SOUTH FLORIDA WADING BIRD REPORT

Volume 16 Mark I. Cook and Mac Kobza, Editors December 2010

SYSTEM-WIDE SUMMARY

Hydrology

Stages were generally above average for most regions of the Greater Everglades through the 2009 wet season and prior to the start of the 2010 dry season (November 2009). Subsequent dry conditions resulted in relatively rapid dry-season recessions for the initial two months of the dry season, providing appropriate pre-breeding foraging conditions. From January through March a series of cold fronts produced freezing weather, large rain events and associated water level reversals, resulting in higher stages than average and generally poor foraging conditions for the remainder of the breeding season.

Nest Numbers

The estimated system-wide total number of wading bird nests in South Florida in 2010 was approximately 21,885. This is a 72% decrease relative to the 77,505 nests of 2009, which was the best nesting year on record in South Florida since the 1940s, and 52% less than the average of the last ten years. All species of wading birds suffered significantly reduced nest numbers relative to the past ten years. Wood stork nesting started relatively early but was very much reduced (81%) relative to the record number of nests in 2009 and most colonies eventually failed. White Ibis numbers were 79% of last year and 62% of the past ten years. Roseate spoonbill nest numbers were the lowest since records began. 2010 had few wading bird nests relative to both the past ten years and to pre-drainage years.

The majority of wading bird nesting in south Florida occurs in the Greater Everglades, and the 2010 breeding season was no exception; an estimated 19,875 nests (91% of all south Florida nests) were initiated in the Water Conservation Areas (WCAs) and Everglades National Park (ENP). This estimate is 72% lower than 2009 when a record high of 73,096 nests was recorded, and 52% lower than the average of the past ten years. Most other regions of south Florida also experienced reduced nesting effort. Of note is Corkscrew Swamp Sanctuary where wood storks have failed to breed in three of the past four years.

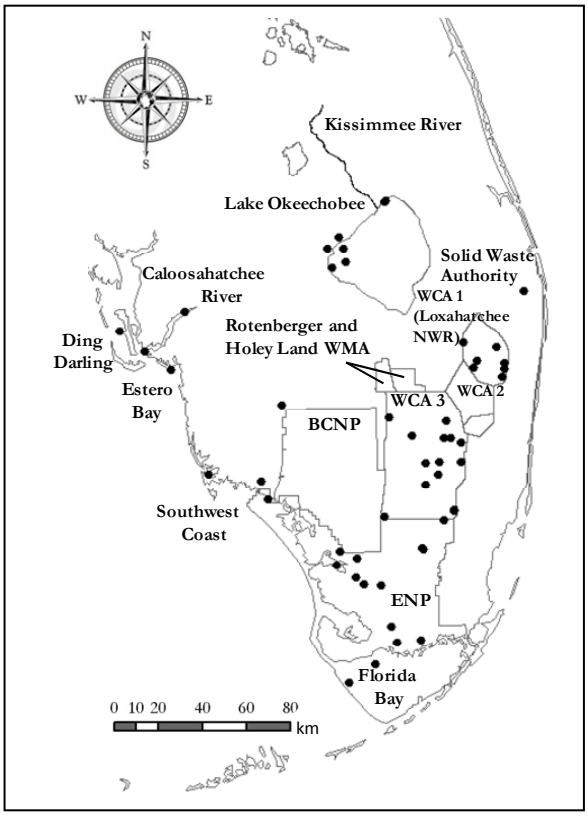
INSIDE THIS ISSUE

Spatial coverage of system-wide nest surveys was recently expanded to include Lake Okeechobee and Kissimmee River floodplain in 2005, and Estero Bay Aquatic Preserve in 2008. On Lake Okeechobee, wading bird nesting effort was relatively high in 2010, with the seventh highest nest count (6,737) since aerial surveys started in 1957. While this was less than the 8,169 nests of last year, it is a marked improvement on 2008 when only 39 nests were recorded around the lake. Wading birds are not yet nesting in significant numbers on the recently restored section of the Kissimmee River floodplain, and this year only 103 nests were recorded. Nesting effort is not expected to increase until hydrologic conditions have been fully restored. Note that for comparative purposes with prior years nest counts for these three regions are not included in the above system-wide total.

Nesting Locations in the Everglades

ENP historically supported the largest number of nests in the Greater Everglades system, but in recent decades most nesting has occurred in the WCAs. A CERP goal is to restore the

Locations of wading bird colonies with ≥ 50 nests in South Florida, 2010.



hydrologic conditions that will re-establish prey densities and concentrations across the landscape that will, in turn, support the return of large successful wading bird colonies to the traditional estuarine rookeries downstream of Shark Slough. In 2010, ENP supported the most nests (37%) followed by WCA-1 (34%), while WCA-3 supported the lowest number of nests (29%). This spatial distribution of nests contrasts with the general pattern over the past decade when either WCA-1 or WCA-3A held the greatest proportion of nests in the Everglades, while ENP was relatively unattractive for nesting (an average of 10% of nests over the past decade). ENP appears to be becoming relatively more attractive to nesting birds in recent years, with the proportion of nests increasing to 20% and 21% in 2006 and 2009, respectively, and then jumping to almost 40% in 2010. The cause of this increase is unclear and it may be due to a temporary decline in nesting conditions in the WCAs rather than an improvement in habitat conditions along the marsh-mangrove ecotone. Wood stork nesting in the Everglades in 2010 was restricted only to colonies in ENP which contrasts with last year when approximately one-third of storks nested in the WCAs.

Nest Success in the Everglades

Nest success varied considerably by species with early nesting species such as wood storks, spoonbills, and great egrets faring particularly poorly. Wood storks initiated nesting relatively early in 2010 (January), possibly as a result of the rapid recession rates in most areas from October through December 2009, but all nests subsequently failed. The unusually high rainfall and persistent cold temperatures from January through March were likely responsible for these abandonments. Both rainfall and cold temperatures are known to limit the availability of aquatic prey, which likely had a strong influence on nest success, but the direct effects of climatic conditions on the adults of this tropically distributed species may have also played an important role. Later nesting egrets, herons, and ibises were relatively more successful at rearing young, and from a sample of 90 nests (mixed species) in WCA-3A, approximately 75 % of nests produced at least one fledgling per nest. The later-nesting species were more successful probably because they avoided the majority of the reversals and cold weather. Recession rates in WY2010 were largely classified as 'poor' and stages were generally too deep in the WCAs for effective wading bird foraging. More suitable hydrologic conditions in the ENP during the course of the 2010 nesting season likely contributed to the increase in the number of nests and nest success of this region relative to WCA-3A and WCA-1.

Wading Bird Abundance

Systematic Reconnaissance Flight surveys revealed that ENP supported very large numbers of foraging birds throughout the 2010 nesting season. Indeed, counts in 2010 were considerably higher than those during the record breaking nesting year of 2009. By contrast, foraging in the WCAs appeared to be much lower than average. The large abundances of foraging wading birds in ENP may be related to colder weather or inappropriate hydrologic conditions at more northern foraging locations.

CERP Targets

Three of the four species groups met the numeric nesting targets proposed by the South Florida Ecosystem Restoration Task Force. Two other targets for the Everglades restoration are an increase in the number of nesting wading birds in the coastal Everglades and a shift in the timing of wood stork nesting to earlier in the breeding season (Ogden, 1994). The 2010 nesting year did show an improvement in the timing of wood stork nesting and a general shift of colony locations to the coast.

Mark I. Cook
Mac Kobza
Everglades Division
South Florida Water Management District
3301 Gun Club Road, West Palm Beach, FL 33406
561-686-8800 ext. 4539
mcook@sfwmd.gov
rkobza@sfwmd.gov

Literature Cited

Chick, J.H., C.R. Ruetz III, J.C. Trexler. 2004. Spatial scale and abundance patterns of large fish communities in the freshwater marshes of the Florida Everglades. Wetlands 24(3): 652-664.

Dorn, N.J. 2008. Colonization and reproduction of large macroinvertebrates are enhanced by drought-related fish reductions. Hydrobiologia 605: 209-218.

Frederick, P.C. and J.C. Ogden 2001. Pulsed breeding of long-legged wading birds and the importance of infrequent severe drought conditions in the Florida Everglades. Wetlands 21(4): 484-491.

Ogden, J.C. 1994. Status of Wading Bird Recovery. D.E. Gawlik, ed. In: *South Florida Wading Bird Report. Vol. 3*, South Florida Water Management District, West Palm Beach, FL.

ABBREVIATIONS

Species: Great Egret (GREG), Snowy Egret (SNEG), Reddish Egret (REEG), Cattle Egret (CAEG), Great Blue Heron (GBHE), Great White Heron (GWHE), Little Blue Heron (LBHE), Tricolored Heron (TRHE), Green Heron (GRHE), Black-crowned Night-Heron (BCNH), Yellow-crowned Night-Heron (YCNH), Roseate Spoonbill (ROSP), Wood Stork (WOST), White Ibis (WHIB), Glossy Ibis (GLIB), Anhinga (ANHI), Double-crested Cormorant (DCCO), Brown Pelican (BRPE), Osprey (OSPR), Bald Eagle (BAEA), Magnificent Frigatebird (MAFR), Fish Crow (FICR), small dark herons (SML DRK), and small white herons (SML WHT).

Regions, Agencies, and Miscellaneous: Water Conservation Area (WCA), Everglades National Park (ENP), Wildlife Management Area (WMA), A.R.M. Loxahatchee National Wildlife Refuge (LNWR), Lake Worth Drainage District (LWDD), Solid Waste Authority (SWA), South Florida Water Management District (SFWMD), U.S. Army Corp of Engineers (USACOE), Systematic Reconnaissance Flights (SRF), Comprehensive Everglades Restoration Plan (CERP), and Natural Systems Model (NSM).

HYDROLOGIC PATTERNS FOR WATER YEAR 2010

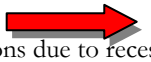
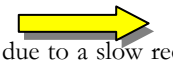
The amount of rain in the Everglades Protection Area (EPA) for Water Year 2010 (WY2010) (May 1, 2009 through April 30, 2010) was substantially more than last year and significantly different, in terms of seasonality, from the 15-year average. This year (WY2010) rainfall amounts also varied little from region to region as shown in **Table 1** below. In Everglades National Park (ENP or Park), the rainfall was 5.3 inches more (9.6 percent) than the historical average and 17.9 inches more (32.4 percent) than last year. In Water Conservation Area (WCA) 3, the rainfall was 9.2 inches more (9.6 percent) than the historical average and 16.3 inches more (36.8 percent) than last year. In Water Conservation Area (WCA) 1 and 2, the rainfall was 13.6 inches more (26.3 percent) than the historical average and 18.2 inches more (38.4 percent) than last year.

As one would expect from these above average precipitation values, regional water depths were also above average. The average depth in the ENP for WY2010 was 1.1 feet (ft), which was 0.2 foot above the historical average, but interestingly was 0.1 foot less than last year. This may be due to the fact that the total inflows from structures into the ENP was 32,000 ac-ft less than last year but the difference most likely due to residual impacts from WY2009 and the very low stages at the beginning of WY2010. The average depth in WCA-3 for WY2010 was 1.7 ft, which was 0.4 foot above the historical average, but again interestingly, was 0.4 foot less than last year. In this case, the evapotranspiration for WCA-3 were essential the same in WY2009 as in WY2010, and total inflows were 259,000 ac-ft more than last year. This difference is clearly due to the very low stages at the beginning of WY2010 relative to WY2009. The average depth in WCA-2 for WY2010 was 1.1 ft, which was 0.2 foot above the historical average, and greater than last year. The average depth in WCA-1 for WY2010 was 1.2 ft, which was 0.7 foot above the historical average, and greater than last year.

The greatest difference between WY2010 and WY2009 can be found by looking at the month of May in 2009 (**Table 2**) and the dry season recession rates (**Figures 1a** - **g**). May is mentioned here because of its tremendous deviation from the norm and its significance to the fledging of wading birds at the end of the 2009 nesting season. **Table 2** summarizes the statistics for rainfall just in May for the last 46–77 years. Notice that May is typically a transition month (from the dry to wet season) and has a very high mean range. Despite this deviation, or maybe because of it, May 2009 had one of the highest precipitation rates of any May on record for the WCA's and tied the overall record for the entire District.

The following hydropattern figures highlight the average stage changes in each of the WCAs for the last two years in relation to the recent historic averages, flooding tolerances for tree islands, drought tolerances for wetland peat and recession rates and depths that support both nesting initiation and foraging success by wading birds. These indices were used by the District to facilitate weekly operational discussions and decisions. Tree island flooding tolerances are considered exceeded when depths on the islands are greater than 1 foot for more than 120 days (Wu et al., 2002). Drought tolerances are considered exceeded when water levels are greater than 1 foot below ground for more than 30 days, i.e., the criteria for Minimum Flows and Levels (MFLs) in the Everglades (SFWMD, 2003).

Figures 1a through **g** show the ground elevations in the WCAs as being essentially the same as the threshold for peat conservation. The wading bird nesting period is divided into three categories based upon foraging observations in the Everglades (Gawlik, 2002).

- A red label  indicates poor conditions due to recession rates that are too fast (greater than 0.6 foot per week) or too slow (less than 0.04 foot for more than two weeks), or when the average depth change for the week is positive rather than negative.
- A yellow label  indicates fair conditions due to a slow recession rate of 0.04 foot for a week or a rapid recession between 0.17 foot and 0.6 foot per week.
- A green/good label  is assigned when water depth decreased between 0.05 foot and 0.16 foot per week.

Although these labels are not indicative of an appropriate depth for foraging, they have been useful during high water conditions to highlight recession rates that can lead to good foraging depths toward the end of the dry season (i.e., April and May).

