Habitat Management Priorities for the Eastern Black Rail

Florida

Last Updated May 6, 2025

Black Rail. David Arkin, McCaulay Library

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INTRODUCTION

Purpose of the Document

The Federally-designated Threatened Eastern Black Rail (*Laterallus jamaicensis jamaicensis*) has experienced precipitous population declines over the past 30 years, primarily due to sea level rise and associated nest flooding (U.S. Fish and Wildlife Service [USFWS] 2019). The northern portion of the subspecies' Atlantic Coast range has experienced the most severe declines, including a 450-km range contraction (Watts 2016). Many of the remaining Black Rail along the Atlantic Coast reside in coastal salt marshes, where they are vulnerable to sea level rise, tropical storms, and hurricanes.

The Eastern Black Rail is secretive and rarely seen. Will Sweet, McCaulay Library

Florida is particularly important for the conservation of Black Rail. The State contains the largest remaining population along the Atlantic Coast (Watts 2016). This is due, in part, to Florida's great diversity and extent of non-tidal habitats that lessen the species' reliance on tidal salt marsh within the state.

The purpose of the document is to identify priority areas for Black Rail in Florida and priority, site specific, near-term management actions that partners can take to conserve the species. This document steps down from more general planning efforts (Atlantic Coast Joint Venture [ACJV] 2020, USFWS recovery documents). We intend for this to be a living document that provides up-to-date information for planners and managers.

ACJV Black Rail Objectives

The ACJV's Black Rail Conservation Plan (ACJV 2020) includes a long-term goal of 2,500 pairs within the ACJV by 2055, including a goal of 1,400 pairs in Florida. The plan also identifies state-by-state population and habitat goals for the species (Table 1). Habitat goals in Table 1 are the minimum acres of habitat (defined below) needed to support the state's population goal. *Please note that the population estimate below may change as the USFWS Species Status Assessment is updated.*

Table 1. Population and habitat goals for the Eastern Black Rail in Florida (ACJV 2020).

	2016 Population Estimate*	Percent of Atlantic Coast Population	2056 Population Goal (pairs)	2056 Non-tidal habitat objective (ac)**	2056 Tidal habitat objectives (ac)	2056 total habitat objectives (ac)
Florida	200-500	59.8%	1,450	4,168	4,168	8,336

**From Watts (2016).*
*** Acreages were calculated by multiplying the number of breeding pairs by the average home range size of Black Rail in the ACJV area (5.75 acres).*

Black Rail Habitat and Distribution in Florida

Black Rail have been detected in saltwater, brackish, and freshwater marshes with shallow water, dense herbaceous cover, and little woody cover. Topographic highs and lows provide drier spots during wet periods and wet spots during drier periods. Black Rail are extremely secretive and difficult to study, and we still have much to learn regarding optimal habitat conditions to support stable or growing populations. Watts (2022) recommended the following targets for managers:

- Shallow water (moist soil to 3 cm depth) covering 50% of the habitat patch area, with > 0.5 ha/territory.
- Herbaceous cover 0.5 to 1.5 m tall covering > 70% of the patch area.
- Woody cover < 20%.
- Within the wetland, > 5 topographic highs greater than normal high water.

(A) Black Rail choose areas with dense herbaceous cover, like this Cutthroat grass (Coleataenia abscissa) in Central Florida. (B) Bunch-forming species create "rail trails" that allow Black Rail to move and forage under dense overhead cover. Black Rail use areas with (C) moist soil, as pictured in this tidal salt marsh, or (D) shallow water, as pictured in this marl prairie. First photo is by Jessica Hinson/USFWS, and the other three are by Craig Faulhaber/USFWS

Ideal habitat also has a 50-100 m buffer of dense herbaceous cover and tends to be greater than 100-m distance from forest edge. In Florida, suitable conditions occur within a variety of natural communities (Appendix 1). For more information on these natural communities, please see Kawula and Redner (2018) or the Florida Natural Areas Inventory's natural community accounts. Black Rail detections occur most often in the following:

Salt marshes: Black Rail use the highest elevations within tidally-influenced salt marshes on Florida's Gulf Coast and on Merritt Island on the Atlantic Coast. Black Rail detections often occur in areas dominated by cordgrasses (*Spartina* sp.) and, on portions of the Gulf Coast, by black needlerush (*Juncus romerianus*).

Floodplain marsh: Black Rail use marshes dominated by sand cordgrass (*Spartina bakeri*) on either side of the St. Johns River within its upper basin, often near salt pannes. Hydrology is driven by rainfall within the basin. It is possible that Black Rail also may occupy floodplain marshes along other river systems in Florida.

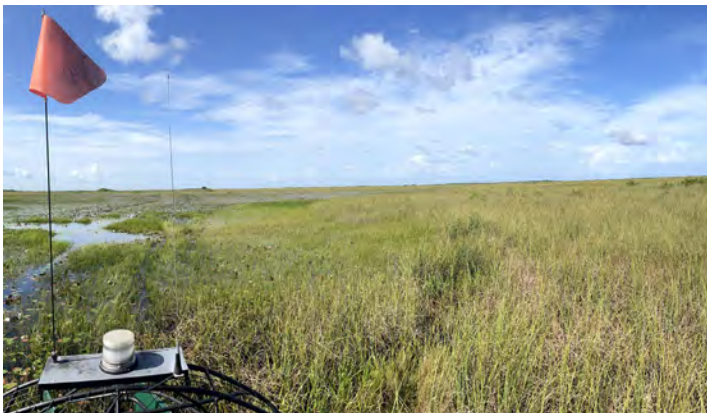
Marl prairie: This South Florida graminoid-dominated freshwater marsh community contains a diverse assemblage of plants on calcitic soils , with species such as short-form sawgrass (*Cladium jamaicense*), muhly grass (*Muhlenbergia* spp.), and sand cordgrass providing potential habitat for Black Rail. Water levels are sheet-flow driven and seasonal, with marl prairies inundated for two to four months of the year.

Glades marsh: This natural community in South Florida is characterized by broad, shallow sheet flow wetlands. In many areas, slightly higher "ridges" support dense sawgrass and tree islands, with deeper sloughs supporting sawgrass and emergent plants. Other areas contain flatter sawgrass plains. Water levels vary seasonally and can be deep at times, with tree islands likely providing upland refugia for species like Black Rail. In some areas, peat soils can delaminate from the limestone bedrock during the wet season, creating vegetated floating islands. Black Rail have been detected on the sawgrass ridges and floating islands.

Black needlerush provides habitat for Black Rail in the microtidal salt marshes along Florida's Gulf Coast. USFWS

Black Rail use this flood plain marsh dominated by sand cordgrass with a salt panne at St. Johns NWR. USFWS

Marl prairie at Big Cypress National Preserve. USFWS



Glades marsh, with sawgrass ridges (right) and sloughs (left) in Francis S. Taylor Everglades Wildlife Management Area. USFWS

Depression marshes and wet prairies: Depression marshes are isolated, mostly herbaceous, seasonally-inundated wetlands. Wet prairies, which are found between depression marshes (or other wetlands) and uplands, often are saturated but only occasionally inundated. Rainfall drives hydrology in both communities. Black Rail have been detected in these wetland types in Central and South Florida when conditions are favorable, but little is known about Black Rail habitat use and spatial dynamics in those landscapes.

Black Rail sometimes occur in wet prairies and depression marshes (left) embedded within dry prairie (right) in Central Florida. USFWS

Cutthroat seeps and cutthroat grass flatwoods: Black Rail have been detected in natural communities dominated by endemic cutthroat grass (*Coleataenia abscissa*) along the Lake Wales Ridge, where water seeps out from the sandy ridge onto areas of lower elevation.

Along the Lakes Wales Ridge, wetlands dominated by cutthroat grass can provide the shallow water and dense herbaceous cover needed by Black Rail. Jessica Hinson/FWS.

Area Identification and Prioritization Process

In the absence of a comprehensive, statewide survey of potential Black Rail habitat, we used survey locations selected by experts as a proxy. We obtained known survey locations from partners and buffered the locations by 5 km to identify public conservation lands within a reasonable dispersal distance (Hall et al. 2018) of those locations. Using Florida's Cooperative Land Cover Map (Appendix 1) and satellite imagery, we eliminated properties within the 5 km buffer that did not appear to contain potential habitat. Additionally, we considered properties with incidental observations and eBird records when establishing our initial list of properties. We then used a simple decision tree (Appendix 2) and feedback from partners to revise our list of properties, identify Priority Areas and Areas for Further Exploration, and to discuss Priority Areas in a series of partner workshops.

> **Priority Areas** are those identified as important for near-term Black Rail habitat enhancement, restoration, and/or creation.
>
> **Areas for Further Exploration** are those identified by the partner group as worthy of future evaluation for Black Rail potential.

We chose to organize the document into four chapters, with each chapter organized according to properties with similar geographic location, natural communities, and ecological processes. Each chapter has maps depicting Priority Areas and Areas for Further Exploration. In the maps in this document, "herbaceous wetlands" refer to land cover classes in Appendix 1 (derived from Kawula and Redner [2018] and using data from Florida's Cooperative Land Cover Map). This document will be updated over time to reflect additional expert input, new data, changes in species conservation status, and implementation efforts that represent collective progress toward habitat goals.

Acreages for each property in this document were derived from the Florida Natural Areas Inventory's Florida Conservation Lands layer. For properties with multiple, disjunct tracts, maps and acreages typically reflect only the tracts with potential habitat

Salters Creek, North Carolina. USFWS

Management Technique Definitions

The following management techniques are mentioned repeatedly throughout this document, including the Attributes section for each area summary, to provide users of this plan with a menu of appropriate management options at a selected area. ***This information is meant to identify opportunity and potential for these management techniques at each site but is not meant to be prescriptive.*** When in doubt, partners were encouraged to select "yes" for a particular technique. A formal site assessment and design is always necessary to identify specific next steps and management/restoration strategies within each parcel.

Additional ecological assessment needed
Additional monitoring and site assessment to determine specific next steps or assess existing restoration efforts at a site.

Facilitated marsh migration
Active management to promote/accelerate marsh migration through modification of the environment.

Land acquisition / protection - existing marsh
Protect (in fee or easement) land with existing marsh.

Land acquisition / protection - marsh migration
Protect (in fee or easement) land to allow for eventual marsh migration.

Living shoreline development
Development of nature-based features (e.g., vegetation, oyster reefs) to promote shoreline stabilization.

Non-native invasive plant species mitigation (Melaleuca, torpedo grass, etc.)
Removal or mitigation of invasive plants

Repair hydrology - berm, embankment, or levee
Removal or alteration of berms, stonewalls or embankments to restore hydrology of marsh platform and/or facilitate marsh migration.

Repair hydrology - ditch plugs
Adjustment of ditch plugging on marsh platform to improve hydrology.

Repair hydrology - ditches
Adjustment of human-made ditches on the marsh platform to improve hydrology.

Repair hydrology - impoundments
Management of human-created impounded wetlands, including re-topping and repair of dikes or installation, repair, or replacement of water control structures or pumps.

Repair hydrology – non-tidal restriction
Removal or modification of features altering non-tidal flow such as road crossings, culverts, bridges, etc.

Repair hydrology - tidal restriction
Removal or modification of features altering tidal flow such as road crossings, culverts, bridges, etc.

Repair hydrology - runnelling / channel creation
Modification of marsh platform using shallow channel creation to remove or prevent ground water saturation at the marsh surface that is causing marsh vegetation death and/or subsidence. Excavated peat is often reused to enhance microtopography.

Sediment modification - microtopography
Removal or rearrangement of soil within an existing wetland to create topographic highs and lows.

Sediment placement - elevation enhancement
Intentional placement of material (including beneficial use of dredged sediment) on the marsh platform to raise the marsh platform. Includes both thin-layer placement and thick-layer placement.

Stormwater Management
Address stormwater to reduce/manage excessive inputs of freshwater, nutrients, pollution, and/or sediment.

Water application – existing wetland
Application of water from an external source to optimize hydrologic and vegetation characteristics for Black Rail within an existing wetland (i.e., supplemental irrigation). This includes supplementation of water either seasonally (Hand 2023) or year-round (Lawson et al. 2022).

Wetland creation - recontouring
Removal or rearrangement of soil within a site to create a wetland at a site that was not historically a wetland.

Wetland creation - water application
Addition of water via irrigation to create a wetland at a site that was not historically a wetland.

Wildlife herbivory reduction
Removal or management of wildlife to reduce/prevent overgrazing including both non-native (e.g., hogs, horses, Sesarma crabs) and native species (e.g., deer, Uca [fiddler] crabs, geese).

Woody vegetation control
Use of prescribed fire, herbicide, flooding, or a combination thereof to remove/reduce or manage shrubs and trees.

Prescribed fire in marsh. Susan McRae

Acronyms

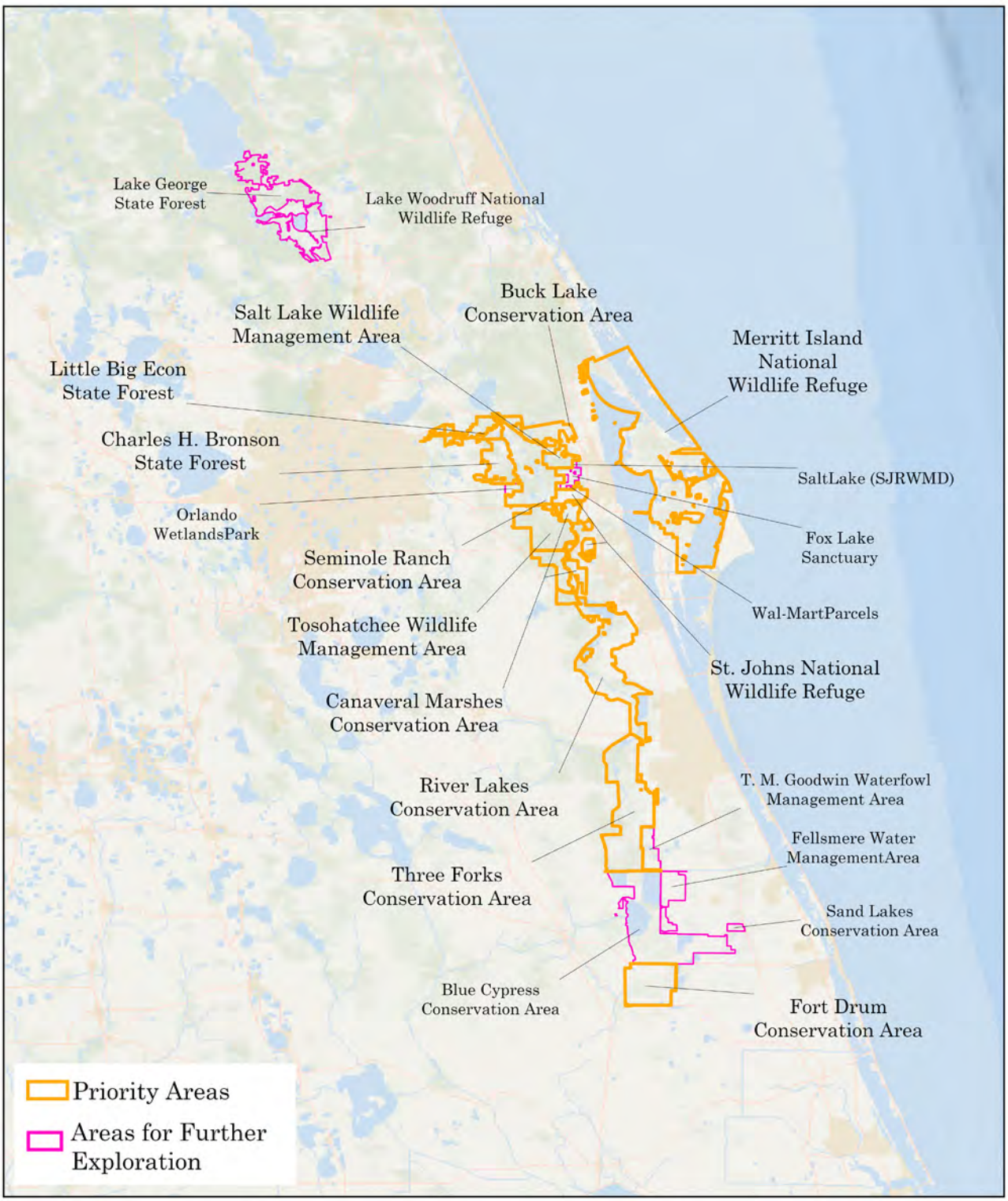
ac	Acres
ACJV	Atlantic Coast Joint Venture
ARU	Autonomous Recording Unit
ARWEA	Apalachicola River Wildlife and Environmental Area
FWC	Florida Fish and Wildlife Conservation Commission
ha	Hectares
NAWCA	North American Wetland Conservation Act
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
SFWMD	South Florida Water Management District
SJRWMD	St. Johns River Water Management District
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WMA	Wildlife Management Area

Chapter 1: Upper St. John River Basin & Merritt Island

Merritt Island marshes. Cian Fenton, Creative Commons

Priority Areas

The order of properties in this chapter starts with Merritt Island, then moves from south to north through the Upper St. Johns River Basin. Acres (ac) and hectares (ha) refer to the total size of the property.



Upper St. Johns River Basin Priority Areas and Areas for Further Exploration

Merritt Island National Wildlife Refuge - 131,704 ac (53,299 ha)

Land manager: USFWS

Point of contact: Stanley Howarter (stanley_howarter@fws.gov)

Existing Conditions

Black Rail occupy the refuge's tidal salt marshes, where the low tidal amplitude in the Indian River helps facilitate the hydrology needed by the species. Most of the refuge's roughly 26,000 acres of salt marsh were impounded in the 1950s and 1960s for mosquito control. Black Rail have consistently occupied a management unit from which the levee was removed in the 1970s. In recent years, the refuge has removed 74 additional miles of levees from other management units, though most of these units do not contain suitable habitat for Black Rail. Fifty-four of 76 impoundments remain and receive significant public use for hunting, fishing, birding, and mosquito control. The National Aeronautics and Space Administration is the landowner for this refuge, and the USFWS manages the land.

Existing Projects

The refuge burns the salt marsh on a five to seven year fire return interval. The refuge and partners recently received funding to remove an additional 8.74 miles of levees in the C20A impoundment, which would restore the hydrology to 1,450 acres of salt marsh that could provide future habitat as sea levels rise.

Black Rail Data

Black Rail have been detected at this site, most recently in 2022. Records of Black Rail on Merritt Island date back more than a century (Watts 2016). Informal surveys indicate that Black Rail have consistently occupied one of the refuge's management units in the Black Point area. The only formal, refuge-wide survey occurred in 2022. These surveys detected a Black Rail in the historic location and one other location along the west shore of the Banana River.

Recommended Next Steps to Management Action

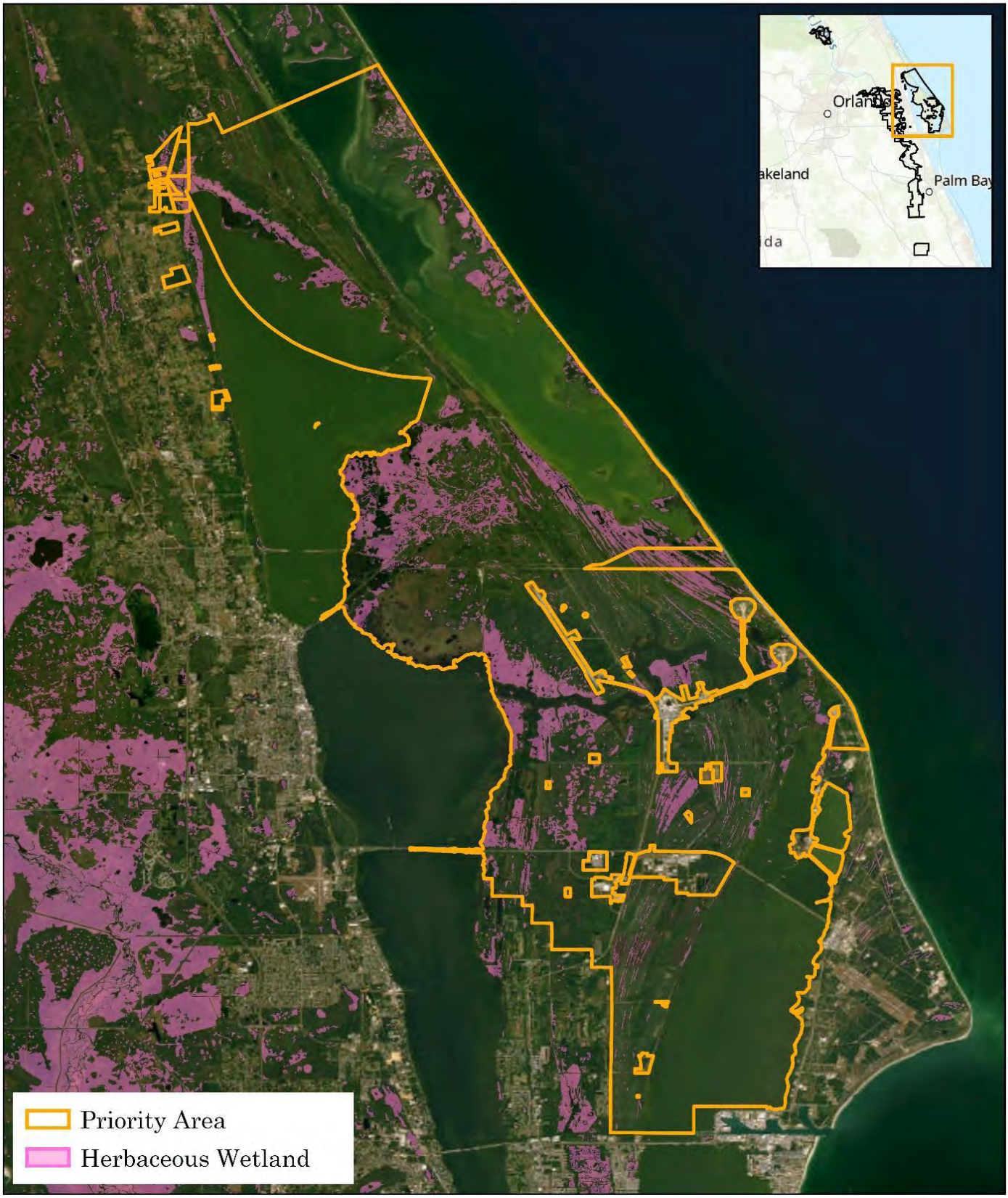
Levee removal, along with woody vegetation management, could restore additional habitat; the removal of the C20A levee provides an excellent learning opportunity. There also may be a need to fill in ditches within some impoundments. Thin layer placement of dredged material may be possible in some areas, provided appropriate sediment is identified. Invasive species, particularly Brazilian pepper (*Schinus terebinthifolia*), are an issue. There may be opportunities to facilitate marsh migration.

Merritt Island tidal salt marsh. USFWS

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	Y
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	Y
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	Y
Sediment placement - elevation enhancement	Y
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	Y
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y

Prescribed burn by Refuge staff. USFWS



Merritt Island National Wildlife Refuge

6.6 Miles

8.15 Kilometers

Fort Drum Conservation Area - 20,973 ac (8,488 ha)

Land manager: St. Johns River Water Management District

Point of contact: Jonny Baker (JaBaker@sjrwmd.com)

Existing Conditions

The roots of non-native invasive Cuban bulrush (Cyperus blepharoleptos) form floating mats that retain suitable characteristics for Black Rail, even as waters rise. USFWS

Fort Drum Marsh Conservation Area is located at the headwaters of the St. Johns River, where it plays an important role in flood control, water storage, and wetland conservation. The eastern side of the property is a mix of sawgrass and other herbaceous marsh types. Black Rail have been consistently observed adjacent to the eastern levee in recent years, where rails are taking advantage of extensive floating mats of Cuban bulrush (*Cyperus blepharoleptos*). Cuban bulrush is a non-native, invasive species, which creates challenging decisions for managers trying to balance management objectives on the property. Maintaining Black Rail habitat in this part of the property requires control of encroaching woody vegetation that grows on the Cuban bulrush mats. In the center of the property, extensive coverage of Cuban bulrush makes access difficult and complicates managers' ability to determine the extent of Black Rail occupancy. The western side of the property contains a mixture of pasture and wet and dry prairies and was under a cattle lease until recently. Levees around the property are maintained according to U.S. Army Corps of Engineers (USACE) specifications, which requires frequent woody vegetation control. Land managers have limited control over water depths, which are governed by a USACE flood control plan and the St. Johns River Water Management District's (SJRWMD) Environmental Water Control Plan (Miller et al. 2022).

Existing Projects

The marsh is burned on a four-year fire return interval. Managers treat the center and eastern portions of the property with herbicide to control invasive non-native Old World climbing fern (*Lygodium microphyllum*), Peruvian primrose-willow (*Ludwigia peruviana*), and Cuban bulrush. On the western side of the property, previous restoration efforts from 2001-2006 included hydrologic restoration via ditch plugs and breaching of levees. More recently, managers have used roller chopping to control woody vegetation in the upland portions of the cattle lease area.

Black Rail Data

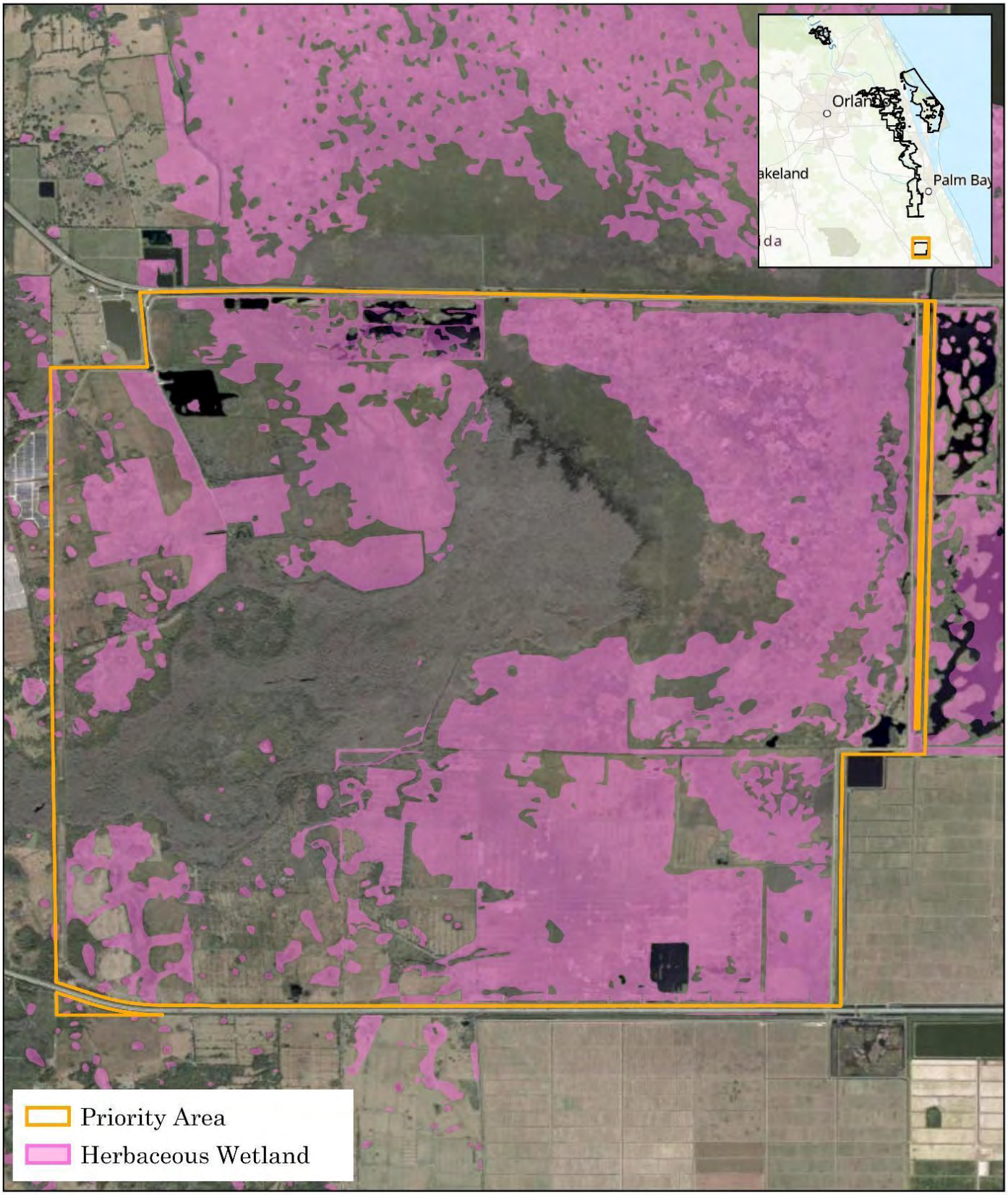
Black Rail have been detected at this site, most recently in 2024. Volunteers and Florida Fish and Wildlife Conservation Commission (FWC) staff have surveyed the eastern side from the levee monthly during the breeding season from 2019 to the present. FWC staff also surveyed portions of the western side during the breeding season from 2021 to 2023. Much of the interior of the marsh is unsurveyed due to access issues. All recent Black Rail detections have been in relatively deep marsh along the eastern levee, though SJRWMD staff reported detections of Black Rail in the south-central portion of the property in 2001. A noticeable uptick in Black Rail detections occurred during regular surveys in 2023 following a prescribed burn in early February that encompassed most of sawgrass-dominated portions of the marsh. The more than four-fold increase in the number of detections in 2023 compared to prior years was likely due to a displacement of rails from territories affected by the prescribed fire to a narrow strip of unburned marsh adjacent to the eastern levee (T. Towles, personal communication).

Recommended Next Steps to Management Action

There is a need to better understand Black Rail distribution within the property, potentially via deployment of Autonomous Recording Units (ARUs) in the interior. There also is a need to assess Black Rail use of Cuban bulrush tussocks and to identify and evaluate management alternatives to balance Black Rail habitat needs with other management objectives. Woody vegetation control along the dike will be necessary to expand and maintain Black Rail habitat here. The pastures and prairies on the western side of the project need hydrologic repairs to support Black Rail due to ditching and draining. This area could provide opportunities to expand Black Rail habitat via techniques like strategic planting of sand cordgrass, supplemental irrigation, management of ditch plugs, management of grazing pressure, and perhaps wetland creation.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	Y
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y



Fort Drum Conservation Area

1.8 Miles

2.25 Kilometers

Three Forks Conservation Area - 47,623 ac (19,272 ha)

Land manager: St. Johns River Water Management District

Point of contact: Jonny Baker (JaBaker@sjrwmd.com)

Existing Conditions

Three Forks Conservation Area plays an important role in water management and flood control, with water levels managed under a schedule from the USACE and the SJRWMD's Environmental Water Control Plan (Miller et al. 2022). The northern section of the property holds the most promise for Black Rail. A north-south levee along the C40 canal bisects this section into the river floodplain to the west and water storage and filtration areas to the east. West of the levee, the floodplain consists of a mixture of grasses and sedges along the river, with an area of sand cordgrass that extends along the river from Lake Hell'n Blazes to Sawgrass Lake. East of the levee, water storage and retention areas contain a mixture of sawgrass and open water. The southwestern corner of the property (Sixmile Creek Marsh Restoration Area) has a strip of herbaceous marsh that is worthy of future exploration, although there may be encroachment by woody vegetation.

Existing Projects

Prescribed fire and management of woody vegetation are the most common management actions. Recently, SJRWMD staff have reduced the density of cabbage palms (*Sabal palmetto*) and woody vegetation in the sand cordgrass marsh. Staff also treat invasive, non-native Peruvian primrose willow in the mixed herbaceous marsh.

Black Rail Data

SJRWMD Staff opportunistically detected a Black Rail in sawgrass within the C-1 Retention Area and in mixed herbaceous marsh within the Three Forks Marsh Conservation Area in 2003. The FWC conducted surveys in the northern section of the property in 2022 and 2023. Surveys included the water storage and retention areas and the sand cordgrass marsh. No Black Rail were detected, but surveys occurred from the levee, and surveyors did not venture into the marsh interior.

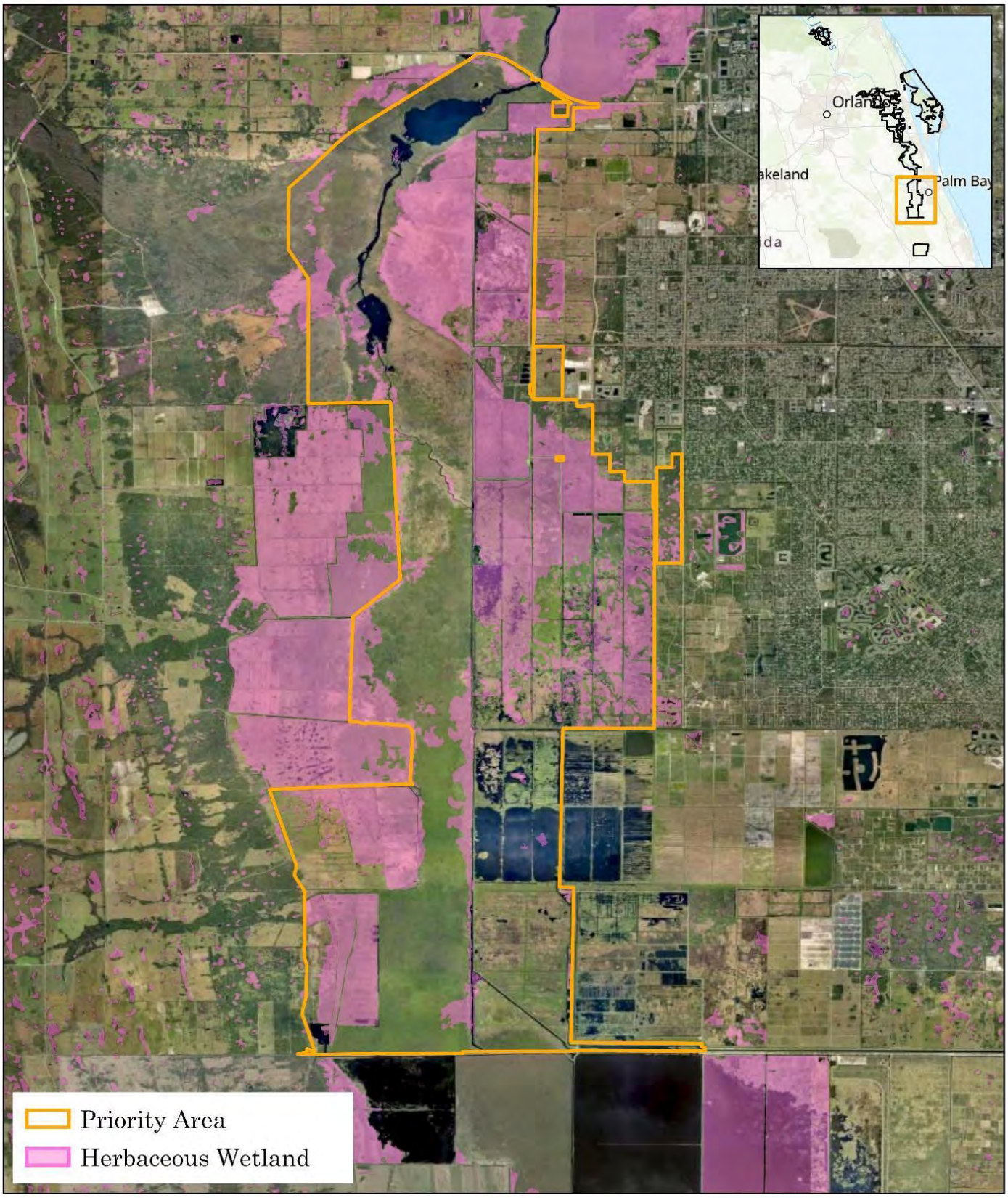
Recommended Next Steps to Management action

Control of woody vegetation and invasive, non-native plants is a persistent issue. ARUs could help determine distribution and occupancy of rails in the marsh interior. There may be some land acquisition opportunities both west and east of the property.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y

Eastern Black Rail. Ed Corey



Three Forks Conservation Area

4.3 Miles

5.25 Kilometers

River Lakes Conservation Area - 41,085 ac (16,626 ha)

Land manager: St. Johns River Water Management District

Point of contact: Jonny Baker (JaBaker@sjrwmd.com)

Existing Conditions

The 41,000-acre River Lakes Conservation Area includes approximately 28 miles of the St. Johns River. Roughly 28,000 acres are floodplain marsh with intermittent patches of potential Black Rail habitat. The most promising portion for Black Rail is the 14,000-acre Moccasin Island Marsh Restoration Area, with a mix of sand cordgrass and other grass/sedge marshes under a Natural Resources Conservation Service (NRCS) conservation easement. A cattle lease on the property overlaps with part of the Moccasin Island Marsh Restoration Area and includes areas of wet prairie and grass/sedge marsh that may have some patches of sand cordgrass. Other areas with sand cordgrass and potential for Black Rail include the northeastern portion of the property adjacent to Interstate 95 and marshes along the property boundary west of Lake Poinsett. Due to past restoration efforts, water levels across the property now fluctuate with the river. Some long, east-west canals remain for flood protection.

