGHT OF INSPECTION: LESSOR or its duly authorized agents, representatives or employees shall have the right to reasonably inspect the Leased Premises and the works and operations of LESSEE in any matter pertaining to this Lease.

12. PLACEMENT AND REMOVAL OF IMPROVEMENTS: All buildings, structures and improvements shall be constructed in accordance with plans that are in accordance with the approved Management Plan or shall require the prior written approval of LESSOR as to purpose, location and design which approval shall not be unreasonably withheld. Further, no trees, other than non-native species, shall be removed or major land alterations done without the prior written approval of LESSOR. Removable equipment and removable improvements placed on the Leased Premises by LESSEE which do not become a permanent part of the Leased Premises will remain the property of LESSEE and may be removed by LESSEE before or upon termination of this Lease.

13. INSURANCE REQUIREMENTS: During the term of this Lease LESSEE shall self-insure or at its option procure and maintain policies of fire, extended risk, and liability insurance coverage. The extended risk and fire insurance coverage shall be in an amount equal to the full insurable replacement value of any improvements or fixtures located on the Leased Premises. The liability insurance coverage insured or self-insured, shall be in amounts not less than $100,000 per person and $200,000 per incident or occurrence for personal injury, death, and

property damage on the Leased Premises. The property insurance shall name LESSOR, the State of Florida and LESSEE as considers. LESSEE shall submit written evidence of having procured all insurance policies required herein prior to the effective date of this Lease and shall submit annually thereafter, written evidence of maintaining such insurance to the Bureau of Public Land Administration, Division of State Lands, Department of Environmental Protection, Mail Station 130, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000. LESSEE shall purchase all policies of insurance from a financially responsible insurer duly authorized to do business in the State of Florida. LESSEE shall immediately notify LESSOR and the insurer of any erection or removal of any building or other improvement on the Leased Premises and any changes affecting the value of any improvements and shall request the insurer to make adequate changes in the coverage to reflect the changes in value. LESSEE shall be financially responsible for any loss due to failure to obtain adequate insurance coverage and the failure to maintain such policies or certificate in the amount set forth shall constitute a breach of this Lease.

14. LIABILITY: Each party is responsible for all personal injury and property damage attributable to the negligent acts or omissions of that party and the officers, employees and agents thereof. Nothing herein shall be construed as an indemnity or a waiver of sovereign immunity enjoyed by any party hereto, as provided in Section 768.28, Florida Statutes, as amended from time to time, or any other law providing limitations on claims.

15. PAYMENT OF TAXES AND ASSESSMENTS: LESSEE shall assume full responsibility for and shall pay all taxes, assessments, liens or other similar liabilities that accrue to the Leased Premises or to the improvements thereon arising during the term of this Lease, including any and all ad valorem taxes and drainage and special assessments or personal property taxes of every kind and all construction or materialman's liens which may be hereafter lawfully assessed and levied against the Leased Premises subsequent to the effective date of this Lease. In no event shall the LESSEE be held liable for such liabilities, which arose prior to the effective date of this Lease.

16. NO WAIVER OF BREACH: The failure of LESSOR to insist in any one or more instances upon strict performance of any one or more of the covenants, terms and conditions of this Lease shall not be construed as a waiver of such covenants, terms or conditions, but the same shall continue in full force and effect, and no waiver of LESSOR of any of the provisions hereof shall in any event be deemed to have been made unless the waiver is set forth in writing, signed by LESSOR.

17. TIME: Time is expressly declared to be of the essence of this Lease.

18. NON-DISCRIMINATION: LESSEE shall not discriminate against any individual because of that individual's race, color, religion, sex, national origin, age, handicap, or marital status with respect to any activity occurring within the Leased Premises or upon lands adjacent to and used as an adjunct of the Leased Premises.

19. UTILITY FEES: LESSEE shall be responsible for the payment of all charges for the furnishing of gas, electricity, water and other public utilities to the Leased Premises and for having the utilities turned off when the Leased Premises are surrendered.

20. MINERAL RIGHTS: This Lease does not cover petroleum or petroleum products or minerals and does not give the right to LESSEE to drill for or develop the same.

21. RIGHT OF AUDIT: LESSEE shall make available to LESSOR all financial and other records relating to this Lease, and LESSOR shall have the right to audit such records at any reasonable time during the term of this Lease. This right shall be continuous until this Lease expires or is terminated. This Lease may be terminated by LESSOR should LESSEE fail to allow public access to all documents, papers, letters or other materials made or received in conjunction with this Lease, pursuant to the provisions of Chapter 119, Florida Statutes.