WATER CONSERVATION AREA 1

Water Year 2010 started with the second wettest May in the history of SFWMD, but less so for WCA-1 than anywhere else. On May 1, 2009, there was still about 4 inches of water across the impoundment (**Figure 1a**). After an exceptionally smooth and steady recession rate from November 2008 until May 2009 that fostered record-breaking nesting and foraging by wading birds in WCA-1, water levels rose about one foot over a two month period; not an extreme rehydration rate, but just enough to bring the 2009 wading bird nesting season to an end. Water depths in WCA-1 continued to rise during the wet season and reached a peak of around 2.0 ft in October 2009 and never posed a flooding problem for tree islands.

The water level changes during the WY2010 dry season and wading bird nesting season was almost a perfect opposite to that in WY2009. At first, recession rates were excellent and it appeared that there could be a hydrologic pattern in support of early nesting by Wood Storks (*Mycteria americana*), a goal of CERP restoration. However, in late December there was a rapid water level rise to average conditions, where levels hovered for almost four months. Recession rates in support of wading bird foraging started up again around April, but depths stayed more than one foot for the rest of the dry season; not an optimum situation for short-legged wading birds. WCA-1 has had the longest duration of good nesting and foraging of any region in the EPA for the previous four years. For WY2010, hydrological conditions were merely marginal everywhere in the Everglades, including WCA-1.

WATER CONSERVATION AREA 2A AND 2B

For the last four years in WCA-2A, the stage levels during the wet season have exceeded the upper flood tolerance for tree islands for one to two months, which is not considered enough time to cause any tree island damage (Wu et al., 2002). This year, despite a huge water level increase of almost 4.0 ft during the months of May to July, water levels did not exceed upper flood tolerance for tree islands for even a day (**Figure 1b**). WCA-2A and 2B continue to be the most hydrologically "flashing" regions in the entire EPA. Future efforts to restore WCA-2A tree islands will require a closer examination (i.e., frequency analysis) to see if this kind of hydropattern can enhance the return of woody species to these marshes.

Wading birds frequently use WCA-2B during droughts because it tends to stay deeper for longer periods than the rest of the EPA. This was particularly true in WY2006 when dry season water levels went below ground in WCA-2A and the wading birds moved to WCA-2B. Last year, large flocks of wading birds were observed foraging in WCA-2B in April and May because recession rates were excellent and depths were near optimum. This year, like everywhere else, May rainfall was remarkable; stage readings at Site-99 went from 7.1 ft to 10.6 ft in two months **(Figure 1c)**. Water depths stayed above three ft for almost the entire dry season and as a result, very few wading birds were observed foraging in WCA-2B in WY2010.

Table 1. Average, minimum, and maximum stage [feet National Geodetic Vertical Datum (ft NGVD)] and total annual rainfall (inches) for Water Year 2010 (WY2010) in comparison to historic stage and rainfall (See Chapter 2 of this volume for a more detailed description of rain, stage, inflows, outflows, and historic databases). Average depths were calculated by subtracting elevation from stage.

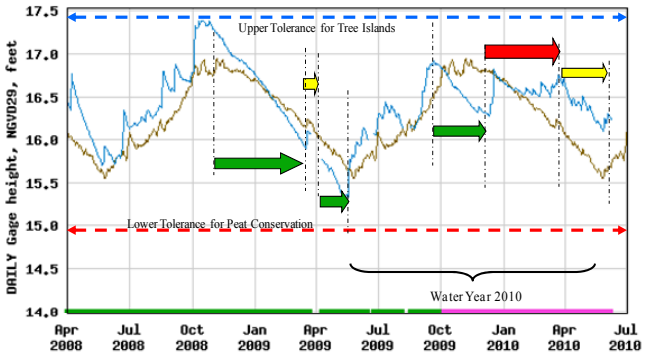
Area	WY2010 Rainfall	Historic Rainfall	WY2010 Stage Mean (min; max)	Historic Stage Mean (min; max)	Elevation
WCA-1	65.6	51.96	16.33 (13.81; 16.99)	15.63 (10.0; 18.16)	15.1
WCA-2	65.6	51.96	12.32 (9.45; 13.56)	12.53 (9.33; 15.64)	11.2
WCA-3	60.6	51.37	9.90 (5.83; 11.06)	9.55 (4.78; 12.79)	8.2
ENP	60.5	55.22	6.15 (4.19; 6.85)	5.99 (2.01; 8.08)	5.1

Table 2. Average, minimum, and maximum total monthly rainfall (inches) for the Everglades Protection Area in comparison to May 2009. (Ali et al., 1999; MacVicar, 1983)

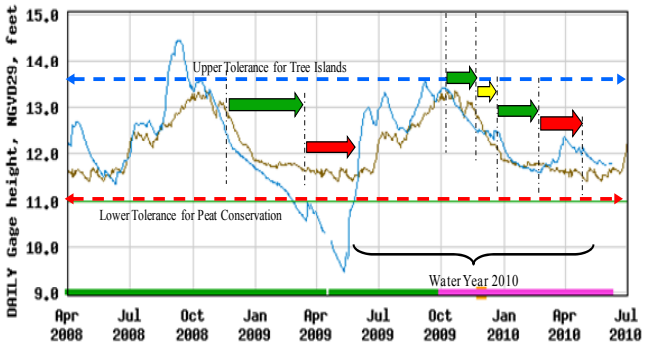
Area	May 2009 Rainfall	Average May Rainfall	Historic May Rainfall (min; max)	Historic Period for min and max (n)
WCA-1&2	9.15"	5.22"	(0.38"; 14.60")	1957-2009
WCA-3	9.00"	5.25"	(0.94"; 10.90")	1963-2009
Entire SFWMD	9.04"	4.66"	(1.26"; 9.04")	1932-2009

Figure 1. Hydrology in the WCAs and ENP in relation to recent average water depths (A: 14yr ave, B: 14 yr ave, C: 15 yr ave, D: 15 yr ave, E: 15 yr ave, F: 12 yr ave, G: 25 yr ave) and indices for tree islands, peat conservation, and wading bird foraging depths.

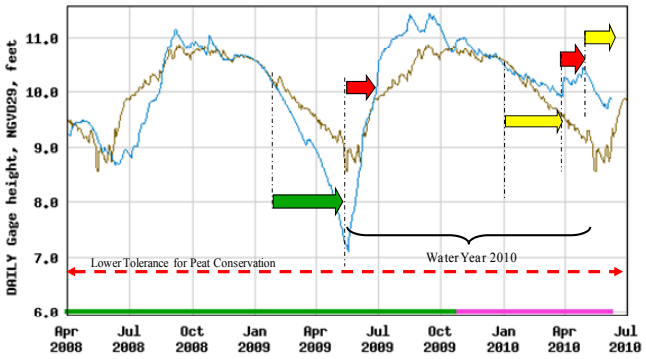
A WCA 1 – Site 9



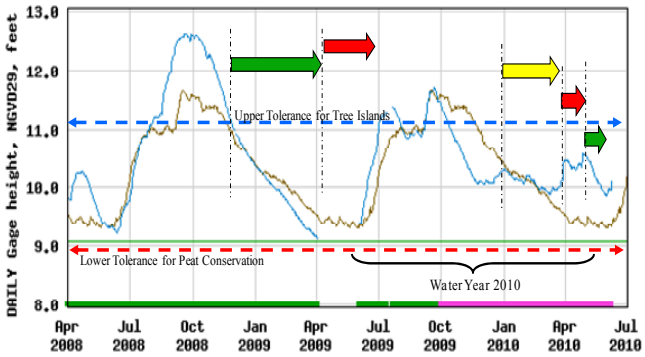
B WCA 2A – Site 17



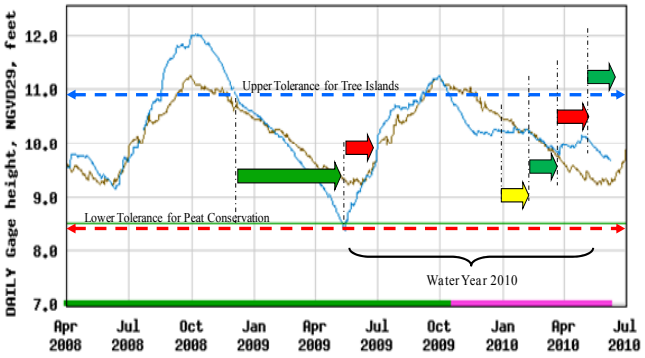
C WCA 2B – Site 99



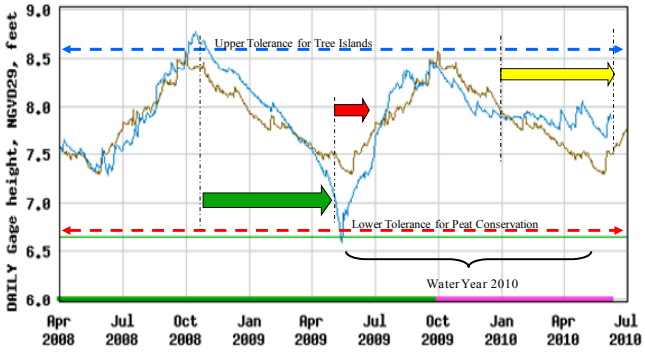
D WCA 3A – Site 63



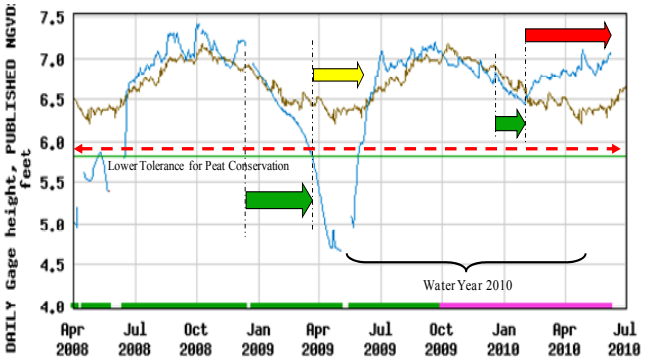
E WCA 3A – Site 64

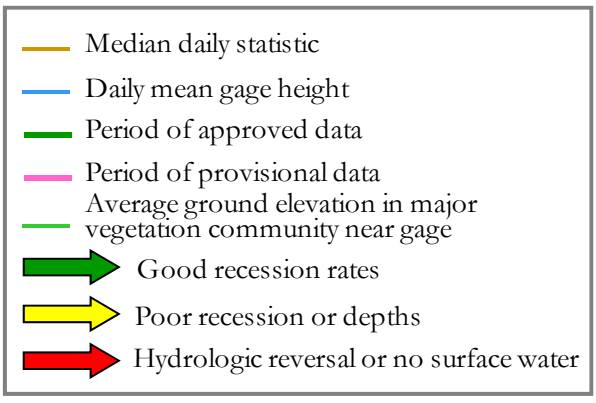


F WCA 3B – Site 71



G NE Shark River Slough





WATER CONSERVATION AREA 3A

In the northeastern region of WCA-3A (gauge 63) the WY09 began relatively well in June 2008 with steady rehydration rates and a long wet season with a hydroperiod capable of rejuvenating the prey base for the region's large wading bird rookery (Alley North) where annual nesting during the past decade has frequently exceeded 20,000 nests. Optimum recession rates in this important northeast section of WCA-3A began around December 2008 and continued uninterrupted until water levels went below ground in April 2009. Soil moisture during the month of April got critically low and posed a muck fire threat to the Alley North colony. Fortunately, there were no muck fires and the May downpours of rain very quickly removed the fire hazard in the region. After the May downpours, water levels exceeded tree island tolerances for two short periods and then in October began to decline, but too steeply to support wading bird foraging **(Figure 1d)**. By December, there was a reversal, followed by no recession, followed by another reversal, which combined marked a four-month period of very poor wading bird foraging habitat.

The hydrologic pattern last year in Central WCA-3A (gauge 64) was extremely conducive for wading bird foraging. Good recession rates that supported maximum foraging behavior and nesting lasted for a full five months beginning in December 2008 and ended abruptly in May 2009 (**see Table 2**). This year was very different **(Figure 1e)**. Water levels barely got high enough to rehydrate tree islands and recession rates were poor for almost the entire wading bird nesting season. However, despite relatively high water, wading birds did manage to successfully forage in the central Everglades during the periods of good recessions rates (March and June).

WATER CONSERVATION AREA 3B

Last year, rising water levels in WCA-3B during the wet season followed the 12-year average almost exactly and the upper tolerance for tree islands was barely reached. Then, in November, water levels fell at an almost steady perfect 0.10 foot per week during the dry season. The setup for optimum March and April foraging by wading birds could not have been better. Water Year 2010 was a very different story **(Figure 1f)**. Like everywhere else in the EPA, there was an abrupt water level rise in May and June 2009, followed by an almost flat and deep dry season with numerous reversals, and a very poor recession rate. Survey flights over this region were very sparse, but it would seem fair to say that extensive use by large flocks was not likely.

NORTHEAST SHARK RIVER SLOUGH

For three years in a row (WY2007–WY2009) this region of Everglades National Park experienced very dry conditions and violations of the MFLs (Sklar et al., 2009). Despite this trend, last year's water levels began dropping in December and good recession rates in support of very good wading bird foraging and nesting remained until April 2009. Like everywhere else, the May rainfall created a dramatic beginning to WY2010 because in two months (May and June) the stage increased by 2.5 ft (**Figure 1g**). The WY2010 dry season had good recession rates for one month (January). The rest of the time and despite the relatively good water depths, the water levels in Northeast Shark River Slough did not decrease, did not support wading bird foraging and in fact, increased.

References

Ali, A. W and W. Abtew. 1999. Regional Rainfall Frequency Analysis for Central and South Florida. Technical Publication WRE # 380. South Florida Water Management District, West Palm Beach, FL.