Existing Projects

The SJRWMD conducted extensive marsh restoration in the past. A recent cabbage palm sale in the cattle lease area has some potential to benefit rails.

Black Rail Data

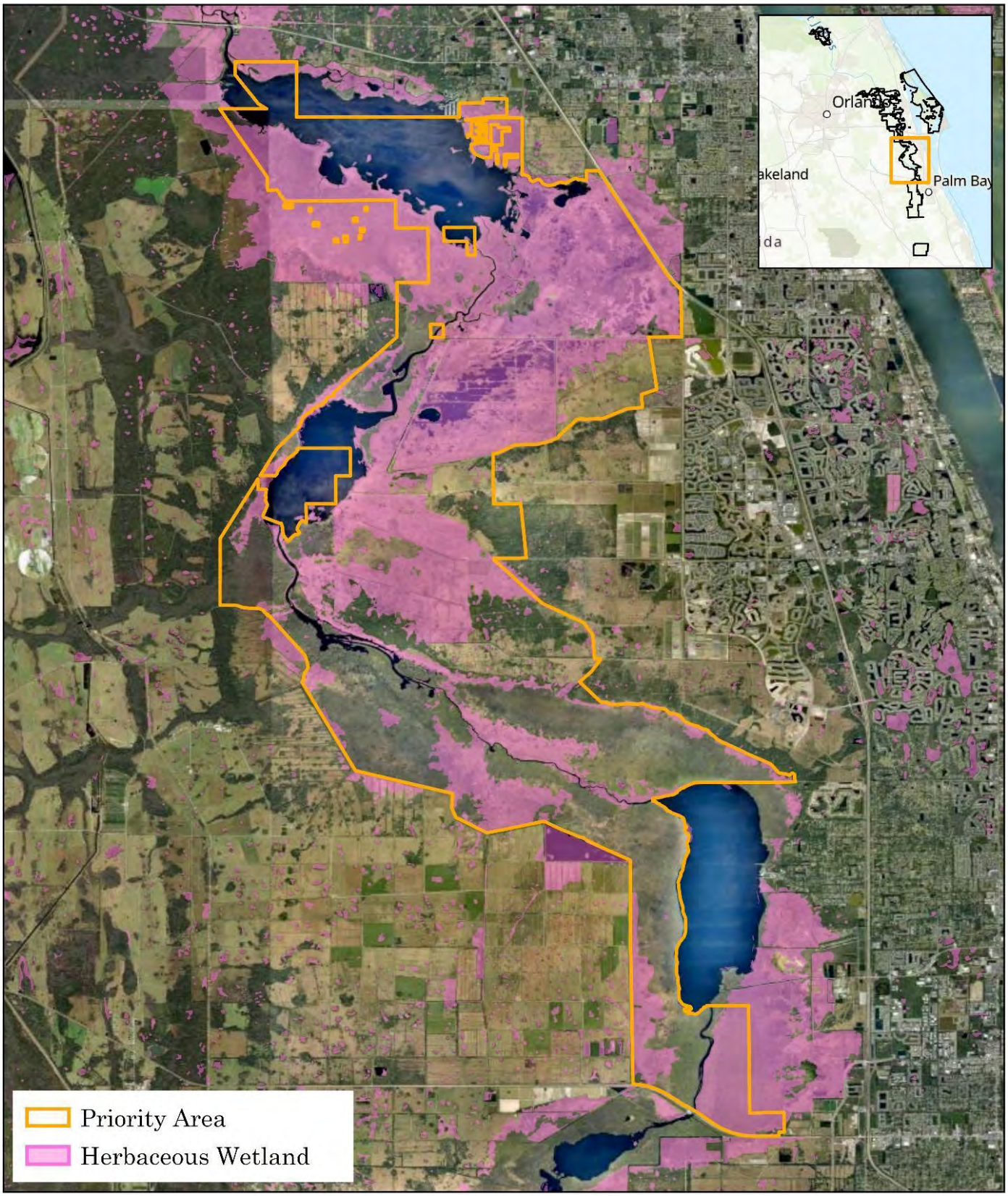
There have been no formal surveys or incidental observations of Black Rail on the property.

Recommended Next Steps to Management Action

The property has a significant amount of potential habitat but has not been surveyed for Black Rail. Woody vegetation control and invasive, non-native plant treatment are important restoration needs. The SJRWMD is interested in acquiring some areas adjacent to Interstate 95 and northeast of Lake Washington.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y



River Lakes Conservation Area

4.2 Miles

5.1 Kilometers

Tosohatchee Wildlife Management Area - 28,798 ac (11,654 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Jess Rodriguez (Jessica.Rodriguez@myfwc.com)

Existing Conditions

Tosohatchee Wildlife Management Area (WMA) contains over 10,000 acres of floodplain marsh. Some parts of the floodplain marsh are in good condition, but other parts have significant encroachment of woody vegetation. The uplands on the property have over 700 acres of depression marshes, but these are surrounded by trees (mostly cabbage palms) and are unlikely to harbor Black Rail. The floodplain tends to be narrower on the western side of the river, which may limit use by Black Rail. Since 2017, the property has had multiple prolonged flooding events, including historic flooding in 2023.

Existing Projects

FWC conducts prescribed fires and treats invasive vegetation with internal funding.

Black Rail Data

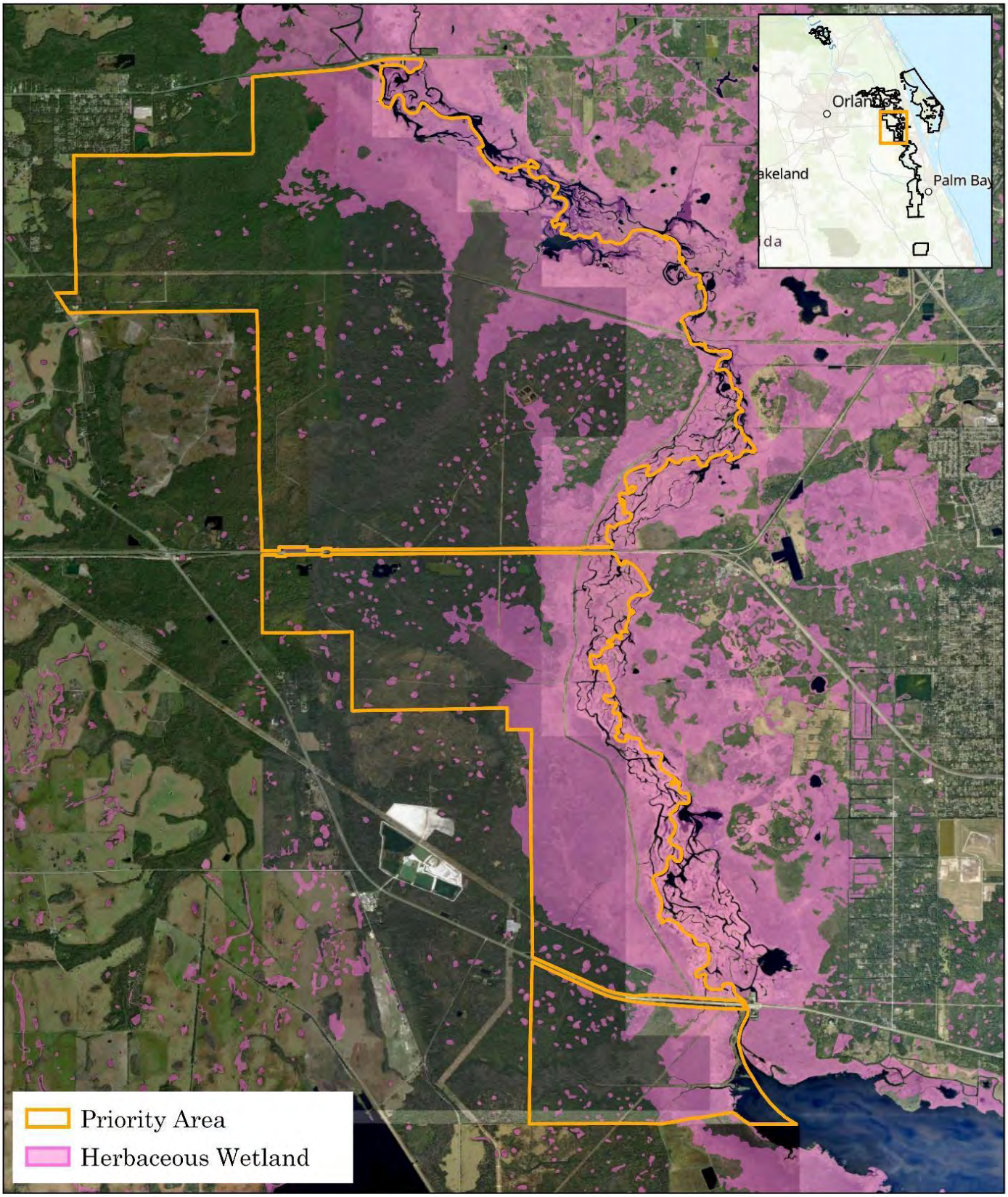
FWC staff detected Black Rail in surveys for the first time in the northern part of the property in 2024. Surveys from 2021 to 2023 produced no detections.

Recommended Next Steps to Management Action

Surveys have covered a relatively small portion of the potential habitat on the property, and FWC would like to find funding to expand BLRA monitoring, likely with ARUs due to accessibility constraints. There is a large infestation of *Melaleuca* that FWC plans to treat with internal funds. Some floodplain marsh management units require woody vegetation control via prescribed fire. An area-wide hydrological assessment needs to be completed on the WMA. This assessment will help better inform hydrology needs.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca,* etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	Y
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y



Tosohatchee Wildlife Management Area

2.95 Miles

3.6 Kilometers

Canaveral Marshes Conservation Area - 10,200 ac (4,128 ha)

Land manager: St. Johns River Water Management District

Point of contact: Graham Williams (gwilliams@sjrwmd.com)

Existing Conditions

The Canaveral Marshes Conservation Area contains nearly 10,000 acres of floodplain marsh split among several disjunct tracts. Salt pannes are present in some areas. Some of the potential Black Rail habitat is in good condition, but other areas have woody encroachment or are long unburned or disturbed. Tropical Storm Fay resulted in the loss of sand cordgrass in some areas. Some old ditches are present, as well as some areas that were converted to agriculture in the past. There are several factors that make management and monitoring challenging. First, access is difficult due to a limited number of roads, some of which are only available seasonally. Some parcels are accessible only via airboat. Second, the property has many small private inholdings that are difficult to acquire. Third, there is a narrow window for applying prescribed fire due to access limitations and to smoke management issues from adjacent roads and other infrastructure. The SJRWMD maintains three cattle leases on the property. The cattle tend to stay closer to the river rather than in the sand cordgrass.

Land managers use prescribed fire to maintain habitat at Canaveral Marshes Conservation Area. Graham Williams (SJRWMD)

Existing Projects

The property is managed with prescribed fire, with burn units on the order of 1,000 acres or more. The SJRWMD also manages the property with herbicide and mechanical treatments to control woody vegetation and maintain habitat. Restoration projects have focused on the northwestern-most parcel, where Black Rail have been detected. Land managers have implemented roller chopping of woody vegetation and large scale treatments of Brazilian pepper. In 2022, managers applied herbicide to reduce woody vegetation and cabbage palms on 300 acres as part of a Competitive State Wildlife Grant project.

Black Rail Data

Black Rail have been observed in the northwestern-most parcel in areas dominated by sand cordgrass, most recently in 2024. The first formal survey for Black Rail occurred in 2016, with opportunistic observations prior to that time. The FWC conducted call-playback surveys from 2022-2024, with Black Rail detected in 2023. Multiple ARUs were deployed at this property between 2022-2024. Black Rail were detected at 6 locations using ARUs in 2022, 2 locations in 2023 and at 8 locations in 2024.

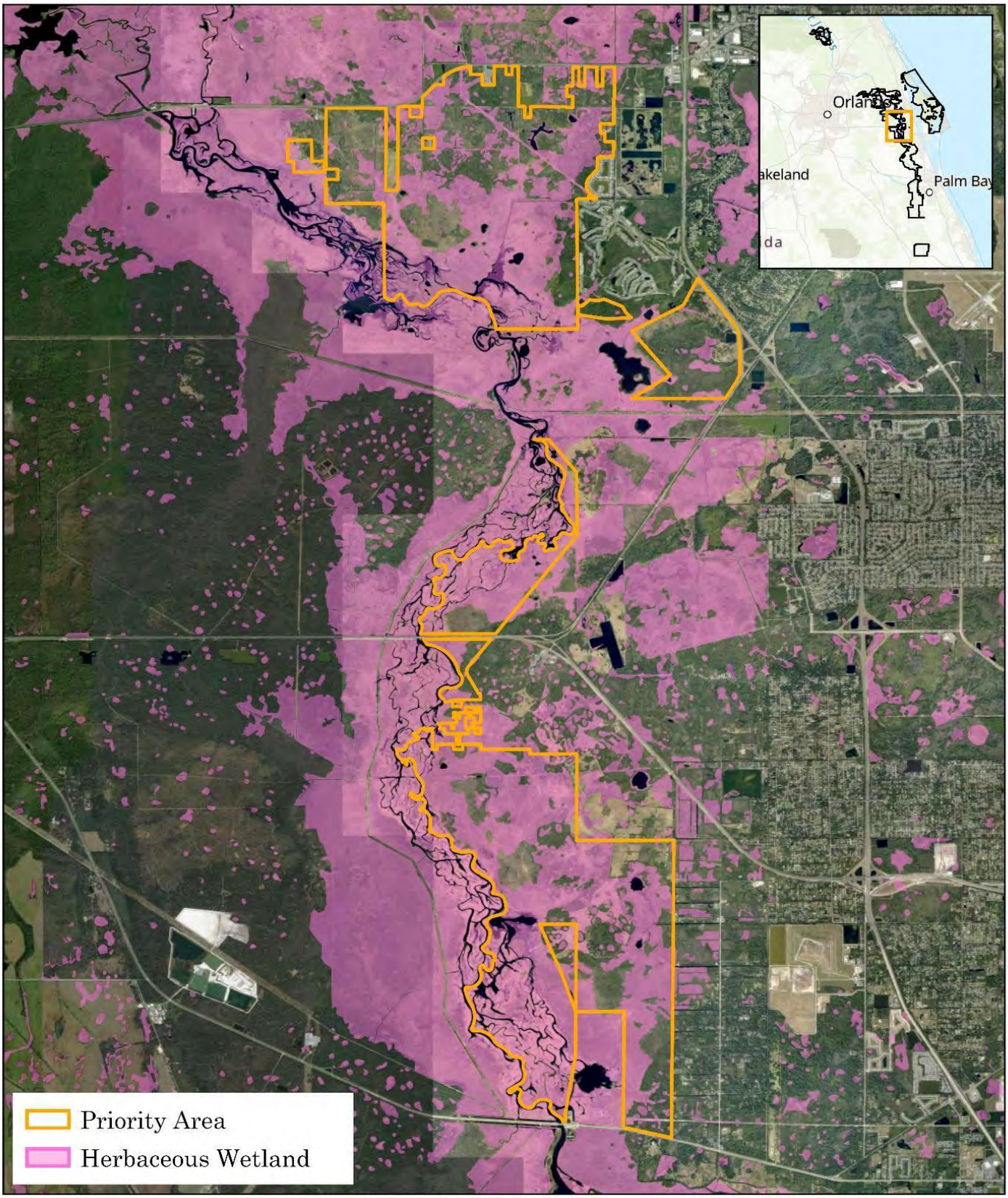
Recommended Next Steps to Management Action

Land acquisition is a top priority for this property due to inholdings that pose challenges for management. Many of the lots are small and have overseas owners, which complicates acquisition efforts. Management of shrubs and invasive non-native vegetation are a constant challenge. Surveys in the southern parcels of the property would inform Black Rail distribution and management needs. A hydrologic needs assessment is necessary to evaluate potential restoration opportunities. For example, the impact of filling ditches and removing parts of berms

(e.g., along Addison Canal) on the habitat and on adjacent lands is unclear without such an assessment. Creating topographic highs and lows carries the risk of invasive non-native plants, so this restoration action is warranted only in areas requiring hydrologic restoration.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	Y
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	Y
Sediment placement - elevation enhancement	N
Stormwater management	Y
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	Y
Woody vegetation control	Y



Canaveral Marshes Conservation Area

2.75 Miles

3.35 Kilometers

St. Johns National Wildlife Refuge - 6,425 ac (2,600 ha)

Land manager: USFWS

Point of contact: Stanley Howarter (stanley_howarter@fws.gov)

Existing Conditions

The St. Johns National Wildlife Refuge contains several disjunct tracts, the two largest of which (State Road 50 Unit and Bee Line Unit) have large expanses of sand cordgrass-dominated marsh. Topographic variation benefits Black Rail on the properties, with Black Rail found in areas that contain topographic highs (salt pannes) in close proximity to topographic lows (depressions with sawgrass). The State Road 50 and Bee Line units were scheduled for development prior to acquisition, and dredging and filling have occurred on all tracts. On the State Road 50 Unit, ditching for agriculture occurred in the early 1900s, followed by construction of Hacienda Road. Hydrologic restoration projects filled in some ditches in the 1990s, but much of the unit still has ditches and associated berms. Shrubs like wax myrtle and *Baccharis* sp. become dominant in the absence of fire. Both units are bounded by major highways on two sides and development on a third, creating challenges for fire management. Other threats on the Refuge include invasive non-native plants and red imported fire ants (*Solenopsis invicta*).

Existing Projects

Managers burn the sand cordgrass marsh on a 5-7 year fire return interval, and the Refuge continues to control invasive non-native plants on both units. In the 1990s, the Refuge pushed levees into the adjacent ditches in the State Road 50 Unit to the west of Hacienda Road, restoring hydrology to roughly 2,000 acres of marsh. The Refuge is seeking opportunities to fill additional ditches.

Black Rail Data

Biologists have detected Black Rail at both major units, with consistent detections in the State Road 50 Unit dating back to the 1970s and as recent as 2024. FWC staff detected Black Rail in 1989 (Runde et al. 1990), and intensive research occurred from 1992-1995, including nest finding and radio telemetry (Legare and Eddleman 2001). Refuge biologists visit the site at least twice a year, but there have been no formal surveys by Refuge staff. A graduate student from the University of Georgia experimented with an Automated Telemetry System for Black Rail in 2022. The FWC conducted surveys in part of the State Road 50 Unit in 2024 and detected Black Rail.

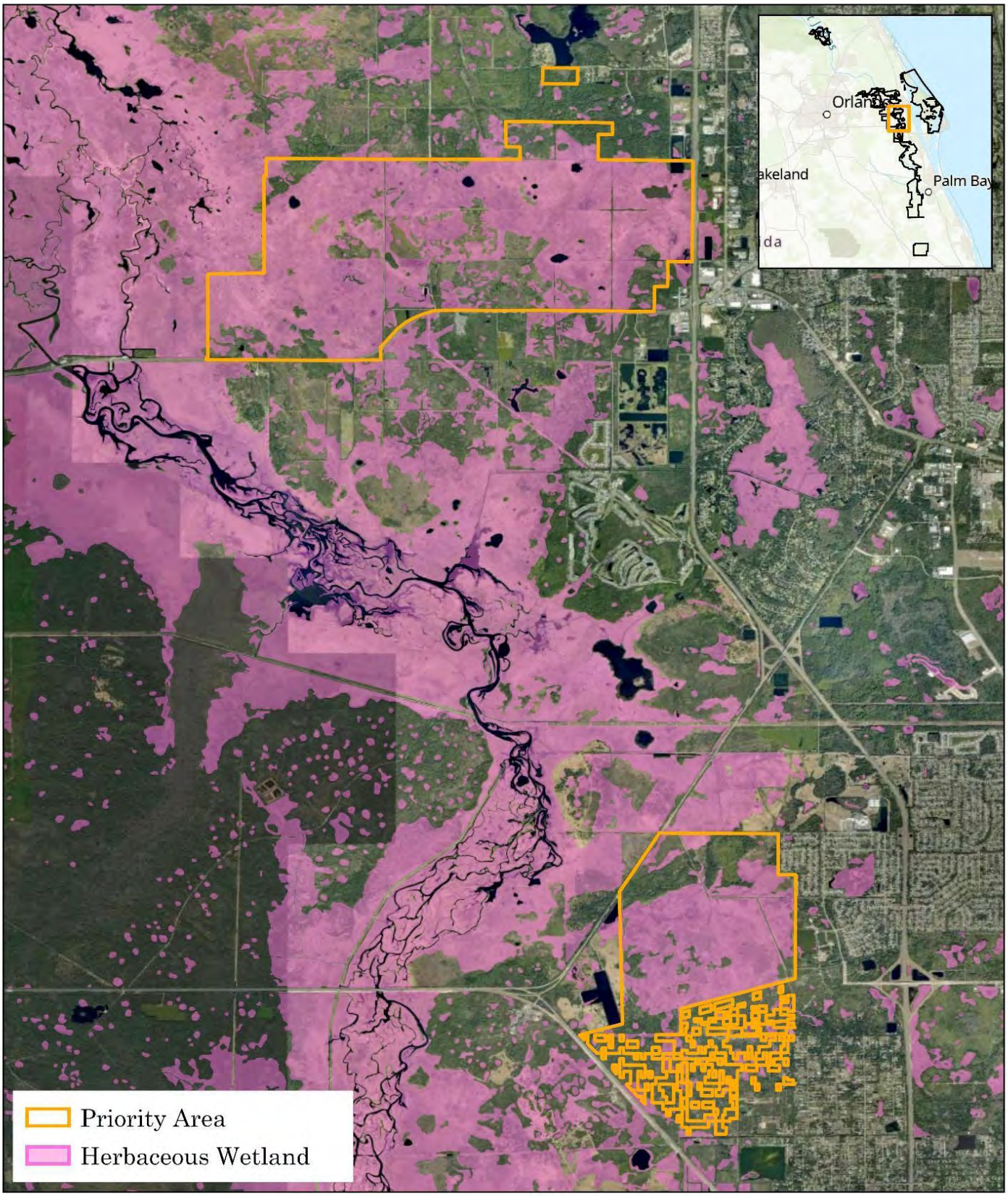
Recommended Next Steps to Management Action

Continued restoration of levees and canals in the State Road 50 Unit would expand habitat for Black Rail on the site. Creating topographic highs and lows is an important design consideration when filling these canals. Acquiring the thin strip of private land on the north boundary of the State Road 50 Unit and vacating the right-of-way along Hacienda Road would benefit management of the unit. Woody vegetation control is necessary in the southeast corner of this unit. Restoration at the Bee Line Unit would be more difficult due to the need to protect adjacent development from flooding. However, there may be opportunity to create Black Rail habitat on a roughly 200-acre pasture in the Bee Line Unit. Completing land acquisition within the existing Refuge land acquisition boundary would facilitate land management and law enforcement, as significant habitat damage from trespass currently occurs. Red imported fire ants have increased on the property since the 1990s, and knowing the impacts of fire ants on Black Rail could be important for management. Fire managers also would benefit from knowing the degree to which the population is augmented by migratory Black Rail during the nonbreeding season.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	N
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	Y
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	Y
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y

Sand cordgrass (Spartina bakeri) dominates the floodplain marsh at St. Johns National Wildlife Refuge. USFWS



St. Johns National Wildlife Refuge

2.3 Miles

2.8 Kilometers

Salt Lake Wildlife Management Area - 5,039 ac (2,039 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Jess Rodriguez (Jessica.Rodriguez@myfwc.com)

Existing Conditions

Salt Lake WMA supports over 2,000 acres of basin marshes around its three major lakes: Salt Lake, Loughman Lake, and South Lake, all of which drain west into the St. Johns River. Salt Lake has unusually high salinity, and the marshes surrounding the lake have salt pannes and salt marsh vegetation (e.g., *Salicornia* sp., black needlerush). Biologists have detected Black Rail around Salt Lake, where the habitat is dominated by sand cordgrass and sawgrass, and potential habitat also occurs in marshes around ponds within the uplands. Canals bring water from adjacent development to the marsh and lakes. Although there has not been a formal hydrologic assessment, informal review suggests that restoration of these canals could cause offsite flooding. Staff have observed habitat disturbance from off-road vehicles in some areas of the marsh.

Existing Projects

FWC uses prescribed fire as the primary tool to manage natural communities used by Black Rail in the WMA. FWC staff use mechanical and herbicide treatments to control invasive non-native plants in the marsh (e.g., Brazilian pepper, Chinese tallow [*Triadica sebifera*], old world climbing fern). They also have treated patches of *Phragmites australis*.

Black Rail Data

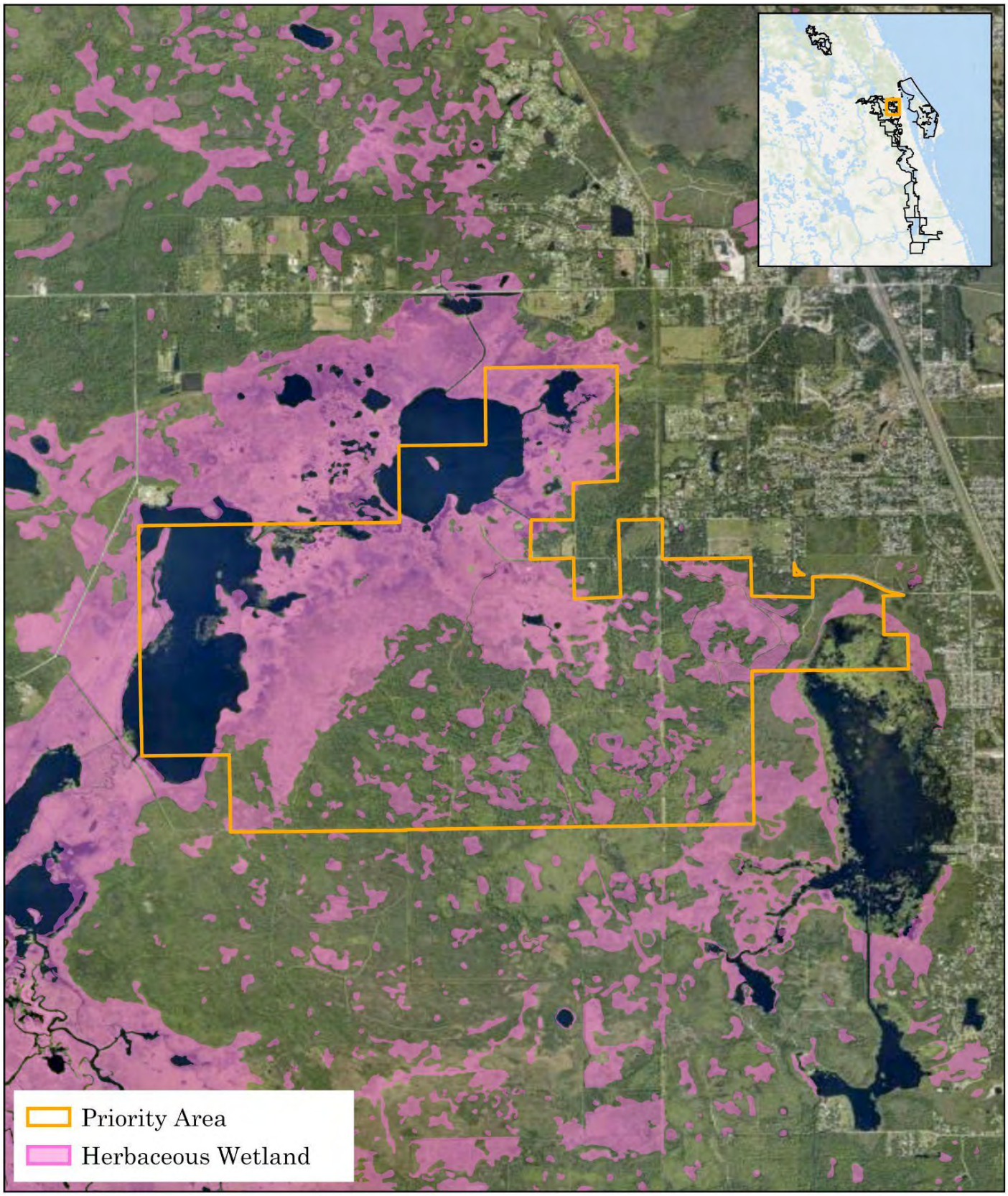
Black Rail have been detected at this site, most recently in 2024. Survey points are on the eastern half of property, where monitoring has occurred annually from 2016 to the present. The western portion of the property is difficult to access.

Recommended Next Steps to Management Action

Some parts of the property remain unsurveyed due to access issues. A formal hydrologic assessment is needed to determine if any hydrologic restoration actions are warranted and possible.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y



Salt Lake Wildlife Management Area

1.45 Miles

2 Kilometers

Seminole Ranch Conservation Area - 29,434 ac (11,912 ha)

Land manager: St. Johns River Water Management District

Point of contact: Graham Williams (gwilliams@sjrwmd.com)

Eastern Black Rail. Michael Gray

Existing Conditions

Seminole Ranch Conservation Area includes a stretch of the St. Johns River characterized by multiple channels. The property contains over 18,000 acres of floodplain marsh, with large areas inaccessible except by airboat. The northern part of the property, near Puzzle Lake, has many salt pannes. A few management units are challenging to burn due to proximity to highways. Additionally, some areas are only seasonally accessible with equipment.

Existing Projects

SJRWMD conducts prescribed fires in large blocks, with most of the property burned in the last several years. Managers also have used mechanical treatments in some areas to control woody vegetation, and staff treat invasive vegetation such as *Phragmites australis*, *Melaleuca*, and Brazilian pepper.

Black Rail Data

Black Rail have been detected at this site, most recently in 2024. FWC biologists conducted formal surveys from 2021-24, with Black Rail detections in 2022, 2023 and 2024. SJRWMD staff also incidentally detected Black Rail on the property in 2017.

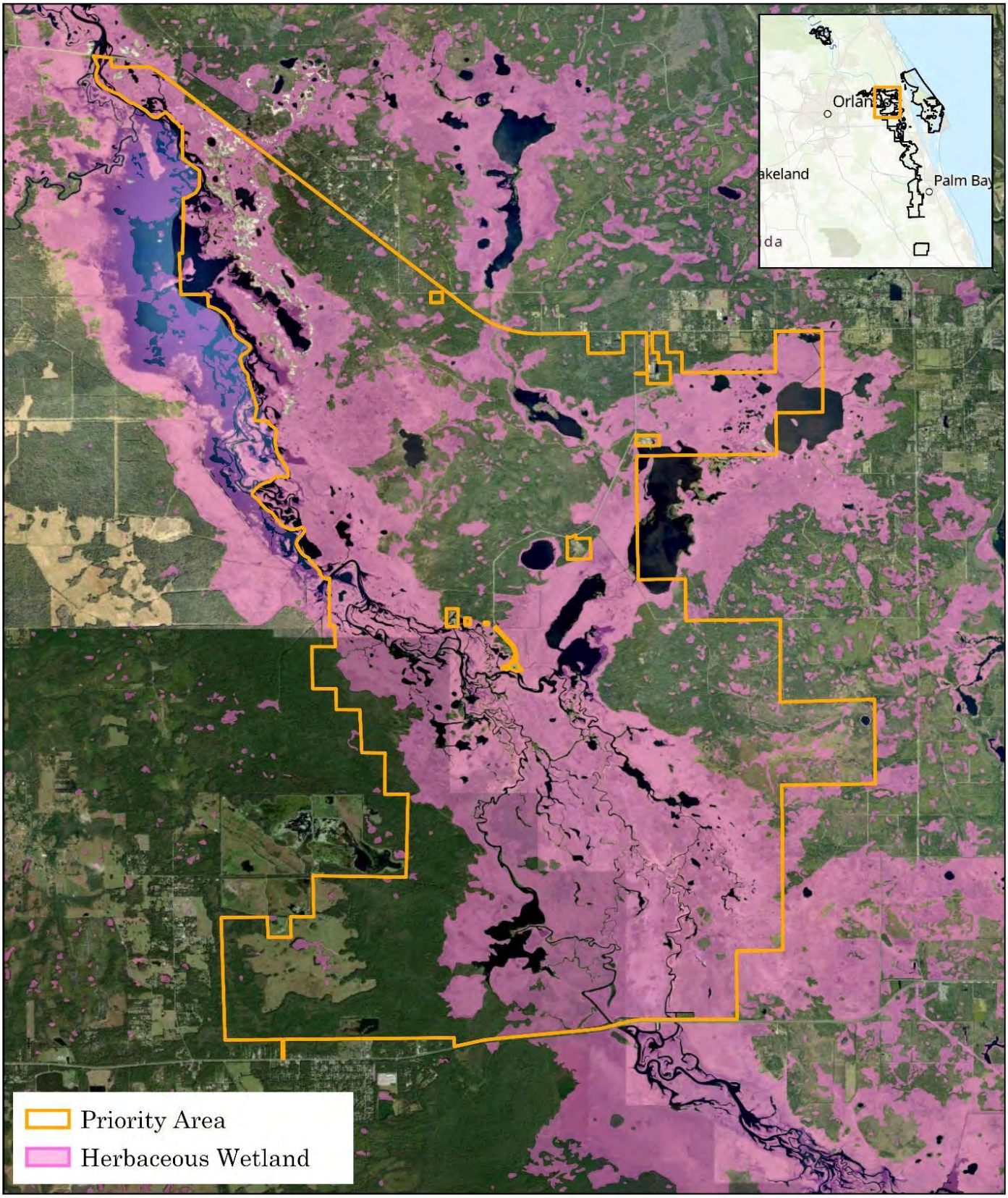
Recommended Next Steps to Management Action

Road improvements would help with access to potential Black Rail habitat and with prescribed fire management. A hydrologic assessment would help to identify whether hydrologic restoration is warranted and possible without causing flooding on adjacent properties. For example, ditches near Hatbill Road and south of Silver Lake are worth examining. Additional *Phragmites* treatments are necessary to ensure that some marshes are not overwhelmed by this species, and cabbage palm control would open up additional areas. Acquisition of inholdings within the property would simplify land management.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	Y
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y

Eastern Meadowlarks also use the floodplain marsh along the St. Johns River Ray Hennessy



Seminole Ranch Conservation Area

2.8 Miles

3.45 Kilometers

Charles H. Bronson State Forest - 11,904 ac (4,817 ha)

Land manager: Florida Forest Service

Point of contact: Stephen.Stipkovits (Stephen.Stipkovits@fdacs.gov)

Existing Conditions

Sand cordgrass dominates the higher elevations of the roughly 1,600 acres of floodplain marsh along the St. Johns River. Some areas of the floodplain marsh have linear indentations, perhaps from former row crops. The elevation change from the floodplain to the uplands is more abrupt on the western side of the St. Johns River, which may affect suitability for Black Rail. The uplands contain depression marshes and basin marshes nestled among mesic hammocks in addition to pastures. The property was a cattle ranch prior to acquisition. A cattle lease remains in the uplands, but cattle are not allowed to graze within the floodplain marsh. The property is jointly owned by the SJRWMD, the Board of Trustees of the State of Florida, and the NRCS. The property consists of two adjacent tracts, the Clonts Tract in Seminole County and the Turkey Creek Tract in Seminole County.

