

Appendix 5-4: STA Avian Survey Results

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INTRODUCTION

The South Florida Water Management District (SFWMD or District), in cooperation with the United States Fish and Wildlife Service (USFWS), developed an Avian Protection Plan (APP) in 2008 for the Everglades Stormwater Treatment Areas (STAs) and their expansions focusing on black-necked stilts (*Himantopus mexicanus*) and Florida burrowing owls (*Athene cunicularia floridana*). Both species are afforded protected status under the Migratory Bird Treaty Act of 1918. Additional protected status has been given to burrowing owls as they are also listed as a species of special concern in the state of Florida. Black-necked stilts and Florida burrowing owls are used as sentinel species for this APP. By addressing these two species in the APP, impacts to other protected migratory bird species are also expected to be minimized. The APP characterizes the risks to ground-nesting migratory bird species from STA construction, operation, start-up, drought conditions, routine maintenance, and enhancement activities and outlines actions intended to minimize harmful impacts to migratory birds and nests due to these activities. This APP is unconventional in that it has been developed to help manage the operation of constructed treatment wetlands, i.e., the STAs, which already provide important habitat, nesting, and foraging benefits to migratory birds as compared to previous agricultural land use (Gawlik and Beck, 2010). More information on the APP to protect ground-nesting migratory birds in the Everglades STAs is discussed in the 2010 SFER – Volume I, Chapter 5 (Pietro et al., 2010).

Another species that is monitored in the STAs during the nesting season is Everglade snail kites (*Rostrhamus sociabilis*). Nesting by this species was first reported in April 2010 at STA-5 Cells 1A and 2A (Kitchens 2010). This was the first documented nesting by this federally and state listed endangered avian species in any of the STAs operated by the District. Since that time, the University of Florida (UF) snail kite team has conducted annual snail kite nesting surveys in the Everglades STAs during this bird's nesting season. When snail kite nests are observed, the UF field team monitors the nests and their findings are reported to the District and the USFWS.

The APP survey results during two nesting periods, Calendar Year 2011 (CY2011; period between April–July 2011) and Calendar Year 2012 (CY2012; period between April–June 2012) are presented in **Tables 1–5**. A summary of the period of record (CY2006–CY2012) nesting data in the STAs is presented in **Table 6**. The operational and management measures implemented in CY2011 and CY2012 to protect the nests are summarized in **Tables 8** and **9**. Related impacts to STA operations during WY2012 (which encompass two nesting periods, April–July 2011 and April 1–30, 2012) are reported in Chapter 5 of this volume under each individual STA section, respectively.

BURROWING OWLS

No burrowing owl nests were observed within the confines of any STAs during the 2011 or 2012 surveys.

BLACK-NECKED STILTS

SURVEY PROCEDURE

Standardized surveys were conducted according to the APP. Close coordination among scientists, water operators, field stations, and the USFWS biologists was maintained throughout the nesting season. Operational procedures related to water flow and levee and canal maintenance were implemented accordingly to reduce impacts to ground-nesting birds within the STAs. Although the abundance of stilt chicks was not measured, more than 100 black-necked stilt chicks were observed foraging near adult birds in several of the STAs during May–July 2011 and May–July 2012.

Per the APP, black-necked stilts were the focus of the surveys, as they are an abundant and conservative indicator species for ground-nesting birds in the STAs. Additionally, black-necked stilts nest directly on the ground, often close to the water's edge. Nest sites are vulnerable to any increase in water level, more so than other ground-nesting species that select sites farther upslope or in standing vegetation. Black-necked stilt nest surveys of treatment cells were performed from the levees (levee surveys) by experienced and trained District staff. Levee surveys represent a resourceful way to observe a large area and obtain useful information regarding the relative number of nests within a treatment cell. Three different types of levee surveys were implemented based on the type of information needed to make operational decisions:

1. Monthly – This type of survey was performed every 30 days from the start of the breeding season. All treatment cells were surveyed to provide baseline nesting information and the basis for operational decisions throughout the season.
2. Supplemental – This type of survey was performed on an ‘as needed basis’ depending on nesting and water conditions. Selected treatment cells were surveyed to provide information needed to make operational decisions.
3. Spot-check – This type of survey was performed on an ‘as needed basis’ depending on nesting and water conditions. Inspections were done on specific nest locations previously recorded; the numbers of nests in cells not surveyed are assumed to remain as previously observed.