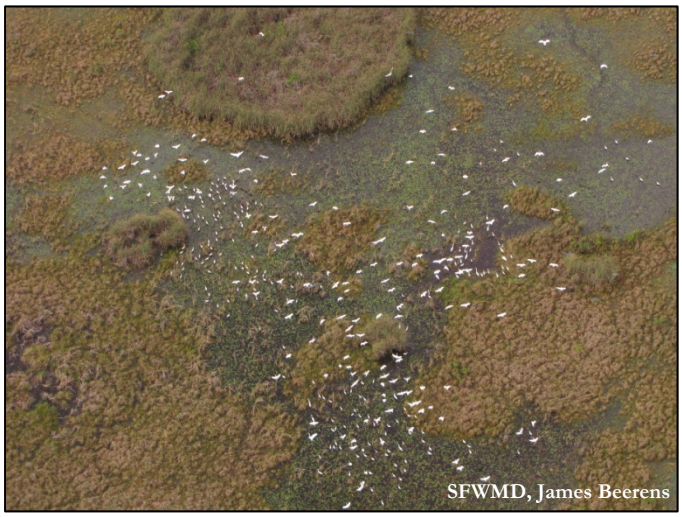
Gawlik, D.E. 2002. The Effects of Prey Availability on the Numerical Response of Wading Birds. *Ecological Monographs*, 72: 329-346.

MacVicar, T.K. 1983. Rainfall Averages and Selected Extremes for Central and South Florida. Technical Publication 83-2 DRE 170. . South Florida Water Management District, West Palm Beach, FL.

Sklar, F.H., E. Cline, M. Cook, T. Dreschel, C. Coronado, D.E. Gawlik, B. Gu, S. Hagerthey, S. Lantz, C. McVoy, S. Miao, S. Newman, J. Richards, K. Rutchey, R. Shuford and C. Thomas. 2009. Chapter 6: Ecology of the Everglades Protection Area. In: 2009 South Florida Environmental Report – Volume I, South Florida Water Management District, West Palm Beach, FL.

Wu, Y., K. Rutchey, W. Guan, L. Vilchek and F.H. Sklar. 2002. Spatial Simulations Of Tree Islands For Everglades Restoration. Pp 469-498. In: Tree Islands of the Everglades. F. Sklar and A. van der Valk, eds. Kluwer Academic Publishers, Boston, MA.

Fred Sklar
Everglades Division
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Fl 33406
561-682-6504
fsklar@sfwmd.gov


SFWMD, James Beerens

REGIONAL NESTING REPORTS

WATER CONSERVATION AREAS 2 AND 3, AND A.R.M. LOXAHATCHEE NATIONAL WILDLIFE REFUGE

The University of Florida Wading Bird Project carried on its long-term monitoring of wading bird nests throughout the WCAs 2, 3 and Loxahatchee NWR in 2010. We focused primarily on counts for Great Egrets, White Ibises, Snowy Egrets, and Wood Storks. Additional estimates for other species were gleaned from ground surveys and visits to nesting colonies.

Methods

We performed two types of systematic surveys in 2010: aerial and ground surveys. The primary objective of both kinds of surveys is to locate and estimate numbers of nest starts in colonies. On or about the 15th of each month from February through June, we performed aerial surveys to find active colonies using one observer on each side of a Cessna 182. A flight altitude of 800 feet AGL and east-west oriented flight transects spaced 1.6 nautical miles apart have been used continuously since 1986 and shown to result in overlapping coverage under a variety of weather and visibility conditions. In addition to contemporaneous visual estimates of nesting birds, we took aerial digital photos of all colonies. We made subsequent counts of nesting birds in these digital photos. The reported numbers of nest starts are usually peak counts, in which the highest count for the season is used as the estimate of nests for each species within each colony. In some cases we adjusted total aerial photo counts based on observations of subcanopy nests seen during ground checks within the colony.

Since 2005, we have also performed systematic ground surveys in parts of WCA 3 that give an index of abundance for small colonies and dark-colored species not easily located during aerial surveys. In the case of ground surveys, all tree islands within sixteen 500m-wide belt transects were approached closely enough to flush nesting birds, and nests were either counted directly, or estimated from flushed birds. These totals were added to the totals reported in Table 2. Note that because ground surveys were conducted on a subset of the total area, the figures should be used mainly for year-to-year comparisons and do not reflect the total number of nesting pairs for species like Little Blue, Tricolored, and Great Blue herons. Estimates for ANHI were not reliable (and thus excluded) since they nested early in the season, well before the heron nesting (and our in-colony nest checks, as well as ground surveys) began.

Results

Nesting Effort: We estimated a total of 12,432 wading bird nests were initiated at colonies within LNWR, WCA 2, and WCA 3 (Tables 1 and 2). This was the lowest number of nests recorded in the WCAs since the current survey protocol was established in 2005. The total is approximately one-third the average of the previous 10 years and less than one-quarter of last year's value.


SFWMD, James Beerens

The most significant reduction was observed in WHIB initiations. This season's estimates are over 6 times smaller than the previous 5-year average of about 19,500. While LNWR hosted comparable numbers of WHIB nests this season, the WCAs (specifically Alley North, Hidden, and 6th Bridge) saw only a small fraction of their usual numbers. Like the 2007 and 2008 nesting seasons, this year saw no WOST nesting in our study area, a stark contrast from the 1433 nests found in 2009. As above, there was unusually high rainfall and very persistent cold temperatures during the January through April period. Both rainfall and cold temperatures are known to strongly affect availability of prey animals, and we suspect that the low prey availability was the strongest of the effects resulting in low numbers of initiations. In addition, there may have been unusual and direct effects of cold, wet weather on energy expenditure by wading birds this winter.

Reproductive Success. Nest starts were relatively late in the 2010 breeding season with most initiated in early- to mid-April. For Great Egrets this is at minimum 4 weeks later than usual for WCA 3. Nest success varied substantially by species at the five colonies in WCA 3 we monitored: Alley North, Hidden, Joule, L-67, and Cypress City. GREG nests predominated at Joule (N = 26), L-67 (N = 20), and Cypress City (N = 28). Combined with those we monitored at Alley North (N = 24), we calculated a very low success (at least one fledgling) rate of 27.6% at those nests where the fate could be determined. In the GREG nests that were successful, we found an average of 1.7 fledglings produced, or an average of 0.5 fledglings for all nest attempts.

Small herons (TRHE, LBHE, SNEG) appeared to have greater success. We monitored 20 TRHE nests at Hidden, 1 at L-67, and another 34 mixed small heron nests at Alley North. Combined we found a nest success rate of 74.5%, with 2.4 fledglings per successful nest or 1.8 for all nest attempts. We followed the fate of 30 WHIB nests at Hidden and 2 (plus 4 GLIB) at Alley North. They too had a relatively high success rate compared to GREGs with 75% producing at least one fledgling. We recorded an average of 1.4 fledglings per successful nest or 1.1 for all attempts.

Table 1. Number of nesting pairs found in Loxahatchee NWR during systematic surveys, February through June of 2010.

Latitude	Longitude	WCA	Colony	GREG	WHIB	WOST	ROSP	SNEG	GBHE	LBHE	TRHE	GLIB	BCNH	Unid. Large Wht.	Unid. Small Wht.	Unid. Small Dark.	ANHI*	Colony Total
26.43477	-80.23314	1	Lox 70 (north)		2,700													2,700
26.55014	-80.44268	1	Lox West	152	693		3								840			1,688
26.43822	-80.39053	1	Lox 99	301	489										337			1,127
26.53280	-80.27620	1	Lox NC-4	432	39			38							146			655
26.45857	-80.24032	1	Lox NC-2	157														157
26.39895	-80.24992	1	Venus	120					2						4			126
26.46838	-80.37229	1	Welt	90														90
Air Surveys > 50 Nests				1,252	3,921	0	3	38	2	0	0	0	0		1,327			6,543
Air Surveys < 50 Nests				115	0	0	0	0	2	24	0	0	0		47			188
Totals By Species				1,367	3,921	0	3	38	4	24	0	0	0		1,374			6,731

* ANHI Not Reported. See Text

Table 2. Number of nesting pairs found in WCAs 2 and 3 during systematic surveys, February through June of 2010.

Latitude	Longitude	WCA	Colony	GREG	WHIB	WOST	ROSP	SNEG	GBHE	LBHE	TRHE	GLIB	BCNH	Unid. Large Wht.	Unid. Small Wht.	Unid. Small Dark.	ANHI*	Colony Total
26.20132	-80.52873	3	Alley N**	340	500		19	500	2	100	400	50	100		263			2,274
26.12428	-80.54148	3	6th Bridge**	207	124		4	100	3	75	200				7			720
25.77353	-80.83722	3	Hidden	63	450						150							663
26.21358	-80.81472	3	Restin		59					220								279
26.01230	-80.63233	3	Joule**	121					4		70							195
25.96052	-80.57207	3	L-67 (Horus)**	123					3									126
25.91565	-80.63022	3	Vacation	116					5									121
26.12408	-80.50438	3	Cypress City**	82					7									89
25.79732	-80.23314	3	3B Mud Canal	62											29			
25.80133	-80.49000	3	3B Mud East	86														86
26.10064	-80.45485	3	Nammu	75					6									81
26.01360	-80.45632	3	Juno	62					4									66
26.01557	-80.56272	3	Jupiter	49					2						14			65
26.13125	-80.70168	3	Odin	54											10			64
26.10715	-80.49802	3	Nanse	46											17			63
Air Surveys > 50 Nests				1,486	1,133	0	23	600	36	395	820	50	100		340			4,983
Air and Ground < 50 Nests***				191	18	0	0	6	118	177	24	0	138		46			718
Totals by Species				1,677	1,151	0	23	606	154	572	844	50	238		386			5,701

* ANHI Not Reported. See Text

** Estimates of subcanopy nests adjusted based on ground visits

*** Includes 360 wading bird nesting pairs from ground surveys

The pattern therefore appears to be that early nesters like Great Egrets endured the majority of reversals and cold weather, and had extremely poor success, while the small numbers of later nesters (ibises and small herons) had considerably higher nest success, probably as a result of late nesting and avoidance of the majority of reversals.

Peter Frederick
John Simon
Department of Wildlife Ecology and Conservation
P.O. Box 110430
University of Florida
Gainesville, Florida 32611-0430
352-846-0565
pfred@ufl.edu
jcsimon@ufl.edu


SFWMD, Pat Lynch

EVERGLADES NATIONAL PARK (MAINLAND)

Status of Wading Bird Colonies in Everglades National Park, 2010 Nesting Season

This summary report addresses colony monitoring within the mainland slough and estuarine areas of Everglades National Park using data collected during the 2010 wading bird breeding season.

Wading bird nesting colonies in Everglades National Park (ENP) are surveyed as part of a regional monitoring program to track wading bird nesting effort and success throughout the greater Everglades ecosystem. Data collected during surveys and monitoring flights help guide ongoing ecosystem restoration projects. The long-term monitoring objectives for wading bird nesting colonies in ENP are:

- Collect data on wading bird nesting effort, locations, numbers of colonies, and timing of colony nesting.
- Compile and share data with other agencies that monitor wading birds in South Florida with the ultimate goal of restoring and sustaining wading bird populations in the Florida Everglades.

Methods

We started our survey flights of known colonies in October 2009 in order to detect the earlier nesting of Roseate Spoonbills. One or two observers checked all known colony locations using a Cessna 182 fixed-wing aircraft. Altitude was maintained at about 800 feet above ground level. Flights started on 29 October and ended on 30 July. During each survey, visual estimates of nest numbers by species were made and photos were taken of colonies using a digital SLR camera with a 70-300mm image-stabilized lens. Photos were later compared to visual estimates to assist with determining nest numbers, nesting stage, and species composition.

We also conducted a systematic colony survey on 15 May of Shark Slough and Taylor Slough. This survey was conducted by 2 observers, with 1 observer sitting on each side of a Cessna 182 fixed-wing aircraft. We searched for colonies along 20 established transects oriented east to west and spaced 1.6 nautical miles apart. Flight altitude was maintained at 800 feet above ground level throughout the survey.

Species monitored include the Great Egret (*Ardea alba)*, Wood Stork (*Mycteria americana*), White Ibis (*Eudocimus albus*), Snowy Egret (*Egretta thula)*, Roseate Spoonbill (*Ajaia ajaja*), Tri-colored Heron (*Egretta tricolor*), Little Blue Heron (*Egretta caerulea*), Cattle Egret (*Bubulcus ibis*), and Black-Crowned Night Heron (*Nycticorax nycticorax*). Other birds found nesting in colonies such as the Great White and Great Blue Heron (*Ardea herodias*), Anhinga (*Anhinga anhinga*), Brown Pelican (*Pelecanus occidentalis*) and Double-Crested Cormorant (*Phalacrocorax auritus*) are noted as well.

Results

Most wading birds, with the exception of Wood Storks, appeared to have pulled off a successful nesting season in ENP. Despite falling short when compared to the exceptional season of 2009 (2010 all species combined decreased by -52%), this season's numbers are still substantial in terms of total nesting effort. We estimated a total of 7,443 pooled species nests in 20 colonies. The 2010 pooled species nest numbers are an increase of 17% over an average of the previous 5 years and an increase of 54% over an average of the last 10 years. When compared to averages of the last 5 and 10 years respectively, all species' averages displayed an increase: Wood Storks (12% and 2%), Great Egrets (3% and 23%), White Ibis (28% and 125%), and Snowy Egrets (75% and 144%).

Wood Storks along with Great Egrets were first observed nesting on 28 January. They were observed at Cuthbert Lake, Paurotis Pond, Rodgers River Bay, Grossman Ridge West and the Tamiami colonies with nest starts. At Paurotis Pond and Rodgers River (Peninsula), storks were already incubating. Our next flight on 4 March revealed that most storks had abandoned their nests, possibly due to the continuing high water conditions seen throughout the area. A few storks, however, continued to nest at Paurotis Pond.

When checked on 31 March, White Ibis and Snowy Egrets had set up nests at Paurotis Pond and other colonies throughout the park. Interestingly, about 75 pairs of Wood Storks had also returned to nest at Paurotis Pond again, perhaps attracted by the increased nesting activity displayed by the other waders. They appeared to be standing on the previously constructed nests. By 16 April, Approximately 22 pairs of Wood Storks had returned to nest again at Cuthbert, and again appeared to be using the previously constructed nests. Meanwhile at Paurotis, most storks were now incubating on nests, with some eggs visible in photographs.