Existing Projects

The floodplain marsh is under a 2-year fire return interval. SJRWMD partnered with the NRCS to remove most of a levee that once separated the river from the floodplain. Some of the levee remains to allow access, with low water crossings to allow water flow. Managers also installed ditch plugs and low water crossings to restore wetlands in the interior of the property and along Turkey Creek. Perhaps 8-9 years ago, managers roller-chopped or mowed part of the floodplain to control encroachment of woody vegetation. Biosolid applications left high amounts of phosphorous in the soil, and the University of Florida currently is studying whether it is possible to remediate the high phosphorous levels.

Black Rail Data

Black Rail have not been detected at this site, but the property is just across the river from Seminole Ranch Conservation Area. There have been no formal surveys,

Recommended Next Steps to Management Action

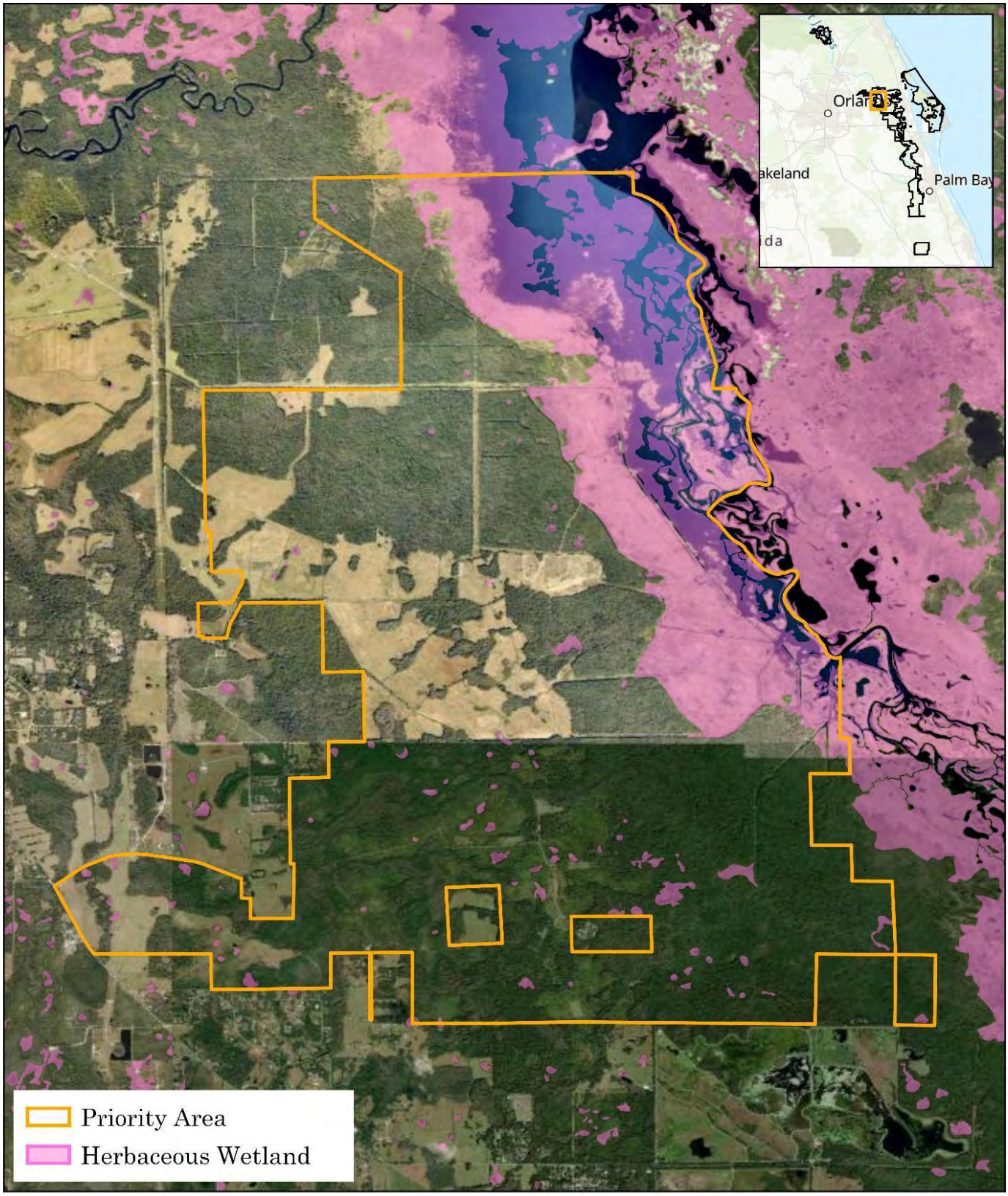
Some of the floodplain marsh needs woody vegetation control to reduce the shrub layer, as well as treatment of invasive, non-native species such as Brazilian pepper in the marsh/ upland transition. Some areas in the Turkey Creek tract have improved pasture that could have restoration potential. However, wetland creation possibilities may be limited due to high amounts of phosphorous in the soil from biosolid application.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N

Water application - existing wetland	N
Wetland creation - recontouring	Y
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y

Sand cordgrass is a dominant fixture at many Florida sites important to Black Rail. USFWS



Charles Bronson State Forest

1.65 Miles

2 Kilometers

Buck Lake Conservation Area - 9,627 ac (3,896 ha)

Land manager: St. Johns River Water Management District

Point of contact: Graham Williams (gwilliams@sjrwmd.com)

Existing Conditions

The western side of the property includes sand cordgrass-dominated floodplain marsh with salt pannes and Black Rail detections along Cabbage Slough. Deeper parts of the sloughs contain sawgrass and cattails (*Typha* sp.) and provide topographic variation. The marsh immediately adjacent to the lake is mostly sawgrass, much of it with water too deep for Black Rail. Wildfires have occurred in parts of the floodplain marsh, but other parts are experiencing encroachment by cabbage palms and woody shrubs in the absence of fire. Depression marshes and wet prairies embedded in the property's flatwoods may provide additional habitat, but there have been no Black Rail detections in these areas. Access to much of the floodplain marsh is difficult except by foot or sometimes with an all-terrain vehicle. Access issues make it difficult to establish fire lines and burn within the floodplain marsh. Burning within Cabbage Slough would require cooperation with the adjacent private landowner. The timing of management actions is influenced by public hunting seasons, which are managed under a cooperative agreement with the FWC.

Cabbage palms encroaching into the marsh limit Black Rail habitat. USFWS

Existing Projects

The SJRWMD conducts prescribed fires and invasive, non-native plant management.

Black Rail Data

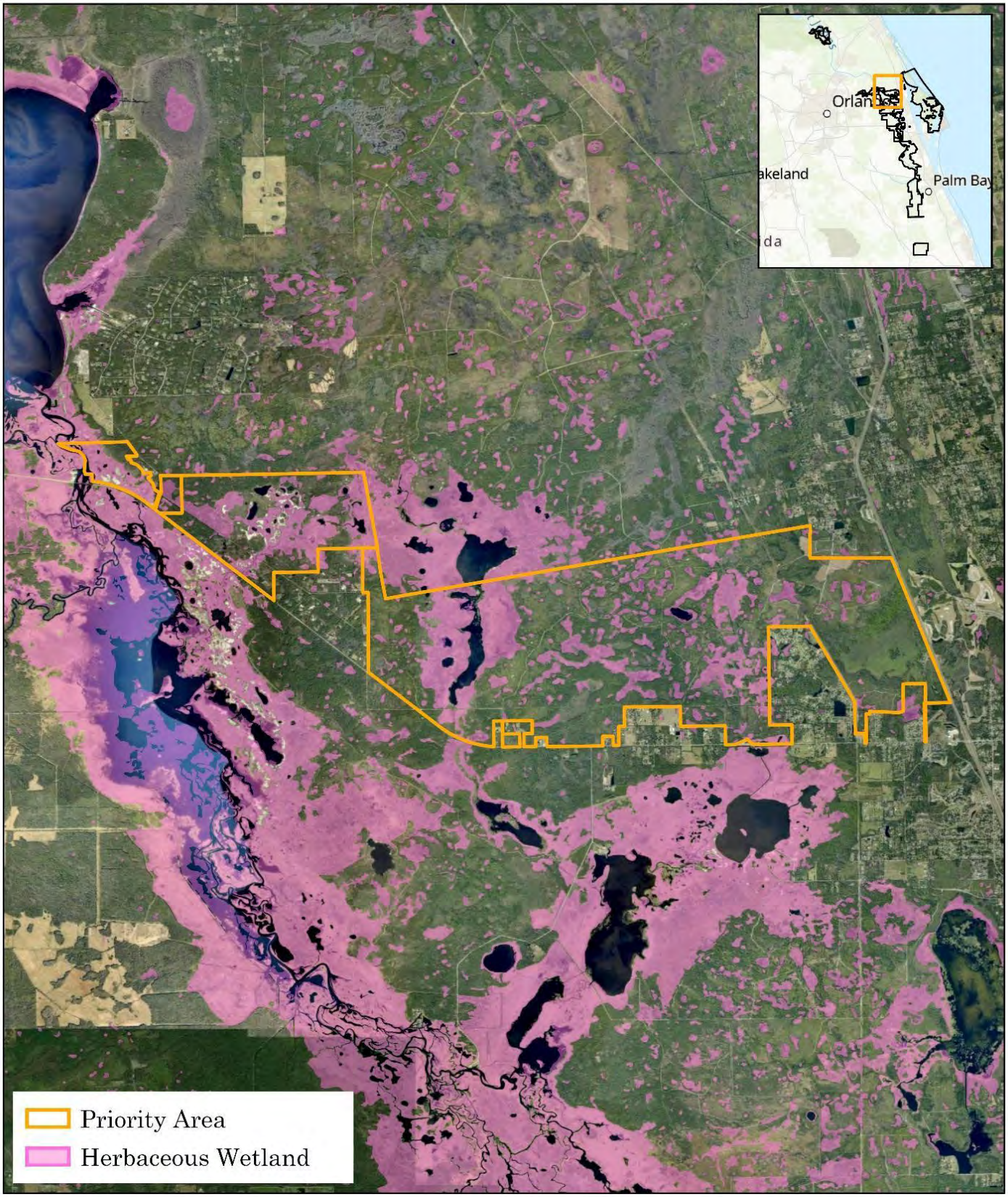
Black Rail have been detected at this site, most recently in 2022 during surveys by FWC from 2022-2024. Statewide surveys in 2016-17 also detected Black Rail on the property (Schwarzer et al. 2024).

Recommended Next Steps to Management Action

Control of woody vegetation and cabbage palms would improve the habitat but would need to be conducted in a manner that minimizes soil disturbance. *Melaleuca* is becoming more prevalent in the floodplain marsh. The hydrology within the floodplain marsh is relatively unaltered, but ditching and a canal are present in the flatwoods. A hydrologic assessment would be necessary to evaluate potential benefits and potential flooding issues from hydrologic restoration. There may be limited opportunities for land acquisition.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y



Buck Lake Conservation Area

2.95 Miles

3.65 Kilometers

Little Big Econ State Forest - 10,188 ac (4,123 ha)

Land manager: Florida Forest Service

Point of contact: Stephen Stipkovits (Stephen.Stipkovits@fdacs.gov)

Existing conditions

The property's Kilbee and Yarborough tracts contain over 2,000 acres of floodplain marsh on the west side of the St. Johns River. Remaining roads provide access to some areas of the floodplain. Wet prairies, depression marshes, and basin marshes are embedded in the adjacent uplands. These tracts were cattle ranches prior to acquisition, and the Kilbee Tract remains under cattle lease. Cattle are now restricted to the uplands. The uplands and wet prairies contain some ditches, particularly in the Kilbee Tract.The property is co-owned by the Board of Trustees of the State of Florida and SJRWMD and is managed by the Florida Forest Service.

Existing projects

Land management includes prescribed fire, treatment of invasive non-native plants, and management of cabbage palms that encroach into the marsh. Managers burn the floodplain marsh on a 2-year fire return interval. Land managers also have used roller-chopping in the past to address encroachment of woody vegetation.

Black Rail data

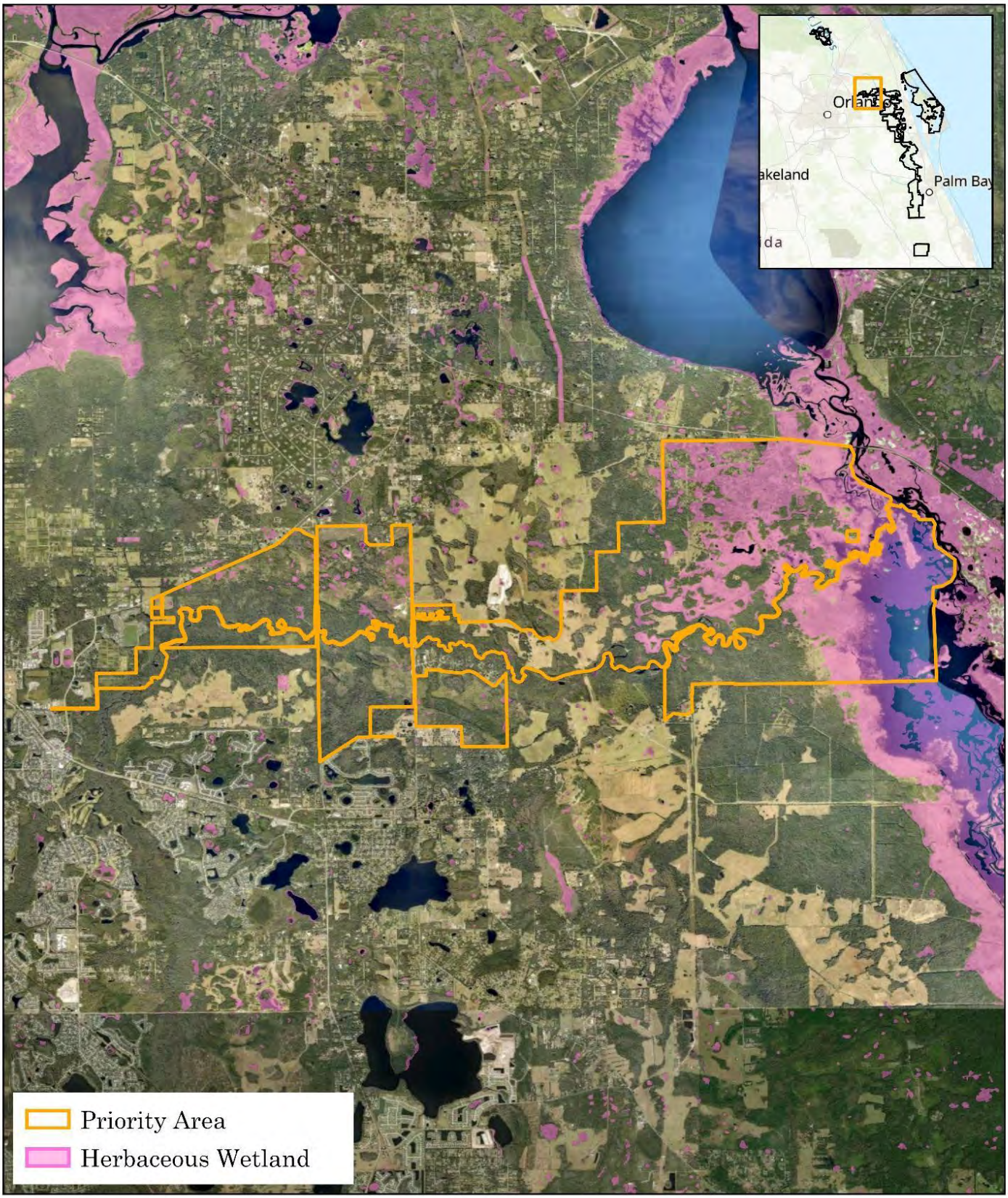
Black Rail have not been detected at this site, but this site has not been formally surveyed. The property is directly across the river from Seminole Ranch Conservation Area, which has Black Rail detections.

Recommended next steps to management action

Control of invasive non-native plants, particularly Brazilian pepper in wet prairies and around the hammocks, is an ongoing challenge. The western side of the property is worth exploring for opportunities to experiment with Black Rail habitat creation in areas that are already disturbed. Addressing ditches in the Kilbee Tract would benefit wet prairies, but the benefits to Black Rail are unclear. Also, a hydrologic assessment would be necessary to identify any flood control issues and to make sure the results of ditch remediation would be compatible with the cattle lease. Feral hogs create disturbance in wet prairies but not in the floodplain marsh.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	Y
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	Y
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	Y
Wetland creation - water application	Y
Wildlife herbivory reduction	Y
Woody vegetation control	Y



Little Big Econ State Forest

2.85 Miles

3.5 Kilometers

Areas for Further Exploration

The following areas were identified by mapping and/or the partner group as important to keep in mind and further assess for future work. Properties are listed in alphabetical order.

Blue Cypress Conservation Area - 49,908 (20,197 ha)
Land manager: SJRWMD
The Blue Cypress Conservation Area is a system of conservation and management areas comprised of a mosaic of freshwater wetland types. Water depths throughout most of the property are too deep to support Black Rail, but it is possible that mats of non-native invasive Cuban bulrush provide suitable habitat for the species in some areas. The property is intended for flood control, water quality improvement, and reduction of freshwater discharges to the Indian River Lagoon, which means that land managers have limited ability to manage water levels for wildlife. One of the management areas, Blue Cypress Water Management Area, is managed for Snail Kites under a Biological Opinion with the U.S. Fish and Wildlife Service.

Fellsmere Water Management Area - 10,043 ac (4,064 ha)
Land manager: SJRWMD
Portions of this area contain vegetated mats of Cuban bulrush that could support Black Rail. As of the time of writing (early 2025), such mats occurred in the northeast corner of the property.

Fox Lake Sanctuary - 3,156 ac (1,277 ha)
Land manager: Brevard County
The basin marsh west of South Lake may be worth exploring for potential Black Rail habitat.

Lake George State Forest - 21,564 ac (8,727 ha)
Land manager: Florida Forest Service
This property contains a narrow wet prairie and marsh fringe along its border with Lake Woodruff National Wildlife Refuge.

Lake Woodruff National Wildlife Refuge - 20,503 ac (8,297 ha)
Land manager: USFWS
Reports of Black Rail at the Refuge date back to 1984 (Watts 2016), and there are reports by birders from the Refuge in March of 2007 and February of 2015. However, access to potential habitat is extremely difficult, and managers opted to include this property in Areas for Further Exploration for now.

Orlando Wetlands Park - 1,657 ac (670 ha)
Land manager: City of Orlando
This human-made wetland treats reclaimed water from local municipalities. It may be worth exploring whether potential Black Rail habitat is present or could be created.

Salt Lake - 307 ac (124 ha)
Land manager: SJRWMD
East of Salt Lake WMA, the property contains marsh along the west side of South Lake.

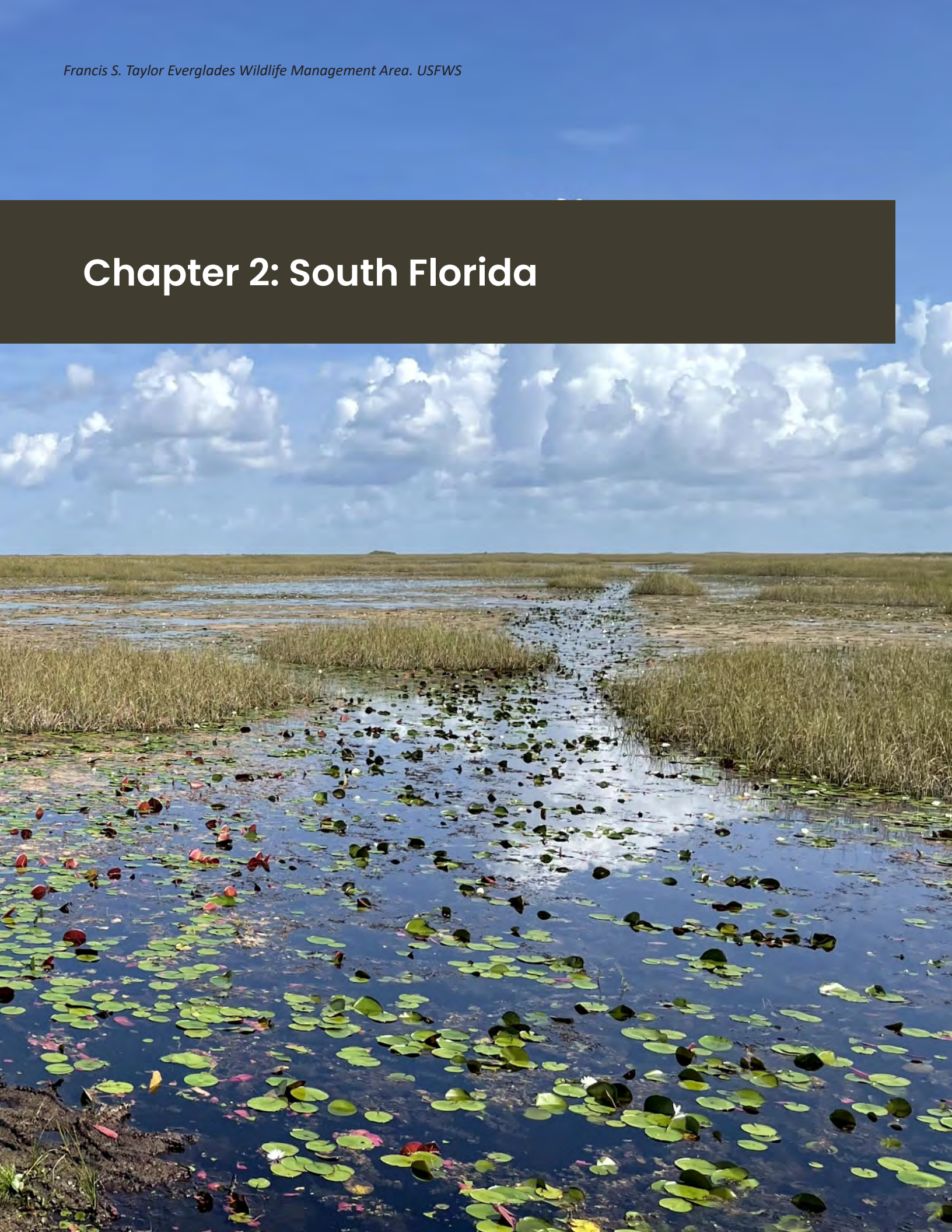
Sand Lakes Conservation Area - 1,256 ac (508 ha)
Land manager: SJRWMD
Partners mentioned this property during workshops, noting the wet prairie and shallow wetlands on the western side of the property. The property also has improved pasture that could be examined for experimentation with habitat restoration or creation for Black Rail.

T.M. Goodwin Waterfowl Management Area - 6,504 ac (2,632 ha)
Land manager: FWC
The FWC manages this series of impoundments for waterfowl, with draw-down in spring. Although no impoundments are managed for rails, some impoundments are left drier in any particular year. Cuban bulrush could provide habitat in some areas. Birders and FWC biologists have incidentally observed Black Rail here in recent years.

Wal-Mart Parcels - 72 ac (29 ha)
Land manager: SJRWMD
These two parcels occur between St. Johns National Wildlife Refuge and Fox Lake Conservation Area.

Private lands
Privately-owned conservation easements, water management areas, an Audubon bird sanctuary, and wetland mitigation banks adjacent to public conservation lands could provide opportunities for partnerships with private landowners.

Black Rail are so beautiful-they should show themselves more often! Will Sweet

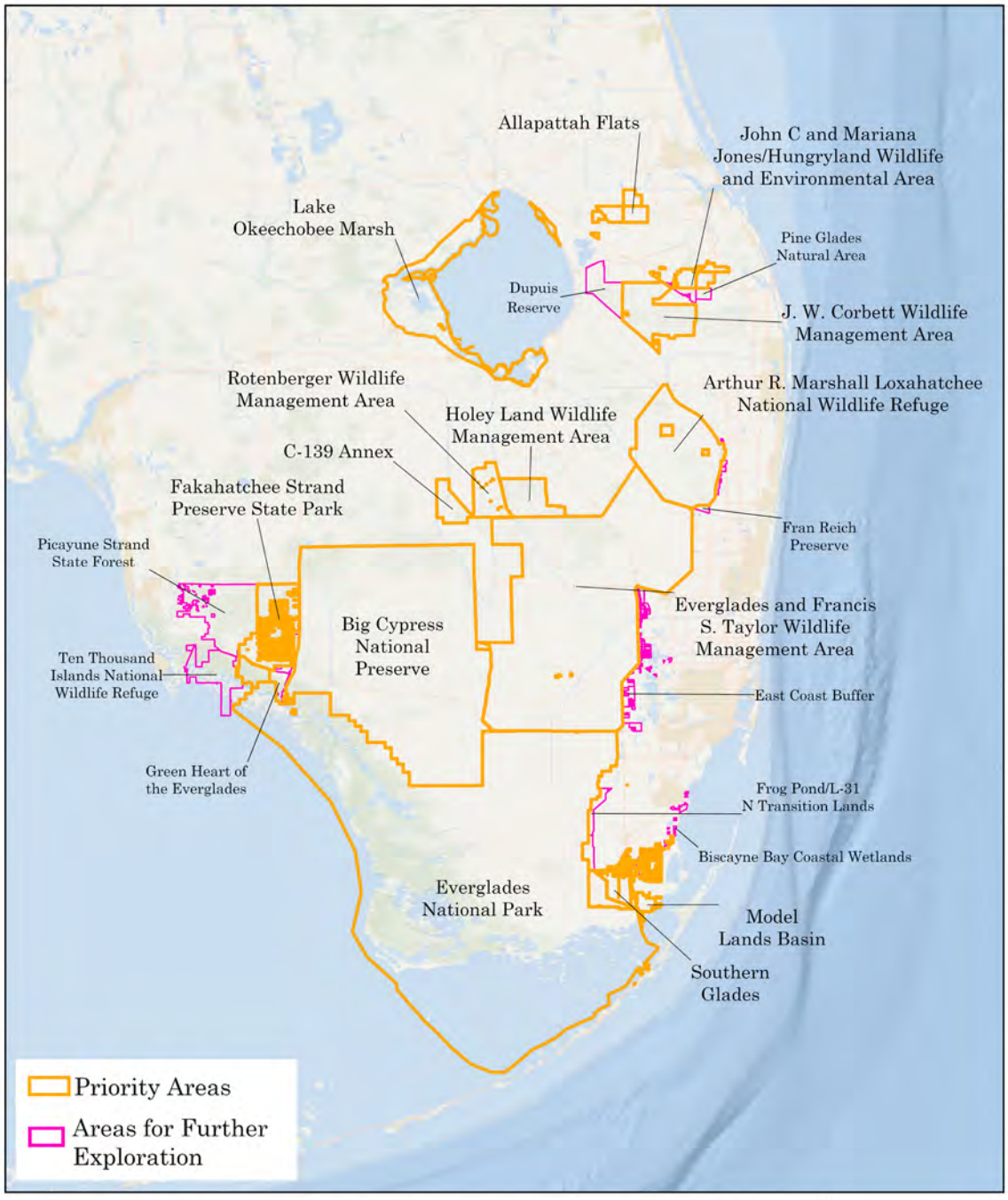


Francis S. Taylor Everglades Wildlife Management Area. USFWS

Chapter 2: South Florida

Priority Areas

The order of properties in this chapter starts with Lake Okeechobee and then proceeds roughly clockwise thereafter. This is not meant to be a comprehensive list of properties in South Florida with Black Rail detections. There are other areas with potential Black Rail habitat, such as Stormwater Treatment Areas and Flow Equalization Basins, where management actions for Black Rail currently are impractical due to competing management objectives and legal mandates. Acres (ac) and hectares (ha) typically refer to the total size of the property. Exceptions include properties with distant, disjunct tracts, in which case acreage refers to just the tracts with potential Black Rail habitat.



South Florida Priority Areas and Areas for Further Exploration

Lake Okeechobee Marsh - 130,873 ac (52,963 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Tyler Beck (Tyler.Beck@myfwc.com)

Existing Conditions

Potential Black Rail habitat in the marshes around Lake Okeechobee includes sand cordgrass, spikerush (*Eleocharis cellulosa*), sawgrass, and beakrush (*Rhynchospora tracyi*) flats. Water depths in the marshes vary annually, and this high variability means that potential Black Rail habitat may be present in some years but not in others or may vary in location from year to year. The FWC manages the marshes around Lake Okeechobee, and the USACE and South Florida Water Management District (SFWMD) manage water levels within the lake, which is key for flood control and water supplies in the Everglades Ecosystem.

Existing Projects

Managers use prescribed fire and mechanical and chemical treatments to manage encroachment of woody vegetation, non-native invasive species (e.g., *Scleria lacustris* and torpedo grass [*Panicum repens*]), and aggressive species (e.g., cattail). Some mechanical treatments occur near the lake edge but not in potential Black Rail habitat.

Black Rail Data

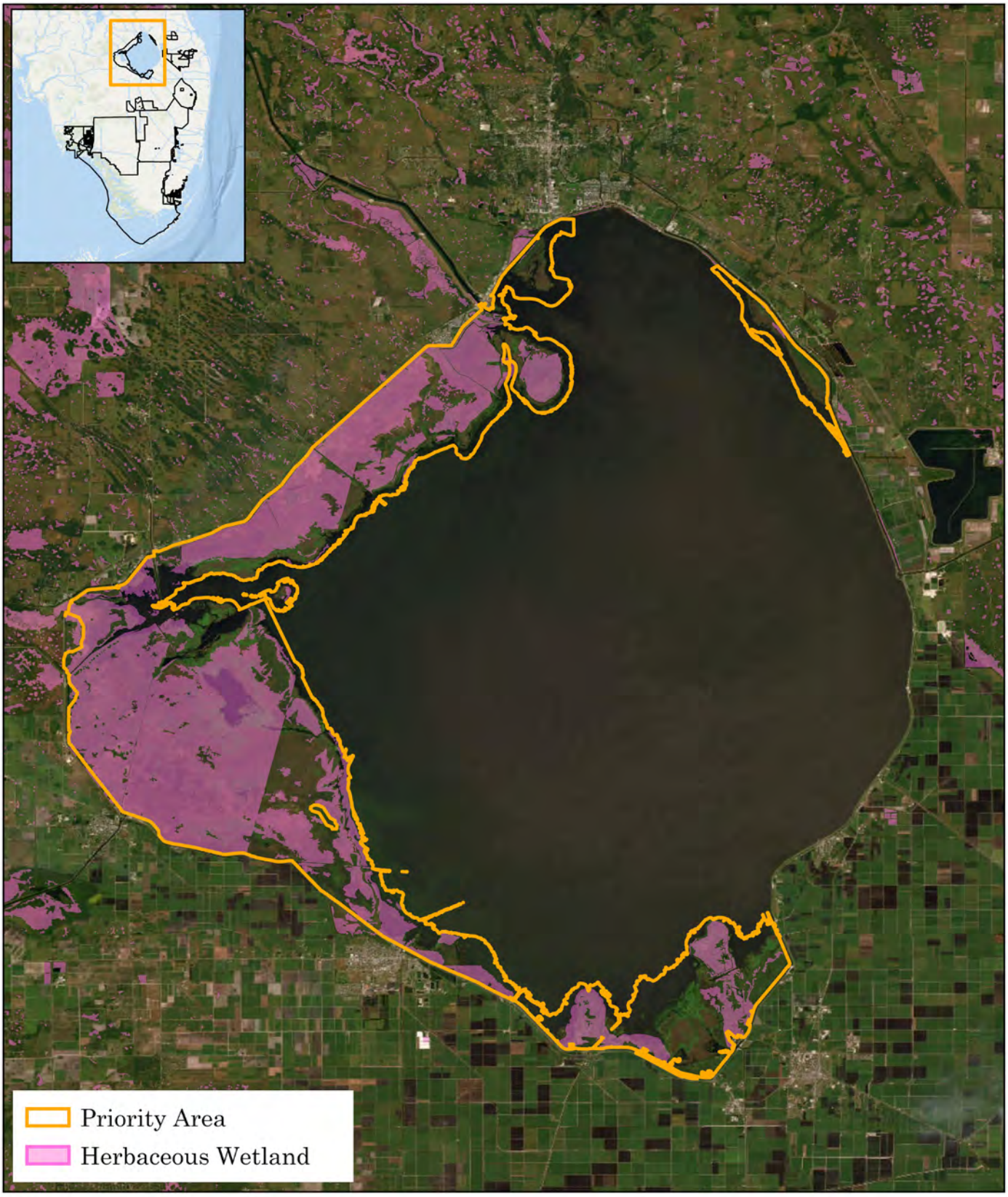
Black Rail have been detected once at this site via incidental observation five or more years ago (exact year uncertain). Biologists placed four ARUs in the marsh for one year, a few years ago, but there were no detections via ARUs. Minimal staff are available for monitoring.