Levee surveys were conducted using binoculars [16 x 50 millimeter (mm)] or a spotting scope (20-60 x 80 mm). A hand-held Global Positioning System unit provided latitude and longitude of observer location on the levee where nests were detected inside of a treatment cell. Distance from the observer to the nest(s) was measured with a rangefinder (6 X 216.0°). Information including coordinates of observer, number and distance of nests, observations, and observer initials were recorded in the field. After each survey was completed, data were sent to District staff for analysis and report generation. Reports were standardized for all STAs and used to inform agency staff of the location and number of nests by flow-way and treatment cell. Reports regarding black-necked stilt nest activity and locations and the resulting activity restrictions within the STAs were distributed to both District and USFWS staff.

2011 BLACK-NECKED STILT NESTING SURVEY RESULTS

The 2011 nesting season surveys began in mid-April, with the earliest nests observed on April 25, 2011 in STA-1E. Because few nests were observed during the April monthly surveys, the May monthly surveys were moved to the beginning of the month and were implemented between May 2 and 16, 2011. June monthly surveys were performed between June 2 and 23, 2011. Supplementary surveys were performed within all STA except STA-6 during late May because of the potential onset of the rainy season. In late June and early July, several spot check

surveys were performed within STA-1E, STA-1W, STA-2, and STA-3/4 to observe whether nesting had been completed in these STAs. The nesting season ended on July 11, 2011, when a spot check in STA-1E found no nesting stilts. This completion date is consistent with nesting patterns observed in previous years.

During the 2011 nesting season, a total of 339 nests were observed. Although this was greater than observations in 2010 (**Tables 1–6**), more black-necked stilt nesting was anticipated in 2011 due to the dry season conditions that occurred between April and July 2011. The highest number of nests observed in STA-3/4 (142 nests), followed by STA-1W (105 nests) (**Tables 1–5**).

There were two key factors that kept the number of nests observed lower than expected. First, water managers were able to keep many of the STA cells hydrated through much of the dry season by managing available water sources. This kept many of these cells inundated to a level such that fewer black-neck stilts were able to establish nests within these cells. Conversely, other STA cells became dry very early in the breeding season and were therefore less suitable nesting grounds for black-necked stilts. Once the rainy season initiated, the District was able to manage water levels and minimize the flooding of locations where nests were present.

2012 BLACK-NECKED STILT NESTING SURVEY RESULTS

The 2012 nesting season surveys began in mid-April, with the earliest nests observed on April 24, 2012, in STA-5/6. Because few nests were observed during the April monthly surveys, the May monthly surveys were moved to the middle of the month and were implemented between May 9 and 23, 2012. June monthly surveys were performed between June 6 and 29, 2012. Supplementary surveys were performed within STA-1E Cell 5 and STA-1W Cell 2B in response to vegetation management activities and heavy precipitation respectively. In June, two spot check surveys were performed within the STA-3/4 Periphyton Stormwater Treatment Area (PSTA) cell to observe whether nesting had been completed in this cell. The nesting season was complete on June 29, 2012, when a spot check in the STA-3/4 PSTA cell found no nesting stilts.

