United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

June 10, 2003

Memorandum

To: Refuge Manager, Arthur R. Marshall Loxahatchee National Wildlife Refuge

From: James J. Slack, Field Supervisor, South Florida Ecological Services Office

Subject: Section 7 Consultation for Proposed 2003-04 Burn Plans on the Loxahatchee National Wildlife Refuge

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed Arthur R. Marshall (A.R.M.) Loxahatchee National Wildlife Refuge (Refuge) 2003-2004 prescribed burn and its effects on the wood stork (*Mysteria americana*), bald eagle (*Haliaetus leucocephalus),* Everglade snail kite (*Rostrhamus sociabilis*), and eastern indigo snake (*Drymarchon corais couperi*) in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) (Act). There is designated critical habitat for the Everglade snail kite on this Refuge in Water Conservation Area 1 (WCA 1). Your request for consultation was received on February 18, 2003.

This biological opinion is based on information provided in the February 18, 2003, Intra-Service Section 7 Biological Evaluation Form; the February 19, 2003, modifications; telephone conversations; field investigations; and other sources of information. A complete administrative record of this consultation is on file in this office.

This project, as proposed, is not likely to adversely affect the following species:

- Bald eagles are observed perched in trees or near the Refuge every two or three years. There are no recorded or observed nests on the Refuge. Therefore, no adverse effects are anticipated.
- Presence of indigo snakes in the project areas is unknown. If they are present, we anticipate they will be able to avoid the proposed activities and therefore any impacts are likely to be insignificant or discountable.

I. CONSULTATION HISTORY

The Refuge's Fire Management Plan is being updated and was reviewed by a scoping committee in October of 2002. It is still in draft.

The initial Intra-Service Section 7, 2003 Annual Burn Report (ABR) package was received from the Refuge on February 18, 2003.

On February 19, 2003, modifications were suggested by the South Florida Field Office (SFFO) to the Refuge in attempt to clarify the scope of species survey information within the burn units of each of the two project areas (WCA1 and Compartment C).

On April 1, 2003, agreement on the need for formal consultation on this project occurred regarding designated critical habitat for the snail kite and wood stork nesting sites.

On May 10, 2003, the Refuge sent modifications to the initial ABR package, streamlining the burn plans into project area descriptions as requested by the SFFO.

On May 15, 2003, the SFFO emailed a draft of the project area description to help guide the Refuge's modifications to the remaining project area data sheets (PADS) and burn unit data sheets (BUDS).

On May 20, 2003, the SFFO received the remainder of the PADS and BUDS from the Refuge.

II. BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Proposed Action

The Refuge proposes to conduct a series of prescribed burns within two fire management areas. The proposed burn areas are WCA1 and Compartment C. The total acreage proposed for burning is 6,597 is composed of 6,321 acres in WCA1 and 276 acres in Compartment C.

The WCA 1 project area is dominated by wet prairies interspersed with shrubs, tree islands, cattails, and increasingly more melaleuca. The effects of strategically applied (temporally and spatially) prescribed fire will reduce fuel loads and help management return the vegetative community to a mosaic pattern of greater plant life diversity. Additionally, fuels reduction will prevent against raging wildfires as occurred during the drought 1989-1990 that certainly contributed to the exponential spread of melaleuca in the Refuge interior. Fire is known to generate massive seedfall of melaleuca, therefore, eradication efforts utilize chemical herbicides while fire is managed outside of these areas.

The Compartment C-6 and C-7 burn units are impoundments comprised of typical native, wetland plants. Fire has been utilized for the past 20 years in this project area to reduce fuels and maintain an open and aquatic habitat in which human visitors enjoy viewing a diversity of wildlife.

Bird surveys that are regularly conducted within the Refuge include monthly snail kite surveys during breeding season (December through July), spring survey of wading bird nest attempts, annual standard reconnaissance flights (University of Florida) surveying wading bird foraging, and bird survey in impoundments (Compartment C) as scheduled by annual management needs (Service 2000).

WCA1 Burn Plan

The project area encompasses 143,000 acres of northern Everglades habitat, comprised primarily of sawgrass (*Cladium jamaicense*), freshwater marsh, wet prairie, slough, and tree islands. Scattered cypress domes also occur in the marsh interior. Soils, primarily composed of Loxahatchee peat, range from 3.6 – 14.0 feet in depth (Refuge Comprehensive Conservation Plan (CCP) 2000). The primary fuel types present in the marsh interior are cattail (*Typha spp.*) and sawgrass ranging from 1.0 – 5.0 feet in height.

Table 1. Dominant habitat types of the Refuge (Richardson et. *al.* 1990)

Vegetation Type	Acres	%	FBPS Fuel Model
Sawgrass	29,966	21	3
Tree Islands	3,254	2	Not applicable
Sloughs	272	< 1	Not applicable
Wet prairie	56,478	40	1
Cattail	8,602	6	3
Brush-sawgrass	4,771	3	5/3
Miscellaneous	35,750	25	Not applicable
Total:	~143,000	100	

The project area is bound to the north by L-40 and L-7 levees and State Road (SR) 80; to the east by the L-40 levee, Stormwater Treatment Area (STA) -1E, South Florida Water Management District (SFWMD) buffer lands, and the Everglades Agriculture Reserve; to the south by the L-39 levee and WCA 2A; and to the west by the L-7 levee and the Everglades Agriculture Reserve.

The goals of this burn plan are to enhance habitat for resident waterfowl, wading birds, and other marsh wildlife, maintain ecological diversity, maintain fire in a fire-dependent community under manageable conditions, and assist in management of exotic plants. The result of the prescribed fires will be reduced standing or downed dead biomass of sawgrass and cattail; and control of melaleuca (*Melaleuca quinquenervia*) and other exotic plants by killing seedlings < 24 inches in height (pre-seedbearing life stages).

Burn Unit 1 (Figures 1-2)

The 309 targeted acres in burn unit 1 are a mosaic of low density sawgrass, small tree islands, or 'bayheads', usually less than one acre in size, and wet prairie. Wet prairies contain an estimated two to four inches of water. Wet prairies will serve as natural firebreaks, and help contain and/or limit the spread of fire, and will provide unburned areas for any wildlife attempting to escape fires or that are present in the burn units. Scattered alligator holes will also provide refugia for wildlife. No attempts will be made to ignite prairie grasses.

Table 2. Dominant vegetation types within Burn Unit 1.

Vegetation Type	Acres	%	FBPS Fuel Model
Sawgrass	77.25	25	3
Tree Islands or 'bayhead'	108.15	35	Not applicable
Wet prairie	92.70	30	1
Brush-sawgrass	30.90	10	5/3
Total:	309	100	

The result of the prescribed fires in this unit will be reduced standing or downed dead biomass of Old World climbing fern (*Lygodium microphyllum*) on previously treated tree islands or 'bayheads'. The burns will be completed in one week between June 1 and August 31, 2003.

Ground crews operating from airboats will ignite dead *Lygodium* biomass on select tree islands. These burns are essentially experimental since the effects of using fire to reduce dead *Lygodium* biomass on Everglade's tree islands has not been studied in detail. Only a fraction of the islands may be ignited, as fire will only carry on islands where there is a large volume of dead biomass. Tree islands will generally not facilitate firing operations because there are no fine fuels, except during severe drought situations. The *Lygodium* on these tree islands (~140 sites) was treated in 1999 and again in 2000 by DEP exotic plant contractors. Refuge staff will monitor the reduction in dead biomass and monitor any resulting spread or increase of Lygodium as the result of using prescribed fire as a tool for tree island restoration after herbicides have been used to treat invasive exotic plants. One airboat will be outfitted with a 50-gallon water rig for holding or spot fires in case of escape. No major problems are expected due to the numerous natural firebreaks (i.e., wet prairies that intersperse the burn unit).

Personnel needed include three airboat operators, two igniters and a pump operator for ground ignitions and holding operations. A crew member will monitor weather and Spot Weather Forecasts. A dispatcher will monitor radio traffic and helicopter flight.

Burn Unit 2 (Figures 2-3)

The 2,600 target acres in burn unit 2 are composed mostly of high-density sawgrass up to 5 feet in height . Shrub and tree islands and small cypress domes are scattered throughout the burn unit. Wet prairies account for nearly 1/3 of the burn unit and presently contain an estimated four to eight inches of water. Wet prairies will serve as natural firebreaks, and help contain and/or limit the spread of fire, and will provide unburned area for any wildlife attempting to escape fires or that are present in the burn units. Scattered alligator holes will also provide refugia for wildlife. No attempts will be made to ignite prairie grasses.

Table 3. Dominant vegetation types within Burn Unit 2.

Vegetation Type	Acres	%	FBPS Fuel Model
Sawgrass	3500	61	3
Tree-Shrub Islands	200	4	Not applicable
Open Prairie	2000	35	1
Total:	5700	100	

The result of the prescribed fires in this unit will be reduced standing or downed dead biomass of sawgrass and cattail; and control of melaleuca and other exotic plants by killing seedlings < 24 inches in height. The burn will be completed in one day in June 2003.

The north, west, and south boundaries will be flagged for ground forces igniting backing fires using airboats. The eastern boundary is bordered by dense willow and the L-40 perimeter canal. The main portion of the burn unit will be ignited using a helicopter-mounted plastic sphere dispenser machine and spot and/or strip head fire techniques. One airboat will be outfitted with a 50 gallon water rig for holding or spot fires in case of escape, and an auxiliary water bucket for the helicopter will be located on scene to attack any major spot fires. No major problems are expected due to the numerous natural firebreaks (i.e., wet prairies that intersperse the burn unit).

Personnel needed include three airboat operators, two igniters and a pump operator for ground ignitions, and holding the north, west, and southern burn perimeter. The helicopter will hold the ignition specialist, burn boss, and pilot. Several ground support crew will monitor refueling of helicopter and takeoffs/landings. A crew member will monitor weather and Spot Weather Forecasts. A dispatcher will monitor radio traffic and helicopter flights.