22. CONDITION OF PREMISES: LESSOR assumes no liability or obligation to LESSEE with reference to the conditions of the Leased Premises. The Leased Premises herein are leased by LESSOR to LESSEE in an "as is" condition, with LESSOR assuming no responsibility for the care, repair, maintenance or improvement of the Leased Premises for the benefit of LESSEE.

23. COMPLIANCE WITH LAWS: LESSEE agrees that this Lease is contingent upon and subject to LESSEE obtaining all applicable permits and complying with all applicable permits, regulations, ordinances, rules, statutes, and laws of the State of Florida or the United States or of any political subdivision or agency of either.

24. NOTICE: All notices given under this Lease shall be in writing and shall be served by certified mail including, but not limited to, notice of any violation served pursuant to Section 253.04, Florida Statutes, to the last address of the party to whom notice is to be given, as designated by such party in writing. LESSOR and LESSEE hereby designate their address as follows:

LESSOR: Department of Environmental Protection
Division of State Lands
Bureau of Public Land Administration
Mail Station 130
3800 Commonwealth Boulevard,
Tallahassee, Florida 32399-3000

LESSEE: South Florida Water Management District
3301 Gun Club Road, P.O. Box 24680
West Palm Beach, Florida 33416-4680

25. BREACH OF COVENANTS, TERMS, OR CONDITIONS: Should LESSEE breach any of the covenants, terms, or conditions of this Lease, LESSOR shall give written notice to LESSEE to remedy such breach within sixty days of LESSEE's receipt of such notice. In the event LESSEE fails to remedy the breach to the satisfaction of LESSOR within sixty days of receipt of written notice, LESSOR may either terminate this Lease and recover from LESSEE all damages LESSOR may incur by reason of the breach including, but not limited to, the cost of recovering the Leased Premises and attorneys' fees or maintain this Lease in full force and effect and exercise all rights and remedies herein conferred upon LESSOR.

26. DAMAGE TO THE PREMISES: (a) LESSEE shall not do, or suffer to be done, in, on or upon the Leased Premises or as affecting said Leased Premises or adjacent

properties in which LESSEE has an interest (i.e., fee or easement interest), any act which may result in damage or depreciation of value to the Leased Premises or adjacent properties, or any part thereof. (b) LESSEE shall not generate, store, produce, place, treat, release or discharge any contaminants, pollutants, or pollution, including, but not limited to, hazardous or toxic substances, chemicals or other agents on, into, or from the Leased Premises or any adjacent lands or waters in any manner not permitted by law. For the purposes of this Lease, "hazardous substances" shall mean and include those elements or compounds defined in 42 USC Section 9601 or which are contained in the list of hazardous substances adopted by the United States Environmental Protection Agency (EPA) and the list of toxic pollutants designated by the United States Congress or the EPA or defined by any other federal, state or local statute, law, ordinance, code, rule, regulation, order or decree regulating, relating to, or imposing liability or standards of conduct concerning any hazardous, toxic or dangerous waste, substance, material, pollutant or contaminant. "Pollutants" and "pollution" shall mean those products or substances defined in Chapters 376 and 403, Florida Statutes, and the rules promulgated thereunder, all as amended or updated from time to time. In the event of LESSEE's failure to comply with this paragraph, LESSEE shall, at its sole cost and expense, promptly commence and diligently pursue any legally required closure, investigation, assessment, cleanup, decontamination, remediation, restoration and monitoring of (1) the Leased Premises, and (2) all off-site ground and surface waters and lands affected by LESSEE's such failure to comply, as may be necessary to bring the Leased Premises and affected off-site waters and lands into full compliance with all applicable federal, state or local statutes, laws, ordinances, codes, rules, regulations, orders and decrees. LESSEE'S obligations set forth in this paragraph shall survive the termination or expiration of this Lease. This paragraph shall not be construed as a limitation upon LESSEE'S obligations as set forth in paragraph 14 of this Lease, nor upon any other obligations or responsibilities of LESSEE as set forth herein. Nothing herein shall relieve LESSEE of any responsibility or liability prescribed by law for fines, penalties and damages levied by governmental agencies, and the cost of cleaning up any contamination caused

directly or indirectly by LESSEE'S activities or facilities. Upon discovery of a release of a hazardous substance or pollutant, or any other violation of local, state or federal law, ordinance, code, rule, regulation, order or decree relating to the generation, storage, production, placement, treatment, release or discharge of any contaminant, LESSEE shall report such violation to all applicable governmental agencies having jurisdiction, and to LESSOR, all within the reporting periods of the applic.. .e governmental agencies. This paragraph shall not be deemed to apply to any conditions existing prior to the effective date of this Lease.