On 27 May there were fewer storks at Paurotis but they were brooding small to medium-sized young in the nests. Approximately 50 nests were still active and looked to have 1-2 young each. Adult birds were seen flying to foraging sites south and west of the colony. The storks at Cuthbert were also still active but reduced in number to approximately 15 nests. They were also brooding small to medium-sized young. Adult birds there were flying to foraging sites north of the colony.

Active Wood Stork nests continued to dwindle down in number from May into July. On 18 June only 4 nests remained at Cuthbert, however they looked to have large young and an adult was brooding on 1 of them. Paurotis had less than 5 nests that were active; I saw at least 2 nests with large young, but no adults. On 8 July all storks at Paurotis had abandoned, however it appears 2 stork nests at Cuthbert managed to fledge young. Photos taken on that date show 2 large young in 1 nest and 1 large young in a 2nd adjacent nest.

While stork numbers had dwindled down throughout the season and mostly failed in their nesting attempts, other waders appeared to be mostly successful. Our last survey flight was 30 July and by then, all colonies had finished, with some fledged White Ibis and Great Egrets still present in many colonies.

Water levels appeared to be higher than usual without any signs of slough-wide dry-down throughout this nesting season. It wasn't until mid-May that some areas in the western and southern portion of Shark River Slough were drying down. We conducted our systematic survey then as Great Egrets were finally seen nesting in Shark Slough. At the end of May, several of the headwaters colonies and a traditional colony site (new site for 2010) in Taylor Slough filled up with nesting birds, predominantly White Ibis, but also Snowy Egrets, Tri-colored Herons, Little Blue Herons, Roseate Spoonbills and Great Egrets.

The following colonies were active throughout May, June and July appear to have successfully fledged young: Cabbage Bay, Lostmans Creek, Broad River, Otter Creek, Rookery Branch, Rodgers River (Great Egrets only), Paurotis Pond, Cuthbert Lake and Lower Madeira (Taylor Slough). Despite high water conditions throughout the season and a failure of Wood Stork nesting, the 2010 nesting season in ENP appeared to be productive one for all other wading bird species that we monitor.

Lori Oberhofer & Oron L. (Sonny) Bass
Everglades National Park
South Florida Natural Resources Center
40001 State Road 9336
Homestead, FL 33034
Telephone: 305-242-7833
sonny_bass@nps.gov
lori_oberhofer@nps.gov

EVERGLADES NATIONAL PARK, FRANK KEY (FLORIDA BAY)

Colony Location: 25.10243, -80.90667 (NAD83)

The colony of Great Egrets, White Ibis, and Brown Pelicans on Frank Key did not form this season.

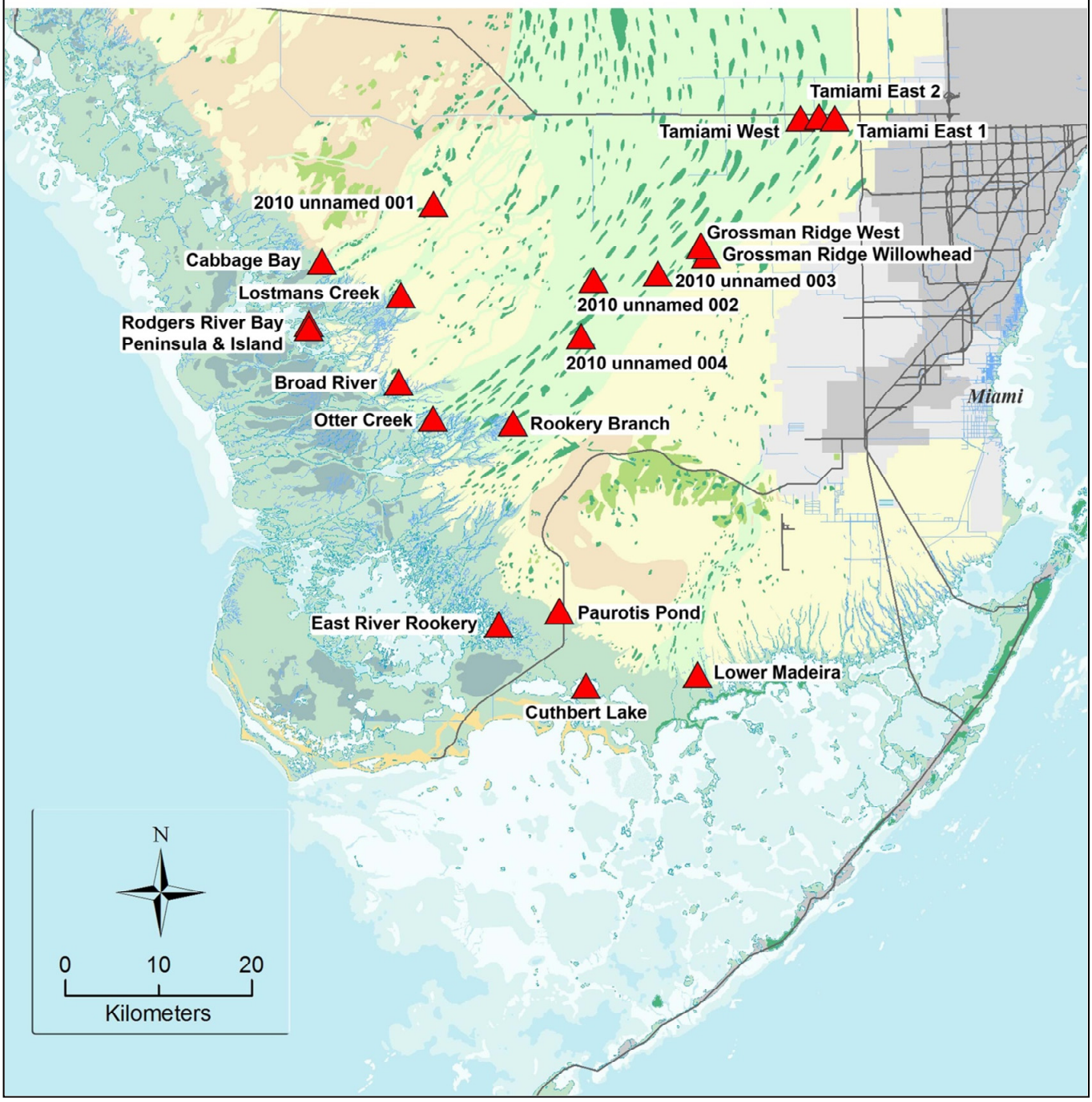
Lori Oberhofer & Oron L. (Sonny) Bass
Everglades National Park
South Florida Natural Resources Center
40001 State Road 9336
Homestead, FL 33034
Telephone: 305-242-7833
sonny_bass@nps.gov
lori_oberhofer@nps.gov

Table 1. Peak numbers of wading bird nests found in Everglades National Park colonies through July 30, 2010.

Colony name	Latitude NAD83	Longitude NAD83	GREG	WOST	WHIB	SNEG	ROSP	TRHE	LBHE	*Total*
Cabbage Bay (New 2009)	25.62000	-81.05612	200		1200	225	+	+	+	1625
Lower Madeira (traditional site)	25.21975	-80.65603	70		1100	200	+	+	+	1370
Paurotis Pond	25.28150	-80.80300	200	325	700	125	+	+	+	1350
Lostmans Creek (New 2009)	25.58723	-80.97204	125		400	125	+			650
Rookery Branch	25.46356	-80.85256	150		175	160		+	+	485
Tamiami West	25.75784	-80.54484	20	350						370
Grossman Ridge Willowhead	25.62613	-80.64582	315							315
Otter Creek	25.46781	-80.93772	80		200	25	+	+	+	305
Rodgers River Bay Peninsula	25.55975	-81.07026	120	165						285
Broad River	25.50293	-80.97440	60		200	25	+	+	+	285
Grossman Ridge West	25.63511	-80.65130	50	75						125
Cuthbert Lake	25.20933	-80.77500	80	35						115
Tamiami East2	25.75935	-80.52457	15	30						45
2010 unnamed 003	25.60809	-80.69763	30							30
East River Rookery	25.26860	-80.86785	25							25
Tamiami East1	25.75762	-80.50801	7	15						22
Rodgers River Bay Island	25.55571	-81.07000	10	5						15
2010 unnamed 004	25.54788	-80.77937	12							12
2010 unnamed 002	25.60194	-80.76585	9							9
2010 unnamed 001	25.67583	-80.93725	5							5
Total			1583	1000	3975	885	0	0	0	7443

+ Indicates species present and nesting, but unable to determine numbers

Locations of wading bird nesting colonies in Everglades National Park, January - July, 2010




SFWMD, Pat Lynch

2010 WOOD STORK NESTING IN SOUTHWEST FLORIDA

Audubon of Florida gathered nesting data at four rookeries in 2010, Corkscrew Swamp Sanctuary (CSS), Lenore Island (LI), Caloosahatchee East (CE), and Barron Collier 29 (BC29). While Wood Storks were the primary focus of the monitoring effort, we were able to gather data on other wading birds at some of the colonies.

Methods

Surveys were conducted in a fixed wing Cessna 172. Nesting effort was recorded by taking digital aerial photographs of the colonies for later analysis. We used a Canon 30D equipped with a 70-300mm zoom lens with an image stabilizer. An altitude of between 800'-1000' was maintained during the survey. Images were examined to quantify the number of nest starts. In each survey set there were a varying number of image features which we were unable to identify. While some of these features may have been active nests, they were not included in the analysis. As a result the results of the analysis are conservative, as only verifiable nests were counted. Five survey flights were conducted between January 15th and May 10th 2010, with the express purpose of conducting wood stork counts the flights on February 11th and May 10th had wood stork nesting activity, and were the only two flights where records were kept of nesting activity.

Results

No nesting was recorded at CSS throughout the duration of the aerial surveys. No nesting was recorded during the additional monitoring along the Sanctuary boardwalk, however, recently fledged yellow-crowned night herons were observed near the CSS boardwalk in July. Observers recorded 152 wading bird nests during the February 11 survey on LI, and 238 nests on May 10th. The two Wood Stork nests identified on LI on February 11th are known to have failed. Of the 25 Wood Stork nests observed on LI on May 10th, 24 are believed to have been in the incubation stage, the 25th nest was inconclusive. This would bring the date for fledging around mid-July. No nesting was recorded at the CE rookery in February. Eighteen nests were observed on May 10th at the CE location, with Great Egret chicks visible in a few nests. The BC29 rookery had 69 wading bird nests on February 11th and 71 nests on May 10th. Forty-two Great Egret chicks were identified in chicks were recorded on the latter BC29 survey.

No results for nesting success could be derived from the survey data for the majority of species. We did not survey the LI colony in June or July, so it is possible that some Wood Storks could have fledged from this location, however it is unlikely given the late nesting date and the onset of rainy season causing significant reversals in late June and July.


SFWMD, Pat Lynch

Hydrology

Despite a fairly 2009 wet rainy season, water levels remained far below average until well into nesting season. Corkscrew registered 54.18" of rainfall from June through September, which is 16.68" above the 50year average. Water levels at the B-staff gauge near the colony site remained more than 5" below average at the end of September, falling more than eleven inches below average by the start of the regions historic nesting season, the first of November. These very low conditions were followed by a cold wet winter. From December through April Corkscrew recorded 29 inches of rainfall, the highest volume on record, 11.35" above the average. This caused frequent and sustained reversals. May was a dry month with below average rainfall, followed by a near average June and July.

Southwest Florida east of the town of Immokalee received considerably more rainfall during the rainy season than the Corkscrew watershed.

Jason Lauritsen
Corkscrew Swamp Sanctuary
375 Sanctuary Road West
Naples, FL 34120
jlauritsen@audubon.org

Table 1. Maximum wading bird nest counts recorded in Southwest Florida, 2010.

Colony	Latitude	Longitude	WOST	GREG	GBHE	LBHE	ANHI	BRPE	LG WHT	SML WHT	SML DRK	CAEG	Total
Corkscrew	26.375033°	-81.616417°	0	0	0	0	0	0	0	0	0	0	0
Lenore Isl (Caloosahatchee West)	26.688865°	-81.830150°	25	135	17	0	0	0	161	0	7	0	345
Caloosahatchee East	26.696582°	-81.794950°	0	13	0	0	0	0	0	5	0	0	18
Barron Collier 29	26.273073°	-81.344044°	19	50	0	0	0	0	0	27	0	0	96
Totals			44	198	17	0	0	0	161	32	7	0	459

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY ROOKERY

Methods

Typically, Breeding Bird Censuses (BBCs) are conducted from February – July in the SWA Roost by two observers every 8-10 weeks, representing approximately 12 man-hours. During the BBC, all islands from three abandoned shell pits are systematically surveyed from a small boat, and the identified bird species and nest numbers are recorded. Surveys are conducted during the morning hours so as to minimize any burden caused by the presence of observers. The peak nest numbers are a compilation of early season boat counts and visual counts from the observation towers.

Location & Study Area

The SWA roost is located on spoil islands in abandoned shell pits that were mined in the early 1960's in Palm Beach County, Florida (Lat. 26°46'42.22"N: Long. 80°08'31.15"W NAD83). The spoil islands consist of overburden material and range from 5 to 367 m in length, with an average width of 5 m. Islands are separated by 5-6.5 m with vegetation touching among close islands. The borrow pits are flooded with fresh water to a depth of 3 m. Dominant vegetation is Brazilian pepper (*Schinus terebinthifolius*), Australian pine (*Casurina spp.*), and Melaleuca (*Melaleuca quinquenervia*), all non-native species. Local features influencing the roost include: 1) the North County Resource Recovery Facility and landfill and 2) the City of West Palm Beach's Grassy Waters (=Water Catchment Area), a 44 km² remnant of the Loxahatchee Slough.

Results

This report presents preliminary data for the 2010 breeding season. Typically, nesting activities have been observed at this colony through September, and these surveys being reported are only through the end of July. Only the peak nest numbers are being reported for each of the bird species.