Burn Unit 3 (Figures 2-3)

The targeted 412 acres in burn unit 3 are composed of a mosaic of low density sawgrass, small tree islands, or 'bayheads', usually less than one acre in size, dead melaleuca heads, and wet prairie. All the melaleuca within the burn unit was treated in 1999 using a private contractor. Melaleuca density at the time was considered sparse to moderate. Wet prairies contain an estimated four to six inches of water. Wet prairies will serve as natural firebreaks, and help contain and/or limit the spread of fire, and will provide unburned area for any wildlife attempting to escape fires or that are present in the burn units. Scattered alligator holes will also provide refugia for wildlife. No attempts will be made to ignite prairie grasses.

Table 4. Dominant vegetation types within Burn Unit 3.

Vegetation Type	Acres	%	FBPS Fuel Model
Sawgrass	123.6	30	3
Tree Islands or 'bayhead'	82.40	20	Not applicable
Wet prairie	144.20	35	1
Dead melaleuca heads	61.80	15	unknown
Total:	412	100	

The result of the prescribed fires in this unit will be reduced standing or downed dead biomass of melaleuca. Burns are expected to be completed in one week between June 1 and August 31, 2003.

Ground crews operating from airboats will ignite sawgrass surrounding the dead melaleuca heads. It is hoped that initial firing operations will carry into downed melaleuca biomass and preferably ignite, and carry into the standing dead trees. These burns are essentially experimental and will be performed with the intention of seeing if prescribed fire can be used as a tool to reduce standing dead melaleuca biomass. Only a fraction of the treated melaleuca islands within the burn unit may be ignited. If initial ignition attempts fail, or results are deemed inadequate, fire operations will be suspended and crews may in turn concentrate on igniting areas of contiguous sawgrass within the delineated unit. Refuge staff will monitor the effects of the prescribed fire on the reduction in dead melaleuca biomass and any resultant impacts to native vegetation. It is also hoped that fires will help stimulate growth of native plant species. One airboat will be outfitted with a 50-gallon water rig for holding or spot fires in case of escape. No major contingency problems are expected due to the numerous natural firebreaks (i.e., wet prairies which intersperse the burn unit).

Personnel needed include three airboat operators, two igniters and a pump operator for ground ignitions and holding operations. A crew member will monitor weather and Spot Weather Forecasts. A dispatcher will monitor radio traffic and helicopter flight.

Burn Unit 4 (Figures 2-3)

Approximately 3,000 acres have been identified as primary target areas. The burn unit acres are almost equally composed of open slough, cattail, sawgrass, and myrtle-shrub islands or ridges. The sawgrass is of a low to medium-density. Cattail adjacent to the L-39 canal and flats contains a large amount of dead biomass that is the primary fuel carrier along with sawgrass. Sloughs comprise a significant portion of the burn unit, contain up to 5 feet of water, and will serve as natural firebreaks. Sloughs will likely serve as havens for any wildlife attempting to escape fires, or that are present in the burn unit. Scattered alligator holes will also provide refugia for wildlife.

Table 5. Dominant vegetation types within Burn Unit 4.

Vegetation Type	Acres	%	FBPS Fuel Model
Sawgrass	900	30	3
Cattail	600	20	3
Myrtle-shrub islands w/ sawgrass understory	600	20	5/3
Open slough	900	30	Not applicable
Total:	3,000	100	

The result of the prescribed fires will be reduced standing or downed dead biomass of sawgrass and cattail, and control of melaleuca and other exotic plants by killing seedlings < 24 inches in height.

Ignition of the eastern portion of the burn unit may be waived as significant concentrations of mature (seedbearing) melaleuca are present just to the north, and an escaped fire would contribute to further spread of this exotic plant. At the present time, conditions are too dry or vegetation too dense for airboats to create 'wet lines' or fire breaks through areas of contiguous sawgrass and myrtle-shrub without jeopardizing crew safety. Ignition of the eastern portion of the burn unit will be at the discretion of the burn boss in collaboration with the Refuge exotics biologist. Areas surrounded by natural firebreaks may be ignited. The burn will be completed on one day in June 2003.

The northern boundary will be flagged for ground forces igniting flanking fires using airboats. The western and southern boundaries are natural or manmade firebreaks (i.e., the L-39 canals and a wide access trail in the marsh interior). The eastern boundary is bordered by dense willow and the L-40 perimeter canal. The main portion of burn unit will be ignited using a helicopter-mounted plastic sphere dispenser machine and spot and/or strip head fire techniques. One airboat will be outfitted with a 50 gallon water rig for holding or spot fires in case of escape, and an auxiliary water bucket for the helicopter will be located on scene to attack any major spot fires. No major contingency problems are expected due to the numerous natural firebreaks (i.e., sloughs which intersperse the burn unit).

Personnel needed include two airboat operators, one igniters and a pump operator for ground ignitions, and holding the northern and western burn perimeter. The helicopter will hold the ignition specialist, burn boss, and pilot. Several ground support crew will monitor refueling of helicopter and takeoffs/landings. A crew member will monitor weather and Spot Weather Forecasts. A dispatcher will monitor radio traffic and helicopter flight.

Compartment C Burn

The 276 acres of this compartment are composed of eleven units (C1, 2a, 2b, and C3-10; Figures 1, 4, 5). While native plants are found in most units, cattail and exotic grasses dominate the edges and large portions of the impoundments. Of the units in Compartment C, only C-6 and C-7 (Marsh Trail) have been actively managed for the benefit of the visiting public for the last 18 years (Service 2000).

The project goals are to enhance habitat for resident waterfowl, wading birds, and other marsh wildlife; maintain ecological diversity; and maintain fire in a fire-dependent community under manageable conditions.

Compartment C consists of eleven moist soil units managed primarily for shorebirds, marsh birds, wading birds, and waterfowl. Current staffing levels have only permitted the management of a few of the units in Compartment C, primarily those units bordering the Marsh Trail. In recent years, mechanical means such as disking, water level manipulation, and herbicide applications have been the preferred management methods for achieving desired goals within these moist soil units. In the past, prescribed fire was used in conjunction with these activities to effectively manage these moist soil units.

Vegetation is extremely diverse within each unit. Nutrient-rich water has led to an explosion of undesirable vegetation such as cattail and willow. Soil content varies within each unit and can effectively limit management activities within each unit as soils may, or may not support heavy equipment; thus, limiting the effective management of these moist soil units. Some units are composed of three to four feet of muck while others have a higher sand content, which generally permits the effective use of heavy machinery.

Table 6. Dominant vegetation types within Compartment C.

Vegetation Type	Acres	%	FBPS Fuel Model
Sawgrass	27	10	3
Tree Islands	27	10	Not applicable
Sloughs	54	20	Not applicable
Wet prairie	27	10	Not applicable
Cattail	54	20	3
Pickerel weed	27	10	Not applicable
Assorted marsh grasses (1 to 6 ft. tall)	54	20	1/3
Total:	270	100	

The project area is bound to the north by Compartments A, B, and the Cypress Swamp; to the east by the Dubois and Bedner Farms property and SR 7; to the south by the LWDD C-30 canal and Church Farm property; and, to the west by the C/L-40 canal/levee and WCA

C-6 Burn Unit (Figure 5)

The eight target acres in burn unit C-6 make up the smallest moist soil unit within Compartment C, and they surrounds the main office building. Half of the unit is deep water. Only the eastern most portion (~4 acres) and edges of the unit can be burned after water levels in the unit have been drained significantly. The primary fuel carrier will be marsh grasses and sawgrass present on the interior levees of the burn unit. Deep-water areas and associated borrow canals, levees, and roadways will serve as firebreaks, and will prevent fires from escaping. Areas adjacent to the burn unit will likely serve as havens for any wildlife attempting to escape fires, or that are present in the burn unit.

Table 7. Dominant vegetation types within C-6.

Vegetation Type	Acres	%	FBPS Fuel Model
Sawgrass	0.4	5	3
Spikerush	1.2	15	1
Marsh grasses	1.6	20	1
Open water	4.8	60	Not applicable
Total:	8	100	

The result of the prescribed fires in this unit will be to reduce standing or downed dead biomass of various marsh grasses and to create a mosaic of vegetated and open habitats within the burn unit perimeter. The burn can be completed on one day between June 1 and August 31, 2003.

Four ignition specialists will ignite the edges and interior of the burn unit. Two Type 6 engines will roam perimeter levees and asphalt road and address any spotting issues. No major problems are expected due to the numerous natural firebreaks present adjacent to the burn unit.

Personnel needed include a burn boss, four ignition specialists, and two engine bosses/operators. A crew member will monitor weather and Spot Weather Forecasts. A dispatcher will monitor radio traffic and helicopter flights.

C-7 Burn Unit (Figure 5)

Thirty-one acres are targeted in burn unit C-7. This unit has been mechanically disked using heavy machinery and a specialized aquatic trail cutter in an effort to open up the unit to provide foraging and resting habitat for shorebirds, wading birds, and waterfowl. Intensive herbicide spraying, both aerial and ground, has also been used in an attempt to curtail the growth of noxious vegetation such as cattail and pickerelweed. Because of nutrient rich water, poor quality vegetation continues to dominate this unit. At the current time, it is believed that the vegetation present would not carry fire even if the unit was completely drained and fuels allowed to cure. It was determined that goals for vegetation diversity had been achieved using mechanical means.

Soils in the unit are primarily muck but the eastern half of the unit contains more sand than the western half. The nutrient rich water and muck soils have led to a unit dominated by pickerelweed, which does not burn or ignite well. There is not enough marsh grass present to effectively carry a fire. Inner edges of the unit would carry a fire but would not promote achievement of objectives as outlined in the burn plan. When fire is ever attempted, deep-water areas and associated borrow canals, levees, and roadways will serve as firebreaks, and will prevent fires from escaping. Areas adjacent to the burn unit will likely serve as havens for any wildlife attempting to escape fires, or that are present in the burn unit.

Table 8. Dominant vegetation types within C-7.