Recommended Next Steps to Management Action

Eutrophic conditions in the lake led to invasion by cattails (*Typha* sp.) and nonnative plants, and managers would like to reduce these species and reintroduce sawgrass . Woody vegetation control is necessary in some areas. More resources are needed for prescribed fire and treatment of invasive nonnative vegetation. Supplemental irrigation of dry areas with solar-powered pumps may be worth exploring along levees that extend into the lake.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration -	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation – water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y



Lake Okeechobee Marsh

9.15
Miles
12.5
Kilometers

Allapattah Flats – 21,652 ac (8,762 ha)

Land manager: South Florida Water Management District

Point of contact: Brian Garrett (bgarret@sfwmd.com)

Existing Conditions

A freshwater marsh grazed by cattle in Florida. Graham Williams

Allapattah Flats contains freshwater marshes and wet prairies embedded within a matrix of improved pasture. The hydrology on the property is highly altered, with ditches draining to the C-23 canal to the north, and much of the property's wetlands become dry during seasonal draw downs. Starting with the northernmost unit and then from east to west, the property is divided into units A, B, C, and D. The western and central portion of A has extensive marsh that stays inundated throughout the wet season. The northeast and southwest sides of unit B have potential habitat, and there are pockets of potential habitat in the central-west portion of C. Unit D, the smallest of the four, has marshes in the south and west that could provide potential habitat. Most of the property is under cattle lease and many of the wetlands are impacted by cattle grazing. NRCS holds an easement over approximately 80% of the property. Invasive plants, such as Brazilian pepper, smutgrass (*Sporobolus indicus* and *S. jaquemontii*), para grass (*Urochloa mutica*), primrose willow, torpedo grass, *Cyperus* sp., and Wright's nutrush (*Scleria lacsutris)* are an ongoing management challenge. Some canals on units B and C harbor Cuban bulrush. There are plans for additional hydrologic restoration that could improve the property's potential for Black Rail.

Existing Projects

Prescribed fire is used as a management tool to improve quality of upland habitat, however much of the property is currently in backlog. Annual non-native invasive plant treatments occur in upland and wetland habitats and in discharge canals. NRCS created a perimeter berm around units A and B and plugged some major outfalls of canals. Land management staff are working with SFWMD's Everglades Protection group to address nutrient load issues at the outfall to the C-23 canal.

Black Rail Data

Black Rail have been detected only once at this site via incidental observation (year uncertain). Staff have conducted surveys on the east side near C-23 project, but there were no detections. The C-44 reservoir, just south of Allapattah Flats, had Black Rail before the reservoir was filled.

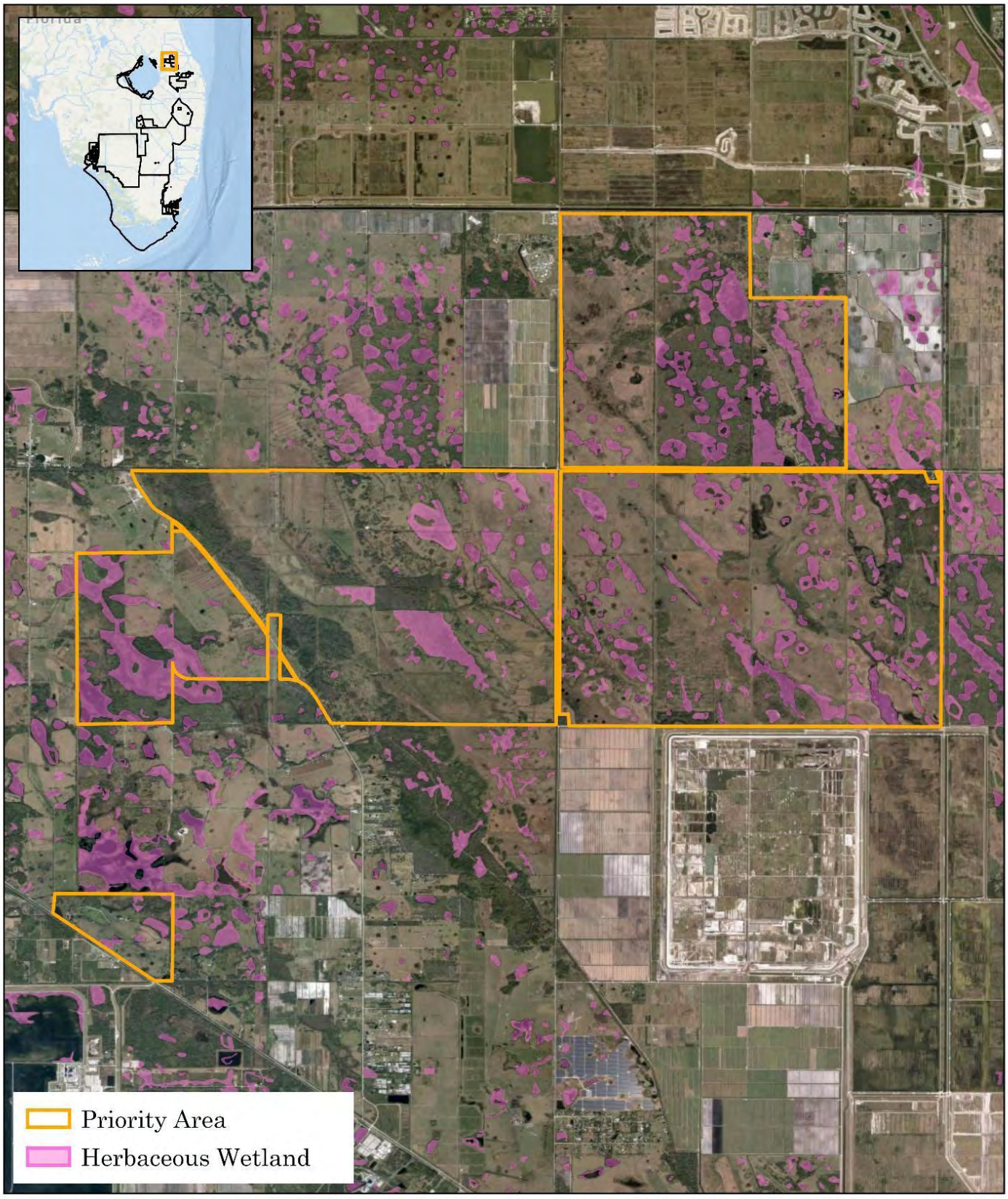
Recommended Next Steps to Management Action

Additional hydrologic restoration is necessary. Some existing ditch plugs require additional reinforcement or alteration to be effective. These are the managers' top priority, followed by backfilling and plugging additional ditches in the property's interior. Managers want to be able to hold water longer on the property. Staff would like to conduct ARU surveys to determine

occupancy. Potential land acquisition possibilities include agricultural land east and west of unit A and south of unit B. Protecting and restoring wetlands on these lands would improve hydrology on Allapattah Flats.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Non-native invasive plant species management (Melaleuca, etc.)	Y
Land acquisition / protection	Y
Living shoreline development	N
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	Y
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	Y
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	Y
Woody vegetation control	Y



Allapattah Flats

2.6
Miles
3.55
Kilometers

J. W. Corbett Wildlife Management Area – 60,833 ac (24,618 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Josiah Freese (Josiah.Freese@myfwc.com)

Existing Conditions

This WMA contains over 16,000 acres of basin marsh, depression marsh, and wet prairie embedded within flatwoods. Swamp buggy access extends from August to the end of February. Buggies often drive in the wet prairie fringes between the flatwoods and depression marshes, which are the areas most likely to support Black Rail. In addition to habitat degradation from swamp buggies, woody encroachment and invasion by nonnative *Scleria* are concerns within potential Black Rail habitat.

Existing Projects

FWC's primary management tool on the property is prescribed fire. Managers have managed woody vegetation encroachment in flatwoods with mulching and have contracts to treat invasive nonnative plants in both the uplands and marshes. The SFWMD is replacing a levee, which will bring more water to a dry corner of the property.

Black Rail Data

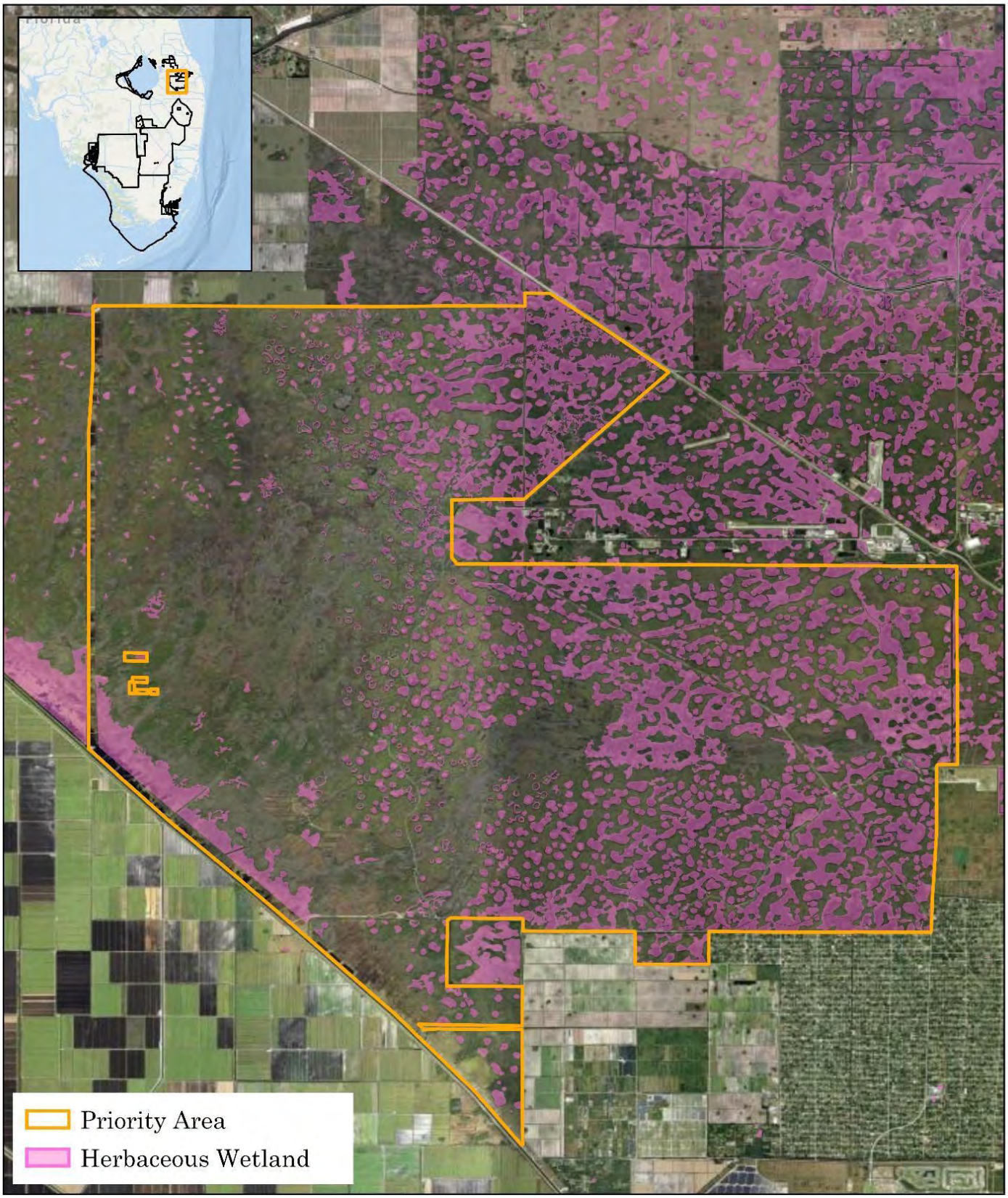
Black Rail have been detected at this site, most recently in 2018. FWC biologists attempt to survey annually for Black Rail but are not always able to meet this goal due to other priorities. Surveys resulted in Black Rail detections from 2013 to 2016 and again in 2018.

Recommended Next Steps to Management Action

Managing habitat degradation from swamp buggies would require a change to State regulations. Black Rail habitat would benefit from continued management with prescribed fire and invasive plant treatments. The results of current restoration activities by the SFWMD could inform opportunities for additional improvements to hydrology.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y



J. W. Corbett Wildlife Management Area

3.45 Miles

4.75 Kilometers

John C. and Mariana Jones/Hungryland Wildlife and Environmental Area - 16,881 ac (6,831 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Josiah Freese (Josiah.Freese@myfwc.com)

Existing Conditions
Hungryland Wildlife and Environmental Area supports a mosaic of depression marshes, wet prairies, and flatwoods, with approximately 7,000 acres of potential Black Rail habitat. Hunting seasons on the property place some constraints on the timing of land management actions. The property has a canal with ditch plugs, and there are no other hydrologic alterations that require restoration. The property is owned by the SFWMD and managed by the FWC. Coordination occurs with the Pal Mar Water Control District.

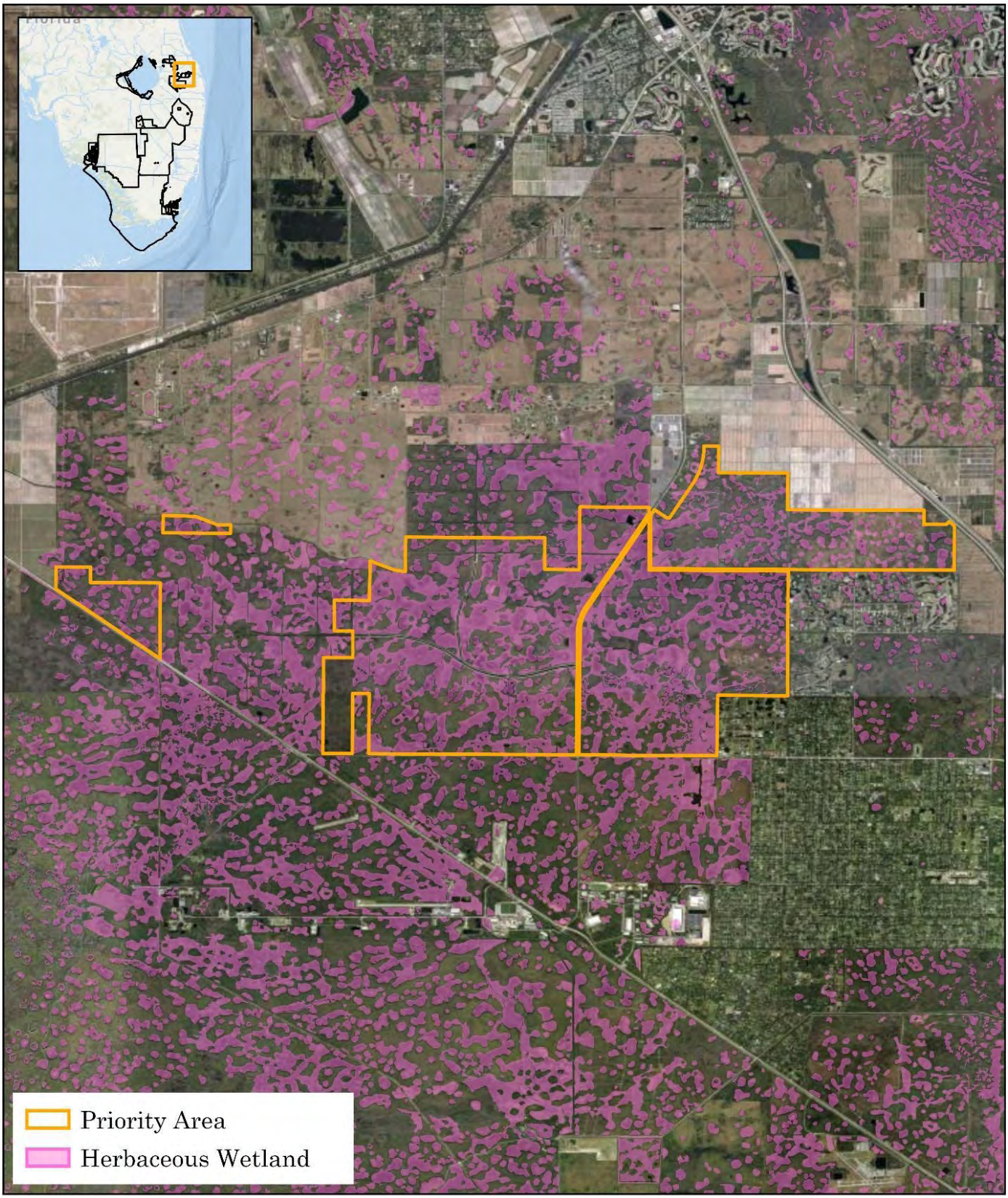
Existing Projects
FWC manages the site with prescribed fire and treatment of invasive nonnative plants. The FWC tries to burn across marshes when burning the adjacent flatwoods. Managers have used mechanical treatments to reduce encroaching woody vegetation in the flatwoods.

Black Rail Data
Black Rail were detected at this site in 2016 (Schwarzer et al. 2024). Formal surveys have occurred irregularly since then, but there have been no further detections.

Recommended Next Steps to Management Action
This site is a priority for deployment of ARUs (planned for 2025). The potential Black Rail habitat could use additional prescribed fire but is otherwise in good condition.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (Melaleuca, etc.)	N
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	N



John C. and Mariana Jones/Hungryland Wildlife and Environmental Area

3.55 Miles

4.9 Kilometers

Arthur R. Marshall Loxahatchee National Wildlife Refuge – 141,040 ac (57,077 ha)

Land manager: U.S. Fish and Wildlife Service

Point of contact: Rebekah Gibble (Rebekah_Gibble@fws.gov)

Existing Conditions

Loxahatchee NWR contains three areas of potential Black Rail habitat. The largest is the extensive interior marsh, most of which contains glades marsh with ridge-and-slough topography. The western portion of the interior marsh is a flatter sawgrass plain. Hydrology is rainfall-driven, and suitable water depths for Black Rail are likely to occur somewhere within the interior marsh throughout the year, with more habitat likely available in drier years. The USACE and SFWMD manage the interior marsh for flood control and drinking water supply, and management actions in this area require buy-in from SFWMD.

The second area of potential habitat is the Strazulla Tract. Hydrology in the tract is rainfall-driven, and habitat suitability varies through the year. The tract is in good shape ecologically. Public access is limited to walking and biking, and the tract is not used for flood control. Third, the Refuge manages a series of impoundments south of the Refuge office. The impoundments currently have emergent grasses, some woody vegetation, and deeper slough-like conditions. Rainfall is the only source of water for the impoundments and varies seasonally, but staff can manage water levels by moving water among cells.

Existing Projects

Invasive plant control and prescribed fire are ongoing for all three areas. The refuge is conducting invasive plant treatments (e.g., *Melaleuca* control) to restore the sloughs and sawgrass. A North American Wetland Conservation Act (NAWCA)-funded project is adding new pumps and culverts in one of the impoundments, which should aid in management for Black Rail.

Black Rail Data

A Black Rail was detected in the sawgrass marsh in the western portion of the Strazulla Tract in 2020. A survey in the impoundments in the 1990s did not detect Black Rail. Florida Gulf Coast University conducted callback surveys in 2022 in the interior marsh. The Refuge also has ARU data from the Strazulla Tract in 2020 and 2022 and from the interior marsh in 2022. Additionally, staff conducted call-back surveys in Strazulla Tract and a few of the impoundments. There have been no additional confirmed detections since 2020, but staff are still analyzing ARU data.

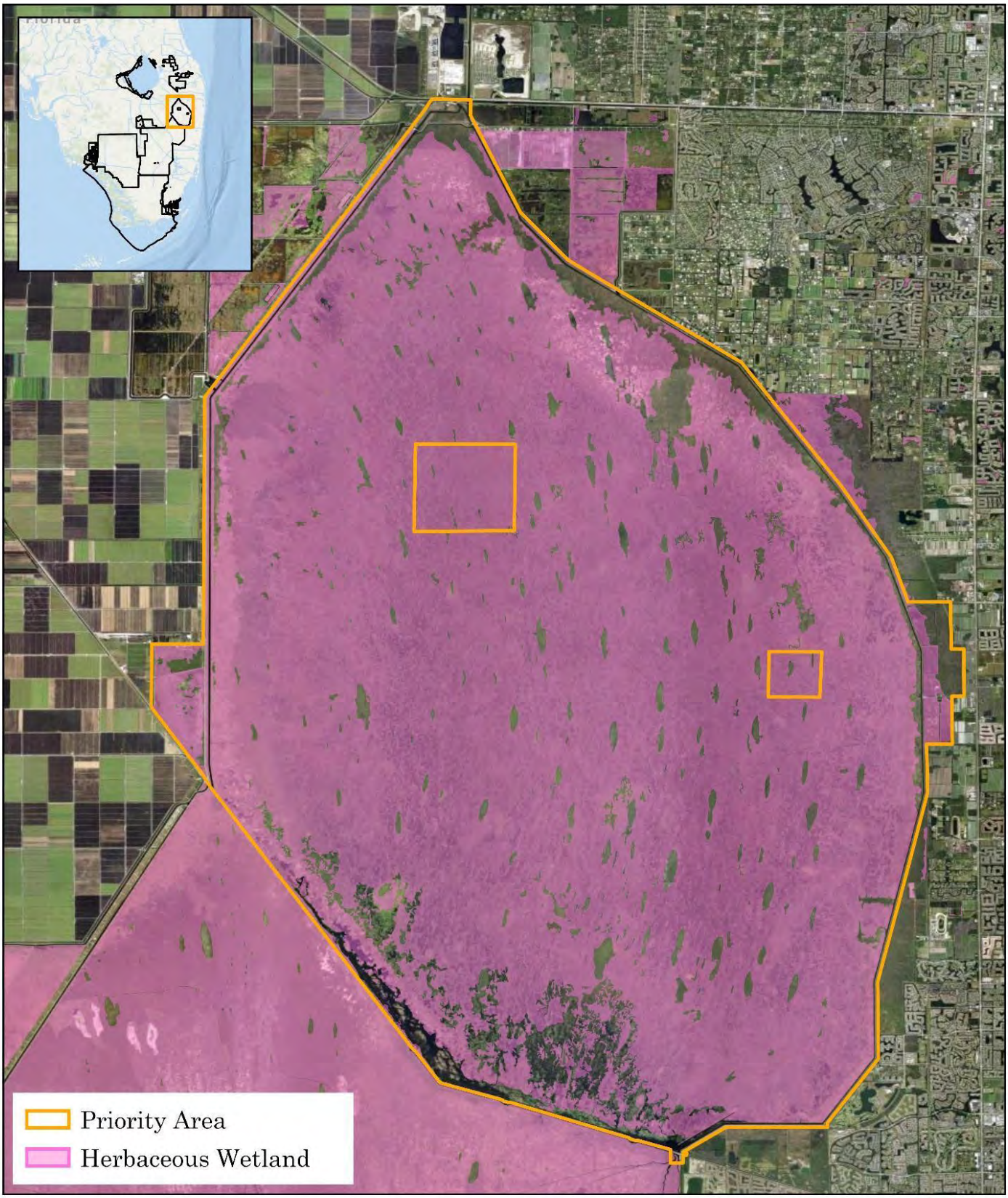
Recommended Next Steps to Management Action

Additional surveys are necessary to determine Black Rail distribution and habitat use on the property. Given the size of the property, staff need assistance determining priority areas for surveys. There is a need to improve Black Rail recognizer models for ARUs to decrease the rate of false positive detections. Initial treatments are happening now for *Melaleuca*, but repeated treatments will be necessary. Native woody vegetation is encroaching into one area due to issues with hydrology, and the Refuge is seeking internal funds for woody vegetation control. NAWCA funding has helped to add pumps and update culverts in the impoundments. However, additional pumps, culverts, and staff gauges are needed; and dredging needs to occur in some ditches to improve managers' ability to move water. Refuge staff are open to recontouring impoundments to create topography needed by Black Rail.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (Melaleuca, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	Y
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	Y
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	Y
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y

Biologists detected a Black Rail in the Strazulla Tract at Loxahatchee National Wildlife Refuge. USFWS



Arthur R. Marshall Loxahatchee National Wildlife Refuge

4.75 Miles

6.6 Kilometers

Everglades and Francis S. Taylor Wildlife Management Area – 669,178 ac(270,808 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Josiah Freese (Josiah.Freese@myfwc.com)

Existing Conditions

This WMA contains large expanses of glades marsh with ridge-and-slough topography and, in some areas, floating vegetated islands that delaminate from the bedrock. Water levels vary seasonally, but there are always wet and dry areas somewhere on the landscape. Invasive nonnative plants such as *Melaleuca* , Brazilian pepper, *Scleria*, and old world climbing fern are problematic in some areas. Water levels are controlled by the SFWMD under the Comprehensive Everglades Restoration Plan (CERP) and are outside of the land managers' control.

Existing Projects

Prescribed fire on a 3-5 year fire return interval is the primary ongoing management action. Projects conducted under CERP influence hydrology of the property. Planned CERP projects could reduce Black Rail habitat in some areas and increase habitat in others.

Black Rail Data

Black Rail have been detected at this site, most recently in 2024. Formal surveys occurred from 2021-2023 with only a few detections. However, biologists have recorded about 30 incidental observations, with detections in all seasons (Ward et al. 2016; FWC, unpublished data). Staff tend to observe Black Rail in sawgrass marsh or along thin, open sloughs with adjacent sawgrass. Biologists also have observed Black Rail using the floating mats that delaminate from the bedrock.

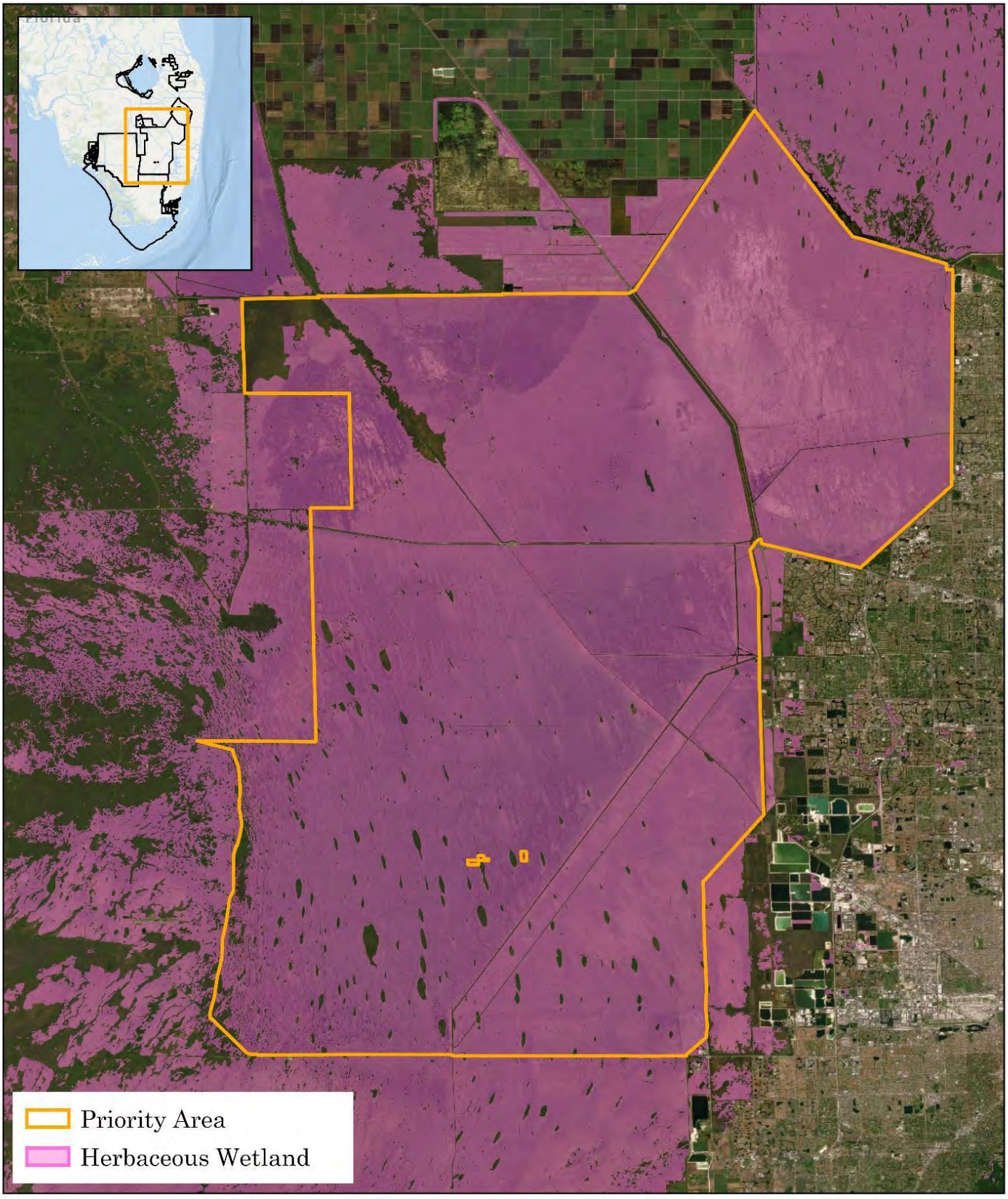
Recommended Next Steps to Management Action

Black Rail distribution and habitat use on the property remain major data gaps and make it difficult to predict the effects of future CERP projects. Managers need additional resources for monitoring given the property's vast size. Staff typically can manage invasive nonnative plants and encroachment by woody vegetation with internal funds but sometimes need additional resources.

Francis S. Taylor Everglades Wildlife Management Area contains an extensive landscape of sawgrass ridges (foreground) embedded within deeper sloughs (background). USFWS

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	Y
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y



Everglades and Francis S. Taylor Wildlife Management Area

11 Miles

15 Kilometers

Rotenberger Wildlife Management Area – 29,355 ac (11,880 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Josiah Freese (Josiah.Freese@myfwc.com)

Existing Conditions

Rotenberger WMA consists of large expanses of glades marsh. Water levels vary seasonally and can be deep at times, with tree islands likely providing upland refugia for species like Black Rail, though even the tree islands are inundated when water levels are particularly high. Water levels are managed by the SFWMD. The central and southern portions of the property currently contain the most likely Black Rail habitat.

Existing Projects

Primary management actions include prescribed fire and treatment of invasive plants. Cattails have invaded the northern end of the property, and managers are using a combination of herbicide and fire to restore this area to sawgrass. Managers removed an old oil drilling pad, restored the area to marsh grade, and planted with native plants in 2020 or 2021. In 2025, Ducks Unlimited was awarded a NAWCA grant to address berms and ditches that interrupt sheet flow in three former agricultural areas on the eastern side of the property.

Black Rail Data

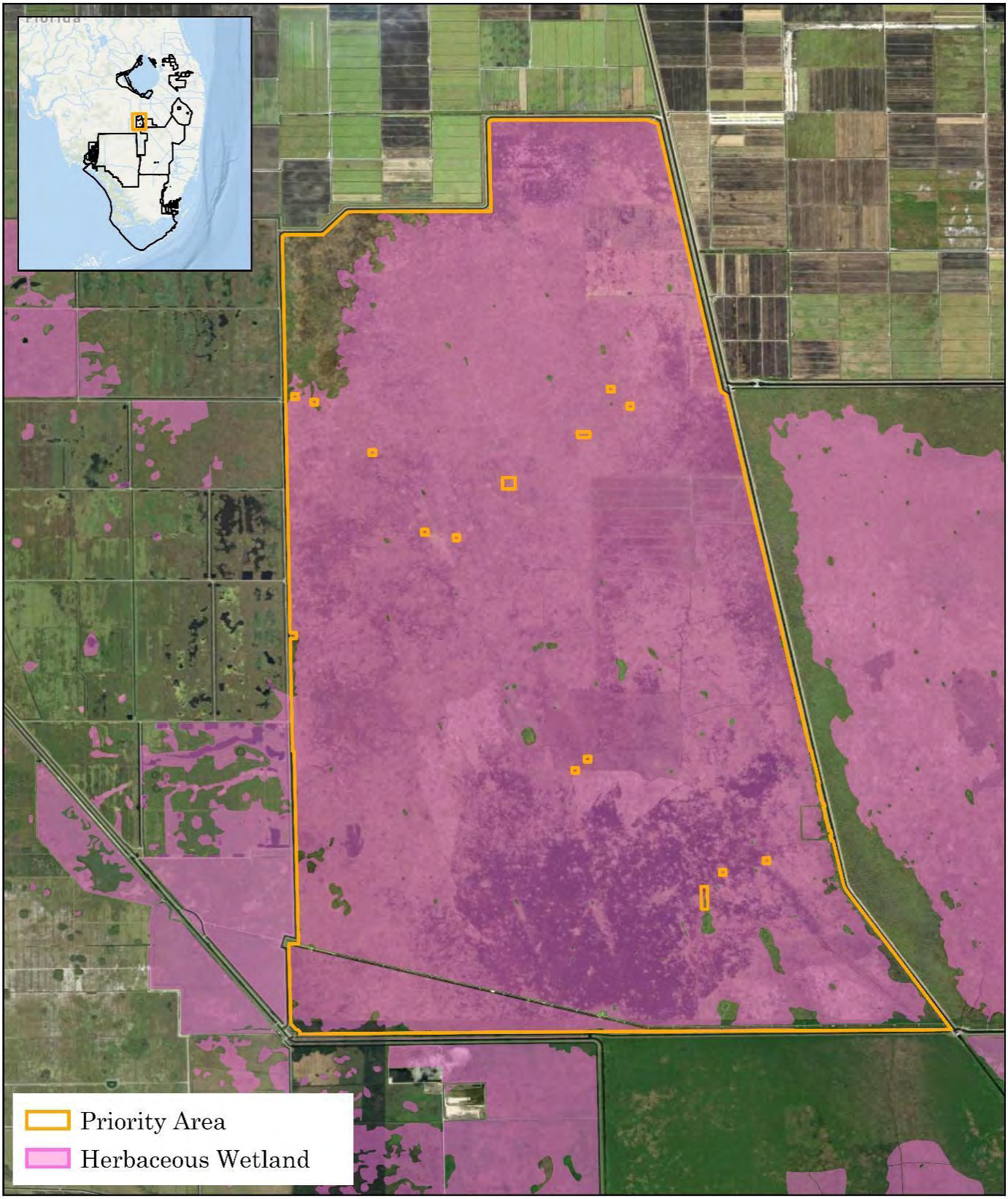
Black Rail have been detected incidentally at this site, most recently in 2024. Incidental observations of Black Rail usually occur near the tree islands. There have been no formal surveys, but FWC staff may start formal surveys in the future.

Recommended Next Steps to Management Action

Black Rail distribution and habitat use are poorly understood in glades marsh, and more information is needed to guide management. Potential restoration actions include expanded cattail treatments, removal of woody vegetation in areas from which berms have been removed, and treatment of invasive nonnative species such as West Indian marsh grass (*Hymenachne amplexicaulis*).

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Land acquisition / protection	N
Living shoreline development	N
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	Y
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	N



Rotenberger Wildlife Management Area

2.45 Miles

3.35 Kilometers

Holey Land Wildlife Management Area – 34,887 ac (14,118 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Josiah Freese (Josiah.Freese@myfwc.com)

Existing Conditions

Similar to the adjacent Rotenberger WMA, glades marsh is the dominant vegetation community on Holey Land WMA, though the latter property tends to be drier. Expansion of Carolina willow (*Salix caroliniana*) is a significant management issue. Water levels are managed by the SFWMD. CERP projects may alter hydrology on the site over time.