27. ENVIRONMENTAL AUDIT: At LESSOR'S discretion, LESSEE shall provide LESSOR with a current Phase I environmental site assessment conducted in accordance with the Department of Environmental Protection, Division of State Land's standards prior to termination of this Lease, and, if deemed necessary by Lessor, a Phase II environmental site assessment.

28. SURRENDER OF PREMISES: Upon termination or expiration of this Lease, LESSEE shall surrender the Leased Premises to LESSOR. In the event no further use of the Leased Premises or any part thereof is needed, LESSEE shall give written notification to the Bureau of Public Land Administration, Division of State Lands, Department of Envir .mental Protection, Mail Station 130, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000, at least six months prior to the release of any or all of the Leased Premises. Notification shall include a legal description, this lease number, and an explanation of the release. The release shall only be valid if approved by LESSOR through the execution of a release of lease instrument with the same formality as this lease. Upon release of all or any part of the Leased Premises or upon termination or expiration of this Lease, all permanent/capital improvements, including both physical structures and modifications to the Leased Premises, shall become the property of LESSOR, unless LESSOR gives written notice to LESSEE to remove any or all such improvements at the expense of LESSEE. The decision to retain any improvements upon termination of this Lease shall be at LESSOR'S sole discretion. Prior to surrender of all or any part of the Leased Premises a representative of the Division of State Lands, Department of Environmental Protection, shall

perform an on-site inspection and the keys to any building on the Leased Premises shall be turned over to the Division.

29. BEST MANAGEMENT PRACTICES: LESSEE shall implement applicable Best Management Practices for all activities conducted under this Lease in compliance with paragraph 18-2.018(2)(h), Florida Administrative Code, which have been selected, developed, or approved by LESSOR, LESSEE or other land managing agencies for the protection and enhancement of the Leased Premises.

30. PUBLIC LANDS ARTHROPOD CONTROL PLAN: LESSEE shall identify and subsequently designate to the respective arthropod control district or districts within one year of the effective date of this Lease all of the environmentally sensitive and biologically highly productive lands contained within the Leased Premises, in accordance with Section 388.4111, Florida Statutes and Chapter 5E-13, Florida Administrative Code, for the purpose of obtaining a public lands arthropod control plan for such lands.

31. PROHIBITIONS AGAINST LIENS OR OTHER ENCUMBRANCES: Fee title to the Leased Premises is held by LESSOR. LESSEE shall not do or permit anything to be done which purports to create a lien or encumbrance of any nature against the real property contained in the Leased Premises including, but not limited to, mortgages or construction liens against the Leased Premises or against any interest of LESSOR therein.

32. PARTIAL INVALIDITY: If any term, covenant, condition or provision of this Lease shall be ruled by a court of competent jurisdiction to be invalid, void, or unenforceable, the remainder of the provisions shall remain in full force and effect and shall in no way be affected, impaired or invalidated.

33. ARCHAEOLOGICAL AND HISTORIC SITES: The collection of artifacts or the disturbance of archaeological and historic sites on state-owned lands is prohibited unless prior authorization has been obtained from the Department of State, Division of Historical Resources. The Management Plan prepared pursuant to Chapter 18-2, Florida Administrative Code, shall be reviewed by the Division of Historical Resources to insure that adequate measures have been planned to locate, identify, protect and preserve the archaeological and historic sites and properties on the Leased Premises.

34. SOVEREIGNTY SUBMERGED LANDS: This Lease does not authorize the use of any lands located waterward of the mean or ordinary high water line of any lake, river, stream, creek, bay, estuary, or other water body or the waters or the air space thereabove.

35. ENTIRE UNDERSTANDING: This Lease sets forth the entire understanding between the parties and shall only be amended with the prior written approval of LESSOR.