A summary of black-necked stilt nests counts for 2012 breeding season is presented in **Tables 1–5** for each individual STA. There were 33 black-necked stilt nests observed via levee surveys during the 2012 breeding season with the highest number of nests observed in STA-5/6 (15 nests), followed by STA-1E (9 nests). This was the smallest number of stilt nests observed during a nesting season during the period in which the APP has been implemented for Everglades STAs (**Table 6**). There were two hydrologic events that occurred in most STA cells that likely explain the low number of stilt nests observed during 2012. Prior to the start of the black-necked stilt nesting season water managers were able to keep many of the Everglades STA cells hydrated by managing available water sources. Additionally, the rainy season began in early May. These two events combined kept many of these cells inundated to a level that few black-neck stilts were able find exposed ground on which to establish nests within Everglades STAs. Once the rainy season initiated, the District was able to manage water levels and minimize the flooding of locations where nests were present.

MODIFICATION OF OPERATIONAL PROCEDURES AND LEVEE AND CANAL MAINTENANCE

Adjustments to operational and mechanical procedures were developed in accordance with the APP to reduce impacts to ground-nesting birds within the STAs. Flow was prioritized in areas that did not have nests. Mowing and grading schedules at affected areas, as part of levee and canal maintenance, were adjusted to occur outside of the black-necked stilt nesting season at locations where nesting was observed. Additionally, bean-bag markers were used to mark nests that could potentially be impacted by vehicle traffic.

While the mowing schedule within the STAs was modified based mostly on the black-necked stilts' nesting season, it also includes other protected ground-nesting migratory bird species including killdeer (*Charadrius vociferous*), common nighthawks (*Chordeiles minor*), and least terns (*Sternula antillarum*). Several dozen protected ground-nesting birds were observed nesting on STA levee roads and staging areas between April and July 2012. Black-necked stilts, killdeers, common nighthawks, and least terns have similar incubation periods ranging between 18 to 25 days (Robinson et al., 1999; Jackson and Jackson, 2000; Thompson et al., 1997; Poulin et al., 1996). While black-necked stilts and killdeer have normally completed their nesting activities in the Everglades STAs by early July, common nighthawks and least terns can nest into mid-August. Nesting impacts to STA operations during 2011 and 2012 nesting seasons are summarized in **Table 8**, and impacts to maintenance within and around the STAs are found in **Table 9**.

EVERGLADE SNAIL KITE NESTING SURVEYS

Everglade snail kites were first spotted over STA-5 and STA-3/4 demonstrating nesting behavior in late March 2010. On April 12, 2010 the District was informed by USFWS that seven snail kite nests had been discovered by the University of Florida snail kite survey crew (Kitchens 2010). This crew was contracted by the Army Corps of Engineers to perform snail kite nesting surveys throughout the state of Florida. Kite nesting activity in STA-5 from April–July 2010 was reported in the 2011 SFER (Germain and Pietro, 2011). Nesting by Everglade snail kites continued in STA-5 until October 2010.

2011 NESTING SEASON (APRIL-JULY 2011)

In January 2011, the University of Florida snail kite crew began reporting dozens of snail kites flying over STA-5 and STA-3/4 (Kitchens, 2011). During 2011, there were no nests established in STA-5 and only one nest was established in STA-3/4. The single nest in STA-3/4 Cell 1A (**Figure 1**) was first reported on May 3, 2011. The nest was determined to have failed on May 29, 2011. STA-5 and STA-3/4 were likely too dry to support successful snail kite nesting due to drought conditions during CY2011. There were no reports of STA operations impacting the success of any Everglade snail kite nests during 2011.