Existing Projects

The FWC manages the property with prescribed fire and treatment of invasive nonnative plants. Land managers mechanically shred approximately 100 acres of Carolina willow per year to restore areas to sawgrass.

Black Rail Data

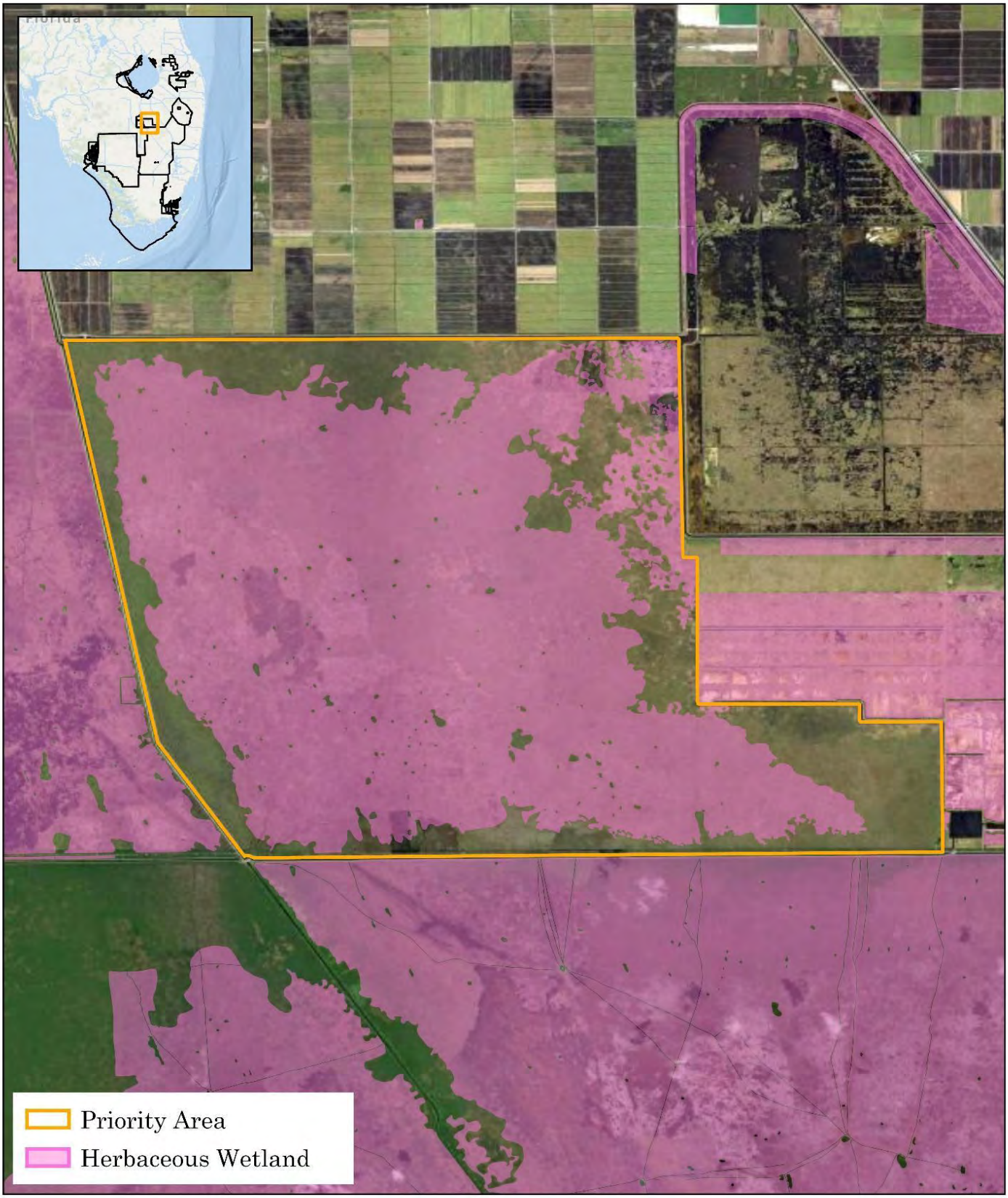
Black Rail have been detected incidentally at this site, most recently in 2018. There have been no formal surveys, though FWC hopes to start them in the future.

Recommended Next Steps to Management Action

Managers need additional resources for mechanical treatment of Carolina willow to restore areas to sawgrass. Black Rail distribution and habitat use are poorly understood in glades marsh.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	Y
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y



Holey Land Wildlife Management Area

3 Miles

4.2 Kilometers

Everglades National Park – 1.5M ac (624,236 ha)

Land manager: National Park Service

Point of contact: Tylan Dean (Tylan_Dean@nps.gov)

Existing Conditions

98% of the park's surface is either permanently or seasonally inundated. The hydrology is driven by seasonal rains, with surface water moving as sheetflow from north of the park toward Florida Bay to the south. Most detections of Black Rail have occurred in marl prairie, which also is home to the Federally-endangered Cape Sable Seaside Sparrow (*Ammospiza maritimus mirabilis*). Some detections of Black Rail also have occurred along the Coastal Prairie Trail in areas dominated by halophytic vegetation such as saltwort (*Batis maritima*). Black Rail may use the edges of pine rocklands as wet season refugia. Hydrologic management depends on properties north of the park in the greater everglades ecosystem and is largely outside of the control of park managers.

Patches of sawgrass (center) in this marl prairie in Everglades National Park provide wetter areas during dry periods. USFWS

Existing Projects

Management actions in the park include prescribed fire and control of invasive nonnative species. Restoration projects conducted as part of CERP affect the amount and timing of water flowing into the park. Black Rail detections have occurred within the Hole-in-the-Donut Project, a massive (6,600-acre) effort that restored a heavily disturbed area to marl prairie.

Black Rail Data

Black Rail have been detected at this site, most recently via incidental observation in 2024. Reports of Black Rail in the park date back only to the 1980s, with most detections in marl prairie near Mahogany Hammock, Taylor Slough, Research Road, and Old Ingraham Highway. The Center for Conservation Biology detected Black Rail during roadside surveys in 2020 and 2021.

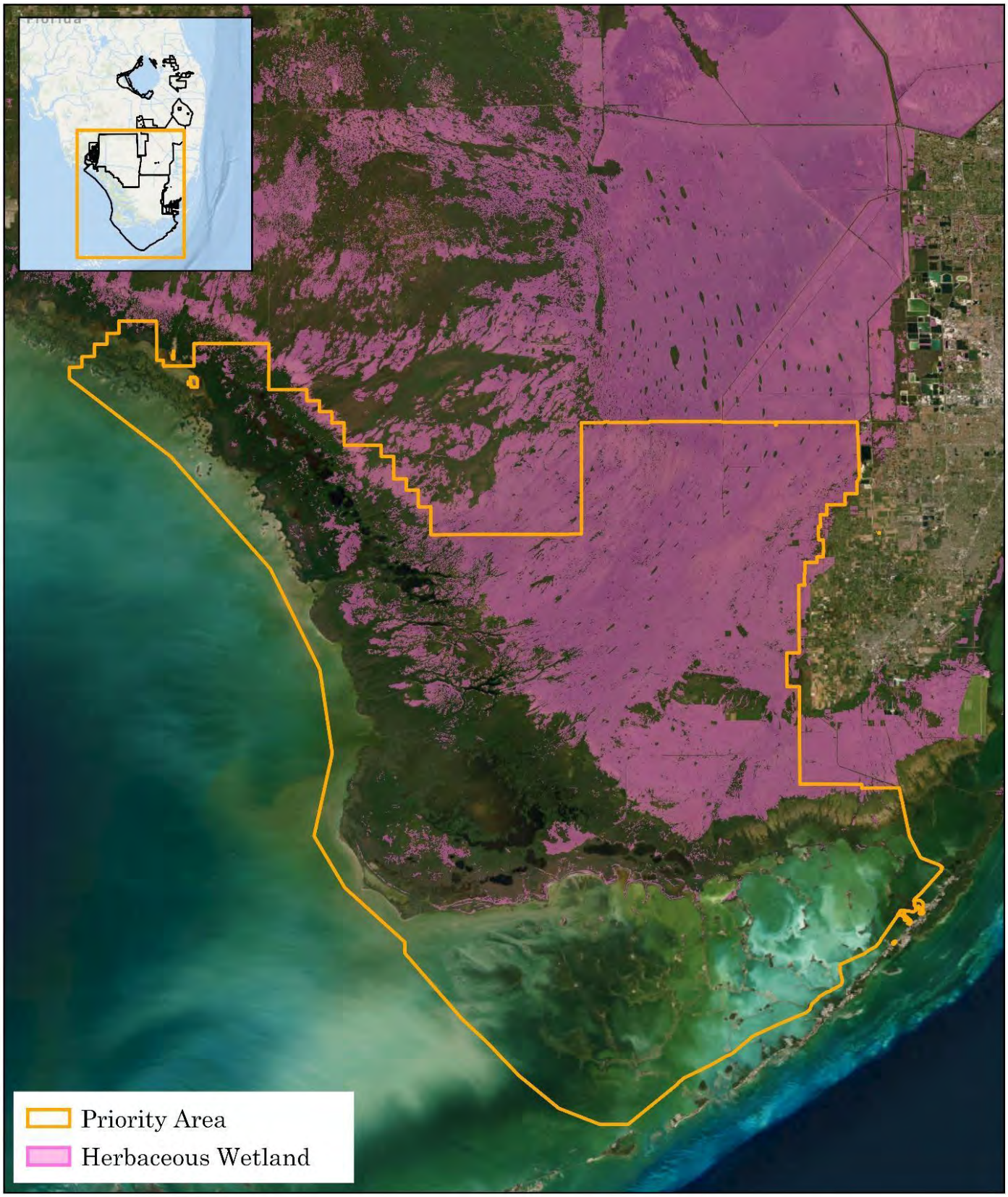
Recommended Next Steps to Management Action

We need to better understand Black Rail habitat use and distribution in the park to inform local management and regional restoration decisions. Additionally, understanding the effect of culverts installed to improve sheet flow under the Main Park Road would help to determine whether additional improvements are warranted. Like many bird species in South Florida, it is possible that Black Rail breeding phenology differs here compared to elsewhere in the species' range. Understanding breeding phenology could inform the timing of management actions.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Land acquisition / protection	N
Living shoreline development	N
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	N

Marl prairie. USFWS



Everglades National Park

19 Miles

27 Kilometers

Model Lands Basin (South Dade Wetlands) - 17, 703 ac (7,164 ha)

Land manager: South Florida Water Management District

Point of contact: Brian Garrett (bgarret@sfwmd.com)

Existing Conditions

Model Lands Basin includes a checkerboard of disjunct parcels owned and managed by a variety of entities (SFWMD, Miami-Dade County, Florida Power and Light, and private landowners) within the Biscayne Bay and Southeastern Everglades Ecosystem Restoration project. Natural communities in these parcels include glades marsh that transitions to salt marsh closer to the coast. Some areas contain healthy herbaceous wetlands, while others have invasive non-native vegetation and disturbance from past agriculture. Some portions are open for pedestrian public access, but unauthorized vehicular access and debris dumping are problems on other parcels.

Existing Projects

Recent management actions include control of non-native invasive plants and the addition of new firelines.

Black Rail Data

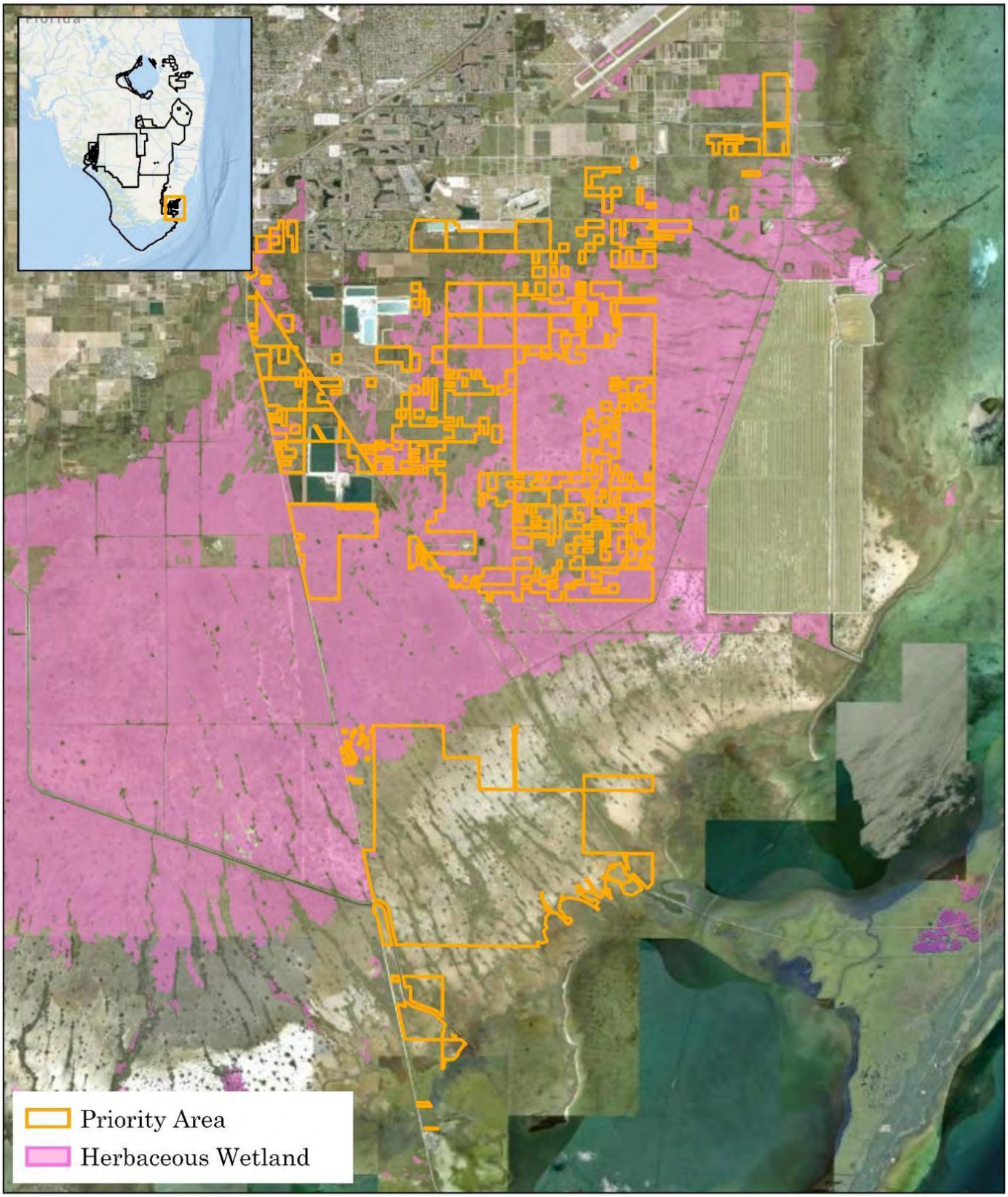
Black Rail have been detected at this site, most recently 2020 during surveys by the Center for Conservation Biology at William and Mary. Detections also occurred in 2017 and 2020 on an adjacent County-held conservation easement.

Recommended Next Steps to Management Action

Land acquisition and consolidation of management responsibility could help facilitate management actions. Additional surveys for Black Rail and hydrologic data would inform potential restoration actions. There are some agricultural areas and old mines that could be restored, and there may be a need to address disruption of freshwater flows from an adjacent mitigation area.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	Y
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	Y
Sediment modification - microtopography	Y
Sediment placement - elevation enhancement	Y
Stormwater management	Y
Water application - existing wetland	N
Wetland creation - recontouring	Y
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y



Model Lands Basin

3.55
Miles
4.9
Kilometers

Southern Glades – 32,751 ac (13,254 ha)

Land manager: South Florida Water Management District

Point of contact: Brian Garrett (bgarret@sfwmd.com)

Existing Conditions

Southern Glades encompasses a combination of glades marsh and marl prairie, including areas occupied by and managed for the Federally-listed Cape Sable Seaside Sparrow. Human disturbance and encroachment by invasive, non-native shrubs (e.g., shoebutton ardisia [*Ardisia elliptica*]) significantly impact the northern boundary of the property, mangroves have encroached into the marsh in the southern portion, cattails and torpedo grass occupy disturbed areas, and some old buildings and paved areas remain. Three major canals cut across the property, disrupting sheet flow. However, there are expanses of marsh and wet prairie that are in good shape and support vegetation and topography suitable for Black Rail.

Existing Projects

Managers use prescribed fire and treat both native and non-native (e.g., *Melaleuca*) woody vegetation around tree islands to keep the habitat open for Cape Sable Seaside Sparrows. Past hydrologic restoration actions include backfilling some canals.

Black Rail Data

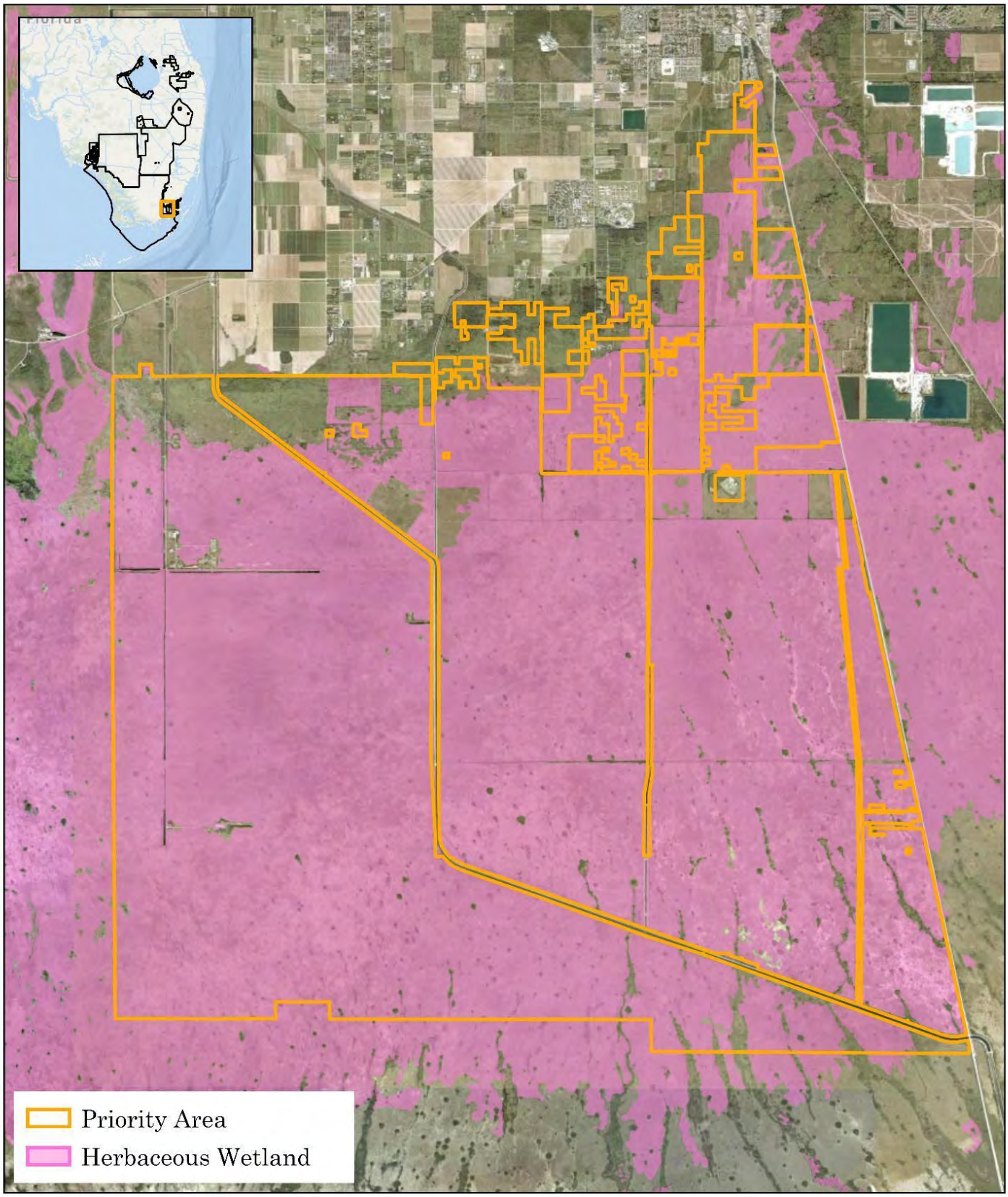
Black Rail have been detected at this site, most recently 2020 during surveys by the Center for Conservation Biology at William and Mary (Hines et al. 2023). Florida Gulf Coast University conducted call-playback surveys in 2021 and reviewed a sample of data from ARUs placed by SFWMD staff in 2020. This effort did not detect any Black Rail.

Recommended Next Steps to Management Action

Some portions of the property, including those occupied by Cape Sable Seaside Sparrows, receive regular prescribed fire, so the property could provide opportunity to study the effects of fire on Black Rail occupancy in freshwater marshes. Opportunities exist for small scale habitat improvements, such as removal of pavement and improving hydrology via placement of ditch plugs and facilitation of sheet flow under roads and old levees.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	Y
Land acquisition / protection	N
Living shoreline development	Y
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	Y
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification - microtopography	Y
Sediment placement- elevation enhancement	N
Stormwater management	Y
Water application - existing wetland	N
Wetland creation - recontouring	Y
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y



Southern Glades

2.3
Miles
3.15
Kilometers

Big Cypress National Preserve – 728,017 ac (294,619 ha)

Land manager: National Park Service

Point of contact: Matthew McCollister (matthew_mccollister@nps.gov)

Existing Conditions

Big Cypress National Preserve contains extensive marl prairies and glades marsh, which are seasonally inundated by rainfall that creates shallow sheet flow across the landscape. The entire prairie floods in wet years and can be entirely dry in others. The National Park Service can manage hydrology along interior roads but does not have control of hydrology in boundary canals. Projects under the Western Everglades Restoration Plan are likely to change the hydrology on the eastern side of the preserve, but it is unclear how these changes could affect Black Rail.

Surveys in the past five years have detected Black Rail in Big Cypress National Preserve's large patches of marl prairie. USFWS

Existing Projects

The National Park Service manages with prescribed fire, with a goal of a 5-year fire return interval in the prairies and marshes. Given the size of the property, management units are large, with some approaching 60,000 acres. Staff also manage invasive nonnative plants. The preserve has removed roadways and plugged canals in an area that had been platted for development in the Bass Lake unit. Managers also have added culverts under interior roads to improve sheet flow.

Black Rail Data

Black Rail have been detected at this site, most recently in 2022. The first report of Black Rail in the preserve was in 1968 (Watts 2016), with sporadic observations thereafter. Recently, surveyors from the Center for Conservation Biology (2020-2021; Hines et al. 2023) and Florida Gulf Coast University (2021-2022; Lefevre and Wallace 2023) detected Black Rail in prairies along and near roads on the western side of the preserve. National Park Service staff also report recent incidental observations farther away from the roads. The massive size of the preserve complicates survey efforts.

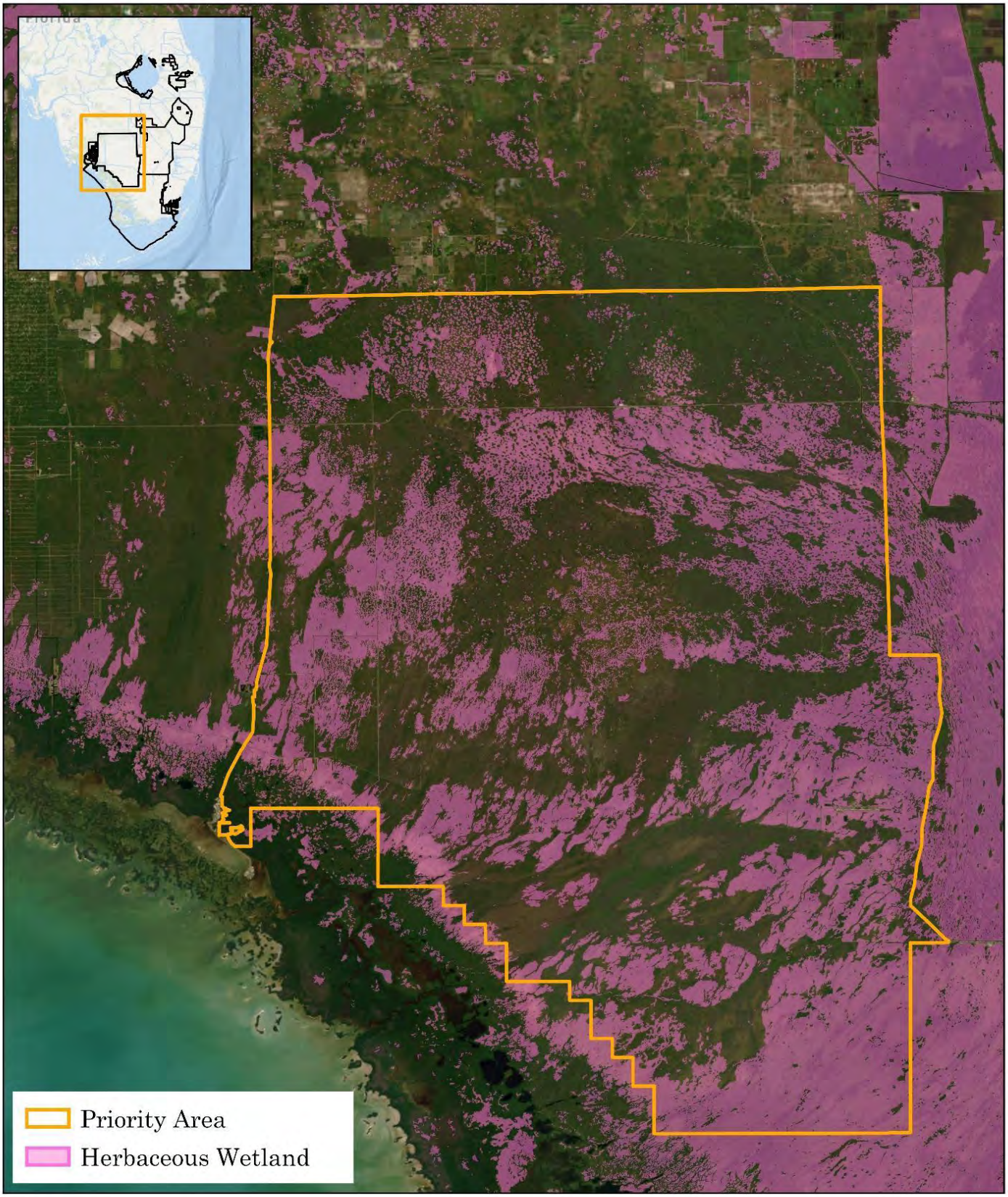
Recommended Next Steps to Management Action

Managers' primary concern is maintaining the resources necessary to keep up with prescribed fire over such a large property. Given the extent of potential habitat, the preserve may contain a significant population of Black Rail, but there is much still to learn about the species' status and distribution on the property. Research also is needed to understand Black Rail habitat use and the effects of management actions. Mechanical treatments are needed to remove woody vegetation and restore prairies and marshes in approximately 800 acres of the Bass Lake and Copeland Prairie units. It may be possible to conduct additional small-scale restoration actions to redistribute sheet flow under the preserve's interior roads.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca,* etc.)	Y
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	Y
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	Y
Sediment placement- elevation enhancement	N
Water application - existing wetland	N
Wetland creation – recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y

Sunset in the preserve. Rudy Wilms, Creative Commons



Big Cypress National Preserve

11 Miles

16 Kilometers

Fakahatchee Strand Preserve State Park -80,340 ac (32, 513 ha)

Land manager: Florida Department of Environmental Protection

Point of contact: Cole Luttrell (Cole.Luttrell@floridaDEP.gov)

Existing Conditions

Fakahatchee Strand Preserve State Park contains eastern and western areas of freshwater marsh separated by an expansive strand swamp. The marshes transition from marl prairie to glades marsh and eventually to salt marsh and salt flats as seasonal sheet flow of water moves from north to south. The western portion of the park contains Dan House Prairie, the largest patch of marl prairie on the property. On the eastern side of the park, adjacent to Big Cypress National Preserve, unauthorized offroad vehicles impact the marl prairie. Burning in the salt marsh is limited to winter months and north winds to avoid smoke hazards on U.S. 41. Because of these challenges, woody vegetation has encroached into the salt marsh. Additionally, mangroves are rapidly colonizing the salt marsh from the south. Flood control projects north of the park could pose challenges for managing Black Rail if they lead to longer hydroperiods and/or pulses of water at the wrong time of year.

Existing Projects

Park staff burn the marl prairies and glades marsh every 2-3 years, and the park conducts prescribed fires in the salt marsh approximately every 6 years. Ducks Unlimited received funding through NAWCA to remove agricultural berms and fill the associated ditches in Dan House Prairie. The park also is planning to replace and add culverts under Well Grade Road. These projects should lessen ponding and restore sheet flow to approximately 1,600 acres. Partners plan to plant herbaceous vegetation after the hydrologic restoration is complete. The FWC, the Nature Conservancy, and the SFWMD assist the park with capture of invasive non-native pythons.

Black Rail Data

Black Rail have been detected at this site, most recently via incidental observation in 2024. Florida Gulf Coast University detected Black Rail in the northeastern marl prairies in 2021 and 2022. Park staff have detected Black Rail in the eastern and southern portions of Dan House Prairie, including three incidental observations during 2024 prescribed fires and several records in the Florida Park Service database from 1998-2003. No surveys have occurred in the glades marsh or salt marsh due to access challenges.

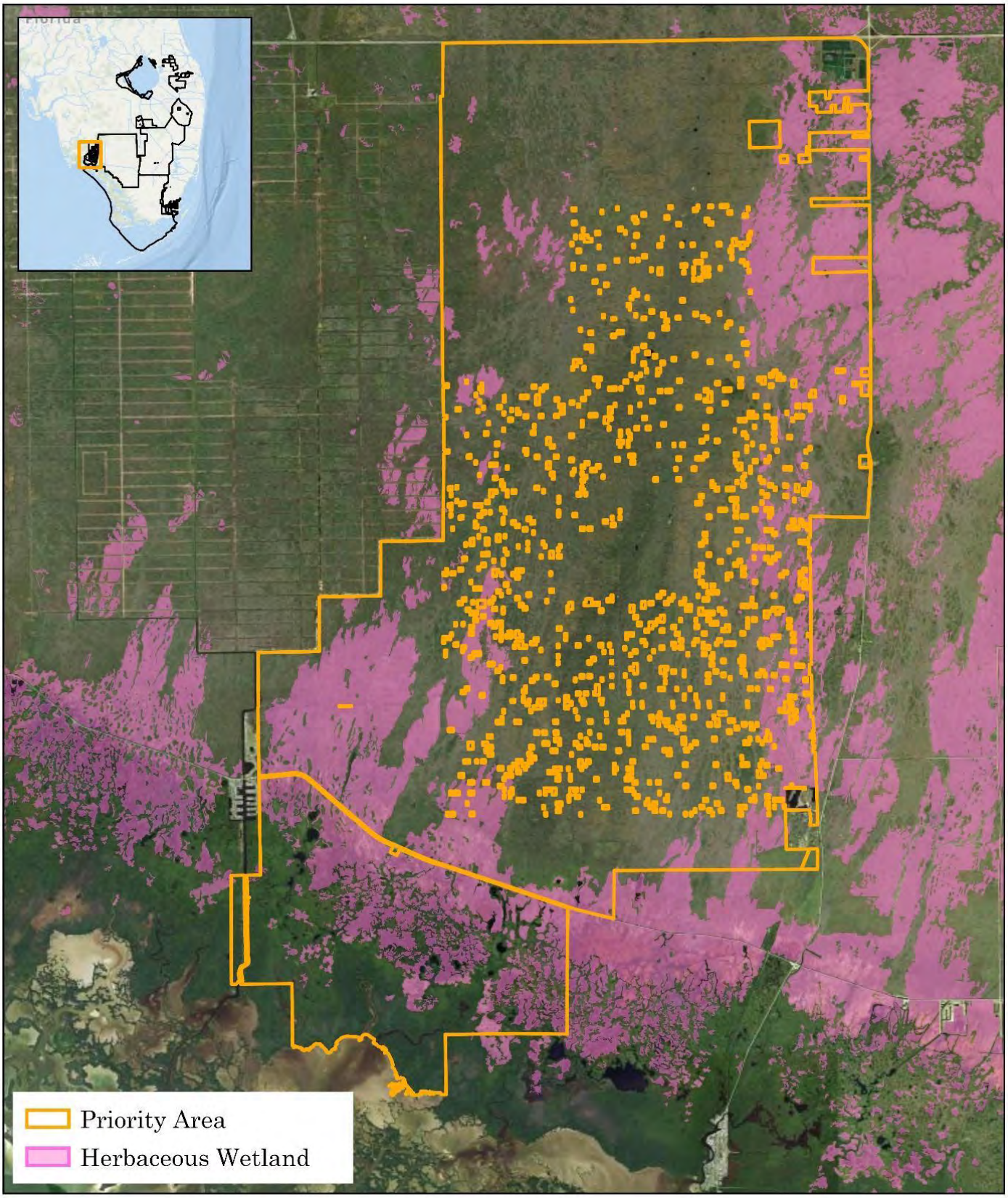
Recommended Next Steps To Management Action

There are several areas of the park that would benefit from hydrologic restoration actions. Adding culverts would help to alleviate ponding and restore hydrology along roads on the east side of the park (e.g., Lancaster and Jones Grade), and Copeland Prairie has remnant agricultural berms that slow sheet flow. Additional conveyance under U.S. 41 (and possibly ditch plugs) would benefit the freshwater/salt marsh ecotone. Addressing unauthorized off road vehicle use would benefit the eastern prairies. The park needs assistance with monitoring for Black Rail and with hydrological monitoring. Invasive non-native species are an ongoing issue, including patches of *Phragmites* in Dan House Prairie, torpedo grass in areas damaged by off road vehicles, and pythons throughout the park. The park has hundreds of inholdings that need to be acquired.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	N
Sediment placement- elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation – recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y

The Florida State Park Service and Ducks Unlimited received funding to push berms into their adjacent ditches to restore sheet flow. USFWS



Fakahatchee Strand Preserve State Park

4 Miles

5.5 Kilometers

C-139 Annex - 18, 319 ac (7,413 ha)

Land manager: South Florida Water Management District

Point of contact: Brian Garrett (bgarret@sfwmd.com)

Existing Conditions
This property contains a roughly 7,000-acre, ongoing restoration project adjacent to Stormwater Treatment Areas 5 and 6 called Abiaki Prairie. The portion that is already restored contains herbaceous wetlands and pockets of cypress and scrub-shrub wetlands

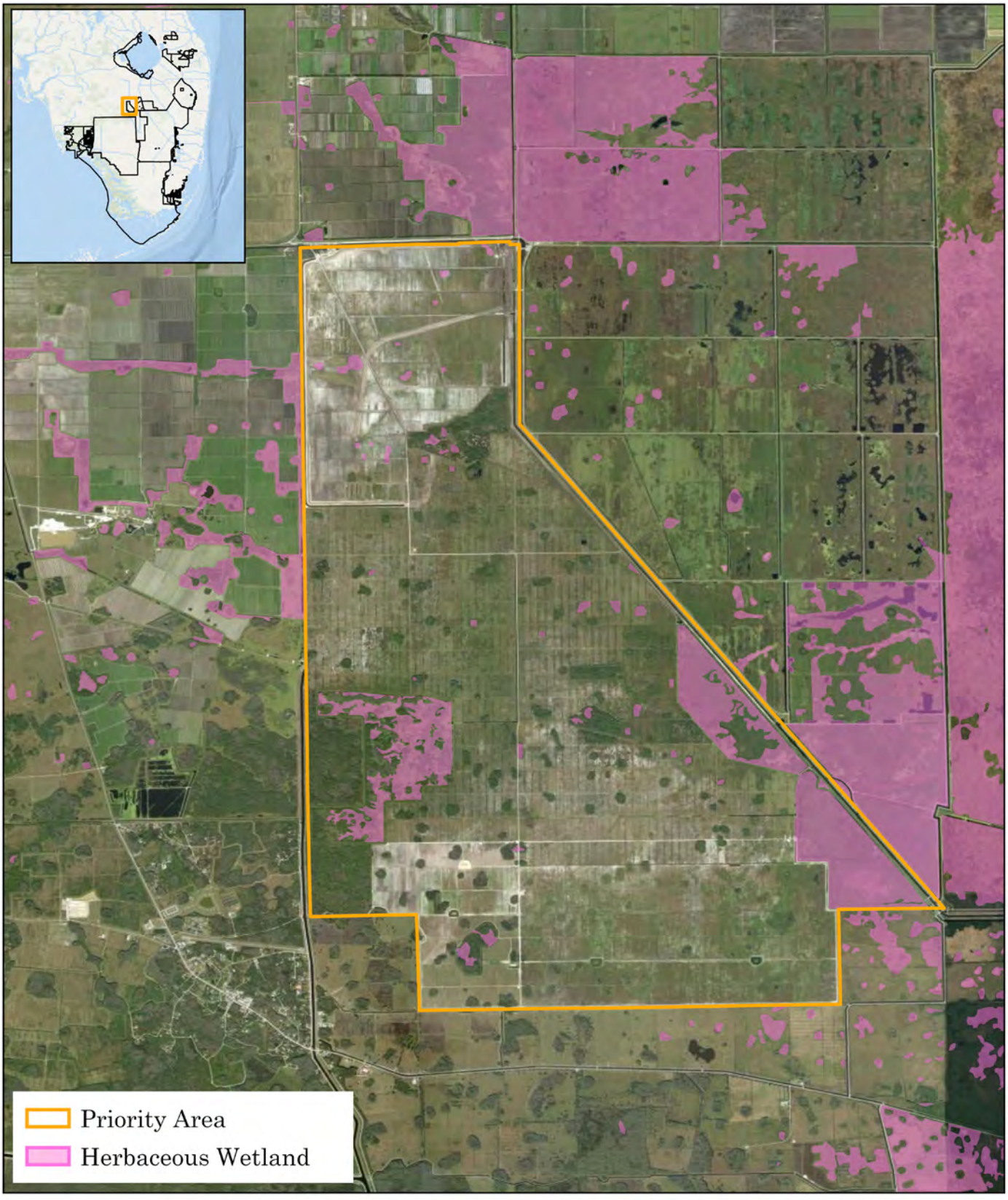
Existing Projects
The SFWMD currently is restoring old citrus groves to wetlands through a phased project. The first two phases are complete. Also, SFWMD has contracted for hog removal.