Vegetation Type	Acres	%	FBPS Fuel Model
Pickerel weed	20.15	65	Not applicable
Marsh grasses	4.65	15	1
Open water	6.20	20	Not applicable
Total:	31	100	

The result of prescribed fires in this burn unit will be reduced standing or downed dead biomass of marsh grasses and to create a mosaic of vegetated and open habitats within the burn perimeter. The burn, if attempted, can be completed on one day between June 1 and August 31, 2003.

Four ignition specialists will ignite the edges and interior of the burn unit. Two Type 6 engines will roam perimeter levees and asphalt road and address any spotting issues. No major contingency problems are expected due to the numerous natural firebreaks present adjacent to the burn unit.

Personnel needed include a burn boss, four ignition specialists, and two engine bosses/operators. A crew member will monitor weather and Spot Weather Forecasts. A dispatcher will monitor radio traffic and helicopter flights.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The Service has determined that the action area for this overall project is WCA 1 and Compartment C of the Refuge (Figure 1).

STATUS OF THE SPECIES AND CRITICAL HABITAT RANGEWIDE

Everglade Snail Kite

The snail kite was federally listed as endangered in 1967 (FR 42 40685-40688) because of its limited population size and distribution, and threats to its habitat posed by over-draining and large-scale conversion of land in southern Florida to agricultural uses. Much of the following discussion is summarized from the MSRP (Service 1999). Other sources are referenced.

Critical Habitat

Critical habitat was designated for the snail kite in 1977 (50 CFR §17.95). Critical habitat includes portions of the WCAs, portions of Everglades National Park (ENP), western portions of Lake Okeechobee, the Strazzulla and Cloud Lake Reservoirs in St. Lucie County, and portions of the St. John's Marsh in Indian River County. Although critical habitat for the snail kite did not include constituent elements, water-level management as discussed below is required to maintain favorable habitat conditions that are considered necessary to ensure the species survival.

Species Description

The snail kite is a medium-sized raptor, with a total body length for adult birds of 14 to 15.5 in (36 to 39.5 cm) and a wingspan of 42.5 to 45 in (109 to 116 cm) (Sykes *et al.* 1995). In both sexes, the tail is square-tipped with a distinctive white base, and the wings are broad and paddle-shaped. Adults of both sexes have red eyes, while juveniles have brown eyes (Brown and Amadon 1976, Clark and Wheeler 1987). The slender decurved bill is an adaption for extracting the kite's primary prey, the apple snail; the bill is a distinguished character for field identification in both adults and juveniles.

Sexual dimorphism is exhibited in this species, with adult males uniformly slate gray and adult females brown with cream streaking in the face, throat, and breast. Most adult females have a cream superciliary line and cream chin and throat (Sykes *et al.* 1995). Females are slightly larger than males. Immature snail kites are similar to adult females but are more cinnamon-colored, with tawny or buff-colored streaking rather than cream streaking. The legs and cere of females and juveniles are yellow to orange; those of adult males are orange, turning more reddish during breeding (Sykes *et al.* 1995).

In the field, the snail kite could be confused with the northern harrier (*Circus cyaneus*), a similarly sized hawk with a white rump. The northern harrier has a longer and narrower tail, with longer narrower wings held in a dihedral. The snail kite's flight is slower and characterized by more wing-flapping, with the head tilting down to look for snails; the northern harrier has a gliding, tilting flight. At a closer distance, the long, curved beak of the snail kite allows it to be easily distinguished from the northern harrier (Sykes *et al.* 1995).

Life History

Habitat: Snail kite habitat consists of freshwater marshes and the shallow vegetated edges of lakes (natural and man-made) where apple snails (*Pomacea pallidosa*) can be found. Suitable foraging habitat for the snail kite is typically a combination of low-profile (<10 ft) marsh with a matrix of shallow (0.65 - 4.25 ft deep) open water that is relatively clear and calm. Low trees and shrubs are also often interspersed with the marsh and open water. Snail kites require foraging areas to be relatively clear and open in order to visually search for apple snails; therefore, dense growth of herbaceous or woody vegetation is not conducive to efficient foraging. Nearly continuous flooding of wetlands for >1 year is needed to support apple snail populations that in turn provide forage for the snail kite (Beissinger 1988).

Nesting and roosting sites almost always occur over water, which deters predation. Nesting substrates include small trees (usually < 32.8 ft in height), but can also occur in herbaceous vegetation, such as sawgrass, cattail, bulrush, and reed (Service 1999). It is important to note that suitable nesting substrate must be close to suitable foraging habitat, so extensive areas of contiguous woody vegetation are generally unsuitable for nesting.

Reproduction: Copulation can occur from early stages of nest construction, through egg-laying, and during early incubation if the clutch is not complete. Egg laying begins soon after completion of the nest or is delayed a week or more. In Florida, the incubation period lasts from 24 to 30 days (Sykes 1987a). Hatching success is variable from year to year and between areas. In nests where more than one egg hatched, hatching success averaged 2.3 chicks per nest. The most successful months for hatching are February (19 percent), March (31 percent), and April

(23 percent) (Sykes 1987a). The breeding season varies widely from year to year in relation to rainfall and water levels. Ninety-eight percent of the nesting attempts are initiated from December through July, while 89 percent are initiated from January through June (Sykes 1987a, Beissinger 1988).

Foraging: The snail kite feeds almost exclusively on apple snails in Florida (Sykes 1987b). Snail kites spend between 25 to 50 percent of the time foraging while nesting, and 31 to 68 percent of the time foraging during pre- and post-nest desertion periods (Service 1999). Feeding perches include living and dead woody-stemmed plants, blades of sawgrass and cattails, and fence posts.

Movements: Snail kites in Florida are not migratory in the strict sense; they are restricted to southern and central Florida. Snail kites are nomadic in response to water depths, hydroperiod, food availability, nutrient loads, and other habitat changes (Bennetts *et al.* 1994). Radio-tracking and sighting of marked individuals have revealed that nonbreeding individuals disperse widely on a frequent basis (Bennetts *et al.* 1994). Shifts in distribution can be short term, seasonal, or long term; and can take place between areas among years (Rodgers *et al.* 1988), between areas within a given nesting season (Beissinger 1986), within areas in a given nesting season, and within or between areas for several days to a few weeks (Bennetts and Kitchens 1997). Sykes (1983) noted that during colder winters, snail kites shift their distribution more to the southern part of their range.

Status and Distribution

Several authors (Nicholson 1926, Howell, 1932, Bent 1937) indicated that the snail kite was numerous in central and south Florida marshes during the early 1900s, with groups of up to 100 birds. Sprunt (1945) estimated the population to be 50 to 100 individuals. The snail kite apparently plummeted to its lowest population between 1950 and 1965. By 1954, the population was estimated at no more than 50 to 75 birds (Sprunt 1954). Stieglitz and Thompson (1967) reported 8 birds in 1963 at the Loxahatchee NWR, 17 on the NWR and 2 at Lake Okeechobee in 1964, 8 in WCA-2A and 2 on Lake Okeechobee in 1965, and 21 in WCA-2A in 1966. On the other hand, no snail kites have been observed nesting within the Lake Okeechobee littoral zone over the past few years, due to loss of nesting substrate (Steve Gornak, FWC, personal communication 2001).

The snail kite has apparently experienced population fluctuations associated with hydrologic influences, both man-induced and natural (Sykes 1983; Beissinger 1986), but the amount of fluctuation is debated. While acknowledging the problems associated with making year-to-year comparisons in the count data, some general conclusions are apparent. Lake Okeechobee apparently can retain some suitable snail kite habitat throughout both wet and dry years, as long as water levels do not compromise nesting substrate. In contrast, kite use of WCA-3A fluctuates greatly, with low use during drought years, such as 1991, and high use in wet years, such as 1994. Although sharp declines have occurred in the counts since 1969 (for example, 1981, 1985, 1987), it is unknown to what extent this reflects actual changes in the population. Rodgers *et al.* (1988) point out that it is unknown whether decreases in snail kite numbers in the annual count are due to mortality, dispersal (into areas not counted), decreased productivity, or a combination of these factors. Despite these problems in interpreting the annual counts, the data since 1969 have indicated a generally increasing trend (Rodgers *et al.* 1988, Bennetts *et al.* 1994). The annual counts since 1995 confirm a continued increasing trend. Most recently, use of telemetry and mark-recapture methods has improved the precision of population estimates and produced significant increases in population estimates (R. Bennetts, University of Florida, personal communication 2001).

The current distribution of the snail kite in Florida is limited to central and southern portions of Florida. Six large freshwater systems (the Upper St. Johns drainage, Kissimmee Valley, Lake Okeechobee, Loxahatchee Slough, the Everglades, and the Big Cypress basin) generally encompasses the current range of the species, although radio tracking of snail kites has revealed that the network of habitats used by the species also includes many other smaller widely dispersed wetlands within this overall range (Bennetts and Kitchens 1997). Continuing radiotracking work underscores the importance of these smaller, peripheral habitats that support large numbers of snail kites, particularly in years when the larger wetland areas are drier than average (R. Bennetts, personal communication 2001).

Recovery Plan Objective

Pursuant to the MSRP (Service 1999), to achieve downlisting the following criteria must be met: the 10-year average for the total population size is estimated as greater than or equal to 650, with a coefficient of variation less than 20 percent for the pooled data over the 10-year period; no annual population estimate is less than 500 in the 10-year period; the rate of increase of the population to be estimated annually or biannually, and over the 10-year period, will be greater than or equal to 1.0, sustained as a 3-year running average over 10 years; the feeding range of snail kites will not decrease from its current extent, including as a minimum, the St. Johns Marsh, the Kissimmee Chain of Lakes, Lake Okeechobee, Loxahatchee Slough, A.R.M. Loxahatchee NWR, all of the WCAs, ENP, Big Cypress National Preserve, Fakahatchee Strand, Okaloacoochee Slough, and marshes surrounding the Corkscrew Regional Ecosystem Watershed (CREW) Land and Water Trust Corkscrew Swamp; and snail kite nestings regularly occurs over the 10-year period in the St. Johns Marsh, Kissimmee Chain of Lakes, Lake Okeechobee, and at least one of the present compartments of the WCAs. The Service recognizes that the snail kite is a resilient species in a highly changeable environment and, that to some degree, a "boom and bust" population fluctuation is characteristic of the species. The above criteria for reclassification to threatened are flexible enough to allow substantial declines in population within a given year, while setting goals over a 10-year period.