2012 NESTING SEASON (APRIL-JULY 2012)

The UF snail kite team conducted snail kite nesting surveys within the Everglades STAs between January and June 2012 (Kitchens, 2012). During the 2012 snail kite nesting season there was one nest established in STA-5. The single nest, located within STA-5 Cell 2A (**Figure 2**), was first reported on April 17, 2012. At this time, it was determined that the nest had already successfully fledged three snail kite chicks and was there were no operational modifications that were necessary. On April 8, a birding tour operated by the Hendry County Audubon Society reported a potential snail kite nest within the southeastern corner of STA-5 Cell 2B. Their report was passed on the University of Florida snail kite team and USFWS. The District discussed the potential nest with USFWS and guidance was established to keep water levels in this cell at 13-ft until the presence of the snail kite nest could be confirmed. The snail kite crew checked this potential nest site during surveys on April 17 and May 7, 2012, but they did not locate a snail kite nest. After the snail kite crew's second attempt to find this potential nest, the District discussed the guidance with the USFWS to hold water levels at 13 ft in this cell. It was agreed that this guidance was no longer necessary and was discontinued on May 10, 2012. Additionally, five snail kites were initially observed over STA-1E during the CY2012 nesting season; however, no nests were established in this STA. There were also no nests established in STA-3/4 during CY2012 nesting season. Overall, there were no reports of STA operations impacting the success of any Everglade snail kite nests during CY2012.

LITERATURE CITED

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Table 1. Summary of black-necked stilt nest counts in STA-1E during 2011 and 2012 nesting seasons.
[Note: Values represent nest count inside treatment cells as observed from the cell levees.]

Flow-way	Cell	Monthly	Monthly	Supple- mentary	Monthly	Supple- mentary	Supple- mentary	Spot Check	Spot Check	Spot Check	Monthly	Supple- mentary	Monthly	Monthly
		4/25/11	5/4/11	5/18/11	6/6/11	6/15/11	6/21/11	6/28/11	7/5/11	7/11/11	4/20/12	4/26/12	5/11/12	6/11/12
Eastern	1	1	3	0	0	NS	0	NS	NS	NS	0	NS	0	0
	2	0	0	0	0	NS	0	NS	NS	NS	0	NS	0	0
	PSTA	0	0	0	1	NS	1	0	NS	NS	0	NS	0	0
Central	3	0	0	1	0	0	0	NS	NS	NS	0	NS	0	0
	4N	0	0	0	0	0	0	NS	NS	NS	0	NS	0	0
	4S	0	9	1	1	0	0	NS	NS	NS	0	NS	0	0
Western	5	0	0	0	0	NS	0	NS	NS	NS	0	5	9	0
	6	0	1	0	1	NS	0	NS	NS	NS	0	NS	0	0
	7	0	0	0	0	NS	0	NS	NS	NS	0	NS	0	0
Distribution Cells	Eastern	3	14	14	4	0	0	NS	NS	NS	0	NS	0	0
	Western	0	0	0	1	2	4	5	4	0	0	NS	0	0
Total Counts		4	27	16	9	2	5	5	4	0	0	5	9	0

NS – not surveyed

Table 2. Summary of black-necked stilt nest counts in STA-1W during 2011 and 2012 nesting seasons.
 [Note: Values represent nest count inside treatment cells as observed from the cell levees.]

Flow-way	Cell	Monthly	Monthly	Supple- mentary	Monthly	Spot Check	Spot Check	Monthly	Monthly	Supplementary	Monthly
		4/21/11	5/09/11	5/25/11	6/14/11	6/28/11	7/5/11	4/20/12	5/15/12	5/23/12	6/6/12
Eastern	1A	0	0	0	0	NS	NS	0	0	NS	0
	1B	0	0	0	0	NS	NS	0	0	NS	0
	3	0	0	0	0	NS	NS	0	0	NS	0
Western	2A	0	0	0	0	NS	NS	0	0	NS	0
	2B	0	78	17	16	2	0	0	5	0	0
	4	0	8	0	0	NS	NS	0	0	NS	0
Northern	5A	0	0	0	0	NS	NS	0	0	NS	0
	5B	0	0	0	0	NS	NS	0	0	NS	0
Total Counts		0	86	17	16	2	0	0	5	0	0

NS – not surveyed

Table 3. Summary of black-necked stilt nest counts in STA-2 during 2011 and 2012 nesting seasons.
 [Note: Values represent nest count inside treatment cells as observed from the cell levees.]