Black Rail Data
Black Rail have been detected at this site, most recently via incidental observation in 2024. There have been no formal surveys.

Recommended Next Steps To Management Action
Approximately half of the restoration project remains, and there may be opportunity to incorporate Black Rail into operational planning. There may be opportunity in completed phases to adjust the hydroperiod or add native plantings to benefit Black Rail. Ditch remediation also may be necessary in a few areas within completed phases. It may be possible to tweak the design of future phases to create suitable habitat.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	Y
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	Y
Sediment placement – elevation enhancement	N
Stormwater management	Y
Water application - existing wetland	N
Wetland creation – recontouring	Y
Wetland creation - water application	N
Wildlife herbivory reduction	Y
Woody vegetation control	N



C-139 Annex

2.3 Miles

3.2 Kilometers

Areas for Further Exploration

The following areas were identified by mapping and/or the partner group as important to keep in mind and further assess for future work. Properties are listed in alphabetical order.

Biscayne Bay Coastal Wetlands - 3,290 ac (1,331 ha)
Land manager: SFWMD

Biscayne Bay Coastal Wetlands includes a series of parcels managed by the SFWMD and USACE as a component of CERP. No Black Rail surveys have occurred, and there have been no incidental observations.The restoration goal is to rehydrate coastal wetlands to reduce point-source water discharges to Biscayne Bay. Restoration efforts will involve installation of flow ways, pump stations, and other modifications. Many of the parcels contain historic agricultural areas with invasive non-native plants. Managers treat larger-scale patches of these plants. SFWMD coastal resiliency staff are proposing some coastal structures (e.g., living shorelines for canal system, flow-through wetlands). There may be some limited opportunities for wetland restoration that could benefit Black Rail, but more exploration is needed.

Dupuis Management Area - 22,000 ac (8,903 ha)
Land manager: SFWMD

Dupuis Management Area contains marshes embedded within cypress swamps (eastern side) and flatwoods (western side). No Black Rail surveys have occurred, and there have been no incidental observations. Much of the property is over-drained due to a series of ditches, with wetlands in the drier northern portion of the property experiencing dry conditions for 4-5 months per year. The marsh along the L-8 canal on the southern side of the property has the most promise for Black Rail, and staff have proposed ARU surveys there. District staff are striving to restore sheet flow and lengthen the hydroperiod within the wetlands. The District began plugging ditches in the 1990s, and Ducks Unlimited recently received funding to fill additional ditches that connect marshes on over 1,000 acres. Restoring the hydrology will require additional ditch plugs and ditch filling. There may be opportunities to protect additional land west of the property.

East Coast Buffer - 19,269 ac (7,798 ha)
Land manager: SFWMD

The Pennsuco wetlands, or Cell 26, is the most promising part of this multi-tract property for Black Rail. The District has been restoring the glades marsh on the Pennsuco wetlands by removing Melaleuca. There have been no Black Rail surveys or incidental observations.

Fran Reich Preserve - 1,640 ac (664 ha)
Land manager: SFWMD

This property contains disturbed wetlands being restored by SFWMD. Numerous birders observed two Black Rail at this preserve from March through early May 2019. Restoration primarily involves removal of invasive, non-native trees. Potential habitat appears to be limited but may increase as restoration proceeds.

Frog Pond/L-31 N Transition Lands/Rocky Glades - 11,297 ac (4,572 ha)
Land manager: SFWMD

These properties along the eastern boundary of Everglades National Park are managed by the SFWMD and are part of CERP. Rocky Glades has marl prairie on the north end, but these properties mostly contain disturbed agricultural land once used for row crops. Invasive, non-native napiergrass (*Cenchrus purpureus*) dominates many areas, though some areas contain restored native ruderal vegetation. Planted pines occur in some historic wet prairies and potential remnant pine rockland habitat. Sawgrass occurs in some areas, including flow ways used for water management on Frog Pond. Hydrology can change significantly in a short period of time in the flow ways during storms. No Black Rail surveys have occurred, and there have

been no incidental observations. Some wetlands have encroachment by native woody species such as wax myrtle (*Morella cerifera*), saltbush (*Baccharis halimifolia*), and willows (*Salix sp*.). Non-native wildlife include pythons and tegus. Frog Pond supports public hunting, including a 100 acre dove field and duck hunting. UTV off-roading is an issue. Land managers wish to restore these properties but currently lack the resources for large-scale work. Managers have conducted some herbaceous plantings. Surveys are needed to know if Black Rail are present and to identify priority areas for restoring agricultural fields to wetlands.

Green Heart of the Everglades - 10, 998 ac (4,451 ha)
Land manager: SFWMD

Acquired by the SFWMD in 2023, this property contains marl prairie and glades marsh north of U.S. 41 and salt marsh south of the highway. No Black Rail surveys have occurred, and there have been no incidental observations. The property borders Fakahatchee Strand State Park and Big Cypress National Preserve, both of which support Black Rail. Proposed public use includes hunting and commercial airboat operations.

Picayune Strand State Forest - 73,859 ac (29,890 ha)
Land manager: Florida Forest Service

This property contains over 2,700 acres of marl prairie that transitions into salt marsh. There have been no surveys or incidental observations of Black Rail, but the area is worthy of investigation given Black Rail occupancy in other marl prairies in South Florida.

Pine Glades Natural Area - 6,692 ac (2,708 ha)
Land manager: Palm Beach County

This property is adjacent to John C. and Mariana Jones/Hungryland Wildlife and Environmental Area and appears to have similar habitat. There have been no Black Rail surveys or incidental observations.

Ten Thousand Islands National Wildlife Refuge - 33,914 ac (13,725 ha)
Land manager: USFWS

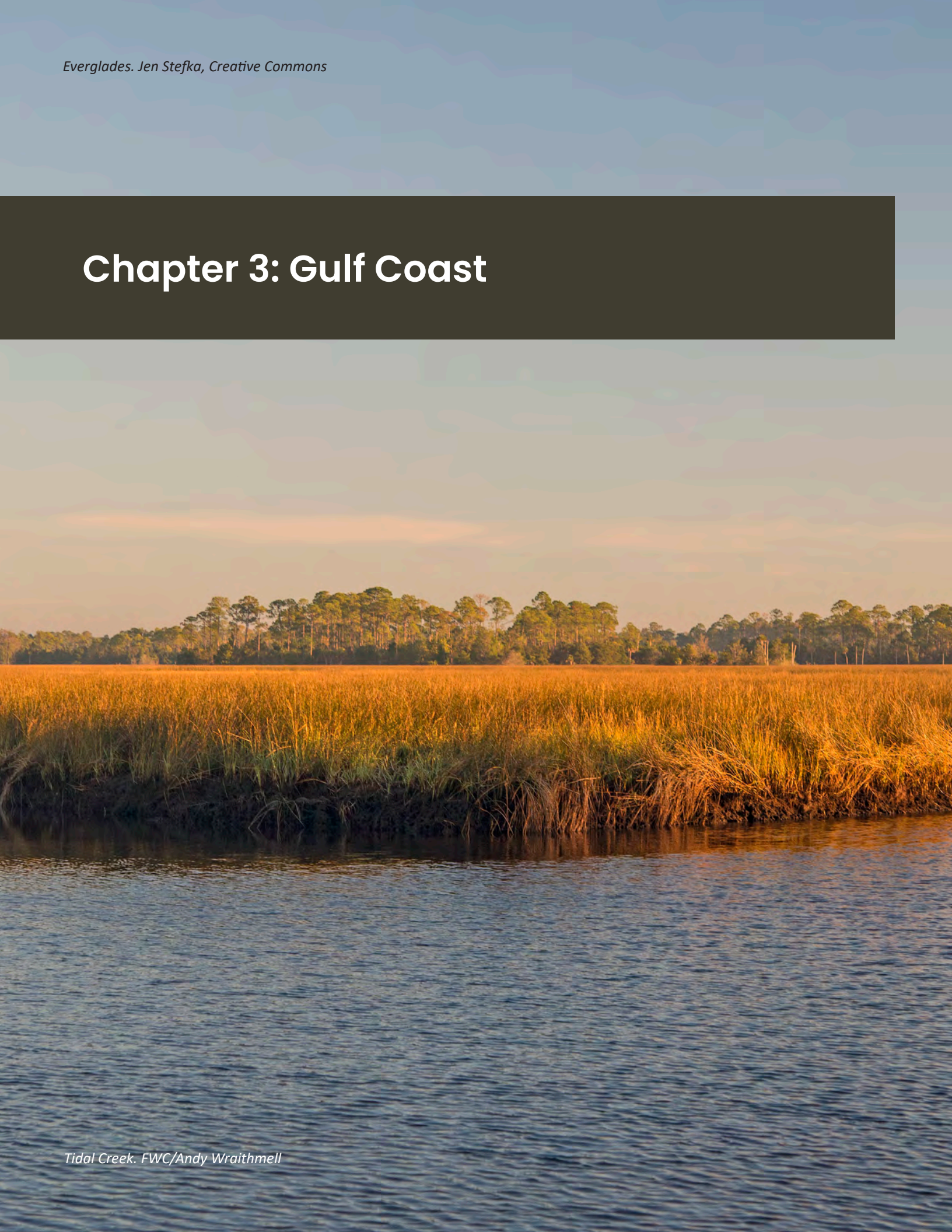
The Refuge has tidal salt marsh along U.S. 41 that may be suitable for Black Rail, but the species has yet to be detected. The acreage of salt marsh is declining rapidly due to encroachment by mangroves.

Private lands

The area between Big Cypress National Preserve to the south and the Caloosahatchee River to the north contains conservation easements owned by the NRCS, USFWS, and the State of Florida. This area also is part of the USFWS's Everglades to the Gulf Conservation Area, in which the USFWS seeks to promote voluntary conservation through conservation easements. Fallow citrus groves and pastures may present opportunities for creating shallow sheet flow wetlands.

Everglades. Jen Stefka, Creative Commons

Chapter 3: Gulf Coast



Tidal Creek. FWC/Andy Wraithmell

Priority Areas

Properties are ordered in this chapter from west to east through the Panhandle and Florida's Big Bend and then north to south along the peninsula. Acres (ac) and hectares (ha) typically refer to the total size of the property. Exceptions include properties with distant, disjunct tracts, in which case acreage refers to just the tracts with potential Black Rail habitat.

Gulf Coast Priority Areas and Areas for Further Exploration

St. Vincent National Wildlife Refuge - 12,126 ac (4,907 ha)

Land manager: U.S. Fish and Wildlife Service

Point of contact: Bradley Smith (Bradley_Smith@fws.gov)

Existing Conditions

St. Vincent National Wildlife Refuge is located on a barrier island with roughly 2,700 acres of tidal salt marsh, much of it dominated by black needlerush. Applying prescribed fire is less challenging than at other properties due to the refuge's island locale, but the fire program does have some fiscal and capacity constraints.

Existing Projects

The U.S. Fish and Wildlife Service manages the tidal salt marsh with prescribed fire and also removes feral hogs.

Black Rail Data

Black Rail have been detected at this site, most recently in 2023. Surveys for Black Rail on the refuge date back to the 1970s. FWC staff detected Black Rail in 1989 (Runde et al. 1990), University of Arizona staff conducted surveys in 2002 (Conway and Nadeau 2006), and the Refuges Inventory and Monitoring group surveyed the property about a decade later. More recently, surveys occurred during the 2016/17 statewide survey effort (Schwarzer et al. 2024), and Tall Timbers Research Station conducted surveys from 2021-2023 as part of the National Oceanic and Atmospheric Association (NOAA) Firebird project. St. Vincent NWR also hosted an eDNA research project through the Refuges Inventory and Monitoring group.

Recommended Next Steps To Management Action

Refuge staff are interested in learning more about prescribed fire and Black Rail, including the effects of ignition techniques, seasonality, and fine-scale burning. Staff also expressed a desire to learn more about factors driving habitat use on the refuge, such as microtopography. It may be possible to create topographic highs and lows and otherwise adjust conditions in the refuge's impoundments, where Black Rail have not been detected. The refuge's acquisition boundary includes salt marsh on the mainland, and there may be opportunities for land acquisition and living shoreline development there. Marsh migration is occurring south of G Road, and there may be opportunities to facilitate this inland movement.

Saltmeadow cordgrass (Spartina patens) provides habitat for Black Rail at St. Vincent National Wildlife Refuge. Carolyn Enloe/FWC

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	Y
Land acquisition / protection	Y
Living shoreline development	Y
Non-native invasive plant species management (*Melaleuca*, etc.)	N
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	Y
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y

Conducting surveys. Amy Schwarzer

St. Vincent National Wildlife Refuge

5.1 Miles

7 Kilometers

St. Marks National Wildlife Refuge - 81,998 ac (33,184 ha)

Land manager: U.S. Fish and Wildlife Service

Point of contact: Amanda Bessler (Amanda_Bessler@fws.gov)

Existing Conditions

St. Marks National Wildlife Refuge contains over 1,570 acres of impoundments managed for waterfowl, waterbirds and shorebirds, as well as roughly 32,000 acres of tidal salt marsh. Surface Elevation Table data indicate that marsh accretion is mostly keeping pace with sea level rise and subsidence. Moist soil management from the early years of the refuge created topographic variation needed by Black Rail in some impoundments. Narrow burn windows, the large area of the refuge, and capacity limitations (the burn crew covers multiple states) constrain the refuge's ability to apply prescribed fire.

Slash pines on the edge of a Florida marsh. Karl Davison, Creative Commons

Existing Projects

Refuge staff use prescribed fire and water level management to benefit Black Rail. The refuge aims to burn the impoundments every other year, with tidal salt marshes burned less often. Staff consult with Tall Timbers Research Station biologists when planning fires in Black Rail habitat. Refuge staff manage invasive nonnative species, such as feral hogs, Cuban bulrush, torpedo grass, and cogon grass (*Imperata cylindrica*).

Black Rail Data

Black Rail have been detected at this site, most recently in 2025. The majority of Black Rail detections come from the impoundments, though Black Rail also occur in the tidal salt marsh. FWC staff detected Black Rail during 1989 surveys and again in the 2016/17 statewide surveys (Runde et al. 1990, Schwarzer et al. 2024). Refuges Inventory and Monitoring staff deployed ARUs in 2017 or 2018. Since 2021, Tall Timbers Research Station Staff has conducted breeding and non-breeding surveys for the NOAA Firebird project in both the Wakulla Unit and the Panacea Unit and have detected Black Rail both inside and outside of the impoundments.

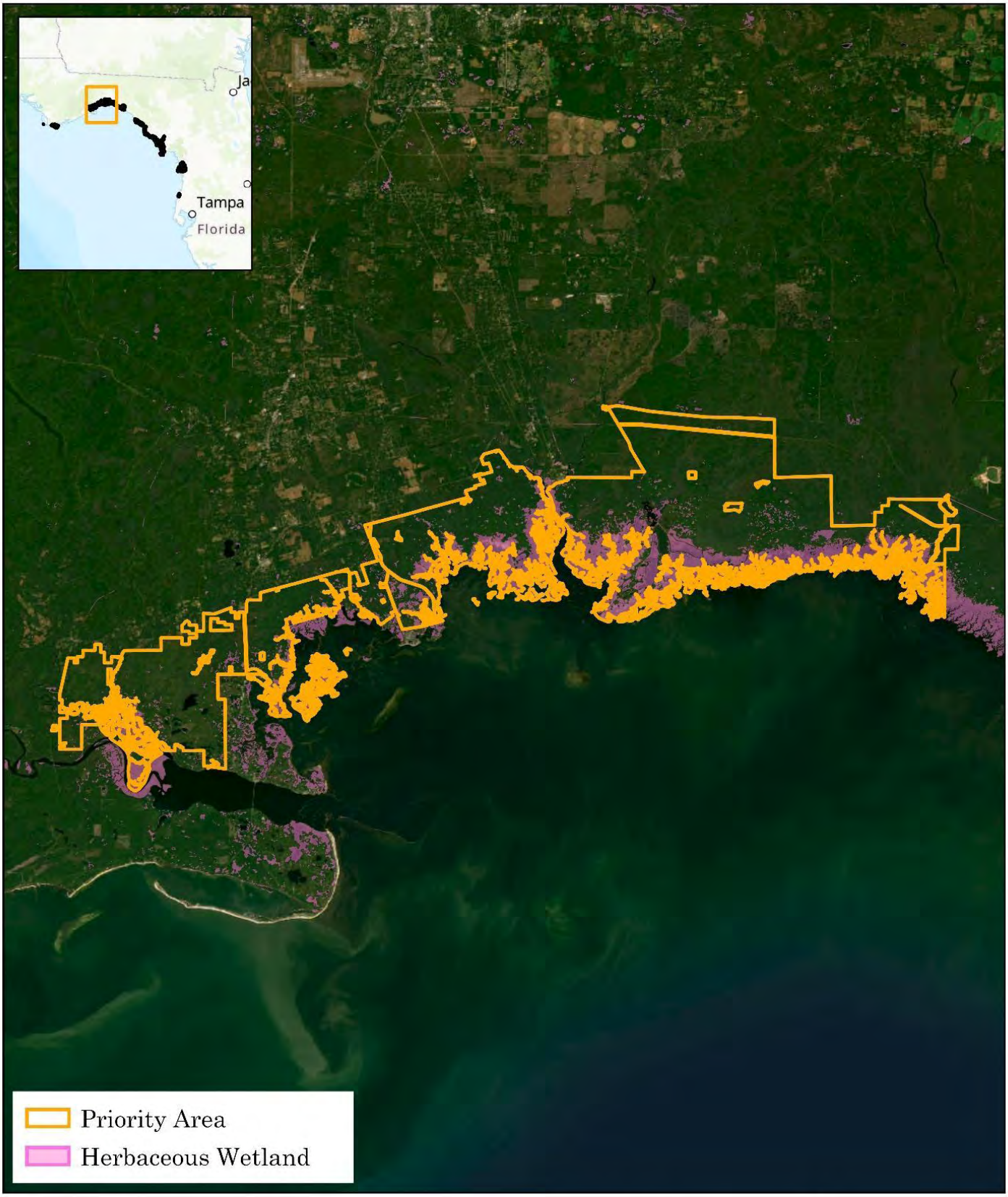
Recommended Next Steps To Management Action

Refuge staff are seeking funding for a hydrologic assessment across the Refuge to determine natural historic flow. Managers also would like to characterize microtopography and hydrology in areas used by Black Rail to improve impoundment management. The 209-acre Stoney Bayou impoundment has suitable groundcover and topography but has encroachment by shrubs, slash pines (*Pinus elliottii*), and cabbage palms. Removing trees and shrubs could expand habitat for Black Rail, and supplemental irrigation may enhance the habitat during dry periods. Funding for a dedicated burn crew for marshes and impoundments would help. Management to facilitate marsh migration may be possible at some sites within the Wakulla Unit and in the Spring Creek area.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	Y
Land acquisition / protection	N
Living shoreline development	Y
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	Y
Repair hydrology - impoundments	Y
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	Y
Sediment modification – microtopography	Y
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	Y
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	Y
Woody vegetation control	Y

Black Rail taking a bath. Brian Tang



St. Marks National Wildlife Refuge

9 Miles

12 Kilometers

Big Bend Wildlife Management Area – Hickory Mound Unit -20,437 ac (8,271 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Rebecca Doane (Rebecca.Doane@myfwc.com)

Existing Conditions

Black Rail habitat on this unit consists of an impounded marsh and tidal salt marsh. The FWC has an agreement and joint management plan with Ducks Unlimited to manage the impoundment for waterfowl. Black Rail still use the impoundment even when water levels are raised. Freshwater inputs to the marsh come from the adjacent hydric hammock. Salinity levels in the tidal salt marsh keep woody vegetation stunted. The WMA serves as a popular recreation spot for crabbers and fishermen, which must be considered when evaluating management actions.

This area uses prescribed fire to manage woody vegetation and invasive species. Sue McRae

Existing Projects

The FWC burns the impounded marsh on a 2-year fire return interval using aerial burns, which has been sufficient to manage woody vegetation growth. Fires typically occur in February, when water levels are drawn down. NAWCA funds were used to bolster the dike of the impoundment. The WMA is one of the study sites for NOAA Firebird to examine the effects of fire on Black Rail occupancy along the Gulf Coast from Texas to Florida's Big Bend. Tall Timbers Research Station conducted surveys as part of this project, using both call playback surveys and ARUs.

Black Rail Data

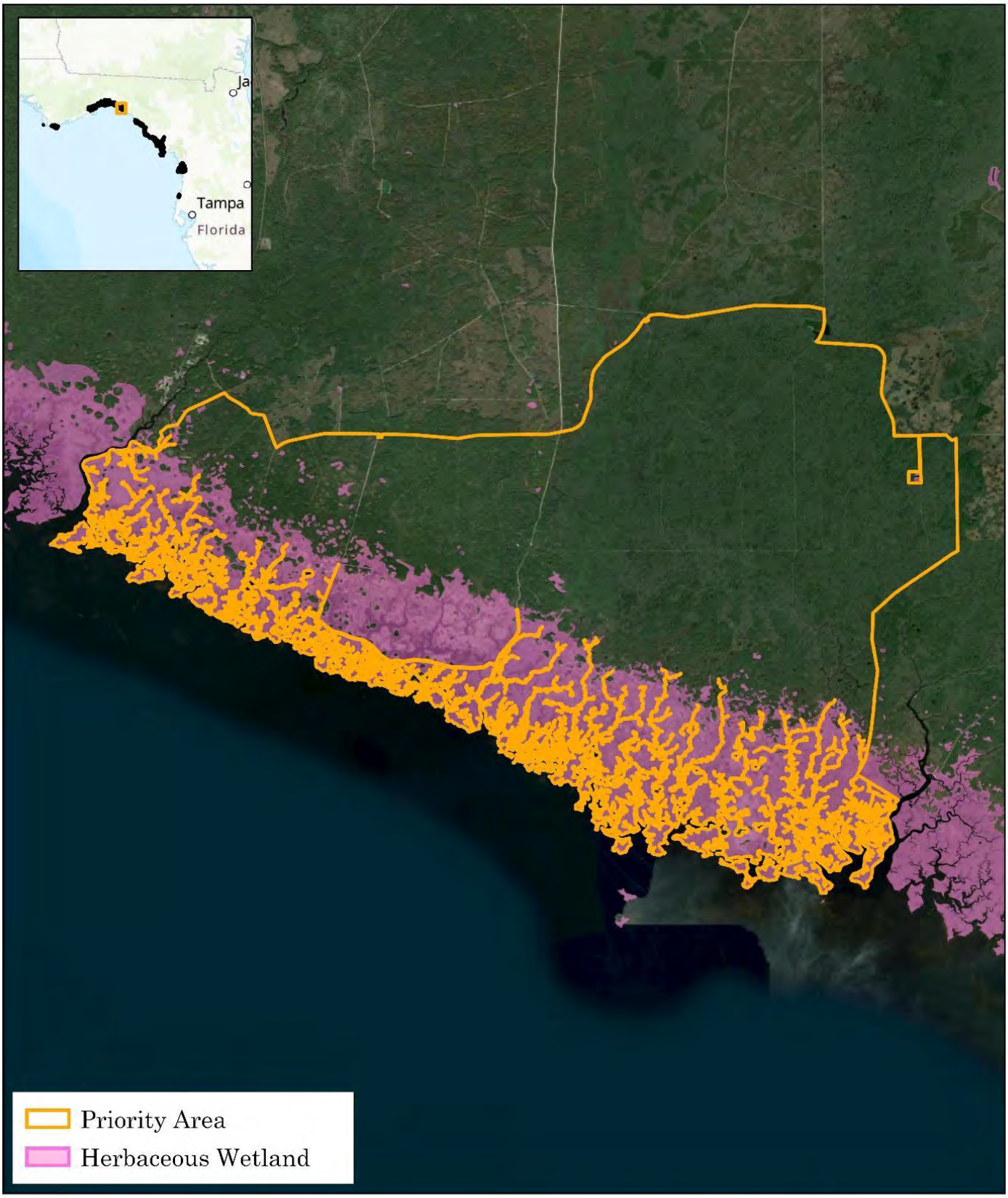
Black Rail have been detected at this site, most recently in 2024. Biologists detected a Black Rail on the property during the FWC's 2016/17 statewide survey (Schwarzer et al. 2024). Tall Timbers Research Station biologists detected Black Rail both within and outside of the impounded wetlands during breeding season and winter surveys from 2021 to 2024, except there were no detections in 2023. To date, most surveys have occurred from the levees, so a portion of the interior of the impoundment and much of the property's tidal salt marsh remain un-surveyed. Black Rail detections have come primarily from the impounded wetland, with a few detections in the adjacent tidal salt marsh.

Recommended Next Steps To Management Action

Surveys in the unsurveyed portion of the impoundment interior and throughout the tidal salt marsh would improve knowledge of Black Rail distribution on the property. FWC also is interested in learning more about the effects of prescribed fire seasonality. Funding sometimes is needed to repair impoundment infrastructure after severe weather events. As of January, 2025, managers were seeking funding to upgrade the dike and box culverts and add an additional spillway to the impoundment structure to mitigate future impacts from hurricane events. It would help to have a vulnerability assessment for sea level rise on this tract.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	Y
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	N
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	Y
Repair hydrology - impoundments	Y
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	Y
Sediment placement - elevation enhancement	N
Stormwater management	Y
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	N



Big Bend Wildlife Management Area – Hickory Mound Unit

2.6 Miles

3.55 Kilometers

Big Bend Wildlife Management Area – Tide Swamp Unit - 22,596 (9,144 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Rebecca Doane (Rebecca.Doane@myfwc.com)

Existing Conditions

Black Rail occur in small pockets of high marsh within the tidal salt marsh of the Tide Swamp Unit of Big Bend WMA. The habitat has a greater density of pine trees than is typical of Black Rail habitat due to pines planted for timber production in the past. However, surveyors have detected rails in the areas with these stunted pine trees. Mangroves are starting to become established in the low marsh. The habitat is prone to inundation during high tides. This unit receives heavy recreational use, mostly near the unit's boat ramp. resulting in trash and sometimes off-road vehicles in the salt marsh. The site is vulnerable to storm events, recent storm surge from Helene estimated to be 21'. This unit of Big Bend WMA also lost 50-75% of canopy during Helene. Any future projects to facilitate marsh migration and habitat for BLRA would be challenging at this location given the extensive forest habitat along the marsh edge and nearby paved Beach Road.

Mangroves are starting to establish in this management unit, encroaching on suitable Black Rail habitat. Marianne Serra, Creative Commons

Existing Projects

The FWC conducts dormant season prescribed fires on a 4-year fire return interval. FWC uses internal funds to address restrictions to freshwater flow from the uplands.

Black Rail Data

Black Rail have been detected at this site, most recently in breeding season 2023. FWC staff detected Black Rail in this unit during surveys in 1989, and an opportunistic detection occurred during 2010 deepwater horizon monitoring activities. None were detected during the 2016/2017 statewide survey effort (Runde et al. 1990, Schwarzer et al. 2024). From 2021 to the present, Tall Timbers Research Station staff surveyed most of the available habitat in the unit for the NOAA Firebird project, with detections in 2021, 2022, and 2023, but not in 2024.

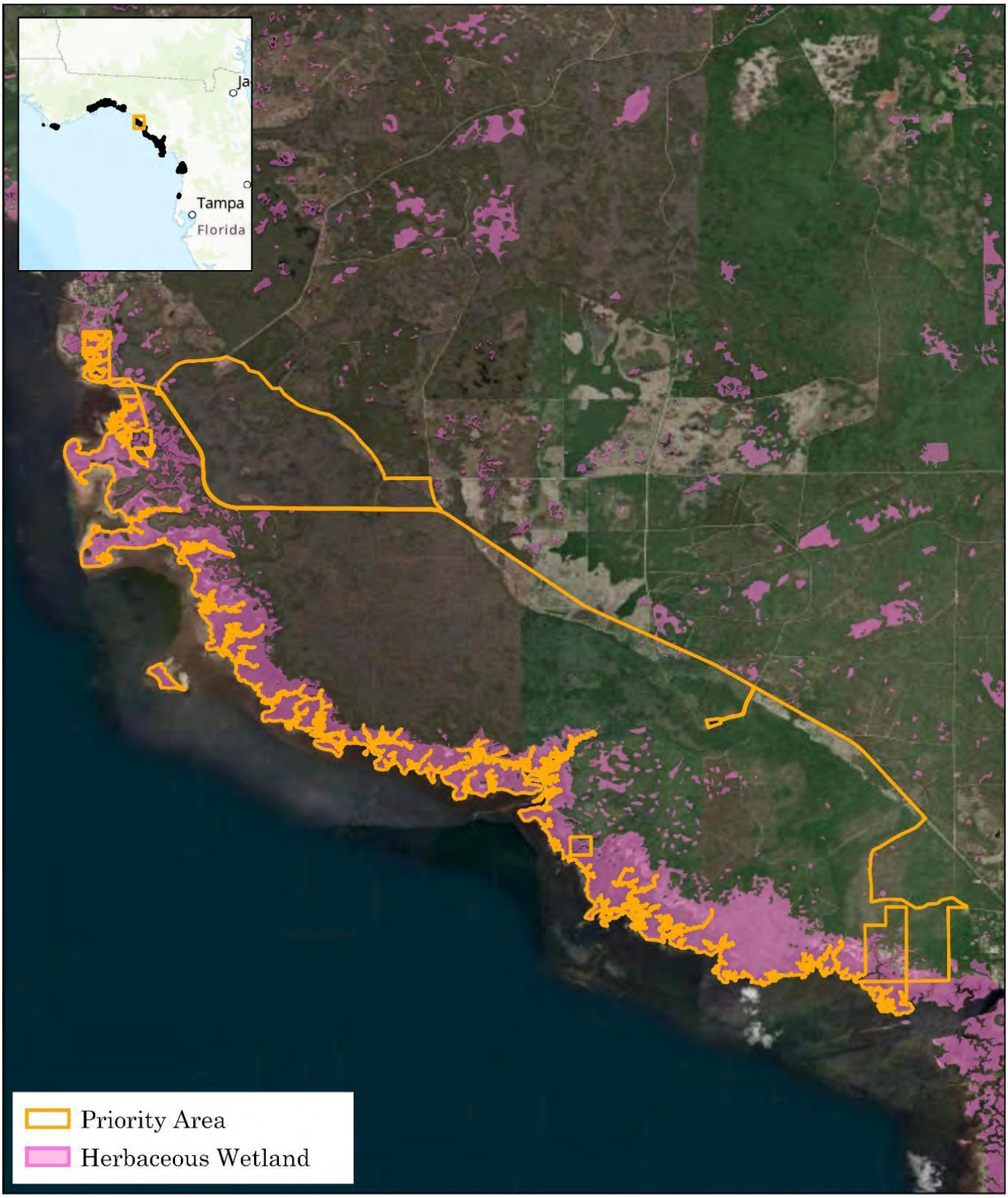
Recommended Next Steps To Management Action

Removing some of the stunted pine trees could improve Black Rail habitat. There also may be an opportunity to facilitate marsh migration by removing ghost forests and pine trees. It would be helpful to evaluate whether marsh accretion is keeping pace with sea level rise. Land acquisition opportunities exist on the northern border of the unit. Largest obstacle predicted at this site is mangrove take over, access, and adjacent flatwoods.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	Y
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	N
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	Y
Woody vegetation control	N

Adams Beach. Carolyn Enloe/FWC



Big Bend Wildlife Management Area – Tide Swamp Unit

3.05 Miles

4.2 Kilometers

Big Bend Wildlife Management Area – Jena Unit - 19,160 ac (7,754 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Rebecca Doane (Rebecca.Doane@myfwc.com)

Existing Conditions

County Road 361 (colloquially termed the "Road to Nowhere") cuts through the tidal salt marsh before terminating at a unique moonscape of salt pannes and rocky outcroppings. The Black Rail habitat also is somewhat unusual, consisting of high marsh dominated by black needlerush and salt pannes. Detections often occur in the intergrade area between the high and low marsh, often near pine hummocks or near the road. Due to the presence of County Road 361, the site receives heavy recreational use, and trash dumping and off-road vehicles degrade the habitat.