Wood Stork

The wood stork was federally listed under the ESA as endangered on February 28, 1984. No critical habitat has been designated for the wood stork, therefore, none will be affected.

Species Description

The wood stork is a large, long-legged wading bird, with a head to tail length of 85-115 cm (33-45 in) and a wingspan of 150-165 cm (59-65 in). The plumage is white, except for iridescent black primary and secondary wing feathers and a short black tail. Wood storks fly with their neck and legs extended. On adults, the rough scaly skin of the head and neck is unfeathered and blackish in color, the legs are dark, and the feet are dull pink. The bill color is also blackish. During courtship and the early nesting season, adults have pale salmon coloring under the wings, fluffy undertail coverts that are longer than the tail, and their toes are bright pink. Immature wood storks, up to the age of about three years, have yellowish or straw-colored bills and varying amounts of dusky feathering on the head and neck.

Life History

Habitat: Wood storks use mangroves as low as 1 m (3 ft), cypress as tall as 30.5 m (100 ft), and various other shrubs or trees located in standing water (swamps) or on islands surrounded by relatively broad expanses of open water (Palmer 1962, Rodgers *et al.* 1987, Ogden 1991) for nesting. The same site will be used for many years as long as the colony is undisturbed, and sufficient feeding habitat remains in surrounding wetlands. Natural wetland nesting sites may be abandoned if surface water is removed from beneath the trees. In response, wood storks may abandon that site and establish a breeding colony in managed or impounded wetlands (Ogden 1991). Between breeding seasons or while foraging wood storks may roost in trees over dry ground, on levees, or large patches of open ground.

<u>Foraging</u>: Wood storks forage in a wide variety of wetlands, where prey densities are high, and the water shallow and open enough to hunt successfully (Ogden *et al.* 1979; Browder 1984; Coulter 1987). Calm water, about 5-40 cm (2-16 in) in depth, and free of dense aquatic vegetation is ideal (Coulter and Bryan 1993). Typical foraging sites include freshwater marshes and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. Wood storks feed almost entirely on fish between 2 and 25 cm (1-10 in) in length (Kahl 1964, Ogden *et al.* 1976, Coulter 1987) but may occasionally consume crustaceans, amphibians, reptiles, mammals, birds, and arthropods. Wood storks use a specialized feeding behavior called tactilocation, or grope feeding, and wade through the water with the beak immersed and open about 7-8 cm (2.5-3.5 in). When the wood stork encounters prey with its bill, the mandibles snap shut, the head is raised, and the food swallowed (Kahl 1964). Occasionally, wood storks stir the water with their feet in an attempt to startle hiding prey (Rand 1956, Kahl 1964, Kushlan 1979).

Wood storks generally forage in wetlands within 50 km (31 mi) of the colony site. Maintaining this wide range of feeding site options ensures that sufficient wetlands of all sizes, and varying hydroperiods, are available during shifts in seasonal and annual rainfall and surface water patterns to support wood storks. Adults feed furthest from the nesting site prior to laying eggs, forage in wetlands closer to the colony site during incubation and early stages of raising the young, and then further away again when the young are able to fly. Wood storks generally use wet prairie ponds early in the dry season then shift to slough ponds later in the dry season thus following water levels as they recede into the ground (Browder 1984).

<u>Reproduction</u>: Breeding wood storks are believed to form new pair bonds every season. First age of breeding has been documented in three to four-year-old birds but the average first age of breeding is unknown. Eggs are laid as early as October in south Florida and as late as June in north Florida (Rodgers 1990). A single clutch of two to five (average three) eggs are laid per breeding season but a second clutch may be laid if a nest failure occurs early in the breeding season. The average clutch size may increase during years of favorable water levels and food resources. Egg laying is staggered and incubation, which lasts about 30 days, begins after the first egg is laid. Therefore the eggs hatch at different times and the nestlings vary in size. The younger birds are first to die during times of scarce food. The young fledge in about nine weeks but will stay at the nest for three to four more weeks to be fed. Adults feed the young by regurgitating whole fish into the bottom of the nest about three to ten times per day. Feedings are more frequent when the birds are young. Feedings are less frequent when wood storks are forced to fly great distances to locate food. The average wood stork family requires 201 kg (443 lbs) of fish during the breeding season (Kahl 1964). Receding water levels are necessary in south Florida to concentrate suitable densities of forage fish (Kahl 1964, Kushlan *et al.* 1975).

<u>Population Dynamics</u>: The United States breeding population of wood storks declined from an estimated 20,000 pairs in the 1930s to about 10,000 pairs by 1960 (49 FR 7332). The total number of nesting pairs in 1995 was 7,853 with 11 percent in South Carolina, 19 percent in Georgia, and 70 percent in Florida (Service 1996).

Since the 1960s, the wood stork population has declined in southern Florida, and increased in northern Florida, Georgia, and South Carolina (Ogden *et al.* 1987). The number of nesting pairs in the Everglades and Big Cypress ecosystems (southern Florida) declined from 8,500 pairs in 1961 to 969 pairs in 1995. During the same period nesting pairs in Georgia increased from 4 to 1,501 and nesting pairs in South Carolina increased from 11 to 829 (Service 1996). The number of nesting pairs in northern and central Florida doubled between 1976 and 1986 (Ogden 1991). Although Ogden (1991) attributed this to an increase in the availability of altered wetland and artificial wetland nesting sites, the regional increase coincided with the northward shift of the wood stork breeding population center and the overall population decline in the southeastern United States.

The size of a wood stork breeding colony, in general, is related to the amount of wetlands within reasonable flight distances of the nesting site. More wetlands means more prey resources, higher rates of reproduction, and less variability in the colony size. Fewer wetlands means fewer prey resources, lower rates of reproduction, and more variability in the colony size. However, the size of a wood stork colony can also vary from year to year based on rainfall patterns and surface water conditions. The colony site may be vacant in years of drought due to inadequate foraging conditions in the surrounding area. Traditional colony nesting sites may be abandoned completely by storks when hydrological changes occur removing surface water from beneath the colony trees. Conversely, nesting failures and colony abandonment may occur if unseasonable rainfall causes waters to rise when they should be receding thus dispersing rather than concentrating forage fish. Stable colonies and persistent but declining colonies are associated with a core foraging area comprised predominantly of wetlands. Unstable colonies and ephemeral colonies are associated with a core foraging area lacking large amounts of wetlands.

The annual climatological pattern that appeared to stimulate the heaviest nesting efforts by storks was a combination of the average or above-average rainfall during the summer rainy season prior to colony formation, and an absence of unusually rainy or cold weather during the following winter-spring nesting season. This pattern produced widespread and prolonged flooding of summer marshes that maximized production of freshwater fishes, followed by steady drying that concentrated fish during the dry season when storks nest (Kahl 1964).

Population stability is dependent upon maintenance of suitable nesting sites, and on the extent and productivity of wetland feeding sites (Ogden and Nesbitt 1979). So it appears that stability in the Central-North region of the wood stork's range is in part due to geographical spread in colonies (Ogden and Nesbitt 1979).

Between 1958 and 1985 the wood stork breeding population center shifted north from Lake Okeechobee to Polk County, a distance of about 132 km (82 mi). The 1976 breeding season was the last year when more pairs nested in south Florida than in central-north Florida. Productivity is generally higher in central-north Florida than south Florida. Whereas the number of colonies in south Florida has remained relatively stable the number of colonies in central-north Florida region continues to increase (Ogden *et al.* 1987). The increase in central-north Florida is associated with an increase in colony numbers and not colony size. Colonies in the north are smaller than colonies in the south. Historically colonies in the south were associated with extensive wetlands and food was abundant. The implication is that food resources may be limiting colony sizes in central-north Florida (Ogden *et al.* 1987). Ogden *et al.* (1987) suggested that the population shift is the result of deteriorating feeding conditions in south Florida and that better nesting success rates in central-north Florida compound population growth in that area.

Concurrent with the population center shift to the north wood storks began to use altered wetlands and artificial wetlands as nesting sites more than they used natural wetlands. Drought conditions in natural wetlands and an increase in the availability of altered and artificial wetland sites contributed to this behavioral adaptation. Altered wetlands are comprised of native wetland vegetation maintained by manipulated water levels. Stable water levels provide increased protection against predators during periods of drought. Artificial wetlands are comprised of native upland vegetation killed by the impounding of water, generally as a result of phosphate mining. The life span of these colonies is limited to the period of time it takes rot to set in and render the dead trees and limbs too weak to support a wood stork nest (Ogden 1991).

Status and Distribution - The wood stork is found from northern Argentina, eastern Peru, and western Ecuador north to central America, Mexico, Cuba, Hispaniola, and the southeastern United States (AOU 1983). Population declines have been documented in Mexico and Belize (Luthin 1987), only one stable population has been reported from Costa Rica, and the status of the wood stork elsewhere in Central America is unknown (Service 1996). Wood storks in South America are threatened by development. The enormous colonies of the Pantanal in Brazil are threatened by agriculture, water pollution, and a massive project to drain, dike, and channelize the world's largest wetland (Alho *et al.* 1988). Mexico listed the wood stork as endangered in 1991.

In the United States, wood storks were historically known to nest in all coastal states from Texas to South Carolina (Wayne 1910, Bent 1926, Howell 1932, Oberholser 1938, Dusi and Dusi 1968, Cone and Hall 1970, Oberholser and Kincaid 1974). Currently, wood storks are known to occur in Florida, Georgia, and South Carolina and may disperse as far north as North Carolina, and as far west as Mississippi and Alabama. In South Florida, breeding colonies of wood storks occur in Broward, Charlotte, Collier, Miami-Dade, Hardee, Indian River, Lee, Monroe, Osceola, Palm Beach, Pold, St. Lucie, and Sarasota Counties.