Cell	Cell	Monthly	Supple- mentary	Monthly	Monthly	Spot Check	Monthly	Monthly	Monthly
	4/14/11	5/2/11	5/20/11	6/13/11	6/14/11	7/6/11	4/18/12	5/9/12	6/18/12
1	0	0	0	0	NS	NS	0	0	0
2	0	0	0	0	NS	NS	0	0	0
3	0	0	0	0	NS	NS	0	0	0
4*	0	12	20	11	NS	0	0	0	0
5*	NS	NS	0	NS	0	NS	0	0	0
6*	NS	NS	2	NS	0	NS	0	0	0
7*	NS	NS	NS	NS	0	NS	0	0	0
8*	NS	NS	NS	NS	0	NS	0	0	0
Total Counts	0	12	20	11	0	0	0	0	0

NS – not surveyed

* = New Compartment B cells were offline during APP survey period

Table 4. Summary of black-necked stilt nest counts in STA-3/4 during 2011 and 2012 nesting seasons.
 [Note: Values represent nest count inside treatment cells as observed from the cell levees.]

Flow-way	Cell	Monthly	Monthly	Supple- mentary	Monthly	Spot Check	Monthly	Monthly	Monthly	Spot Check	Spot Check
		4/13/11	5/13/11	5/27/11	6/16/11	7/6/11	4/26/12	5/14/12	6/7/12	6/19/12	6/29/12
Eastern	1A	0	17	0	0	NS	0	0	0	NS	NS
	1B	0	1	1	0	NS	0	0	0	NS	NS
Central	2A	0	0	0	0	NS	0	0	0	NS	NS
	2B	0	1	0	8	0	0	0	0	NS	NS
PSTA	USAV	0	61	NS	0	NS	0	0	0	NS	NS
	LSAV	0	34	NS	0	NS	0	0	0	NS	NS
	PSTA	0	0	NS	0	NS	0	1	3	2	0
Western	3A	0	0	0	0	NS	0	0	0	NS	NS
	3B	0	8	11	1	0	0	0	0	NS	NS
Total Counts		0	122	12	9	0	0	1	3	2	0

NS – not surveyed

Table 5. Summary of black-necked stilt nest counts in STA-5/6 during 2011 and 2012 nesting seasons.
 [Note: Values represent nest count inside treatment cells as observed from the cell levees.]

Flow-way	Cell	Monthly	Monthly	Monthly	Monthly	Supple- mentary	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	
		4/11/11	4/12/11	5/5/11	5/16/11	5/31/11	6/2/11	6/23/11	4/24/12	4/25/12	5/16/12	5/21/12	6/18/12	6/22/12	6/29/12
Flow-way 1	STA-5 1A	NS	0	NS	2	0	NS	0	NS	0	NS	0	NS	0	NS
	STA-5 1B	NS	0	NS	0	0	NS	0	NS	0	NS	0	NS	0	NS
Flow-way 2	STA-5 2A	NS	0	NS	0	0	NS	0	NS	0	NS	0	NS	0	NS
	STA-5 2B	NS	0	NS	5	1	NS	0	NS	0	NS	0	NS	0	NS
Flow-way 3	STA-5 3A	NS	0	NS	2	0	NS	0	NS	0	NS	0	NS	0	NS
	STA-5 3B	NS	0	NS	0	0	NS	0	NS	0	NS	0	NS	0	NS
Flow-way 4	STA-5 4A*	NS	NS	NS	NS	NS	NS	NS	0	NS	1	NS	NS	NS	0
	STA-5 4B*	NS	NS	NS	NS	NS	NS	NS	0	NS	2	NS	NS	NS	0
Flow-way 5	STA-5 5A*	NS	NS	NS	NS	NS	NS	NS	1	NS	0	NS	NS	NS	0
	STA-5 5B*	NS	NS	NS	NS	NS	NS	NS	2	NS	1	NS	NS	NS	0
Flow-way 6	STA-6 Cell4*	NS	NS	NS	NS	NS	NS	NS	0	NS	7	NS	0	NS	NS
	STA-6 Section 2*	0	NS	1	NS	NS	0	NS	1	NS	0	NS	0	NS	NS
Flow-way 7	STA-6 Cell 5	0	NS	0	NS	NS	0	NS	0	NS	0	NS	0	NS	NS
Flow-way 8	STA-6 Cell 3	0	NS	0	NS	NS	0	NS	0	NS	0	NS	0	NS	NS
Total Counts		0	0	1	9	1	0	0	4	0	11	0	0	0	0