36. MAINTENANCE OF IMPROVEMENTS: LESSEE shall maintain the real property contained within the Leased Premises and the improvements located thereon, in a state of good condition, working order and repair including, but not limited to, keeping the leased premises free of trash or litter, meeting all building and safety codes for the location situated, maintaining the planned improvements as set forth in the approved Management Plan and maintaining any and all existing roads, canals, ditches, culverts, risers and the like in as good condition as the same may be on the effective date of this Lease, reasonable wear and tear excepted; provided, however, that any removal, closure, etc, of the above improvements shall be acceptable when the proposed activity is consistent with the goals of conservation, protection, enhancement, or safety of the natural and historical resources within the Leased Premises and with the approved Management Plan.

37. GOVERNING LAW: This Lease shall be governed by and interpreted according to the laws of the State of Florida.

38. SIGNS: LESSEE shall ensure that the area is identified as being publicly owned and operated as a public facility in all signs, literature and advertising. If federal grants or funds are used by LESSEE for any project on the Leased Premises LESSEE shall erect signs identifying the Leased Premises as a federally assisted project.

39. SECTION CAPTIONS: Articles, subsections and other captions contained in this Lease are for reference purposes only and are in no way intended to describe, interpret, define or limit the scope, extent or intent of this Lease or any provisions thereof.

40. ADMINISTRATIVE FEE: LESSEE shall pay LESSOR an annual administrative fee of $300. The initial annual administrative fee shall be payable within thirty days from the date of execution of this Lease Agreement and shall be prorated based on the number of months or fraction thereof remaining in the fiscal year of execution. For purposes of this Lease Agreement, the fiscal year shall be the period extending from July 1 to June 30. Each annual payment thereafter shall be due and payable on July 1 of each subsequent year. .

41. COUNTERPARTS: This Lease may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. A facsimile copy of this Lease and any signatures hereon shall be considered for all purposes as originals.

42. AMENDMENTS: This Lease may be amended, including any amendments to add additional properties to the legal description of the Leased Premises as referenced in paragraph 2 hereinabove, only upon the written approval of both LESSOR AND LESSEE.

IN WITNESS WHEREOF, the parties have caused this Lease to be executed on the day and year first above written.

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA

Judy Woodard
Witness

Judy Woodard
Print/Type Witness Name

Florence Davis
Witness

Florence Davis
Print/Type Witness Name

By: Gloria C. Nelson (SEAL)
GLORIA C.NELSON, OPERATIONS AND MANAGEMENT CONSULTANT MANAGER, BUREAU OF PUBLIC LAND ADMINISTRATION DIVISION OF STATE LANDS, DEPARTMENT OF ENVIRONMENTAL PROTECTION

"LESSOR"

STATE OF FLORIDA
COUNTY OF LEON

The foregoing instrument was acknowledged before me this 29th day of November 2000, by Gloria C. Nelson, as Operations and Management Consultant Manager, Bureau of Public Land Administration, Division of State Lands, Department of Environmental Protection, as agent for and on behalf of the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida, who is personally known to me.

Cheryl J. King
Notary Public, State of Florida

Print/Type Notary Name

Commission Number:

Commission Expires:

CHERYL J. KING
MY COMMISSION # CC 852921
EXPIRES: November 7, 2003
Bonded Thru Notary Public Underwriters

Approved as to
Form and Legality

By: _____
DEP Attorney

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Witness
PAULA MOREE
Print/Type Name

Witness
LINDA HUMMEL
Print/Type Name

Witness
Joan Bartley
Print/Type Witness Name

Witness
Linda Green
Print/Type Witness Name

By: _____
MICHAEL COLLINS
Print/Type Name

Title: Chairman, Governing Board

Attested to:

By: _____
Anthony Burns
Print/Type Name

Title: Assistant Secretary

Legal Form Approved
SFWMD Office of Counsel

By _____ Date 10-10-00

STATE OF FLORIDA
COUNTY OF PALM BEACH

The foregoing instrument was acknowledged before me this 7th day of NOVEMBER 2000, by MICHAEL COLLINS as Chairman, Governing Board, South Florida Water Management District, who is personally known to me or who has produced _____ as identification, and by _____, as Assistant Secretary, Govrerning Board, South Florida Water Management District, who is personally known to me or who has produced _____ as identification.

(SEAL)

Paula Moree
Notary Public, State of Florida

PAULA MOREE
Type Notary Name

Paula Moree
MY COMMISSION # CC738264 EXPIRES
August 8, 2002
BONDED THRU TROY FAIN INSURANCE, INC.

Commission Number: CC738264

Commission Expires: 8/8/02