The decline in the U.S. population of the wood stork is thought to be related to one or more of the following factors: (1) reduction in the number of available nesting sites, (2) lack of protection at nesting sites, and/or (3) loss of an adequate food base during the nesting season (Ogden and Nesbitt 1979). Ogden and Nesbitt (1979) indicate that a reduction in nesting sites is not the cause in the population decline because the number of nesting sites used from year to year is relatively stable. They point out that although the largest historic colonies are on public lands, these colonies have still declined and this is most likely related to loss of wetlands and the subsequent reduction in prey availability.

Threats: The primary cause of the wood stork population decline in the United States is loss of wetland habitats used for foraging. Almost any shallow wetland depression where fish become concentrated, either through local reproduction or receding water levels, may be used as feeding habitat by the wood stork. Wood storks historically occurred in all coastal states from Texas to South Carolina. Dahl (1990) estimates that these states lost about 38 million acres, or 45.6 percent, of their historic wetlands between the 1780s and the 1980s. However, it is important to note that wetlands and wetland losses are not evenly distributed in the landscape. Hefner *et al.* (1994) estimated that 55 percent of the 2.3 million acres of the wetlands lost in the southeastern United States between the mid-1970s and mid-1980s were located in the Gulf-Atlantic Coastal Flats. These wetlands were strongly preferred by wood storks as nesting habitat.

Browder et al. (1976, 1978) documented the distribution and the total acreage of wetland types occurring south of Lake Okeechobee, Florida for the period 1900 through 1973. We combined their data for habitat types known to be important foraging habitat for wood storks (cypress domes and strands, wet prairies, scrub cypress, freshwater marshes and sloughs, and saw grass marshes), and found that these habitat types have been reduced by 35 percent since 1900.

The alteration of wetlands and the manipulation of wetland hydroperiods to suit human needs has also reduced the amount of habitat available to wood storks. The decrease in wood storks nesting on Cape Sable was related to the construction of the drainage canals during the 1920s (e.g., Holt 1926). Water level manipulation can facilitate raccoon predation of wood stork nests when water is kept too low (alligators deter raccoon predation when water levels are high). Artificially high water levels may retard nest tree regeneration since many wetland tree species require periodic droughts to establish seedlings. Water level manipulation may decrease food productivity if the water levels and length of inundation do not match the breeding requirements of forage fish. At the same time water levels that are too high encourage the spread of larger fish that prey on the smaller fish preferred by wood storks.

Since the 1970s, wood storks have also been observed to shift their nest sites to artificial impoundments or islands created by dredging activities (Ogden 1991). The percentage of nests in artificial habitats in central and north Florida has increased from approximately 10 percent of all nesting pairs in 1959 to 1960 to 60 to 82 percent between 1976 and 1986 (Ogden 1991). Nest trees in these artificially impounded sites often include exotic species such as Brazilian pepper (*Schinus terebinthifolius*) or Australian Pine *(Casuarina spp.)*. Ogden (1996) has suggested that the use of these artificial wetlands indicates that wood storks are not finding suitable conditions within natural nesting habitat or they are finding better conditions at the artificial wetlands. The long-term effect of these nesting areas on wood stork populations is unclear.

Human disturbance is a factor that is known to have a detrimental affect on wood stork nesting (Service 1996). Wood storks have been known to desert nests when disturbed by humans thus exposing eggs and young birds to the elements and to predation by gulls and fish crows.

The role of chemical contamination in the decline of the wood stork in unclear. Pesticide levels high enough to cause eggshell thinning have been reported in wood storks but decreased productivity has not yet been linked to chemical contamination (Ohlendorf *et al.* 1978, Fleming *et al.* 1984). Burger *et al.* (1993) studied heavy metal and selenium levels in wood storks from Florida and Costa Rica. Adult birds generally exhibited higher levels of contaminants than young birds. The authors attribute this to bioaccumulation in the adults who may be picking up contaminants at the colony nesting site and while foraging at other locations during the non-breeding season. There were higher levels of mercury in young birds from Florida than young birds or adults from Costa Rica. Young birds from Florida also exhibited higher levels of cadmium and lead than young birds from Costa Rica. The authors recommended that the lead levels in Florida be monitored. Burger *et al.* (1993) drew no conclusions about the potential health effects to wood storks.

Recovery Plan Objective

Pursuant to the MSRP (Service 1999), to achieve delisting this species the following criteria must be met: wood stork foraging and nesting habitat in the Everglades watershed is restored and/or enhanced as a result of interagency coordination efforts in managing primary environmental components via modified waters and prescribed fire. The recovery criteria is identified in the wood stork recovery plan, for the Everglades and Big Cypress Basin is a population of 2,500 nesting pairs. To estimate the productivity of wood storks, the number of fledged young per nest is being determined for the major nesting colonies in South Florida during the same breeding cycle.

ENVIRONMENTAL BASELINE

The environmental baseline includes the effects of past and ongoing human and natural factors leading to current status of the species and their habitats.

Status of the species and critical habitat within the action area

Wood Stork: Wood storks have been observed feeding with other wading birds in the central slough of WCA 1, adjacent to the burn units. The wading bird survey crew, operating under a Special Use Permit to conduct the spring 2003 wading bird nesting survey, have found no nesting wood storks on the Refuge. Wood storks will likely take advantage of foraging opportunities post-burn because of consumption and thinning of dead sawgrass biomass that is expected to create more open conditions and ideal foraging conditions for all marsh birds.

Everglade Snail Kite: Everglade snail kites primarily use the action area for foraging, though nesting occurred within burn unit 2 in 1998 (Figure 6). No regular nesting activity has been identified in the areas proposed for prescribed burning. Snail kite activity within the action area has been monitored annually for several years. The Florida Cooperative Fish and Wildlife Research Unit interns have been conducting bi-monthly snail kite surveys at the Refuge since January 2003. No snail kites have been observed in WCA 1 through April 2003. The mobility of snail kites allows them to utilize areas with suitable hydrologic conditions, and the amount of use, both for foraging and nesting within the action area, depends largely on the local hydrologic conditions. Hydrologic conditions appropriate for snail kites are seasonally maintained within the action area. Native vegetation is maintained within the action area, including shrubs that may provide substrate for nesting.

Designated critical habitat for the snail kite includes WCA 1 (143,000 acres). The action area represents less than 17 percent of the total designated snail kite critical habitat (841,639 acres, a digitized estimate).

Factors affecting species environment within the action area

Historically, surface water originating from rainfall and natural springs flowed towards the Refuge from the Kissimmee basin of central Florida. The overflow waters are currently controlled by constructed levees and canals, ceasing the natural flow that has resulted in Refuge access at three points of controlled surface flow. These access points and rainfall are currently driving the hydroperiod and hydropattern changes/modifications of the Refuge. The shallow, shorter hydroperiod marshes that once surrounded the Refuge have been replaced by deep-water habitats along canals. The resulting affect is the loss of the mosaic of habitats that provided the deep water slough habitats for foraging snail kites and shallower marshes for foraging wading birds like wood storks. In areas that have become wetter, tree islands have decreased in size and number (Service 2000). In drier areas, particularly the north portion of the Refuge, woody vegetation has become more abundant. Lower water levels, during dry season (generally November through March) in particular, increase the potential for fire and for fires to burn hotter where burnable biomass has accumulated from years of fire suppression. Such changes in the natural fire regime result in more change to vegetation and soils from the natural, pre-modified waters condition.

Impoundment of sheet flow waters has changed the patterns of nutrient transport, seed dispersal, soil accretion, or loss (Brandt 2000). Subsequently, the structure and composition of vegetation has changed. Due to human activities during the last century, nutrients and toxic substances are ubiquitous and an ever-increasing problem in the South Florida environment. Researchers have documented a variety of negative effects from increased nutrients such as phosphorus; changed periphyton communities; loss of native sawgrass communities; increased organic matter in water; reduced dissolved oxygen; conversion of wet prairie plant communities to cattails; and loss of important habitats for wading birds (Stober *et al.*, 1996). Some high nutrient water does move into the Refuge but most of it remains in the canals surrounding the conservation area, instead of flowing directly through. Much of the interior (WCA 1) water comes from rainfall, while the high nutrient water that does enter the Refuge only affects habitat near the canals. The affects of chemical and hydrologic imbalances have promoted extensive cattail marshes to develop in the Refuge. While cattails are not described in historical accounts, or identified on early maps of the Everglades, cattails currently occupy at least 6,000 acres of the Refuge (Richardson et *al.* 1990). Thick stands of cattail obstruct wildlife use of these wetlands and preclude wildlife-dependent recreation such as birding and photography.

In view of the adverse affects of high nutrient waters along with other causes of chemical imbalance, the U.S. Attorney General for South Florida field a lawsuit in 1988 n behalf of the Refuge and ENP. As a result of this lawsuit, the SFWMD constructed in 1994, a 3,700 acres nutrient (phosphorus) removal project. This project tested methods for removing phosphorus loads making an important contribution toward water quality and the STAs currently adjacent to and benefitting the Refuge hydrology. Thus far, two filtering marshes straddle the refuge to the north covering approximately 12,000 areas. Coupling the intent of these STAs and the implementation of agricultural best management practices (BMPs) will reduce phosphorus values. Appropriate fire management used in area where cattails concentrations are greatly reducing habitat quality is expected to suppress the most wide-spread cattail populations creating better foraging areas.

Other species of invasive exotic plants, such as Brazilian pepper (*Schinus terebinthifolius*), maleleuca, and Old World climbing fern, pose a threat to native plant communities of the Refuge. The degraded habitat has been proven to support less species diversity than native plant habitats. Alternative methods for exotic plant control on the Refuge include chemical (herbicides), physical (mechanical removal and prescribed fire), and biological treatments. Control of the various exotic plants on the Refuge depends on an integrated management approach using both chemical and biological strategies along with prescribed fire and mechanical treatments where appropriate.