NS- not surveyed

* = New Compartment C cells were offline during APP survey period

Table 6. Summary of black-necked stilt nesting in the STAs from 2006 to 2012.

STA	2006	2007	2008	2009	2010	2011	2012
1E	186	102	69	102	150	42	9
1W	49	236	26	360	19	105	5
2	0	74	16	237	29	39	0
3/4	5	55	7	69	15	142	4
5/6	122	147	73	105	14	11	15
TOTAL	362	614	191	873	227	339	33

Sources: Pietro et al. (2007, 2008, 2009, 2010); Germain & Pietro (2011) ; Ivanoff et al. (2012)

Table 7. General strategies implemented for all STAs during the 2011 and 2012 ground-nesting migratory bird breeding season.

STA	Type of Action	Date Implemented	Strategies Implemented to Reduce Impact on Ground Nesters
All	Operational	Throughout Breeding Season	Utilized flow-ways that were not impacted with black-necked stilt nests to reduce phosphorus in stormwater runoff.
All	Maintenance	Throughout Breeding Season	Modified mowing and grading schedule to reduce impacts to ground nesters and young on levee roads and embankments.

Table 8. Summary of impacts of migratory bird and apple snail kite nesting to STA operation during the 2012 ground-nesting migratory bird breeding season.

Location	Species	Survey Date	# of Nests	Impact to Operations	Affected Time Period
STA-1E Western Distribution Cell	Black- necked Stilts	06/06/2011	5	No flows to WDC during the affected time period; flow to WDC resumed when all eggs were either hatched or flooded by rising water solely caused by rainfall.	06/06/2011 – 07/11/2011
STA-1W Cell 2B	Black- necked Stilts	06/26/2011	2	No flows through western flow-way during the affected time period; flow restriction was lifted when all eggs were either hatched or flooded by rising water solely caused by rainfall.	06/26/2011 – 07/05/2011
STA-3/4 Cells 2B and 3B	Black- necked Stilts	06/26/2011	8 (Cell 2B) 1 (Cell 3B)	Avoided flows through Central and Western Flow-ways during the affected time period; flow restriction was lifted when all eggs were either hatched or flooded by rising water solely caused by rainfall.	06/26/2011 – 07/06/2011
STA-3/4 PSTA Cell	Black- necked Stilts	05/14/2012	4 Nests	Stage was maintained at <11.13 ft to protect the nests.	05/14/2012 – 06/29/2012
STA-1W Cell 2B	Black- necked Stilts	05/15/2012	5 Nests	Stage was maintained at < 11.35-ft to protect the nests.	05/15/2012 – 05/23/2012
STA-5 Cell 2B	Apple Snail Kite	04/08/2012	1 Unconfirmed Nest	Unconfirmed snail kite nest in STA-5 Cell 2B was reported by the Hendry County Audubon Society birding tour group. Stage was maintained at 13.0 ft during the affected period to protect the nest.	04/08/2012 – 05/10/2012

Table 9. Summary of impacts of migratory bird nesting to STA facility maintenance and construction during the 2012 ground-nesting migratory bird breeding season.