Table 1. Peak number of wading bird nests in SWA Rookery from February to July 2010.

GREG	SNEG	CAEG	GBHE	LBHE	WOST	WHIB	ANHI	TRHE	Un-identified	Total Nests
11	0	34	0	2	131	182	46	5	0	411

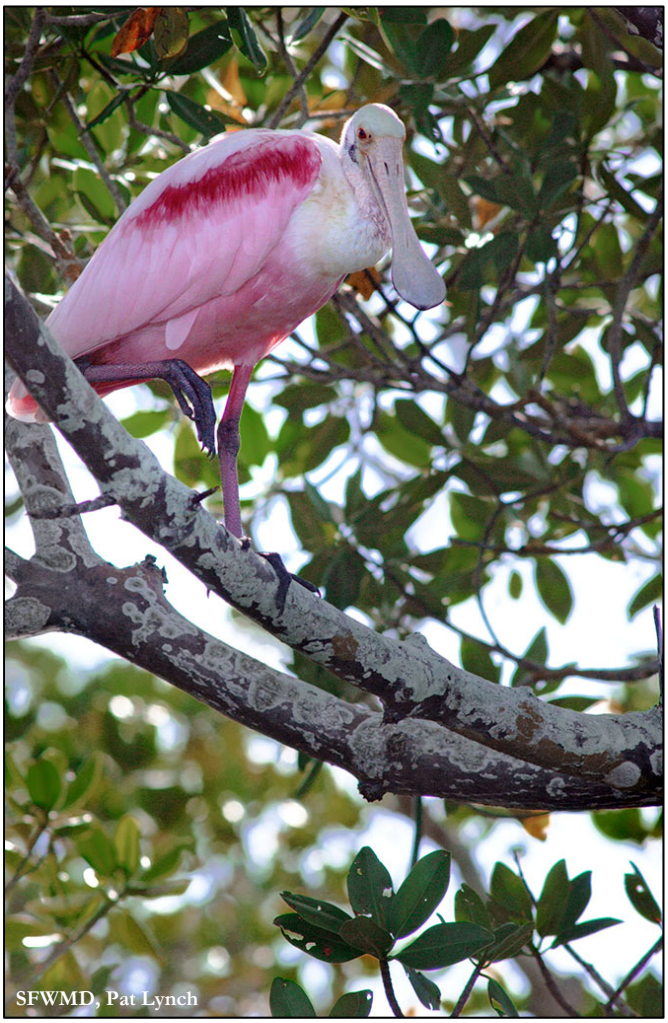
The estimated peak number of wading bird nests for the SWA Colony is 411 which is much lower than previous seasons (averaging 3000 nests). The birds initiated in February but cooler weather and rains in February, March and April may have caused a high percentage of nest abandonment and delay in nesting with species, such as the White Ibis and other small wading birds. There were nests of the following bird species: Great Egrets, Cattle Egrets, Wood Storks, White Ibis, Little Blue Herons, Tricolor Herons, and Anhinga. The Wood Stork nest numbers were lower this year at 131 nests. It should also be noted there were at least three (3) Roseate Spoonbill nests with a few fledglings observed from the towers.

Mary Beth (Mihalik) Morrison, David Broten & Michael Tyson
Solid Waste Authority of Palm Beach County
7501 North Jog Road
West Palm Beach, FL 33412
(561) 640-4000 ext. 4613
mmorrison@swa.org

ROSEATE SPOONBILL NESTING IN FLORIDA BAY ANNUAL REPORT 2009-2010

Methods

Between Oct 2009 and May 2010 nest surveys were conducted, within the five regions of Florida Bay (Figure 1 as per Lorenz et al. 2002), at all forty of the Keys that have been used by Roseate Spoonbills as nesting colonies. Nest success was estimated through mark and revisit surveys at the most active (focal) colony or colonies within each region. A colony was considered successful if it averaged at least one chick to 21 days (the age at which chicks begin branching and can no longer be assigned to a nest) per nesting attempt (c/n). We present our results in the context of spoonbill nesting in Florida Bay since 1984, the year that the South Dade Conveyance System (SDCS), which has direct water management implications on Florida Bay, was completed (Lorenz 2000, Lorenz et al. 2002). In addition to our nest surveys, we use resights of banded chicks, prior to abandoning their natal colonies, as a metric to compare with the productivity estimates from our nest surveys.


SFWMD, Pat Lynch

Spoonbill Monitoring Results

Northwest Region: Sandy Key

Three of the five colonies in the Northwest region were active producing a total of 177 nests, well below the mean of 217 nests in the last 25 years (Table 1). There were 83 nests on Sandy Key, the focal colony for the region, which is well below the mean of 152 nests since 1984-85 (Table 1). Of the 47 nests monitored, only 43% were successful, producing a mean of 0.60 chicks to 21 days per nest (Table 2). Total production for Sandy Key was estimated at 50 young (Table 4). Actual production, however, was likely much lower. On 4 Mar, towards the end of the nesting cycle, a total of only nine fledglings were observed on the island, while an additional 14 large young were found dead in the water below the nests. This indicated that a significant number of chicks died shortly after reaching the 21-day mark. Our banding results further support a failure late in the nesting cycle. We banded 13 nestlings from nine nests at Sandy Key (Table 3). Only five (38%) of the banded chicks were resighted as fledglings before abandoning their natal colony, while seven (54%) of the banded chicks were confirmed dead.

This season, Sandy Key exhibited two distinct nesting periods. During the first wave, nests initiated between 1 Nov and 7 Dec, (n=29 nests monitored), 76% of the nests failed while only 24% were successful. In contrast, during the second wave, nests initiated between 26 Dec and 7 Jan (n=18 nests monitored), 72% of the nests were successful while only 28% failed.

Northeast Region: Duck Key

Only three of the nine colonies in the Northeast region were active producing only 41 nests, well below the mean of 175 nests since 1984-85 and the lowest nest count for the region during that period (Table 1). Ninety percent of the nests initiated in the region were located on Duck Key. The Duck colony was not successful, producing an average of only 0.53 c/n (Table 2). Only thirty-seven percent of the nest attempts were successful. Total production for the colony was estimated at 20 young (Table 4), but like Sandy Key, many of those young likely did not successfully fledge. Only six or seven fledglings were ever observed within the colony. Our banding results further support a lack of fledged young. Seven nestlings were banded from four nests within two colonies (Deer and Duck Keys; Table 3) in the Northeast region. None of the banded chicks was ever observed as a fledgling before abandoning its natal colony, and three (43%) of the banded chicks were confirmed dead.

Southeast Region: Stake Key

Only five nests were initiated in two of the 12 colonies in the Southeast region, well below the mean of 76 nests since 1984-85 (Table 1). Four of the five nests were located on Stake Key. We were able to determine the fate of only two of those nests, both of which failed, for a mean of 0.0 c/n (Table 2). No chicks were banded in the Southeast region this season.

A small second nesting event (n=3) occurred at Bottle Key in April. Only one nest was successful, producing 3 chicks. Two chicks were banded and, at last check, these chicks were 28 days of age but not yet capable of sustained flight.

Central Region: Calusa and First Mate Keys

There were only nine nests in three of the ten Central region colonies; extremely low when compared to a mean of 52 nests since 1984-85 (Table 1). Five nests on Calusa Key and three nests on First Mate Key were monitored, all of which failed to produce young. Thus, for the region as a whole, productivity was 0.0 c/n and no chicks fledged. Two nestlings were banded from two nests within two colonies (Calusa and North Jimmie Keys; Table 3) in the Central region and both (100%) were confirmed dead.

A small second nesting event (n=2) occurred at Calusa Key in April. Both nests were successful and together produced three young.

Southwest Region: Twin Key

All four colonies in the Southwest region were surveyed but only one, Twin Key, was active (Table 1). One nest was initiated on Twin Key but the fate of the nest is unknown.

Bay-wide Synthesis

Overall, spoonbill nests in Florida Bay were initiated later than usual this season. The mean lay date at Sandy Key each season since 2002-03 fell between 2 Nov and 2 Dec, considerably earlier than the mean lay date of 13 Dec in 2009-10 (Table 4). Similarly, the mean lay dates in the Northeast and Southeast regions in all seasons since 2002-03 fell between mid November and late December, compared with 20 Jan and 17 Jan, respectively, in the 2009-10 season (Table 4). While productivity was extremely low overall, those nests that were initiated later in the season at Sandy Key were considerably more successful than those initiated during the first wave of nests. Spoonbills time their nesting to coincide with the annual drawdown during the Florida Bay dry season. The unusually high water levels on the spoonbill foraging grounds this season and the resulting lack of concentrated prey likely led to the delayed, and ultimately unsuccessful, nesting baywide. The extreme cold event in early to mid January may have played a role in the low nesting effort and productivity as well.

In all, only 24 chicks were banded from 16 nests across Florida Bay. Of those, 12 (50%) were found dead, and only seven (29%) were observed as fledglings before leaving their natal colonies (Table 3). Between March 2003 and April 2009, 1678 nestlings were banded with a colored, alphanumeric band in Florida Bay. As of July 16, 2010, 108 (6%) have been resighted. In comparison, between April 2003 and May 2009, 1061 spoonbill nestlings were banded within nesting colonies in the Tampa Bay region. As of July 16, 2010, 242 (23%) of those 1061 banded birds have been resighted. These data continue to demonstrate that Florida Bay is no longer the principal source location for spoonbill recruitment into Florida's breeding population. Bay-wide, the Roseate Spoonbill nesting effort in 2009-10 was the lowest year on record since the completion of the SDCS in 1984 (n=233 nests; Table 1), indicating a continued downward trend.

Table 1. Number of Roseate Spoonbill nests in Florida Bay November 2009 through March 2010. An asterisk indicates a colony where nesting success surveys were conducted. Second nesting attempts are not included.

			Summary since 1984-85		
Region	Colony	2009-10	Min	Mean	Max
Northwest	Clive	7	6	24.38	52
	Frank	0	0	50.17	125
	Oyster	0	0	5.78	45
	Palm	87	9	30.33	62
	Sandy*	83	62	151.54	250
	Subtotal	177	65	216.72	325
Northeast	Deer	2	2	6.75	15
	Duck*	37	0	9.71	100
	Little Betsy	0	4	12.50	21
	North Nest	0	0	0.71	8
	North Park	0	0	17.05	50
	Pass	0	0	0.88	7
	Porjoe	0	0	27.33	118
	South Nest	2	0	19.76	59
	Tern	0	0	100.21	184
	Subtotal	41	44	174.67	333
Southeast	Bottle	0	0	11.06	40
	Cotton	0	0	0.00	0
	Cowpens	0	0	5.53	15
	Crab	0	0	2.00	8
	Crane	0	0	12.06	27
	East	0	0	3.11	13
	East Butternut	0	0	5.69	27
	Low	0	0	0.00	0
	Middle Butternut	1	1	19.79	66
	Pigeon	0	0	10.18	56
	Stake*	4	0	5.59	19
	West	0	0	2.93	9
	Subtotal	5	39	75.53	117
Central	Calusa*	5	0	11.67	21
	Captain	0	1	4.33	9
	East Bob Allen	0	0	13.16	35
	First Mate*	3	1	5.67	15
	Jimmie Channel	0	6	19.32	47
	Little Jimmie	0	0	4.00	12
	Manatee	0	0	0.18	3
	North Jimmie	1	2	2.00	2
	Pollock	0	0	2.20	13
	South Park	0	0	10.68	39
	Subtotal	9	15	52.39	96
Southwest	Barnes	0	0	0.25	3
	East Buchanan	0	0	5.76	27
	Twin	1	0	1.75	8
	West Buchanan	0	0	3.19	9
	Subtotal	1	0	9.69	35
	Florida Bay Total	233	316	530.35	880

Table 2. Mean number of chicks to 21 days per nesting attempt and the percentage of nests that were successful. Success is defined as a mean of at least one chick to 21 days per nesting attempt. Summary figures refer to the focal colony or colonies surveyed in each year. Numbers in parentheses indicate how many years each region has been surveyed since 1984-85. Second nesting attempts are not included.

		2009-10		Summary since 1984-85			
Region	Colony	Nesting Season		Min	Mean	Max	% Years Successful
Northwest	Sandy	0.60	43%	0.00	1.31	2.50	68% (n=22)
Northeast	Duck	0.53	37%	0.00	0.89	2.20	50% (n=22)
Southeast	Stake	0.00	0%	0.14	1.07	2.09	50% (n=12)
Central	Calusa	0.00	0%				
	First Mate	0.00	0%				
	Region Total	0.00	0%	0.00	0.93	1.86	42% (n=12)


SFWMD, Pat Lynch

Table 3. Roseate Spoonbill chicks banded in Florida Bay between December 2009 and May 2010.

Region	Colony	# nests banded	# chicks banded	# resighted as fledglings	% resighted as fledglings	# found dead	% found dead	# unknown fate	% unknown fate
Northwest	Sandy	9	13	5	38%	7	54%	1	8%
Northeast	Deer	2	3	0	0%	0	0%	3	100%
	Duck	2	4	0	0%	3	75%	1	25%
	Subtotal	4	7	0	0%	3	43%	4	57%
Southeast	Bottle	1	2	2	100%	0	0%	0	0%
Central	Calusa	1	1	0	0%	1	100%	0	0%
	North Jimmie	1	1	0	0%	1	100%	0	0%
	Subtotal	2	2	0	0%	2	100%	0	0%
Florida Bay Total		16	24	7	29%	12	50%	5	21%

Table 4. Estimated dates of nesting events for focal colonies surveyed in the 2009-10 nesting season. All dates refer to the first egg laid in each clutch or the first egg to hatch in each clutch. The estimated number of chicks fledged from each focal colony is also presented.