EFFECTS OF THE ACTION

Wood storks: Wood storks forage in the interior marsh during periods of low water during the spring draw down (April through early June). Wood storks are extremely sensitive to water level fluctuations and generally disperse with the onset of summer rains (late May or early June). Wood stork nesting has been documented only twice on the Refuge (Figure 6), during the drought years of 1990 and 2001. There was no nesting activity in the project area this year so new fledglings are not dependent on these foraging grounds. Traditionally, wood storks depart from the Refuge by early June. Any adult wood storks using the area are capable of flight to avoid fire activities.

Snail kites: Activities associated with site preparation and the prescribed fire itself may result in short-term disturbance and disruption of foraging and sheltering activities of kites using the area. Adult kites are capable of escaping prescribed burns through flight, regardless of ignition technique. Since there are no nests in the area, there will be no adverse effects on newly fledged nestlings learning to forage in the area. Reduced foraging and roosting may result from fire, or from equipment, personnel, and vehicles involved with conducting the proposed fires. These effects will be temporary and only short-term adverse effects to adults since the burn window is well past breeding season.

Kites are usually encountered at the Refuge during winter months (December to March), and if snail kite breeding occurs, it typically takes place from January to March. This coincides with the period when water levels are highest within the interior marsh, and they can more effectively forage on apple snails. Kites are most commonly observed before spring draw down when water levels drop significantly making foraging too energetically expensive.

A key element to nesting success is suitable nesting substrate close to foraging habitat. The prescribed burns will not impact the hydroperiod of any of these burn areas. The burns will result in short-term reductions in nesting structure suitability for snail kites, however, they will not result in permanent adverse impacts to critical habitat.

Species addressed in this opinion are dependent on periodic fire for the maintenance of feeding, breeding, and/or sheltering areas. Although the proposed fire my result in adverse affects to individuals through the temporary loss of habitat, the fire will maintain the ecological functions and values of the native prairie and sawgrass communities. We expect that the fire will result in significant benefits to these listed species by restoring and maintaining suitable habitat conditions over the long term. The following beneficial effects will result from the proposed action:

- A reduction in the hazardous fuel loads that contribute to the potential for catastrophic wildfire.
- Improved forage base for the snail kite and wood stork.
- Improved soil and groundcover conditions for the recovering native plants.
- Eradication of targeted exotic pest plants. Without prescribed fire, exotic pest plants will continue to invade and displace native, plant communities.
- Restoration and maintenance of historical habitat succession conditions.
- Enhancement of the diversity of plant and animal assemblages.

Prescribed fire is a natural component of the disturbance regime in south Florida, and most communities are either fire-dependent or fire-adapted.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The two Refuge project areas comprising the action area are wholly owned by the Service. Any future actions outside the scope of this opinion will require a separate consultation.

CONCLUSION

After reviewing the current status of the Everglade snail kite and its critical habitat and the wood stork, the environmental baseline for the action area; effects of the proposed action; and the cumulative effects; it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of these species. Critical habitat has been designated for the snail kite. However, it is the Service's biological opinion that the action, as proposed, is not likely to destroy or adversely modify designated critical habitat.

III. INCIDENTAL TAKE STATEMENT

Section 9 of the Act and federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking if that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Service so that they become binding conditions of any grant or permit issued to the Refuge, as appropriate, for the exemption in section 7(o)(2) to apply. The Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Service (1) fails to assume and implement the terms and conditions or (2) fails to require the Refuge to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Refuge must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(I)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Wood stork: Incidental take is anticipated to be in the form of harm and harassment during prescribed fire events and over the time it takes for habitat to recover as suitable for foraging and roosting. Any adult wood storks using the area are capable of flight to avoid fire activities and no nesting occurred this year, so no mortality of wood storks is anticipated. Traditionally, wood storks depart from the Refuge by early June. Therefore, take is anticipated to be ten individuals per year.

Snail kite: Incidental take is anticipated to be in the form of harm and harassment during prescribed fire events and over the time it takes for habitat to recover as suitable for foraging and roosting. Adult kites are capable of escaping prescribed burns through flight and there are no nests in the area, so no mortality of snail kites is anticipated. Kites are usually encountered at the Refuge during winter months (December to March). Therefore, take is anticipated to be two individuals per year.

REASONABLE AND PRUDENT MEASURES

Because the burns will occur when they are least likely to impact wood storks and snail kites, the Service is not aware of any additional measures to minimize impacts of incidental take of snail kites and wood storks.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Service must comply with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are non-discretionary.

1. Monitor the response of species pre- and post- prescribed fire and report this information to this office.

2. Upon locating a dead, injured, or sick specimen, initial notification must be made to the nearest Service Law Enforcement Office (Mr. Vance M. Eaddy; Fish and Wildlife Service; 9549 Koger Blvd., Suite 111; St. Petersburg, Florida 33702; 727-570-5398). Secondary notification should be made to the Florida Fish and Wildlife Conservation Commission; South Region, 3900 Drane Field Road, Lakeland, Florida, 33811-1299; 1-800-282-8002. Care should be taken in handling sick or injured specimens to ensure effective treatment and care, or in the handling of dead specimens to preserve biological material in the best possible state for later analysis as to the cause of death. In conjunction with the care of sick or injured specimens or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

IV. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

- Implement to the extent practicable, the actions in the MSRP (Service 1999) which are necessary to recover the snail kite and wood stork.

V. REINITIATION NOTICE

This concludes formal consultation on the action described in the Refuge's proposed fire management plans. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, as defined by the action area measures provided in this project description; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions, please contact Mike Carlson at 772-562-3909, extension 296 or Cindy Schulz, extension 305.

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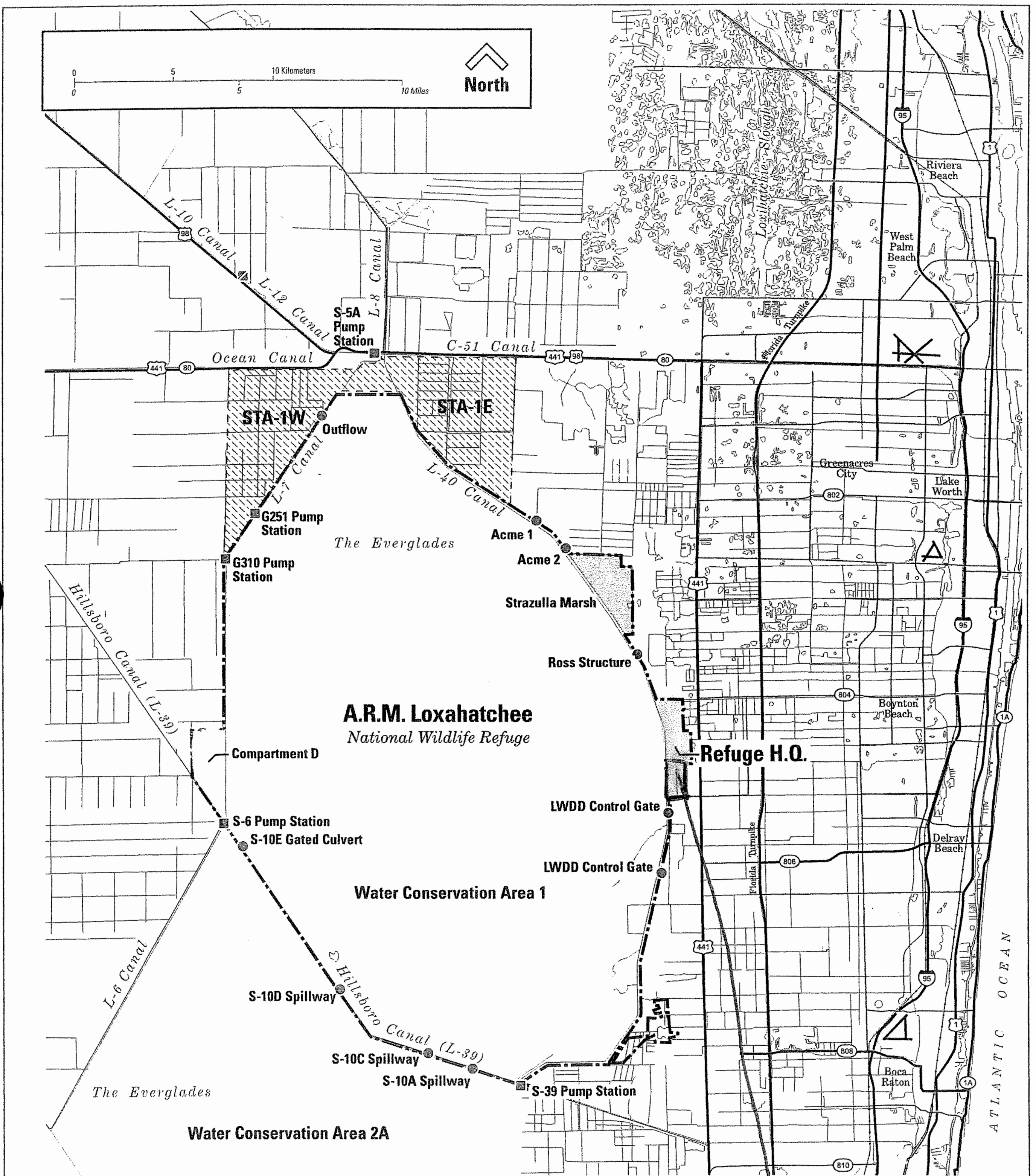
Figure | The location of pump stations and spillways at A.R.M. Loxahatchee National Wildlife Refuge