Location	Species	Survey Date	# of Nests	Impact to Operations	Affected Time Period
STA-2 Cell 2 South Levee Road	Killdeer	05/24/2011	1	One ground nest was marked with bean bags and reported to District staff. Mowers avoided area until nesting was completed in mid-June 2011.	05/24/2011 to end of nesting period
North & South Levee Roads of STA-1W Cell 2B	Black-necked Stilts	05/25/2011	12	Nests were marked with bean bags and reported to District staff. Mowers avoided area until nesting was completed in early July 2011.	05/25/2011 to end of nesting period
Levee Road near the G-370 Pump Station in STA-3/4	Killdeer	06/17/2011	1	Nest was marked with bean bags and reported to District staff. Mowers avoided area until nesting was completed in early July 2011.	06/17/2011 to end of nesting period
Compartment C Construction Area	Killdeer and Common Nighthawk	05/05/2011	2 (one killdeer and one common nighthawk)	Area was marked and District staff was notified about presence of these nests. Construction activities were avoided the area until all eggs were hatched and chicks moved out of the area.	05/05/2011 to end of nesting period
	(1) ground-nesting common nighthawk	07/12/2011		Nests were marked on levee road near G-343 structure in Compartment B construction area.	07/12/2011
STA-5 Cell 2B	Apple Snail Kite	04/08/2012	1 Unconfirmed Nest	Unconfirmed nest was reported by the Hendry County Audubon Society. Aside from stage maintenance, activities within 500 m of the reported nest (Figure 1) were restricted during the affected period to protect the nest.	04/08/12– 05/10/2012

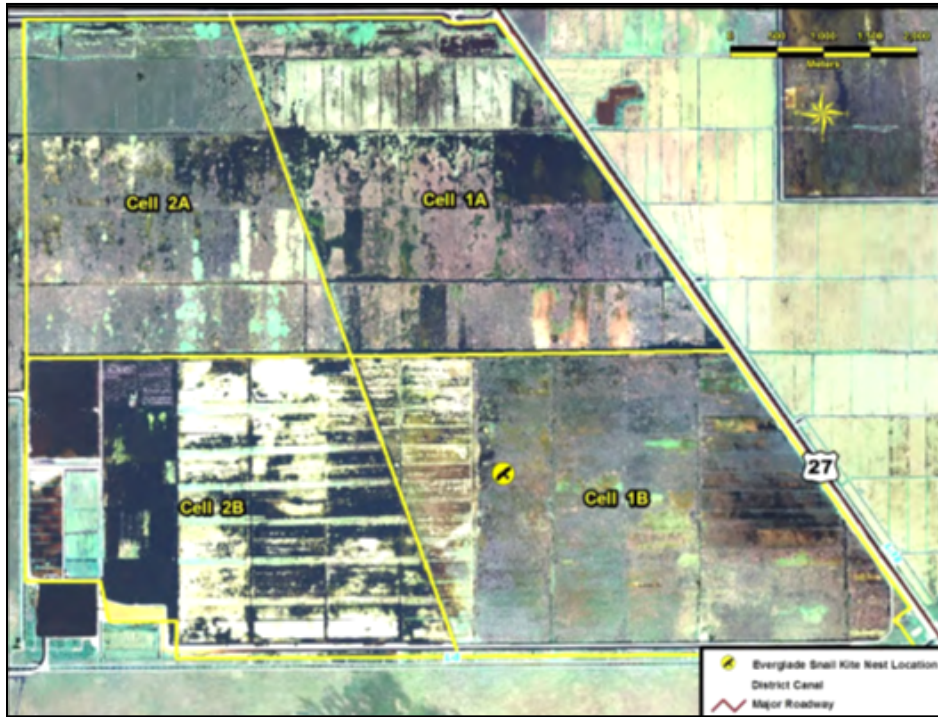


Figure 1. Location of one Everglade snail kite nest identified in STA-3/4 during 2011.



Figure 2. General location of one unconfirmed Everglade snail kite nest in STA-5 during the 2012 nesting period.