Black Rail hiding in the marsh. Michael Gray

Existing Projects

Access for prescribed burning is challenging in much of the marsh, and managers usually burn only the uplands. Managers treat invasive nonnative species, including patches of torpedo grass in the marsh and cogon grass along the road.

Black Rail Data

Black Rail have been detected at this site, most recently in 2023. This unit has been a well-known site for Black Rail for decades, with detections dating back at least to 1989 surveys by FWC staff (Runde et al. 1990). Legare and Eddleman (2001) studied Black Rail home range and nest locations on private land adjacent to this WMA in 1992 and 1993. Biologists incidentally detected Black Rail in this unit in 2015 but did not detect the species during the 2016/17 statewide survey effort (Schwarzer et al. 2024). Since 2021, Tall Timbers Research Station staff has conducted Black Rail surveys north of the terminus of County Road 361. If funding is no longer available, FWC staff intend to start monitoring this unit. Potential habitat extends farther south than current survey efforts, but access is challenging.

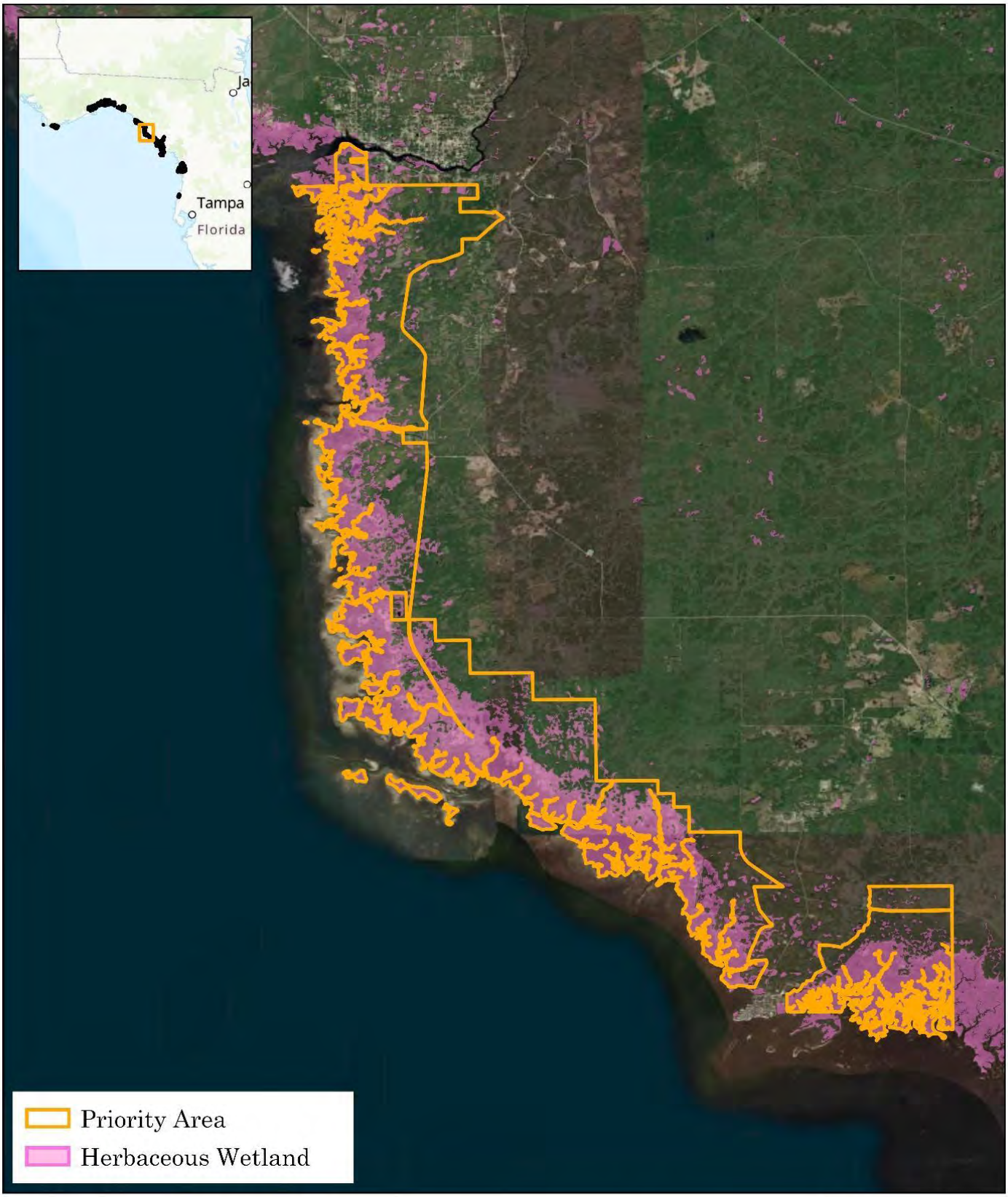
Recommended Next Steps To Management Action

Restricting vehicular access to the marsh would reduce habitat degradation but would require a change to State regulations by the FWC. It is possible that sediment placement could help restore disturbed areas, but these areas may recover on their own if left undisturbed. Burning portions of the property is challenging, and additional access points would help facilitate burning. There are a few inholdings on the south end toward Horseshoe Beach that could be acquired. Some priority data gaps include surveys of much of the marsh south of County Road 361 and an evaluation of the vulnerability of the unit to sea level rise.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	N
Sediment placement - elevation enhancement	Y
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	N

Short black needlerush dominates the high marsh at the Jena Unit of Big Bend Wildlife Management Area. USFWS



Big Bend Wildlife Management Area – Jena Unit

4.1 Miles

5.65 Kilometers

Crystal River Preserve State Park - 27, 675 ac (11, 200 ha)

Land manager: Florida Department of Environmental Protection

Point of contact: John Kilmer (John.Kilmer@FloridaDEP.gov)

Existing Conditions

The coastal portion of this park is characterized by reticulated tidal creeks and salt marsh islands. Black needlerush dominates the low marsh, and saltgrass (*Distichilis spicata*) is the dominant species in the high marsh. Patches of saltmeadow cordgrass (*Spartina patens*) are present in some areas. Salt pannes occur at the highest elevations within the salt marsh, dominated by succulents such as saltwort and glasswort (*Salicornia* sp.) or short grasses. Tree islands dot the marsh, with some reduced to ghost forests with sea level rise. Much of the marsh is difficult to access except by airboat. The salt marsh tends to grade into tidal freshwater marsh dominated by sawgrass or into hydric hammock. Airboats sometimes make paths in the marsh. Management of the property is shared between the Florida Park Service and Florida Aquatic Preserves staff.

Edge of wooded area. Hammock Island Trail is a trail in Crystal River Preserve State Park that winds through scrub, a coastal marsh, and a wooded area called a hammock. Steve Martin, Creative Commons

Existing Projects

Park staff treat non-native invasive Brazilian pepper on the tree islands. The park typically does not use prescribed fire in the salt marsh.

Black Rail Data

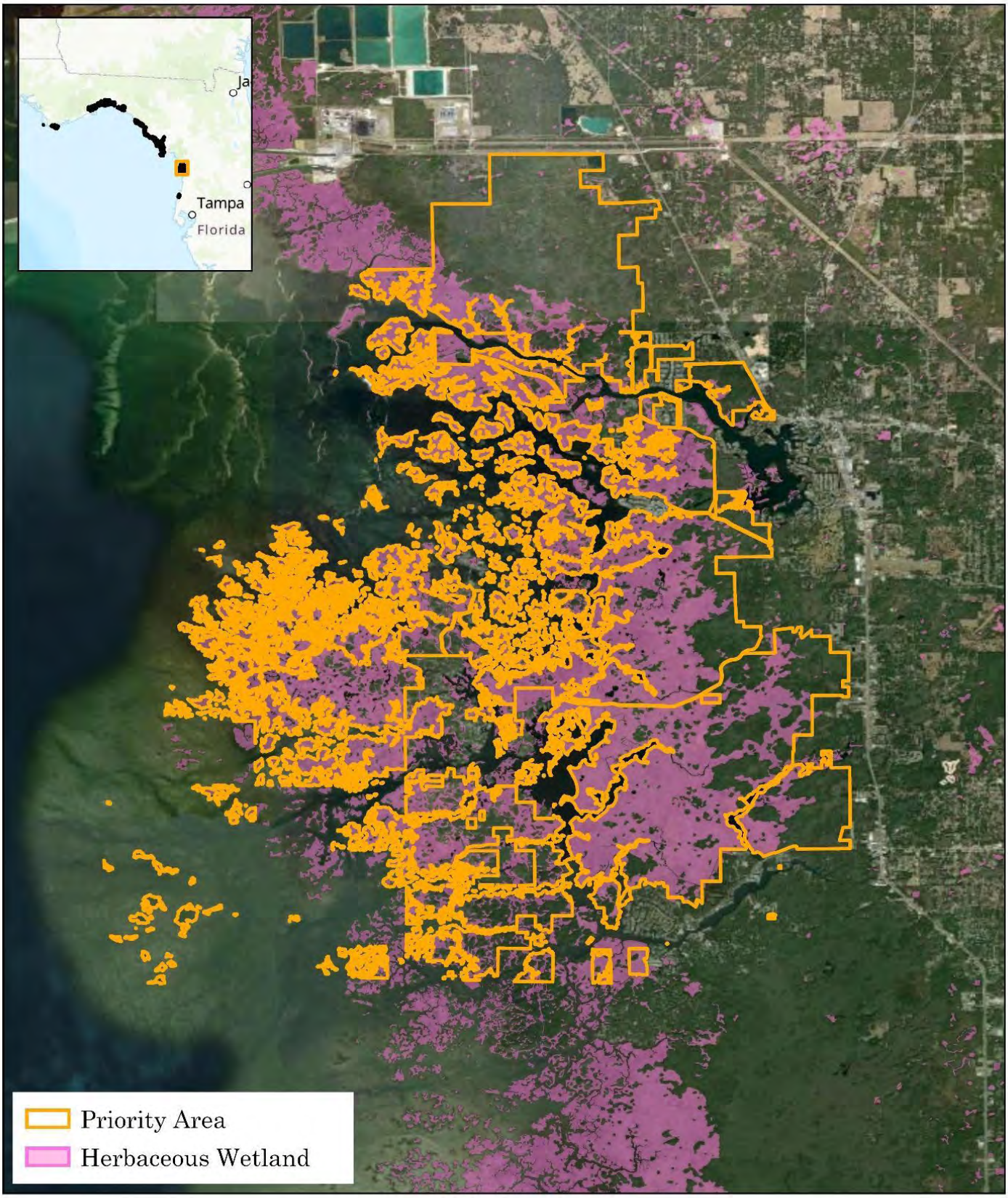
Black Rail were detected incidentally at this site in October 2015. Formal surveys by Florida Fish and Wildlife Conservation Commission in 2016 and by Wildlands Conservation in 2024 did not detect Black Rail.

Recommended Next Steps To Management Action

The park plans to replace culverts along Seven Mile Loop Road, which acts like an impoundment. The park plans to conduct a hydrologic assessment to guide the project but will install low water crossings and will enlarge some culverts in the meantime. The Southwest Florida Water Management District has completed designs to remove berms and insert culverts at Red Fish Hole to improve water flow, with the eventual goal of replacing the southern berm with a littoral shelf. Monitoring needs include surveys for Black Rail and an assessment of how inland natural communities are likely to change with sea level rise. The park is trying to acquire inholdings when possible. Invasive, non-native plants (e.g., Brazilian pepper and asparagus fern [*Asparagus aethiopicus*] on tree islands, papyrus [*Cyperus papyrus*] in the marshes) are an ongoing challenge. The park is potentially open to burning the marsh edge to help facilitate marsh migration.

ATTRIBUTES

Additional ecological assessment needed	Y
Facilitated marsh migration	Y
Land acquisition / protection	Y
Living shoreline development	Y
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	Y
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	Y
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	Y
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	Y
Woody vegetation control	Y



Crystal River Preserve State Park

3.4 Miles

4.7 Kilometers

Werner-Boyce Salt Springs State Park - 3,388 ac (1,371 ha)

Land manager: Florida Department of Environmental Protection

Point of contact: Tracy Muzyczka (Tracy.Muzyczka@FloridaDEP.gov)

Existing Conditions

The tidal salt marshes and salt pannes at Werner-Boyce Salt Springs State Park have been known to harbor Black Rail since the late 1990s. Most of the potential Black Rail habitat is on the northern end of the property, with a few spotty areas of habitat on the southern end of the park. Mangroves have started encroaching into the salt pannes, and some of the high marsh habitat was lost due to Hurricane Idalia in 2023. Mosquito ditches and disturbed areas are a reminder that the park was originally slated for development. Development on the park's borders complicates implementation of prescribed fire. This development, including U.S. Highway 19 on the east side of the park, also poses a challenge for marsh migration. An outfall canal through the park provides stormwater protection for adjacent communities. The park is state-owned, though part of the middle section of the park is leased to the county.

This site is one of many that deals with highly invasive Brazillion Pepper encroaching on Black Rail habitat. Jenny Evans, Creative Commons

Existing Projects

The Florida Park Service attempts to burn the marsh on a 5-year fire return interval, and the park has been re-establishing fire lines in an effort to meet management objectives. Trash dumping requires ongoing management, as do invasive nonnative plants such as Brazilian pepper. The park has a 5-year invasive plant management plan, and AmeriCorps volunteers are brought in to help with treatments.

Black Rail Data

Black Rail have been detected at this site, most recently in 2024. Pranty and colleagues (2004) detected Black Rail at this park during surveys in 1998, and there have been incidental observations by park staff since that time, mostly in black needlerush. FWC staff detected Black Rail in 2016 (Schwarzer et al. 2024), but surveys by Tall Timbers Research Station in 2021 and by park staff in 2022 did not detect the species. However, observers detected a Black Rail during the 2021 Audubon Christmas Bird Count, and park staff incidentally observed the species in the northern end of the park in 2024.

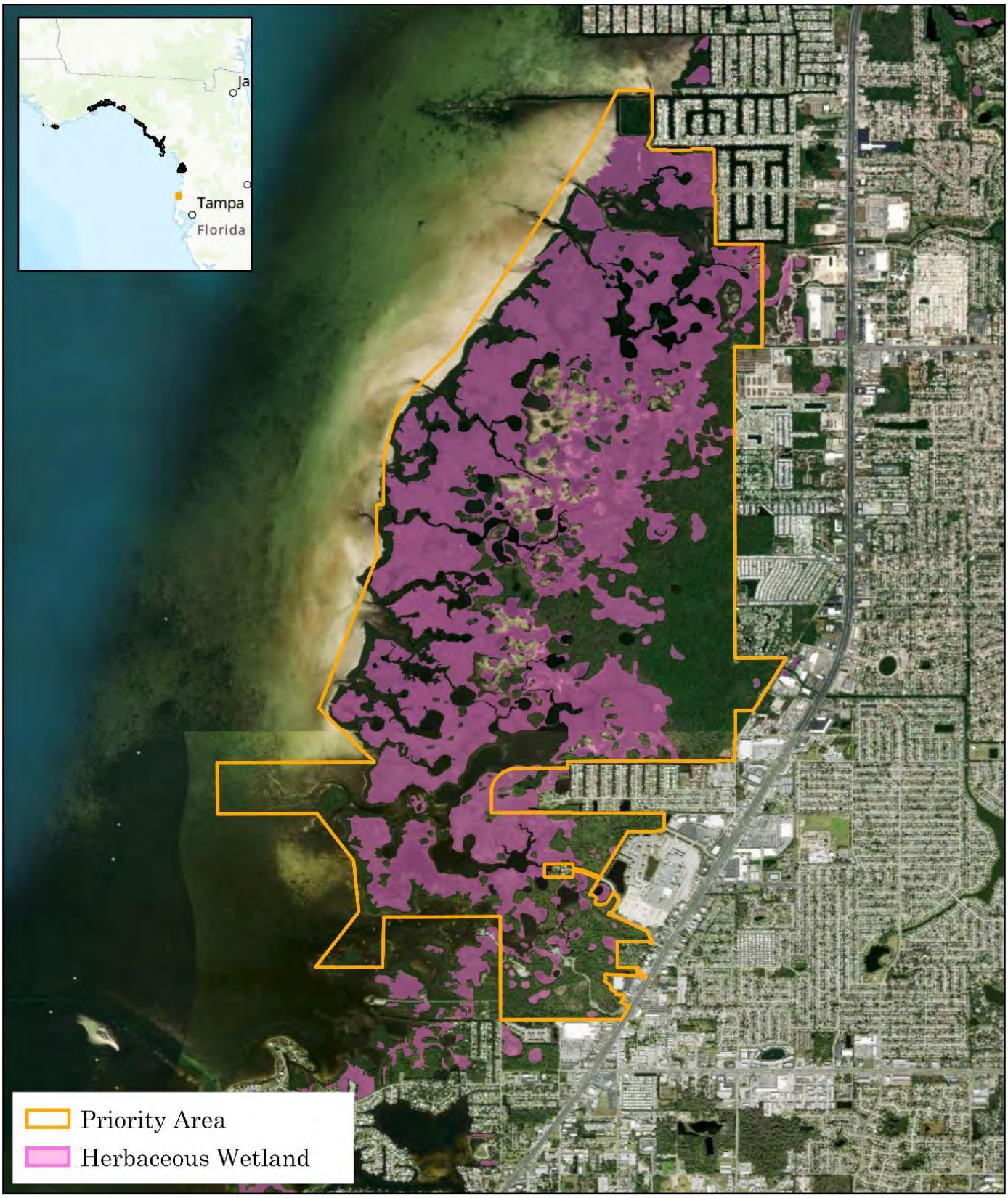
Recommended Next Steps To Management Action

The park's 10-yr unit management plan calls for a hydrologic assessment. This assessment is needed to determine whether there are opportunities to restore hydrology, create topographic highs and lows, manage the impoundment on the south side of the park, or raise the marsh platform through sediment placement. A living shoreline may be necessary to protect park residences. The park would benefit from land acquisition on the northern and southern property boundaries. There may be opportunities for wetland creation or restoration if the park can acquire parcels to the north.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	Y
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	Y
Repair hydrology - ditches	Y
Repair hydrology - impoundments	Y
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	Y
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	Y
Sediment placement - elevation enhancement	Y
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	Y
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	Y

Werner-Boyce Salt Springs State Park. Carolyn Enloe/FWC



Werner-Boyce Salt Springs State Park

1.05 Miles

1.45 Kilometers

Areas for Further Exploration

The following areas were identified by mapping and/or the partner group as important to keep in mind and further assess for future work. Properties are listed in alphabetical order.

Apalachicola National Estuarine Research Reserve - 119,439 ac (48,335 ha)
Land manager: Florida Department of Environmental Protection

There is a small amount of habitat on Little St. George Island, where Tall Timbers Research Station placed ARUs in 2023. This reserve also includes brackish marsh in the upper Apalachicola Bay area that may be worth exploring for potential habitat.

Apalachicola River Wildlife and Environmental Area and Box-R Wildlife Management Area - total of 93,184 ac (37,710 ha)
Land manager: FWC

Tidal salt marshes and brackish marshes at Apalachicola River Wildlife and Environmental Area (ARWEA) contain patches of black needle rush, giant cordgrass (*Spartina cynosuroides*), cattails, common reed (*Phragmites australis*), and sawgrass. Sawgrass also dominates the floodplain marshes at both of these FWC-managed areas. At ARWEA, extensive freshwater tidal floodplain marshes occur at the mouth of the Apalachicola River. Floodplain marshes at Box-R Wildlife Management Area are embedded in a swamp matrix, and the most extensive marsh is just inland from the higher levees along the Jackson River. It is unclear how much of the marshes are suitable for Black Rail, and there have been no surveys for the species on either property. However, FWC biologists have reported observing Black Rail at ARWEA during prescribed fires.

Big Bend Wildlife Management Area – Snipe Island Unit and Spring Creek Unit (FWC), Econfina River State Park (Florida Department of Environmental Protection), and Econfina River Conservation Area (Suwannee River Water Management District) - total of 34,516 ac (13,968 ha)

These conservation lands contain un-surveyed tidal salt marsh on either side of the Big Bend Wildlife Management Area's Hickory Mound Unit, which is occupied by Black Rail.

Chassahowitzka National Wildlife Refuge (USFWS), Chassahowitzka River and Coastal Swamps (Southwest Florida Water Management District), & Homosassa Tract of Withlacoochee State Forest (Florida Forest Service) - total of 43,918 ac (17,773 ha)

Chassahowitzka National Wildlife Refuge contains extensive salt marsh dominated by black needlerush with patches of salt grass and scattered tree islands with cabbage palms and red cedar (*Juniperus virginiana*). The adjacent Chassahowitzka River and Coastal Swamps, managed by the Southwest Florida Water Management District, contains a disjunct parcel with black needlerush and sawgrass marsh. The Refuge also abuts salt marsh on the Homosassa Tract of Withlacoochee State Forest. The FWC conducted surveys at Chassahowitzka National Wildlife Refuge in 2017 but did not detect any Black Rail.

Choctawhatchee River Water Management Area - 442 ac (179 ha)
Land manager: Northwest Florida Water Management District

This property has three small tracts north of Santa Rosa Beach. The largest is a ditched parcel of salt marsh about 3/4th of a mile north of unditched salt marsh with two incidental observations of Black Rail (2011 and 2015).

Cockroach Bay Preserve State Park (Florida Department of Environmental Protection) and Cockroach Bay Nature Preserve (Hillsborough County) - total of 1,623 ac (657 ha)

Cockroach Bay Preserve State Park has patches of saltmarsh on small mangrove-fringed islands. Surveys in 2017 found no Black Rail. The adjoining Cockroach Bay Nature Preserve has patches of unsurveyed salt marsh and salt flats bordering a fringe of mangrove swamp.

Cockroach Creek Greenway Nature Preserve - 550 ac (222 ha)
Land manager: Hillsborough County

This park contains depression marshes embedded in mesic flatwoods. There have been no surveys or incidental observations of Black Rail.

Lanark Reef - 1.7 ac (0.7 ha)
Land manager: Audubon Florida

Audubon Florida staff reported two incidental observations of Black Rail at this site over the last several years during the nonbreeding season.

Little Manatee River (Lower Tract) - 1,070 ac (433 ha)
Land manager: Southwest Florida Water Management District

This property contains tidal marsh along the Little Manatee River. There have been no surveys or incidental observations of Black Rail.

Lower Suwannee River/Cedar Key National Wildlife Refuges - 55,155 ac (22,321 ha)
Land manager: USFWS

Lower Suwannee River and Cedar Key National Wildlife Refuges contain 16,410 acres of tidal salt marsh dominated by black needlerush. Most of the refuges' coastline lacks a high marsh transition between the low marsh and forested uplands, but there may be pockets of potential Black Rail habitat, including along some islands and in some marsh patches along the Suwannee River. Challenges at the refuge include limited staff capacity for burning and degradation of the marsh from illegal airboats trespassing and making trails throughout the marsh where there were no natural trails (i.e., creeks). Managers are working with law enforcement staff to address the latter issue. Encroachment by mangroves into the tidal salt marsh is an ongoing issue. Burning the salt marsh is challenging, but prescribed fires in the uplands are allowed to run into the marsh. University of Florida researchers applied treatments in 2023 to encourage saltgrass-dominated marsh preferred by Florida salt marsh voles (*Microtus pennsylvanicus dukecampbelli*). Formal surveys by Refuge Inventory and Monitoring staff and during the 2016/17 statewide survey resulted in no Black Rail detections (Schwarzer et al. 2024). Incidental observations include a March, 2010, record and a detection between 2015-2020 in or near Florida salt marsh vole habitat in the non-breeding season. The University of Florida deployed ARUs for monitoring focal species, including Black Rail. However, deployment occurred outside of the typical Black Rail breeding season. There may be opportunities to facilitate marsh migration through management of ghost forests. Fine-scale elevation mapping could help predict where Black Rail could be and where efforts to facilitate marsh migration could be effective. Thin layer placement could help to raise the marsh platform in some areas, and creation of topographic highs and lows could create microtopography for Black Rail in these areas. Old timber roads disrupt water flow through the refuge's freshwater forested wetlands, and managers are seeking funds for restoring this flow, which could benefit the salt marsh through increased inputs of fresh water.

Mashes Sands Park - 246 ac (100 ha)
Land manager: Wakulla County
The park contains salt mash behind the spit of Mashes Sands Beach.

San Marcos de Apalache Historic State Park - 15 ac (6 ha)
Land manager: Florida Department of Environmental Protection
This small park contains roughly 10 acres of salt marsh, with higher marsh dominated by black needlerush.

Terra Ceia Preserve State Park - 1,948 ac (788 ha)
Land manager: Florida Department of Environmental Protection
This park was included in a 2017 Florida Fish and Wildlife Conservation Commission survey effort, but no Black Rail were detected.

Waccasassa Bay and Cedar Key Preserve State Parks - total of 41,157 ac (16,656 ha)
Land manager: Florida Department of Environmental Protection
Waccassa Bay Preserve State Park encompasses over 19,000 acres of salt marsh, with black needlerush and saltmarsh cordgrass (*Spartina alterniflora*) transitioning to open, high saline flats of saltgrass, saltwort, Christmas berry (*Lycium carolinianum*), and exposed limestone. The marsh is dotted with islands of cedar and palms and transitions to hydric hammock. Ghost forests are evident on some tree islands as sea levels rise. Brazilian pepper and feral hogs are the most significant issues in the tree islands and salt marsh. Salt marsh vole has been found in the park. There are no records of Black Rail, but access to much of the park is challenging and requires an airboat. The adjacent Cedar Key Preserve State Park has some high salt marsh flats along the western boundary, but relict sand dunes on the property limit the potential for marsh migration compared to Waccasassa Bay. Cedar Key Preserve State Park has basin and depression marshes, but these likely are too deep to support Black Rail.

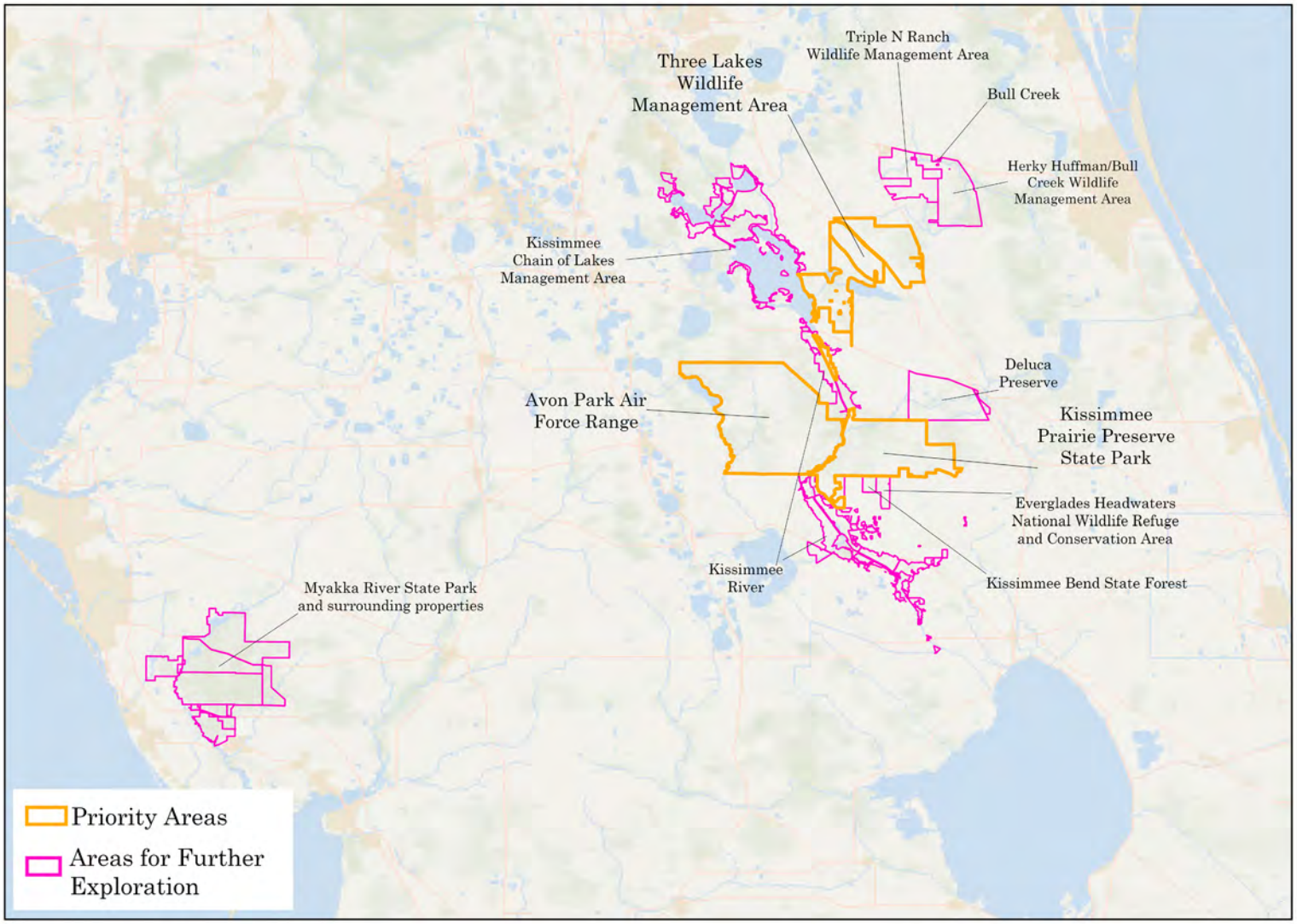
Weekiwachee Preserve (Southwest Florida Water Management District) & Chassahowitzka Wildlife Management Area (FWC) - total of 40,794 ac (16,509 ha)
Weekiwachee Preserve encompasses salt marsh dominated by black needlerush with scattered salt pannes. A lesser amount of similar habitat is available on the adjacent Chassahowitzka Wildlife Management Area. In 2017, a survey conducted by FWC detected a single Black Rail in the northern portion of Weekiwachee Preserve.

Cutthroat grass (Coleataenia abscissa) at Avon Park Air Force Range. USFWS

Chapter 4: Central Florida

Priority Areas

The order of properties in this chapter starts on the west side of the Kissimmee River with Avon Park Air Force Range and then proceeds roughly clockwise. Acres (ac) and hectares (ha) typically refer to the total size of the property. Exceptions include properties with distant, disjunct tracts, in which case acreage refers to just the tracts with potential Black Rail habitat.



Central Florida Priority Areas and Areas for Further Exploration

Avon Park Air Force Range - 108,707 ac (43,737 ha)

Land manager: Department of Defense

Point of contact: Gabby Jukkala (Gabriella_Jukkala@fws.gov)

Existing Conditions

Potential Black Rail habitat on Avon Park Air Force Range includes wet and dry prairies and cutthroat grass (*Coleataenia abscissa*) flatwoods adjacent to depression marshes throughout the property, as well as herbaceous wetlands, cutthroat seeps, and floodplain marsh bordering the property's eastern boundary. Hydrology is predominantly controlled by rainfall, especially in the southern half of the property, with water levels increasing in the prairies and cutthroat grass flatwoods as the rainy season progresses. Sheet flow maintains a higher water table in the northern half of the property, keeping seepage slopes and some large depression marshes wet year-round. The floodplain marsh is frequently inundated by the Kissimmee River during the late wet season, particularly in the restored section bordering the property's southeast corner. The presence of unexploded ordinance limits the use of restoration techniques involving heavy machinery.

Florid Grasshopper Sparrow are also found at Avon Park Airforce Range. FWC

Existing Projects

Managers apply prescribed fire and invasive plant management to these habitats.

Black Rail Data

Biologists detected Black Rail on the property in 2017 and each year from 2021 to 2024. In 2017, surveyors discovered a Black Rail in cutthroat grass flatwoods adjacent to a large depression marsh during a formal statewide survey (Schwarzer et al. 2024). The same year, biologists incidentally detected a Black Rail at 2 different prairie locations near depression marshes during a Florida Grasshopper Sparrow survey. Since 2021, biologists have deployed ARUs during the breeding season to formally survey for Black Rail. ARUs detected a Black Rail in 2023 and 2024 near the location of the original 2017 flatwoods detection, as well as in 2022 and 2023 near the locations of the 2 original 2017 prairie detections. Additionally, ARUs recorded a Black Rail at 2 new prairie locations in 2021 and 2022 and 2 different cutthroat seeps/depression marshes in 2022 and 2024. Biologists plan to use habitat modeling and aerial imagery to focus future surveys, to incorporate call-broadcast surveys in areas with ARU detections, and to deploy ARUs in the Kissimmee River floodplain, which has not been surveyed previously.