Compartment C

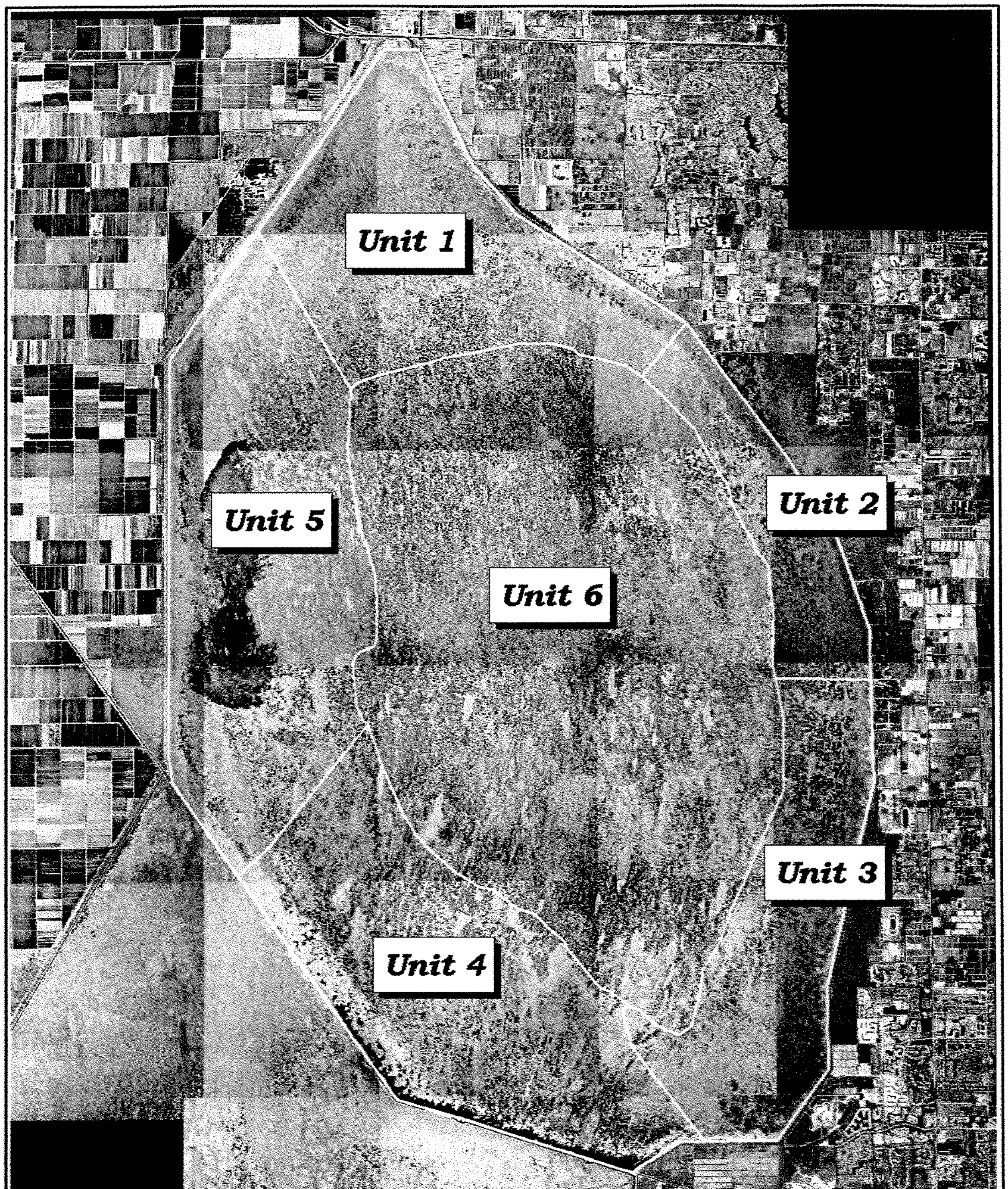


Figure 2. Interior Burn Units As Identified in the A.R.M. Loxahatchee NWR Fire Management Plan 2001.

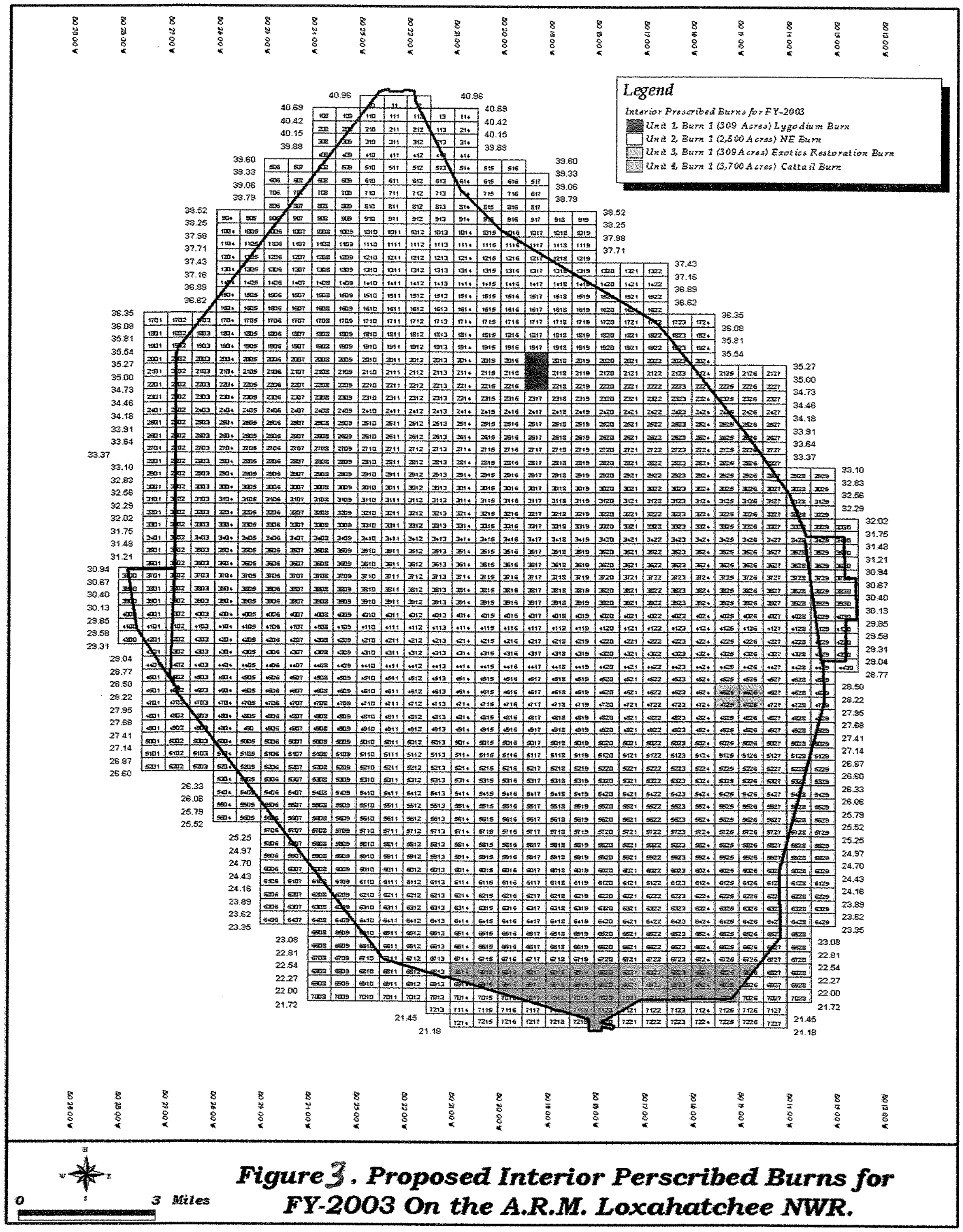


Figure 3. Proposed Interior Perscribed Burns for FY-2003 On the A.R.M. Loxahatchee NWR.

Figure 4 Proposed boundary expansion near the Headquarters of A.R.M. Loxahatchee National Wildlife Refuge