		Nest Initiation Dates				
Region	Colony	Earliest Nest	Latest Nest	Mean Lay	Mean Hatch	Est. # of chicks
Northwest	Sandy	1-Nov-09	7-Jan-10	13-Dec-09	4-Jan-10	50
Northeast	Duck	10-Jan-10	28-Jan-10	20-Jan-10	12-Feb-10	20
Southeast	Stake	16-Jan-10	18-Jan-10	17-Jan-10	9-Feb-10	0
Central	Calusa	9-Nov-09	21-Nov-09	15-Nov-09	8-Dec-09	0

Jerome J. Lorenz
Karen Dyer
Audubon of Florida's Tavernier Science Center
115 Indian Mound Trail
Tavernier, FL 33070
305-852-5092
jlorenz@audubon.org

Literature Cited

Lorenz, J.J. 2000. Impacts of water management on Roseate Spoonbills and their piscine prey in the coastal wetlands of Florida Bay. Dissertation, University of Miami, Coral Gables, FL, USA.

Lorenz, J.J., J.C. Ogden, R.D. Bjork, and G.V.N. Powell. 2002. Nesting patterns of Roseate Spoonbills in Florida Bay 1935-1999: Implications of landscape scale anthropogenic impacts. Pp. 563-606 *in* J.W. Porter and K.G. Porter (eds.). The Everglades, Florida Bay, and coral reefs of the Florida Keys: An ecosystem sourcebook. CRC Press, Boca Raton, FL.


SFWMD, Pat Lynch

HOLEY LAND AND ROTENBERGER WMAS

Systematic wading bird surveys were not conducted this year in Holey Land or Rotenberger WMAs. No wading bird nests were observed during aerial white-tailed deer surveys in May 2010.

Daniel Mitchell
Fisheries and Wildlife
Biological Scientist III
Florida Fish and Wildlife
Conservation Commission
(954) 746-1789 Ext. 111
(954) 746-1791 Fax
daniel.mitchell@myfwc.com

2010 WADING BIRD REPORT FOR BIG CYPRESS NATIONAL PRESERVE

In 2010, no systematic surveys for wood stork nests were conducted by NPS staff in Big Cypress National Preserve. Historic nest sites were checked on an informal basis by the NPS helicopter pilot during other missions.

Deborah Jansen
Wildlife Biologist
Big Cypress National Preserve
33100 Tamiami Trail East
Ochopee, FL 34141
Office: 239-695-1179
Cellphone: 239-340-0210
FAX: 239-695-3901
deborah_jansen@nps.gov

WADER NESTING COASTAL SOUTH SOUTHWEST FLORIDA 2010

Hydrology

After three to four years of extreme dry seasons (March-June) at Corkscrew (CSS) and Rookery Bay (RB), 2010 was unusual in that there was no dry-down. Water levels at both sanctuaries were higher than usual; with May's water level at CSS equal to 1970 the highest ever recorded (N=46 years), and RB's ponds about even with six other wet years (N-28 years). Certainly 2010 was a different year as far as water levels go.

Location and Methods

As in the last few years there was a change in nest censusing methods due to the amount of debris left in the understory of the colonies by hurricane Wilma and the exceptional growth of the surviving mangrove that has become very dense (see each colony description for details). Considerably more effort was expended trying to determine what was going on with the small waders, as recorded below. Note that numbers of nests in Table 1 represent peak numbers of nests.

Rookery Bay (RB) [26°01.721'N 81°44.573'W]
This year we surveyed one red mangrove island, 0.14 ha. Nest censuses were conducted on 4/16, 5/20, 6/17 by boat with 2 observers for 0.5 hour.

Marco Colony (ABC) [25°57.389'N 81°42.232'W]
Three red mangrove islands, 2.08 ha. Nest censuses were conducted 4/13, 5/27, 6/27 with one observer, by boat for 1.5 hours.

Smokehouse Key (SK) [25°54.562'N-81°43.885'W]
One island in Caxambas Pass, 0.8 ha (Red Mangrove; a little terrestrial vegetation on sand ridge in center). Censuses were conducted on 4/22, 5/14, 6/12, by boat for one hour by one observer.

East River (ER) [25°55.886'N 81°26.667'W].
Three Red Mangrove islands, 0.25 ha. A nest census was conducted on 6/13 by canoe, three observers, two hours, complete coverage.

Chokoloskee Bay (CHOK) [25°50.834'N 81°24.71 0'W]
Four Red Mangrove islands, 0.2 ha. This year the waders used all four islands, boat census, 3/30, 4/28, 5/29, two people, one hour.

Sundown Censusing
For the RB and ABC colonies, birds coming in to roost for the night were counted at sundown; the goal of this project is to get an index of the numbers and species in the area, year round.

Marco Colony (ABCSD)
Censused monthly with two boats and various numbers of volunteers (4-8). Boats were anchored in the two major flyways (North and East) where we recorded the numbers and species of birds flying in and out of the colony during the nesting season, one hour before sunset to one half hour after sunset. This project is ongoing and started in 1979.

Rookery Bay (RBSD)
Censused every two weeks with one boat and two observers (one a volunteer). The boat was anchored so that the majority of birds can be observed flying in one hour before sunset to one half hour after sunset. We recorded species and numbers of birds flying in and out of the colony during the nesting season. This project is ongoing and started in 1977.

Species Accounts

Great Egret
Nesting started quite early (mid January) at both ABC and CHOK, and as usual in March at RB and SK, they do not nest at East River. At the early colonies, numbers increased steadily and peaked in mid May. In the other colonies (ER, RB) numbers of nests were much lower than average and peaked later in the season. There was no indication of a second wave of nesting in any of the colonies, which is unusual. Chick production appears to have been successful as there were good numbers of young GREG feeding along the mangrove edges at the time of writing. For the 28 years of this study GREG have increased fairly steadily (by about 61%) and this year produced the highest number of nests recorded (436). In the sundown counts GREG were quite low early in the year but increased significantly in April, May and June.

Snowy Egret, Little Blue Heron, Tricolored Heron and Cattle Egret
Nesting started late and in very low numbers and while young were present in July we were unable to determine nest success. This is the first year that no LBHE nests have been recorded (Table 1). Small wader nesting has declined in the area dramatically (86%, N = 28 years). The sundown censuses indicated that none of these species were present in the area in good numbers.

Reddish Egret
Not sure what is going on; nests (n=2) dropped at ABC and each nest failed; there are currently four large young at SK (n=2 nests) which may yet make it.

White Ibis & Glossy Ibis
No attempts to nest this year.

Table 1. Peak Wader Nests Counts in Coastal Southwest Florida 2010.

Colony	GBHE	GREG	SNEG	LBHE	TRHE	REEG	CAEG	WHIB	GLIB	Total
Rookery Bay		14				1				15
Marco (ABC)	10	194	26		19	1	19			269
Smokehouse Key		21	9		4	2				36
East River			53		86					139
Chokoloskee Bay	1	207								208
Total	11	436	88	0	109	4	19	0	0	667
Mean (28 years)	12	217	249	49	403	5	347	33	38	1353

Whatever nature and humans throw at the waders, most impressive to me is how they keep trying. Some manage (even increase) and others are not doing well. Trying to understand all this is a real challenge and fascinating.

Theodore H. Below
Avian Ecologist
3697 North Rd.
Naples, FL 34104
thaovb3rd@comcast.net

WADING BIRD NESTING AT LAKE OKEECHOBEE

Introduction

The first aerial Surveys of nesting wading bird colonies began on Lake Okeechobee in 1957 (David 1994, Smith and Collopy 1995, Zaffke 1984). These surveys were conducted from 1957-1959, 1961, and 1970-1976 with nest counts ranging from a high of 10,400 in 1974 to a low of 130 nests in 1971 (David 1994). These surveys were usually done once during the breeding season and could have underestimated peak nest effort. However, from 1977- 1992 more systematic monthly surveys were conducted by the South Florida Water Management District to assess the effects of water management on wading bird populations (David 1994, Smith and Collopy 1995).

In 2005, Florida Atlantic University continued the wading bird nesting surveys to determine location and size of colonies as a part of the CERP Monitoring and Assessment Plan. We reported the highest nesting effort on record in 2006 with 11,310 nests, and the lowest nesting effort on record in 2008, with 38 nests. Herein we report our findings for 2010.

Methods

During the dry season of 2010, Florida Atlantic University conducted wading bird nesting surveys to determine timing and location of breeding populations as a part of the CERP Monitoring and Assessment Plan. Once a month from March through June, two observers, one on each side of a single engine Cessna 182, surveyed wading bird nests along aerial transects at an altitude of 244 m (800 ft) at a speed of 185 km/h (100 knots). One transect was flown from Eagle Bay Island and followed the eastern rim of the Lake to Ritta Island. The remainder of transects were East- West and spaced at a distance of 3 km (1.6 nautical miles). When one or more white wading birds were detected, the airplane lowered to an elevation of 122 m (400 ft) and circled the location to verify if birds were nesting. If it was determined to be a colony, nests counts were made and species composition was recorded. Colonies were defined as any assemblage of at least two nests that were separated by greater than 200 m (Erwin et al 1981, Smith and Collopy 1995). We also recorded photographs and geographic location. The colonies accessible by airboat were visited to improve count accuracy. Estimates for January and February were based only on airboat reconnaissance due to environmental and logistical issues.

UPCOMING MEETINGS

American Ornithologists' Union, 129th Stated Meeting.
24-29, July 2011. Jacksonville, Florida.
- www.birdmeetings.org

Cooper Ornithological Society Annual Meeting.
9-13, March 2011. Kearney, Nebraska
- snr.unl.edu/kearney2011/index.asp

The Wildlife Society Annual Conference.
5-10, Nov. 2011. Waikoloa, Hawaii.
- joomla.wildlife.org/

Rainfall and hydrology data was obtained from the South Florida Water Management District's DBHYDRO database. The lake stage is considered to be mean reading of four principle gages in the pelagic zone of Lake Okeechobee (L001, L005, L006, and LZ40). All elevation data are presented in National Geodetic Vertical Datum 1929 (NGVD 1929) and locations are in North American Datum 1983 (NAD 1983). Historical stage data is from 1977 to the present, which corresponds to the time period of systematic aerial surveys.

Hydrology

Water levels in the 2010 dry season were highly atypical (Fig. 1). During a normal dry season, Lake levels are usually high in January with a recession lowering lake levels through the following months until the start of the wet season. In 2010, lake levels were maintained at approximately 4.1 meters (13.5 ft) from approximately January through March, with no sign of the typical seasonal drydown. In mid March rains occurred throughout the system and lake stage rose to approximately 4.5 m (14.8 ft), peaking at approximately 4.62 m (15.2 ft) on May 2. Thereafter water levels receded, experiencing one more major reversal at the end of May when water levels rose 7 cm (2.8 in). This pattern created higher than average water levels later in the dry season than is typical.


SFWMD, Pat Lynch

Results and Discussion

Locations and Size

Twelve colonies were located (Fig. 2); ten on-lake and two off-lake, with an estimated total of 6,737 nests. This number was derived by summing the peak nesting month for each species except for Anhingas and Cattle Egrets (Table 1). For historical comparisons, the cumulative total for Great Egrets (GREG), Great Blue Herons (GBHE), White Ibises (WHIB), and Snowy Egrets (SNEG) was 5600 nests, making 2010 the fifth largest nesting year of the 22 years monitored since 1977 and the seventh largest of the 30 years monitored since 1957. All colony locations were at established sites, and were detected last year, except for Indian Prairie South. However, this colony was small, having only 4 GBHE and 1 ANHI nests.

The majority of nests (68% excluding ANHI and CAEG), were detected at the Moore Haven colony (Table 2). This colony contained all the focal species. Another 25% of nests were at the two Eagle Bay colonies, with strong nesting effort by small ardeids (SNEG, TRHE, LBHE) and a handful of GBHE. These

three colonies contained 93% of all nesting at Lake Okeechobee. These colonies are comprised of willow surrounded by water, which is the typical structure favored by wading birds for nesting on the Lake (David 1994).

Timing and Success

With lake stage at 4.1 m during the first two months, most of the traditional marsh colony locations had little water surrounding them. Airboat surveys during January detected only GBHE nests. In February there were 15 GREG nests at Clewiston Spit, Rock Islands and Moonshine Bay. Both Clewiston Spit and Rock Islands are spoil islands with minimal vegetation surrounded by water. Moonshine Bay is a willow head at a lower elevation than the rest of the surrounding Moore Haven marsh so it remains inundated for some time after the marsh has dried. With the increase in lake stage in March due to the unusually high precipitation for the dry season, colony activity increased. During aerial surveys on April 7, Moore Haven and the Eagle Bay colonies contained active nests. Additional ground visits corroborated the initiation of nesting by all focal species in these colonies. With this rise in Lake stage during the second half of the dry season, the nest numbers at the deeper colonies in Moonshine Bay were low and contained no small ardeids and ibis.

Wood Storks and Roseate Spoonbills

Since 2007, a small colony of Wood Storks (WOST) has developed at an alligator farm about 4 km N of Harney Pond along Highway 21. A peak of 7 WOST nests were detected during the 2010 March surveys compared to a high of 35 in 2009. By May, approximately 12 total young WOST were seen in the vicinity. By the June surveys, only 2 nests were still active.

Although a consistent roost of 200 ROSP developed in northern Indian Prairie in 2010, environmental conditions led to no nesting attempts by this species. Last year, ROSP were detected nesting on the Lake for the first time since the late 1800s (Oder 1874).

Environmental Conditions

Receding water levels have shown to be beneficial for concentration of prey for wading bird foraging, along with shallower water for prey accessibility (Kushlan 1976, Gawlik 2002). While wading bird foraging was observed before the increase in lake stage this dry season by SFWMD scientists, these numbers decreased dramatically after the reversals. By March, almost all of the littoral zone was too deep for foraging. But even as foraging areas were being reduced on the Lake, nest initiations by small ardeids, which tend to initiate in mid March and April (Smith and Collopy 1995, Frederick and Collopy 1989), were increasing. With decreased opportunities within the Lake due to the deeper marsh, other opportunities must have been available. During this time of high lake stage, flight lines of egrets and ibis from the colony were observed flying to the west and northwest over the levee, perhaps taking advantage of better foraging conditions in wetlands outside the Lake. On May 2, after the peak in Lake elevation, a steady recession, with the exception of one reversal, improved the foraging habitat within the Lake through the end of the season.