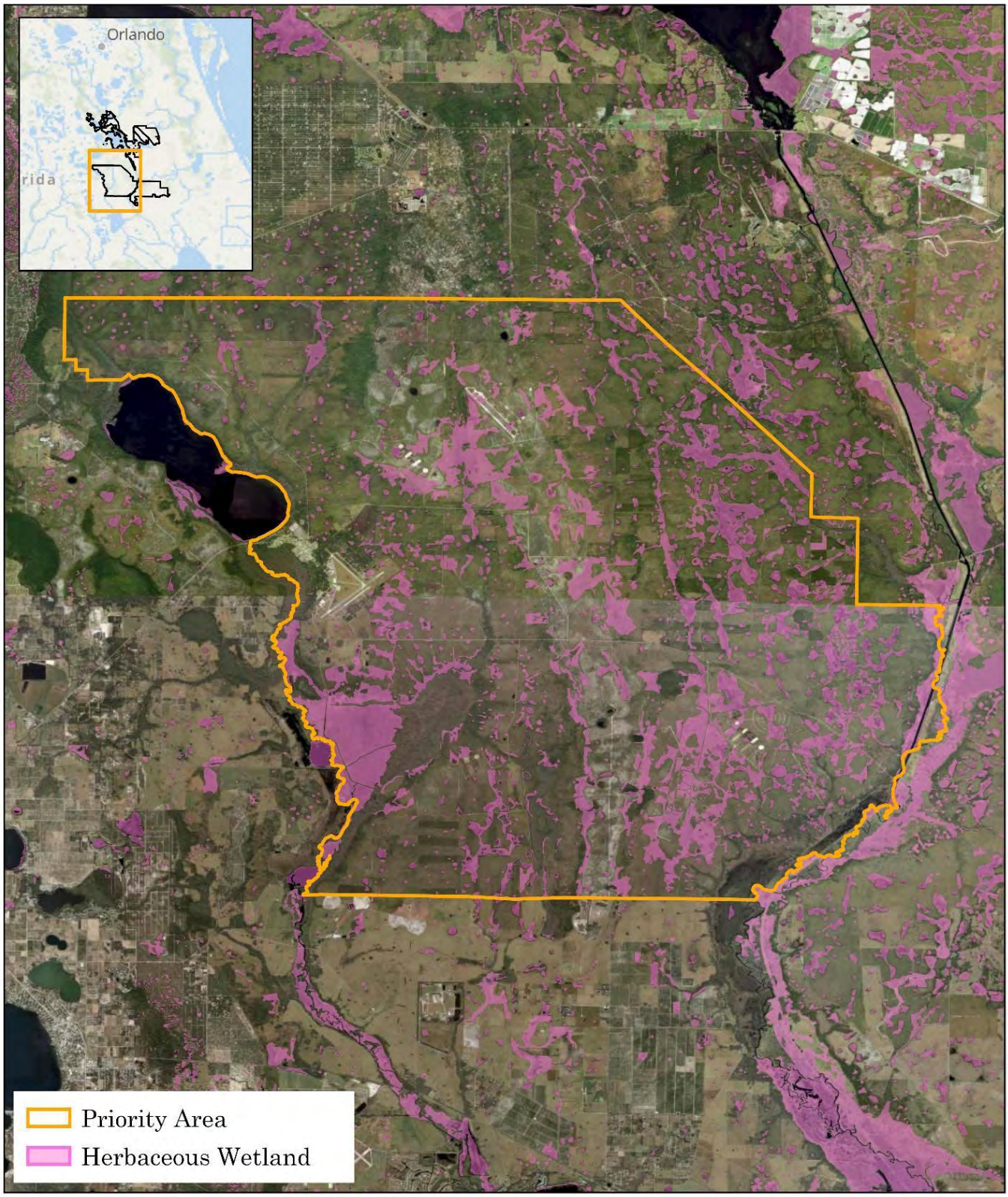
Recommended Next Steps To Management Action

How Black Rail use the property, and whether they breed on site, remains unknown. Additional hydrologic data would help to better understand the potential of the property to support the species. Encroaching woody vegetation can be managed with prescribed fire and chainsaw crews when necessary. Some wetlands currently under cattle lease could potentially be managed to benefit Black Rail. Pine plantations could be restored to flatwoods in the future. Feral hogs are a source of habitat degradation.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	Y
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	Y
Woody vegetation control	Y

Cutthroat grass at Avon Park Airforce Range.
Jessica Hinson/USFWS



Avon Park Air Force Range

5.2 Miles

7.15 Kilometers

Three Lakes Wildlife Management Area - 63,910 ac (25,863 ha)

Land manager: Florida Fish and Wildlife Conservation Commission

Point of contact: Jess Rodriguez (Jessica.Rodriguez@myfwc.com)

Existing Conditions

Black Rail detections (and surveys) all have occurred in the mosaic of dry prairies, wet prairies, and depression marshes in the southwestern portion of the property, though there also may be potential for the species in basin marshes and depression marshes in other management units. Hydrology is rainfall-driven and varies both seasonally and annually. Construction of a levee to the west roughly 30 years ago changed the hydrology of the property by slowing the flow of water.

Wet prairie and depression marsh at Three Lakes Wildlife Management Area. USFWS

Existing Projects

Prescribed fire is the primary management tool on the property, and managers also control invasive nonnative plants, such as cogon grass . The FWC conducts prescribed fires in the prairies and marshes on a 1–3-year fire return interval to mimic the historic, frequent lightning-caused fires. Managers recently used roller chopping to decrease palmetto cover and increase herbaceous cover in dry prairies to benefit Federally-listed Florida Grasshopper Sparrows (*Ammodramus savannarum floridanus*). Roller chopping also occurred at the edges of some depression marshes several years ago to reduce woody vegetation and restore continuity between the uplands and wetlands.

Black Rail Data

Black Rail have been detected at this site, most recently in 2021. Biologists detected Black Rail during a formal statewide survey in 2016 (Schwarzer 2024), which was a particularly wet year. Incidental observations occurred in wet prairies, dry prairies, and depression marshes in 2013, 2015, 2016, 2018, and 2021. However, the Center for Conservation Biology surveyed the property in 2020 and had no detections (unpublished data). Incidental observations were more frequent over the past decade, probably due to an increased staff presence in the area for management of the Florida Grasshopper Sparrow. Nevertheless, there are no detections in some years, and the spatial dynamics of Black Rail in Central Florida's prairie ecosystem remain a mystery.

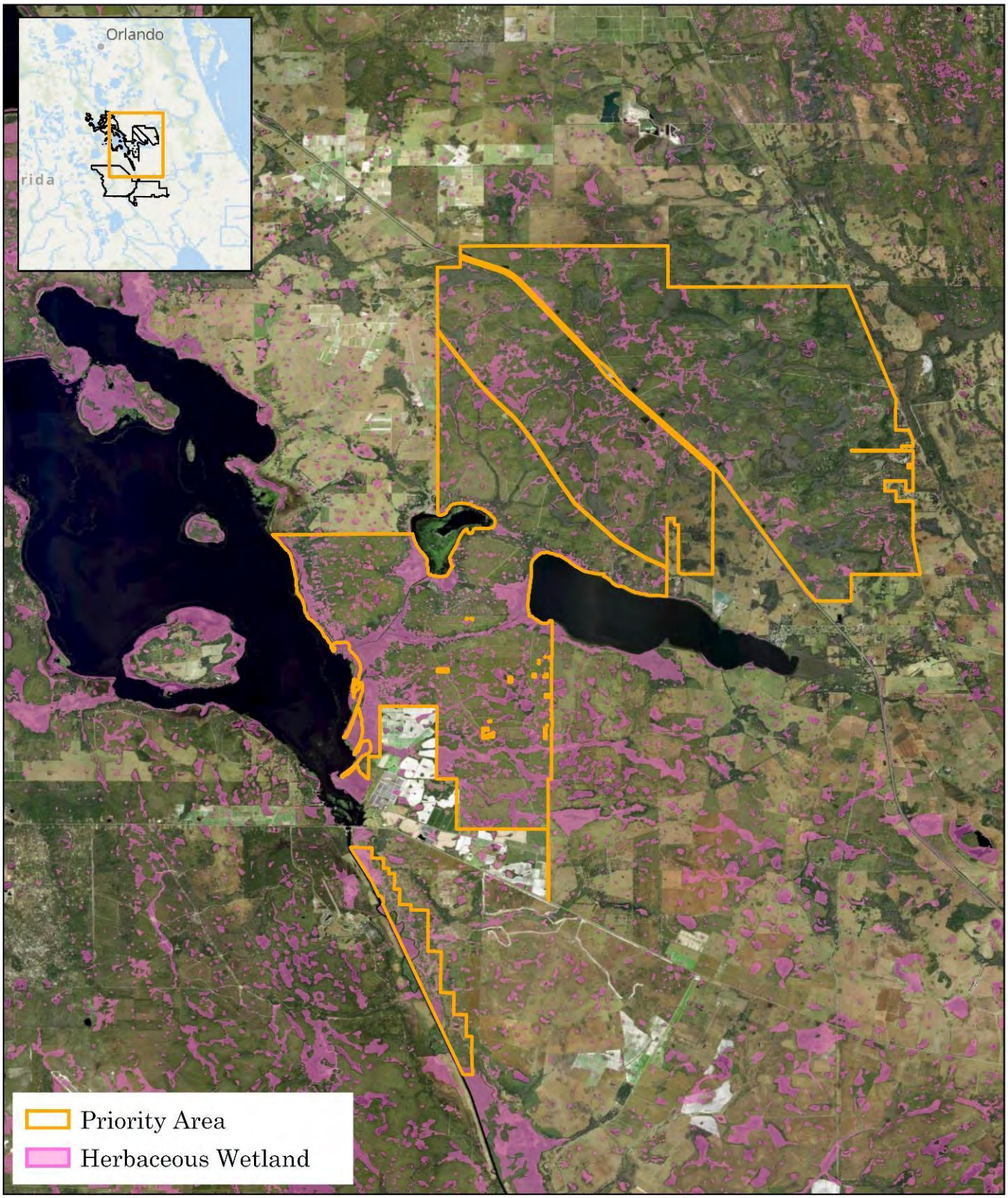
Recommended Next Steps To Management Action

It is important to learn how Black Rail use Central Florida's prairie ecosystem. FWC is planning future surveys, but staff will need assistance to conduct surveys on an annual basis, given other competing priorities on the property. A major ditch crosses the property from east to west, but filling the ditch could result in nest flooding for Federally-listed Florida Grasshopper Sparrows and could conflict with objectives for State-listed gopher tortoises.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	N
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	N
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	N
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	N
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	N
Woody vegetation control	N

Wet prairie and depression marsh embedded in dry prairie at Three Lakes Wildlife management Area. USFWS



Three Lakes Wildlife Management Area

5.45 Miles

7.5 Kilometers

Kissimmee Prairie Preserve State Park - 58,089 ac (23,508 ha)

Land manager: Florida Department of Environmental Protection

Point of contact: Karina Nieves (Karina.Nieves@FloridaDEP.gov)

Existing Conditions

Kissimmee Prairie Preserve State Park supports an extensive mosaic of dry prairies, wet prairies, and depression marshes. Sloughs channel water to the Kissimmee River floodplain marsh on the western side of the property. The most recent Black Rail observation occurred adjacent to one of these sloughs. The property has 2 pastures, 1 of which is occupied by Federally-listed Florida Grasshopper Sparrows. The pastures either have a cattle lease or are in the planning stages for a cattle lease, which could limit potential for habitat creation or restoration. Access can be an issue during the wet season; fixing culverts could help alleviate this in some areas.

Existing Projects

The Florida Park Service manages the property with prescribed fire. The Florida Park Service currently are fixing some culverts and are planning to add some low water crossings. Managers also are installing fire lines in the pastures that contain Florida Grasshopper Sparrows. The park has projects to treat invasive nonnative *Lygodium* sp. and cogon grass in the park.

Black Rail Data

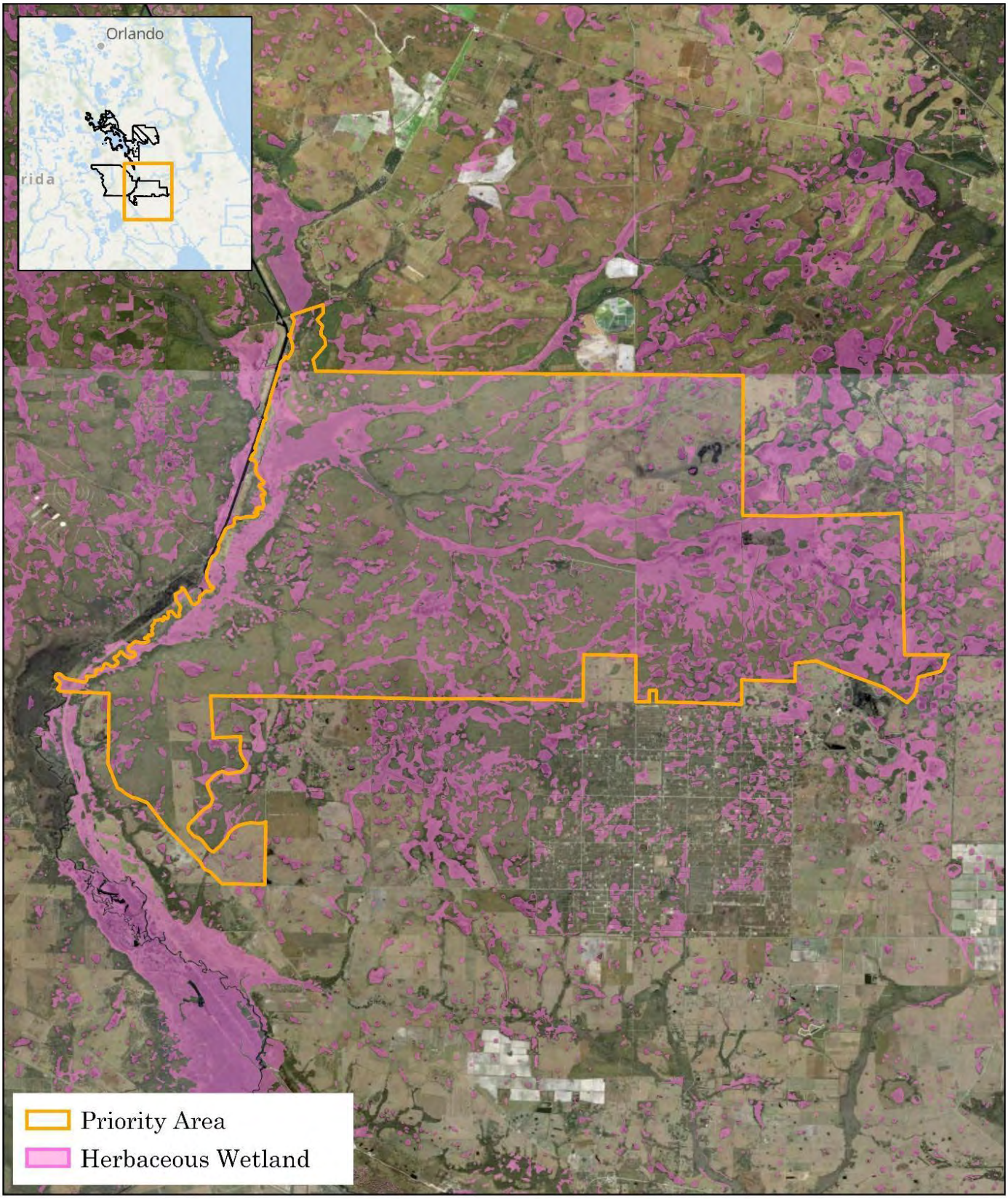
Black Rail have been detected at this site, most recently in 2016 near Seven Mile Slough (Schwarzer 2024). The Center for Conservation Biology surveyed the property in 2020 but did not detect the species.

Recommended Next Steps To Management Action

Managers need to better understand how Black Rail use Central Florida's prairie landscape to inform management decisions.

Attributes

Additional ecological assessment needed	Y
Facilitated marsh migration	N
Land acquisition / protection	Y
Living shoreline development	N
Non-native invasive plant species management (*Melaleuca*, etc.)	Y
Repair hydrology - berm, embankment, or levee	N
Repair hydrology - ditch plugs	N
Repair hydrology - ditches	N
Repair hydrology - impoundments	N
Repair hydrology - non-tidal restriction	Y
Repair hydrology - runnelling / channel creation	N
Repair hydrology - tidal restriction	N
Sediment modification – microtopography	Y
Sediment placement - elevation enhancement	N
Stormwater management	N
Water application - existing wetland	N
Wetland creation - recontouring	N
Wetland creation - water application	N
Wildlife herbivory reduction	Y
Woody vegetation control	N



Kissimmee Prairie Preserve State Park

4.8 Miles

6.6 Kilometers

Areas for Further Exploration

The following areas were identified by mapping and/or the partner group as important to keep in mind and further assess for future work. Properties are listed in alphabetical order.

Bull Creek - 30 ac (12 ha)
Land manager: SJRWMD

This relatively small parcel adjacent to Bull Creek WMA has a few depression marshes that may be worth a site visit.

Deluca Preserve - 27,072 ac (10,956 ha)
Land manager: University of Florida

Adjacent to Kissimmee Prairie Preserve State Park, Deluca Preserve contains depression marshes and wet prairies within a matrix of pasture and dry prairies. The University of Florida owns and manages the property, and Wetlands America Trust holds a conservation easement on the property. Initial surveys in 2023 in the southern portion of the property did not detect Black Rail (M. McMillian, unpublished data).

Everglades Headwaters National Wildlife Refuge and Conservation Area - 5,180 ac (2,096 ha)
Land manager: USFWS

The Kissimmee Bend Unit of the Refuge contains depression marshes and wet prairies adjacent to sloughs that flow through dry prairie. The Okeechobee Unit includes depression marshes embedded in pasture and dry prairie. Both units are adjacent to Kissimmee Prairie Preserve State Park. There have been no Black Rail surveys or incidental observations. The Refuge is seeking assistance with engineering and design for a project to restore hydrology in the Okeechobee Unit.

Herky Huffman/Bull Creek Wildlife Management Area - 23,511 ac (9,515 ha)
Land manager: FWC

The area features well-managed depression marshes and wet prairies, with prescribed fire as the primary management tool. There were no detections in FWC's 2016/17 survey effort (Schwarzer et al. 2024), and there have been no incidental observations. The property is owned primarily by the SJRWMD and managed by the FWC. The purposes of acquisition included flood control and protection and enhancement of water resources and habitat. There is potential for some portions of the property to be returned to the original landowner in the future. The FWC has planned exploratory surveys and may need additional resources to adequately cover potential habitat. If Black Rail are detected, FWC staff may need assistance with continued monitoring. Partners expressed a need to learn more about how Black Rail use the Central Florida landscape.

Kissimmee Bend State Forest - 1,992 ac (806 ha)
Land manager: Florida Forest Service

Similar to the adjacent Kissimmee Prairie Preserve State Park, this property contains depression marshes, wet prairies, and sloughs in a dry prairie matrix. There have been no surveys or incidental observations of Black Rail.

Kissimmee Chain of Lakes Management Area - 28, 478 ac (11,525 ha)
Land manager: SFWMD

This property consists of a series of tracts with marshes and wet prairies making up 50% and 24% of the land cover, respectively. Tracts with the most promising potential habitat include Rough Island (between Cypress Lake and Lake Hatchineha), Gardner-Cobb Marsh (between Cypress Lake and Lake Kissimmee), and Rolling Meadows (south of Lake Hatchineha). The Gardner-Cobb Marsh tract has a cattle lease, and the area is popular with air boaters, who create trails through the marsh. The Oasis Marsh tract also has a gentle slope that could provide potential habitat, but the site currently has thick cattails (*Typha sp*.) and is difficult to access. Managers have restored primary ditches and are now working on smaller hydrologic improvements, including a partnership with Ducks Unlimited to address some secondary ditches. All tracts are part of the Kissimmee River Headwaters Revitalization Project. A new (2024) water schedule dictates water levels and may influence future distribution of potential habitat. There have been no surveys or incidental observations of Black Rail. Future actions include surveys for Black Rail, additional ditch remediation to improve potential habitat, and enhancement of an impounded wetland on the Rolling Meadows tract.

Kissimmee River - 41,807 ac (16,919 ha)
Land manager: SFWMD

This property, managed by SFWMD, borders the Kissimmee River both north and south of Avon Park Air Force Range. The most promising areas are to the south, where the Kissimmee River Restoration Project (1999-present) has been restoring the river and surrounding floodplain marsh. Encroaching willows and non-native invasive plants such as West Indian marsh grass and para grass pose management challenges in the marshes. There was one incidental observation on the property in April of 2000. It is difficult to predict where Black Rail may occur without monitoring or modeling the hydrology in the post-restoration flood plain. Future restoration opportunities include restoring hydrology in areas such as Paradise Run, south of Ice Cream Slough and north of Rattlesnake Marsh, and Istokpoga Creek.

Myakka River State Park (Florida Department of Environmental Protection) and surrounding conservation lands (multiple land managers) - total of 83,978 ac (33,985 ha)

Biologists surveyed Myakka River State Park's depression marshes and wet prairies in 2017 but did not detect Black Rail. Surrounding conservation lands with similar habitats include Big Slough Preserve, Deer Prairie Creek Preserve, Deer Prairie Creek/Churchill and Jordyn Parcels, Myakka River, Pinelands Reserve, and T. Mabry Carlton, Jr. Memorial Reserve.

Triple N Ranch Wildlife Management Area - 16,406 ac (6,639 ha)
Land manager: FWC

Bordering Herky Huffman/Bull Creek Wildlife Management Area, Triple N Ranch contains depression marshes, basin marshes, and wet prairies in a matrix of flatwoods. The property also contains improved and semi-improved pastures along its southern border, where there is a moderately-grazed cattle lease. The FWC manages the property with prescribed fire, and most natural communities are close to historical conditions. Hydrologic restoration is ongoing, mostly in the pastures, and includes ditch-filling and installation of culverts and low-water crossings. Surveys for Black Rail occurred as part of the statewide 2016-17 effort, but there have been no detections on the property (Schwarzer et al. 2024). More information is needed before managers would consider potential hydrologic management actions in potential Black Rail habitat. Biologists are planning exploratory surveys, but additional resources would help them cover more ground. If Black Rail are detected, staff will conduct regular monitoring into the future.

Private lands

Central Florida's ranchlands have conservation easements owned by the NRCS, the USFWS, The Nature Conservancy, and various land trusts. This region also has existing partnerships and funding opportunities through the Avon Park Air Force Range Sentinel Landscape and through the USFWS's Everglades Headwaters Conservation and Southwest Florida conservation areas. Challenges include identifying interested landowners, developing and implementing best practices for cattle grazing, and resolving uncertainties about how Black Rail use this landscape. Fallow citrus groves and pastures may present opportunities for habitat creation.

CONCLUSION

Best Practices and Permitting Considerations

The Eastern Black Rail: Management Guidance (Watts 2022) provides helpful information about management targets and techniques for the species. This Federally-designated Threatened species is protected under the Federal Endangered Species Act and Chapter 68A-27 of the Florida Administrative Code (F.A.C.). For information on prohibitions and exceptions to those prohibitions, please refer to 50 CFR § 17.41 or the final 4(d) rule in the Federal Register. If you have questions about potential impacts to Black Rail or permitting considerations, please contact the Florida Ecological Services Field Office. Per Rule 68A-27.007, F.A.C., no FWC permit is necessary for Federally-authorized impacts.

Monitoring

Any habitat restoration efforts should be monitored both pre-implementation and post-implementation to measure change and determine whether goals have been met. This monitoring will ideally build upon the existing knowledge base for Black Rail habitat enhancement, restoration, or creation in this area. An Eastern Black Rail Call-Response Survey Protocol for Range-Wide Monitoring is now available.

ARUs provide a promising alternative to call-response surveys, which necessitate five or more visits per point due to the species' cryptic nature. ARUs reduce time and cost of field work and are advantageous for surveying areas where access is challenging. Disadvantages include the time necessary to post-process acoustic data and the current lack of standard sampling designs. The Eastern Black Rail ARU and Bioacoustics Team has been developing resources to aid partners with these challenges.

Acknowledgments

Special thanks to Tyler Beck (FWC) for being our state contact for this project.

Thank you to the following partners that participated in workshops and/or contributed to the document: Christy Akers, Rob Aldredge, Chad Allison, Karyn Allman, Corey Anderson, Joel Andreas, Tammy Ash, Anabelle Baggs, Jonny Baker, Jeff Beal, Amanda Bessler, Marcel Bozas, Tim Breen, Ron Brockmeyer, Carla Burmann, Shawn Chistopherson, Madison Cole, Katie Conrad, Jim Cox, Ted Darnell, Cortney Deal, Audrey DeRose-Wilson, Danielle Devine, Rebecca Doane, Jared Draxler, Andrew Eastwick, Christine Eastwick, Jennifer Eells, Carolyn Enloe, Adam Eurbin, Chris Farrell, Michael Faustini, Josiah Freese, Josh Friers, Dan Frisk, Danielle Ganas, Brian Garrett, Rebekah Gibble, Stephen Glass, Nicholas Gonzalez, Chris Green, Andrew Gude, Mitchell Haag, Dianne Hall, Neal Halstead, Blair Hayman, Ryan Hess, Chance Hines, Jessica Hinson, Jon Hoch, Jeff Howe, Brian Jeffery, Ian Jin, Aaron Johnson, Alyssa Jordan, Gabby Jukkala, Kevin Kalasz, Katrina Noland, Sydney Kaufman, Patty Kelly, John Kilmer, Mark Kiser, Dan Kolterman, Kelly Kramer, Tiffany Lane, Jacob Larsson, Anna Laws, Mike Legare, Heather Levy, Cole Luttrell, Melanie Mancuso, Meghan Massatt, Matthew McCollister, Jen McGann, Miles Meyer, Aline Morrow, Tracy Muzyczka, Karina Nieves, Justin Nolte, Lori Oberhofer, Patrick Pitts, Terry Peacock, Daniel Pearson, Jeffrey Pettis, Kimberli Ponzio, Lynn Proenza, Keith Ramos, Amber Rhodes, Jess Rodriguez, Douglas Rogers, Pablo Ruiz, Beverly Sanders, Katrina Scheiner, Jim Schuette, David Schutt, Amy Schwarzer, Jodie Slater, Bradley Smith, Christine Soldo, Jessica Spikler, Thomas St. John, John Stark, Stephen Stipkovits, Karen Strawn, Tim Towles, David Turner, Raul Urgelles, Oliver Van Den Ende, Eric Verderber, Kameron Voves, Caroline Walker, Natasha Warraich, Andrew West, Graham Williams, and Morgan Wolf.

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Suggested citation: Atlantic Coast Joint Venture. 2024. Report. Habitat Management Priorities for the Eastern Black Rail in Florida. Available at: www.acjv.org/document/BLRA_FL.pdf

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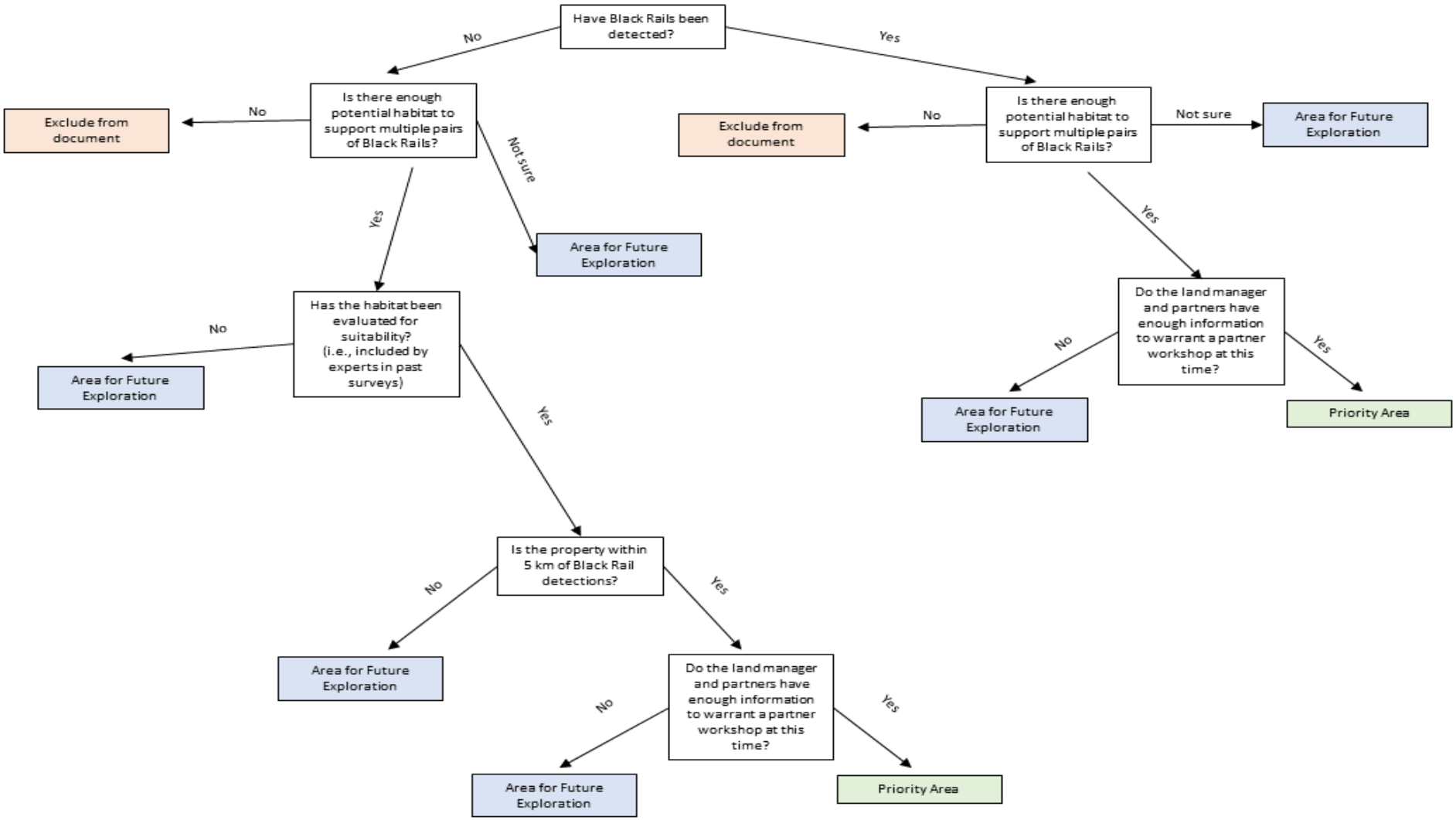
Appendix 1. Land Cover Classes Used In Maps

In this document's maps, "herbaceous wetlands" refer to the following land cover classes from the Florida Land Cover Classification System (Kawula and Redner 2018). These land cover classes also were used in initial screening to identify properties with potential habitat within five kilometers of existing Black Rail survey point locations.

2111 Wet Prairie
21112 Cutthroat Seep
21113 Calcareous Wet Prairie
2113 Marl Prairie
2114 Seepage Slope
2120 Marsh
2121 Isolated Freshwater Marsh
21211 Depression Marsh
21212 Basin Marsh
2122 Coastal Interdunal Swale
2123 Floodplain Marsh
21231 Freshwater Tidal Marsh
2124 Slough Marsh
2125 Glades marsh
2131 Sawgrass
2133 Spike Rush
2410 Impounded Marsh
5240 Salt Marsh
5241 Salt Flat
5242 Cordgrass
5243 Needlerush

Appendix 2. Decision tree for assignment of Priority Areas and Areas for Further Exploration



Appendix 3. Table of Priority Areas and Management Techniques

Property name	Planning_area	Additional ecological assessment needed	Facilitated marsh migration	Land acquisition	Living shoreline development	Non-native invasive plant species management	Repair hydrology - berm, embankment, or leve	Repair hydrology - ditch plugs	Repair hydrology - ditches	Repair hydrology - impoundments	Repair hydrology - non-tidal restriction	Repair hydrology - runnelling / channel creati	Repair hydrology - tidal restriction	Sediment modification - microtopography	Sediment placement - elevation enhancement	Stormwater management	Water application - existing wetland	Wetland creation - recontouring	Wetland creation - water application	Wildlife herbivory reduction	Woody vegetation control
Allapattah Flats	South Florida	Y	N	Y	Y	N	Y	Y	Y	N	Y	N	N	N	N	Y	N	N	N	Y	Y
Arthur R. Marshall Loxahatchee National Wildlife Refuge	South Florida	Y	N	N	N	Y	N	N	N	Y	N	N	N	Y	N	N	Y	N	N	N	Y
Avon Park Air Force Range	Central Florida	Y	N	Y	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	Y	Y
Big Bend Wildlife Management Area - Hickory Mound Unit	Gulf Coast	Y	Y	Y	N	N	Y	N	Y	Y	Y	N	N	Y	N	Y	N	N	N	N	N
Big Bend Wildlife Management Area - Jena Unit	Gulf Coast	Y	N	Y	N	Y	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N
Big Bend Wildlife Management Area - Tide Swamp Unit	Gulf Coast	Y	Y	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	Y	N
Big Cypress National Preserve	South Florida	Y	N	N	N	Y	Y	N	N	Y	Y	N	N	Y	N	N	N	N	N	N	Y
Buck Lake Conservation Area	Upper St. Johns River Basin	Y	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y
C-139 Annex	South Florida	Y	N	N	N	Y	Y	Y	Y	N	N	N	N	Y	N	Y	N	Y	N	Y	N
Canaveral Marshes Conservation Area	Upper St. Johns River Basin	Y	N	Y	N	Y	Y	Y	Y	N	Y	N	N	Y	N	Y	N	N	N	Y	Y
Charles H. Bronson State Forest	Upper St. Johns River Basin	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	Y
Crystal River Preserve State Park	Gulf Coast	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	N	N	N	N	N	N	Y	Y
Everglades and Francis S. Taylor Wildlife Management Area	South Florida	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	Y
Everglades National Park	South Florida	Y	N	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
Fakahatchee Strand Preserve State Park	South Florida	Y	N	Y	N	Y	Y	Y	N	N	Y	N	N	N	N	N	N	N	N	N	Y
Fort Drum Conservation Area	Upper St. Johns River Basin	Y	N	N	N	Y	N	Y	N	N	N	N	N	Y	N	N	N	N	N	N	Y
Holey Land Wildlife Management Area	South Florida	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	Y
J. W. Corbett Wildlife Management Area	South Florida	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y
John C. and Mariana Jones/Hungryland Wildlife and Environmental Area	South Florida	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Kissimmee Prairie Preserve State Park	Central Florida	Y	N	Y	N	Y	N	N	N	N	Y	N	N	Y	N	N	N	N	N	Y	N
Lake Okeechobee Marsh	South Florida	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y

BLRA_name	Planning_area	Additional ecological assessment needed	Facilitated marsh migration	Land acquisition	Living shoreline development	Non-native invasive plant species management	Repair hydrology - berm, embankment, or leve	Repair hydrology - ditch plugs	Repair hydrology - ditches	Repair hydrology - impoundments	Repair hydrology - non-tidal restriction	Repair hydrology - runnelling / channel creati	Repair hydrology - tidal restriction	Sediment modification - microtopography	Sediment placement - elevation enhancement	Stormwater management	Water application - existing wetland	Wetland creation - recontouring	Wetland creation - water application	Wildlife herbivory reduction	Woody vegetation control
Little Big Econ State Forest	Upper St. Johns River Basin	Y	N	N	N	Y	N	Y	Y	N	N	N	N	Y	N	N	N	Y	Y	Y	Y
Merritt Island National Wildlife Refuge	Upper St. Johns River Basin	Y	Y	N	N	Y	Y	N	Y	N	N	N	N	Y	Y	N	N	Y	N	N	Y
Model Lands Basin	South Florida	Y	N	Y	N	Y	Y	Y	Y	N	Y	N	Y	Y	Y	Y	N	Y	N	N	Y
River Lakes Conservation Area	Upper St. Johns River Basin	Y	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y
Rotenberger Wildlife Management Area	South Florida	Y	N	Y	N	N	Y	N	N	N	N	N	N	N	N	Y	N	N	N	N	N
Salt Lake Wildlife Management Area	Upper St. Johns River Basin	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y
Seminole Ranch Conservation Area	Upper St. Johns River Basin	Y	N	Y	N	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	Y
Southern Glades	South Florida	Y	Y	N	Y	Y	Y	Y	Y	N	Y	N	N	Y	N	Y	N	Y	N	N	Y
St. Johns National Wildlife Refuge	Upper St. Johns River Basin	Y	N	Y	N	N	Y	Y	N	N	N	N	N	Y	N	N	N	Y	N	N	Y
St. Marks National Wildlife Refuge	Gulf Coast	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	Y	N	N	Y	Y
St. Vincent National Wildlife Refuge	Gulf Coast	Y	Y	Y	Y	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	Y
Three Forks Conservation Area	Upper St. Johns River Basin	Y	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y
Three Lakes Wildlife Management Area	Central Florida	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Tosohatchee Wildlife Management Area	Upper St. Johns River Basin	Y	N	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	Y
Werner-Boyce Salt Springs State Park	Gulf Coast	Y	N	Y	Y	Y	N	Y	Y	Y	N	Y	N	Y	Y	N	N	Y	N	N	Y