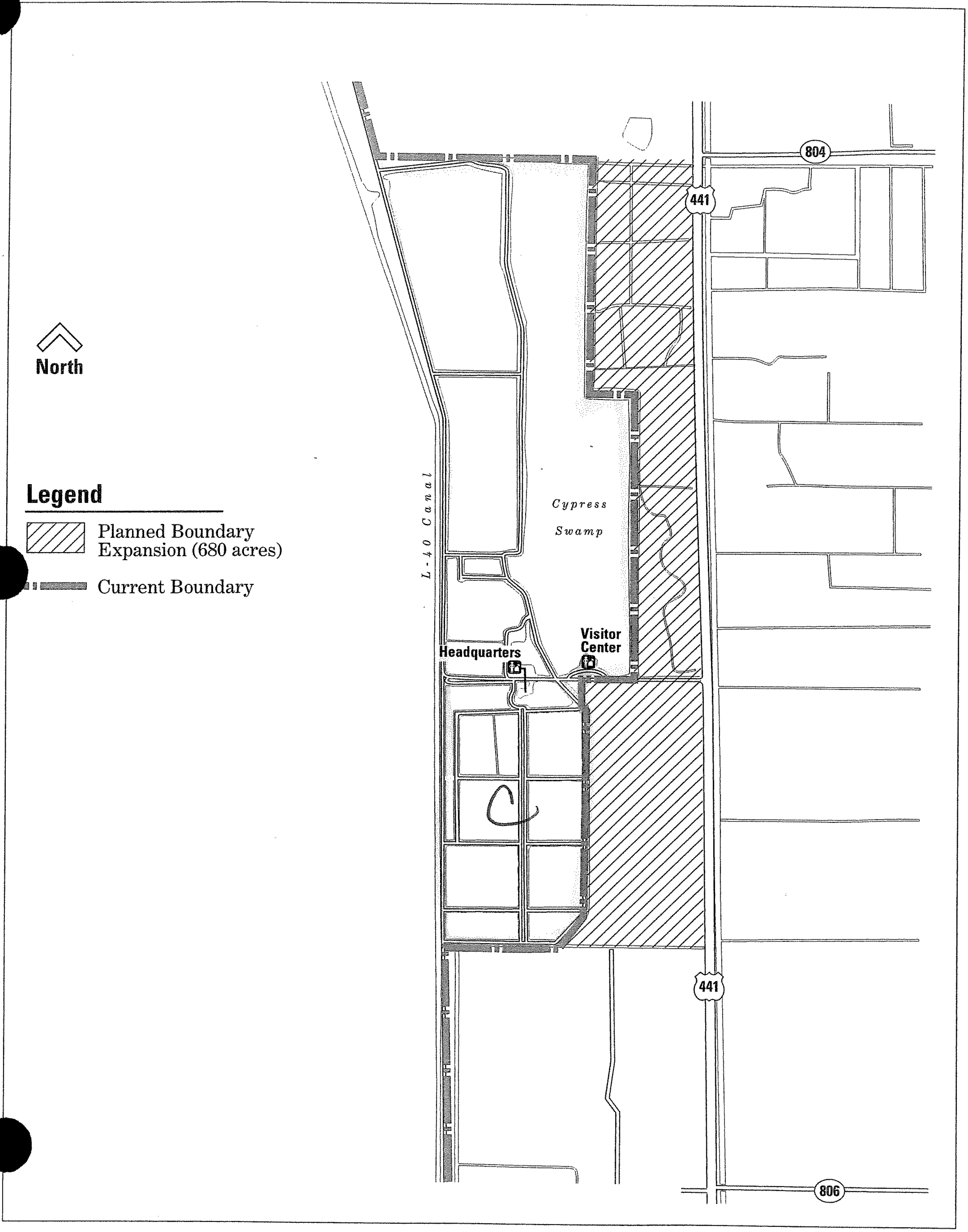
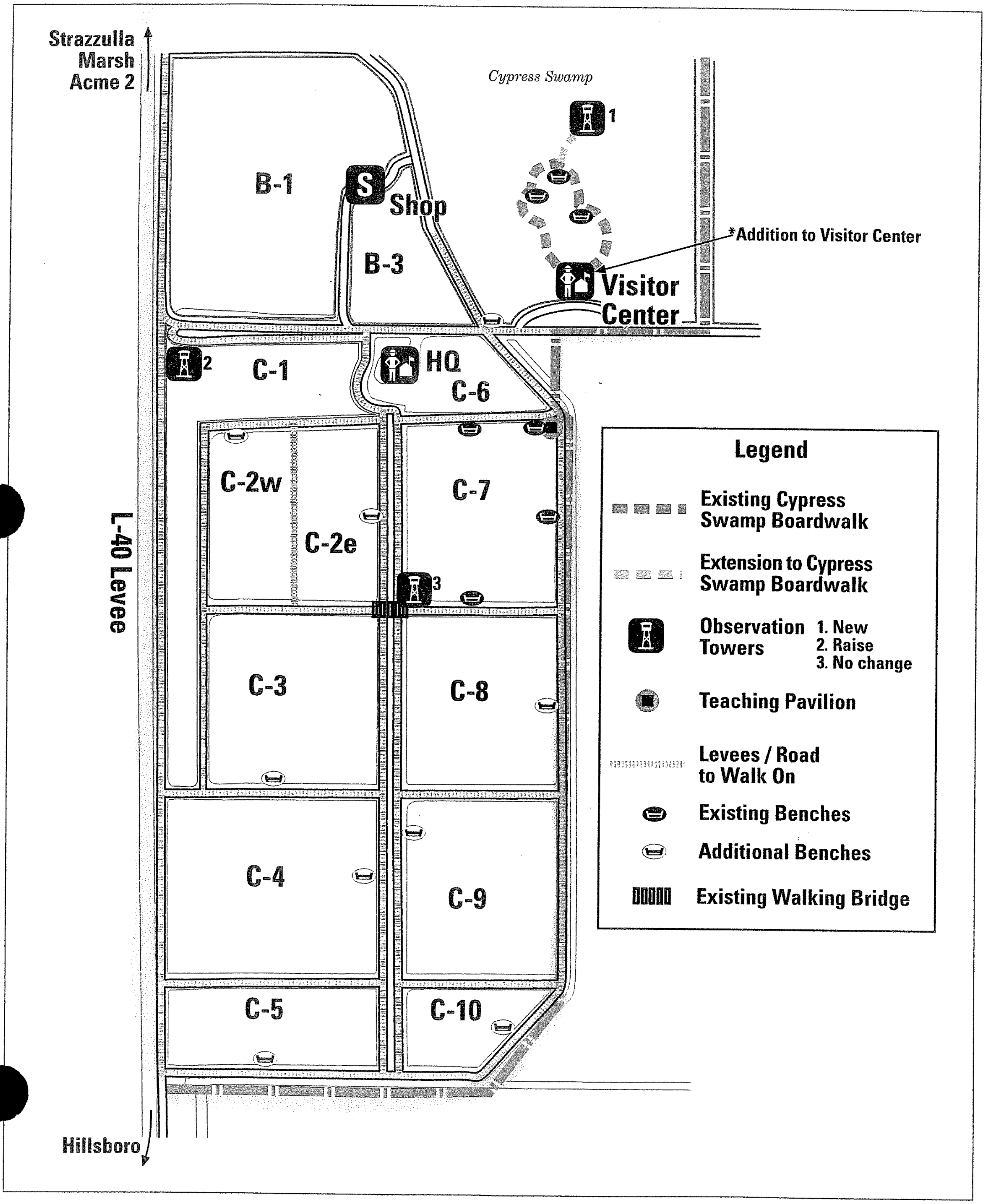


Figure 5 Expanded public use opportunities at the Headquarters Area, A.R.M. Loxahatchee National Wildlife Refuge.



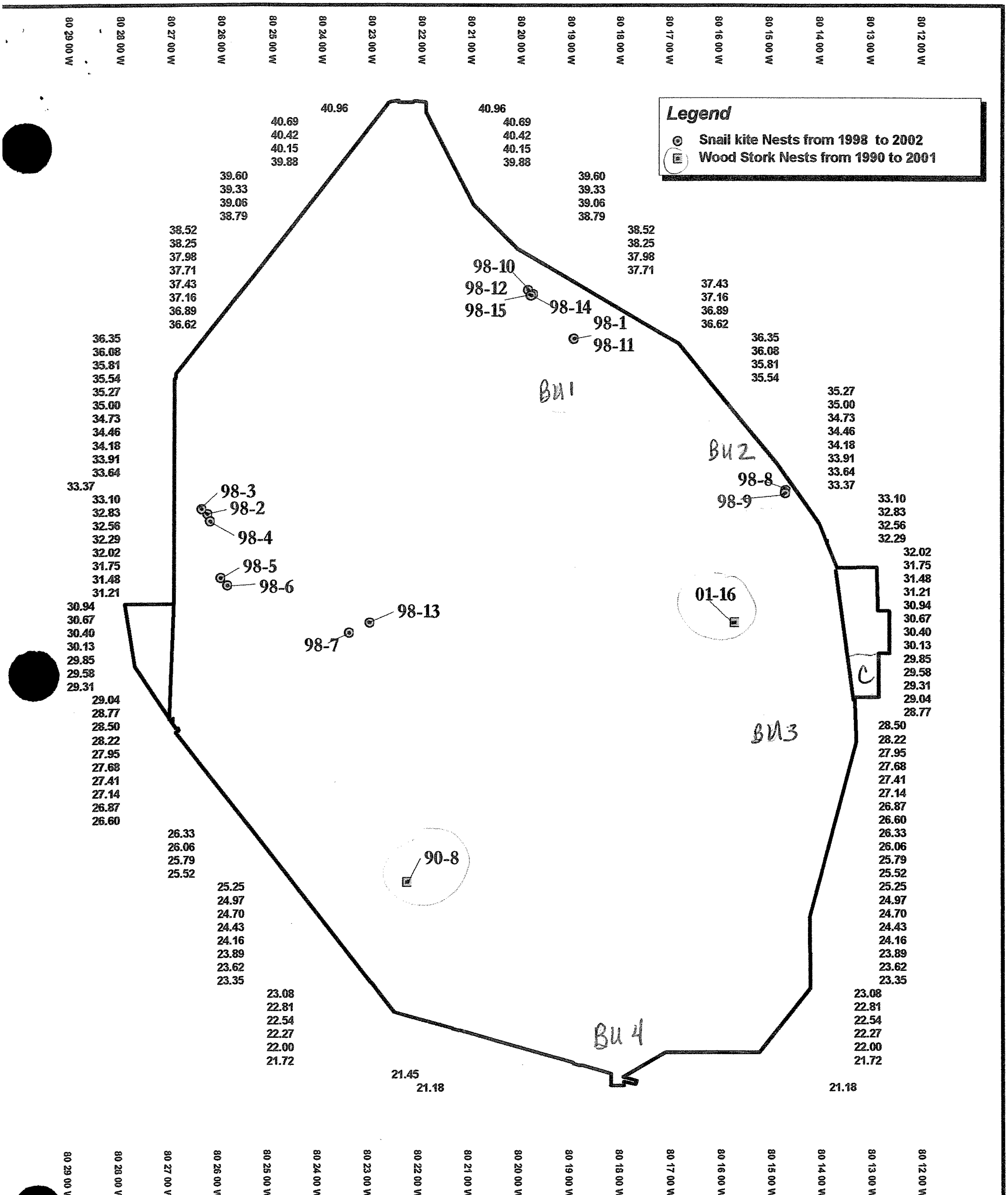


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Figure6 . Locations of Snail Kite & Wood Stork Nests in the A.R.M. Loxahatchee NWR. 1995 - 2002.

Burn Units 1-4
Compartment C

bcc:Reading Biological Opinions cy2003
CSchulz:slb:06/10/03(R:\2003\Biological Opinions cy2003\June\2003ABR Lox NWR-BO.wpd)

bcc:
FWS, Atlanta, GA (Joe Johnston)
FWS, Jacksonville, FL (Billy Brooks)

4

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Revised 1/9/03

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Enclosures: None ✓ Black & White ______ Color ______

DRAFT ✓ **FINAL** ______

SPECIAL INSTRUCTIONS: Ann. Burn Report from [illegible]oxahatchee NWR, Intra-Service S7

recommend concurrence

* see requested additional info (*) attached

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