Acknowledgments

Funding for this research was provided by the U.S. Army Engineer Research and Development Center. We appreciate the support from our technician Rosemary Hartman for her long days in the field and the rest of the Gawlik Lab for all their input.

Richard A Botta
Dale E Gawlik
Department of Biological Sciences
Florida Atlantic University
777 Glades Road
Boca Raton, FL 33431-0991
561-297-3333
rbotta@fau.edu
dgawlik@fau.edu

Literature Cited

David, P.G. 1994. Wading bird nesting at Lake Okeechobee, Florida: An historic perspective. Colonial Waterbirds 17:69-77.

Erwin, R.M., J. Galli and J. Burger. 1981. Colony site dynamics and habitat use in Atlantic Coast seabirds. Auk 98:550-561.

Gawlik, D.E. 2002. The effects of prey availability on the numerical response of wading birds. Ecological Monographs 72:329-346.

Frederick, P.E. and M.W. Collopy. 1989. Nesting Success of Five Ciconiiform Species in Relation to Water Conditions in the Florida Everglades. The Auk 106:625-634

Kushlan, J.A. 1976. Wading bird predation in a seasonally fluctuating pond. Auk 93:464-476.

Havens, K.E. and D.E. Gawlik. 2005. Lake Okeechobee conceptual model. Wetlands 25:908-925.

Marx, D.E., and D.E. Gawlik. 2006. Wading bird colony location and size at Lake Okeechobee. Pp. 24-28 *in* M. I. Cook and H.K. Herring (Eds.). South Florida Wading Bird Report, Vol 12. South Florida Water Management District, West Palm Beach, Florida.

Oder, F.A. 1874. Natural History: Birds of Lake Okeechobee. Forest and Stream; A Journal of Outdoor Life, Travel, Nature Study, Shooting, Fishing, Yachting (1873-1930) 2:162.

Smith, J.P. and M.W/ Collopy. 1995. Colony turnover, nest success and productivity, and causes of nest failure among wading birds (Ciconiformes) at Lake Okeechobee, Florida (1989-1992). Archiv fur Hydrobiologie, Advances in Limnology 45:287-316.

Zaffke, M. 1984. Wading bird utilization of Lake Okeechobee marshes 1977-1981. Technical Publication 84-9. South Florida Water Management District, Environmental Sciences Division, West Palm Beach, Florida, USA.


Dale Gawlik

Figure 1. Comparisons of 2010 lake stage (m NGVD27) and daily precipitation totals (cm) with the daily lake stage average from 1977 to the present.

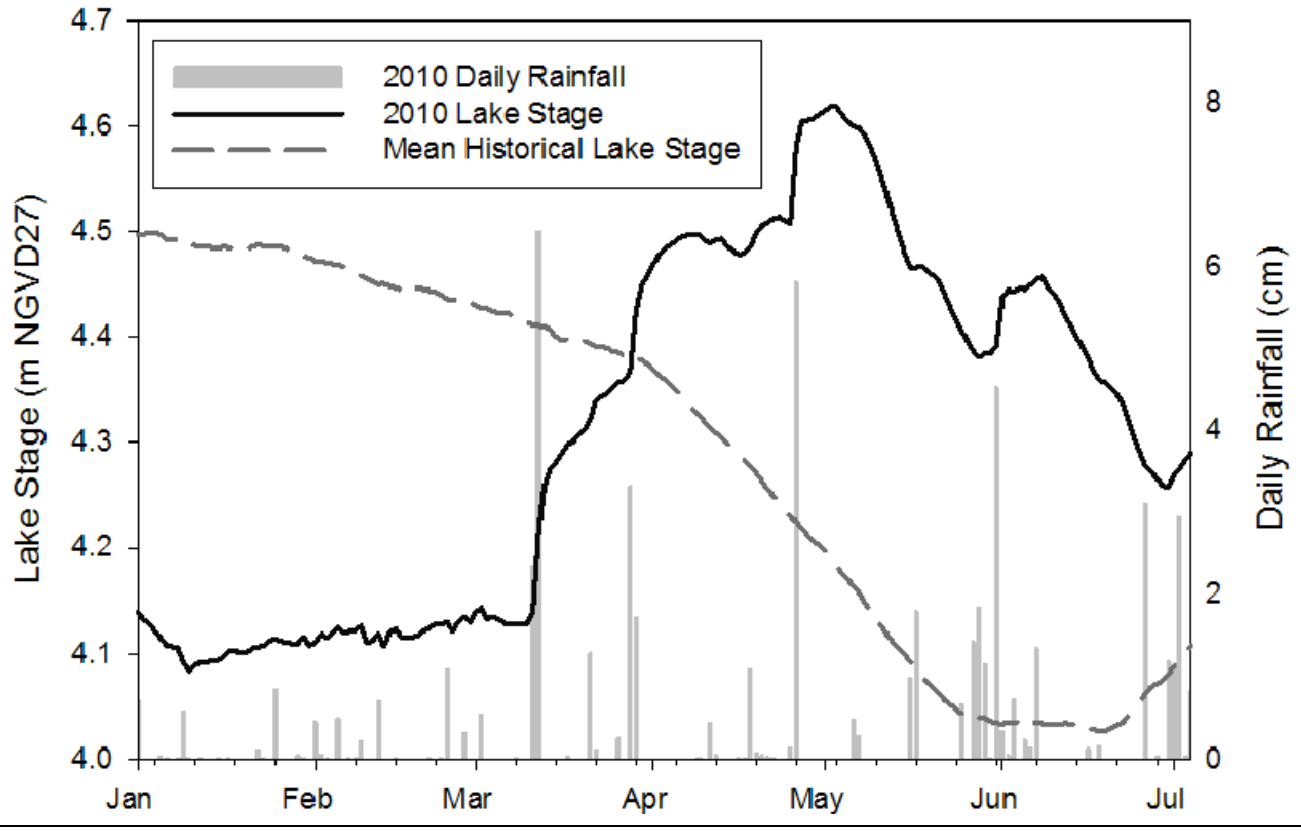


Table 1. Timing and nest effort for species breeding in wading bird colonies during 2010 at Lake Okeechobee. Italics denote peak nest effort for species included in grand total. Airboat monitoring only was conducted during January and February.

Month	GREG	GBHE	WHIB	SNEG	LBHE	TRHE	WOST	GLIB	CAEG	ANHI	Nest effort[1]
January	---[2]	4	---	---	---	---	---	---	---	1	4
February	15	*23*	---	---	---	---	---	---	---	25	38
March	62	17	---	---	---	---	*7*	---	---	70	86
April	269	20	600	1,010	115	390	6	2	5	110	2,412
May	*667*	17	*2,000*	*2,910*	*230*	*750*	3	*150*	500	110	6,727
June	324	6	2,000	1,268	225	260	2	100	1,970	105	4,185

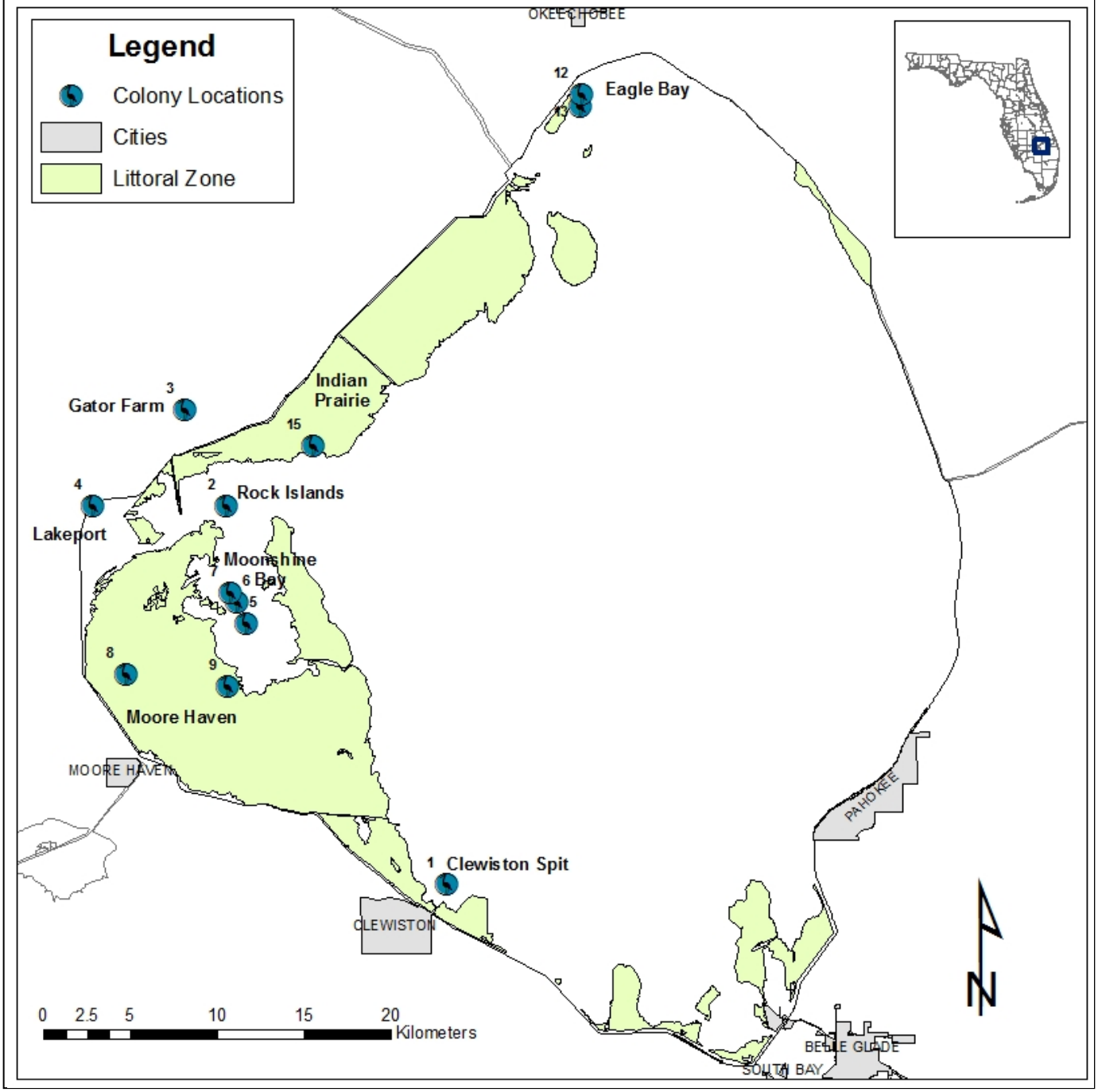
[1] Does not indude CAEG or ANHI. [2] Species not detected during monthly survey.

Table 2. Geographic coordinates (NAD 83) and species-specific peak nest efforts in detected colonies during the 2010 breeding season at Lake Okeechobee. Airboat monitoring only was conducted during January and February.

Colony	ID	Peak Month[1]	Lattitude	Longitude	GREG	GBHE	WHIB	SNEG	LBHE	TRHE	WOST	GLIB	CAEG	ANHI	Total[1]
Clewiston Spit	1	APR	26.77591	-80.90939	30	---[2]	---	---	---	---	---	---	---	---	30
Eagle Bay East	13	MAY	27.17987	-80.83080	---	1	---	1,000	10	250	---	---	100		1,261
Eagle Bay Trail	12	MAY	27.18659	-80.83056	---	3	---	200	20	200	---	---	300	15	423
Gator Farm	3	MAY	27.02278	-81.06084	80	---	---	115	---	---	7	---	250	---	202
Indian Prairie South	15	FEB	27.00386	-80.98625	---	4	---	---	---	---	---	---	---	5	4
Lakeport Marina	4	MAY	26.97260	-81.11440	25		---	50	---	10	---	---	500	---	85
Moonshine Bay	5	APR	26.91117	-81.02514	40	15	---	---	---	---	---	---	---	30	55
Moonshine 2	6	MAR	26.92233	-81.03053	6	6	---	---	---	---	---	---	---	10	12
Moonshine 3	7	APR	26.92755	-81.03479	8	2	---	---	---	---	---	---	---	20	10
Moore Haven	8	FEB	26.88525	-81.09517	500	10	2,000	1,500	200	300	---	150	1,000	100	4,660
Moore Haven East1	9	APR	26.87882	-81.03612	9	2	---	---	---	---	---	---	---	---	11
Rock Island 4	2	APR	26.97227	-81.03672	41	3	---	45	---	---	---	---	---	---	89

[1] Does not indude CAEG or ANHI. [2] Species undetected during monthly survey effort.

Figure 2. Map of wading bird colonies observed at Lake Okeechobee from January to June 2010.




Dale Gawlik

KISSIMMEE RIVER

Introduction/Background

We survey wading bird nesting colonies and foraging wading bird abundance along the Kissimmee River as part of the Kissimmee River Restoration Evaluation Program (KRREP)(Williams and Melvin 2005, 2005a). To date, approximately 7,710 acres of wetland habitat (ca. ½ of project total) has been restored and the interim response of foraging wading birds has exceeded expectations (Bousquin et al. 2010). While there is no formal expectation for wading bird nesting effort, the number and size of colonies that have formed along the river since restoration began in 2001 has been below the historical average (Williams and Melvin 2005). All construction is scheduled for completion by the end of 2015, when new water regulation schedules for headwater lakes and the river will also be implemented, further improving wading bird habitat. Wading bird responses to the river restoration project will be monitored through 2020.

Methods

We performed systematic aerial surveys (Feb 16, Mar 22, Apr 23, and May 18) to search for wading bird nesting colonies within the floodplain and surrounding wetland/upland complex of the Kissimmee River. Surveys began at Rabbit Island in Lake Kissimmee and proceeded southward along the river to the S65-D structure (Figure 1). Known colonies in Lakes Mary Jane, Kissimmee (Rabbit Island), and Istokpoga were also surveyed at least once. Observers were placed on both sides of a helicopter flying at an altitude of 244 m along east-west transects spaced 2 km apart. Each transect spanned the 100 yr flood line of the river plus an additional 3 km east and west of the flood line. Nesting colonies were also monitored, when encountered, during separate aerial surveys of foraging wading birds (Jan 11, Feb 12, Mar 9, Apr 13, May 11). Once a colony was located, nesting species and the number of active nests were visually estimated by both observers. Nest counts were also obtained later from digital aerial photos taken at each colony to improve the accuracy of initial counts made from the air. It is likely that a relatively small number of dark colored species such as little blue heron (*Egretta caerulea*), glossy ibis (*Plegadis falcinellus*), tricolored heron (*Egretta tricolor*), and black-crowned night heron (*Nycticorax nycticorax*) were undercounted during the aerial surveys because of their lower visibility from above (Frederick et al. 1996), thus the colony totals presented in Tables 1 and 2 are considered conservative.

Results

A total of seven colonies were surveyed during 2010, only three of which occurred within the KRREP survey area (Tables 1 and 2; Figure 1). The other four colonies were observed in Lakes Mary Jane (Lat 28.3795, Long -81.1843), Kissimmee (Rabbit Island Lat 27.9391 Long -81.2543 and Lat 27.9218, Long -81.2283), and Lake Istokpoga (Lat 27.3403, Long -81.2839). The largest was first observed on Feb 18 on Rabbit Island in Lake Kissimmee, which has been the largest colony observed within both the upper and lower basins in recent years (Table 2; Bousquin et al. 2008, 2009). However, a significant proportion (>50%) of the white ibis nesting on Rabbit Island appeared to have abandoned nesting sometime between April 23 and May 18. No subsequent survey was conducted to determine if the number of nesting ibis was further reduced, but anecdotal evidence suggests that nesting effort for white ibis was further reduced before the end of the breeding period. One possible factor contributing to the partial colony abandonment was the above normal rainfall during the previous 5 months and the 4.68" of rainfall over Lake Kissimmee during the period between April 23 and May 18. This may have caused water level reversals in surrounding isolated wetlands where a portion of these birds were also likely foraging outside of Lake Kissimmee. Reversal of water levels during the dry season is thought to decrease prey availability for wading birds by redistributing prey over a larger surface area and decreasing prey density, thereby leading to nest abandonment when sufficient food cannot be captured to feed young.

The largest colony to form along the Kissimmee River was first observed on May 18, in the southern reach of MacArthur Run near the Pool C boat ramp. The other two colonies along the Kissimmee River also formed outside of the restored portions of the river; one in the northern 1/3 of Pool A near the River Ranch Resort on an island in the C-38 canal and the other southwest of the Pool D floodplain on private property (Lykes Brothers, Inc.)(Table 1 and Figure 1).

SFWMD, Pat Lynch

**Figure 1. Aerial survey transect routes and locations of nesting colonies within the Kissimmee River floodplain and surrounding wetland/upland complex during 2010. ***The Lake Mary Jane colony (not shown above) is approximately 30 mi. to the north- northeast of Lake Kissimmee and 16 mi. southeast of the city of Orlando.

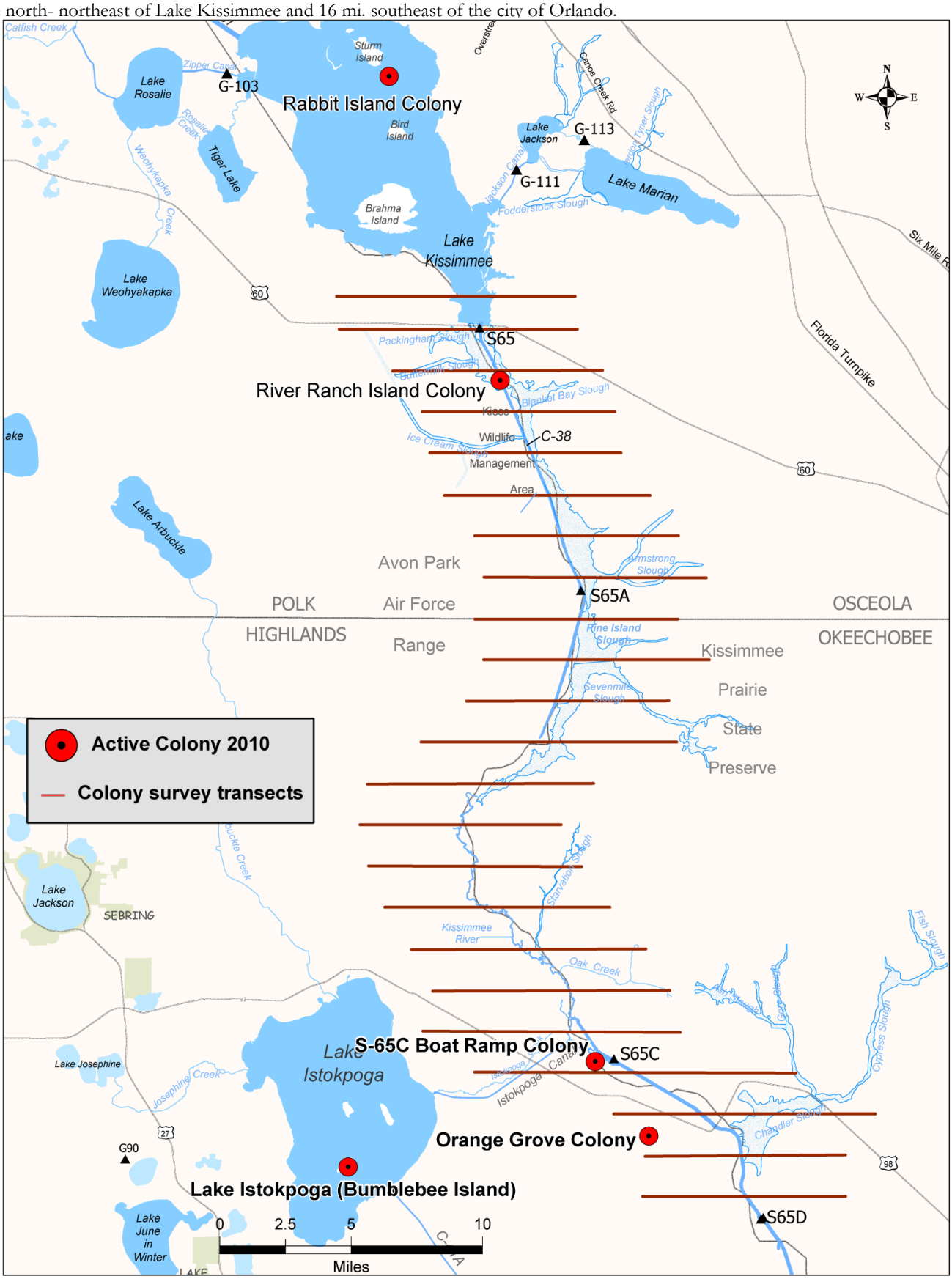


Table 1. Peak numbers of wading bird nesting colonies inside or within 3 km of the Kissimmee River 100 yr flood line between Lake Kissimmee and S65-D structures during 2010 (Feb-May).

Lat, Long	Colony Name (Location)	CAEG	GREG	WHIB	SNEG	GBHE	LBHE	TRHE	GLIB	BCNH	Total
27.7747, -81.1857	River Ranch Island (Island in C-38 canal; east of River Ranch Resort)	-	30	-	-	12	-	-	-	-	42
27.3176, -81.0305	S-65C boat ramp (Approx. 0.6 mile SW of ramp)	842	-	-	-	-	22	15	-	-	879
27.3595, -81.093	Orange Grove (1.0 mile SW of Pool D floodplain)	49	5	-	-	19	-	-	-	-	73

Table 2. Peak numbers of wading bird nesting colonies inside or within 3 km of the Kissimmee River 100 yr flood line between S-65 and S65-D structures and within Lakes Mary Jane, Kissimmee, and Istokpoga. Surveys were conducted Mar-Jun, 2004; Mar-Jun, 2005; Feb-Jun, 2006; May-Jul 2007; Jan-May 2008; Feb-Apr 2009; Feb-May 2010.

Kissimmee River

Year	CAEG	GREG	WHIB	SNEG	GBHE	LBHE	TRHE	GLIB	BCNH	Total
2004	-	-	-	-	-	-	-	-	-	-
2005	400	81	-	-	5	-	-	-	-	486
2006	500	133	-	-	4	-	-	-	-	637
2007	226	-	-	-	-	-	1	-	-	227
2008	-	2	-	-	4	-	-	-	-	6
2009	240	126	-	-	27	11	3	-	-	407
2010	891	35	-	-	31	22	15	-	-	994
Total	2,257	377	-	-	71	33	19	-	-	2,757

Lake Mary Jane

Year	CAEG	GREG	WHIB	SNEG	GBHE	LBHE	TRHE	WOST	BCNH	Total
2010	-	250	-	-	-	-	-	100	1	351
Total	-	250	-	-	-	-	-	100	1	351

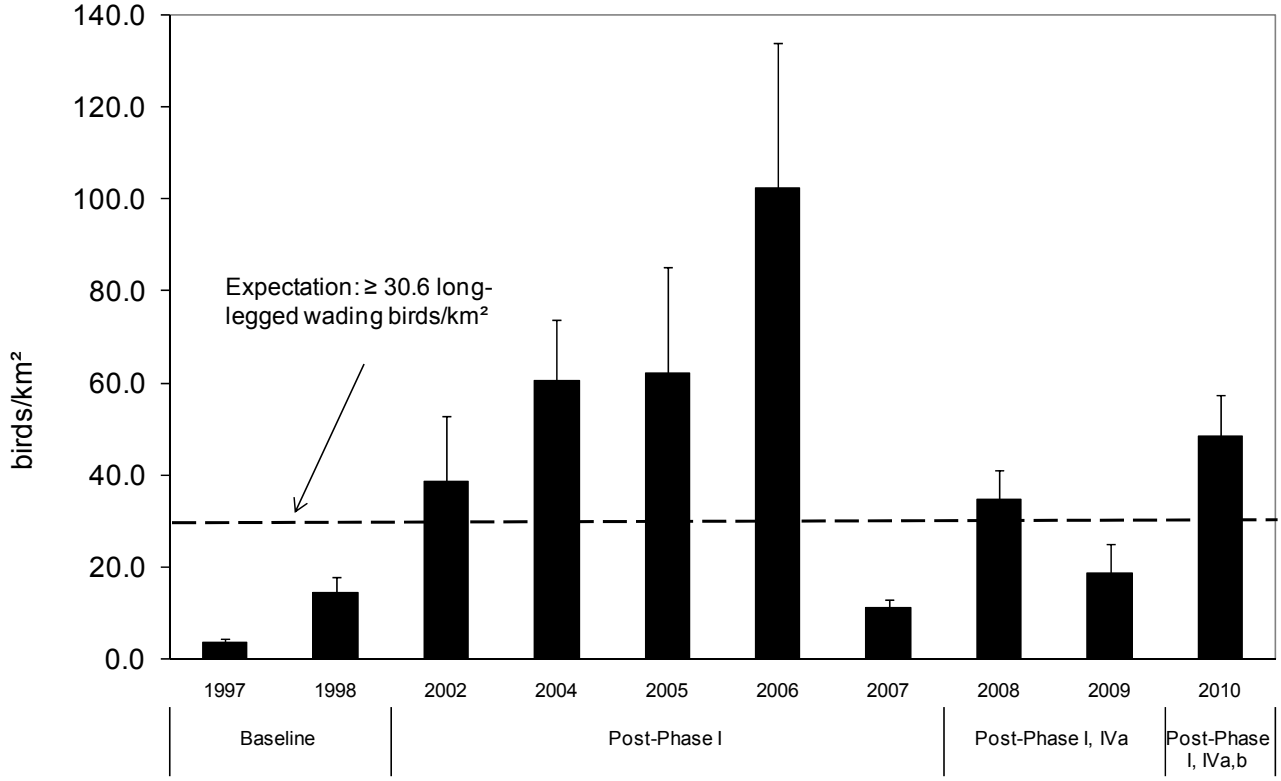
Lake Kissimmee

Year	CAEG	GREG	WHIB	SNEG	GBHE	LBHE	TRHE	GLIB	BCNH	Total
2009	740	150	75	10	50	42	87	10	3	1,167
2010	200	249	1,156	-	59	-	-	-	-	1,664
Total	940	399	1,231	10	109	42	87	10	3	2,831

Lake Istokpoga

Year	CAEG	GREG	WHIB	SNEG	GBHE	LBHE	TRHE	GLIB	BCNH	Total
2010	103	325	110	-	75	-	-	-	-	613
Total	103	325	110	-	75					613

Figure 2. Baseline and post-Phases I, IVa, and IVb abundance (± SE) of long-legged wading birds (excluding cattle egrets) during the dry season (Dec-May) within the 100-year flood line of the Kissimmee River. Baseline abundance was measured in the Phase I area prior to restoration. Post-restoration abundance was measured beginning approximately 10 months following completion of Phase I.



Although this year's total nesting effort was an increase over last year, the increase was due entirely to an increase in the number of cattle egret nests at the S-65C boat ramp colony. The terrestrial cattle egret, which is indicative of the un-restored upland pasture habitat that dominates the Phase II/III area adjacent to the colony, is expected to decrease in abundance as a result of continued restoration in the area south of Phase I. Likewise, it is expected that the abundance of aquatic wading bird species breeding along the river will increase within the Phase II/III area after over 4,688 acres of wetland habitat are re-established (see Wading Bird Abundance below).

The continued small numbers of aquatic species nesting along the restored portion of the river suggests that prey availability on the floodplain is not yet sufficient to support the completion of breeding for these wetland dependent birds. Water levels within the restored floodplain were also well above average during the 2010 dry season, and much of the floodplain was too deep for wading bird foraging during a time when most aquatic species initiate breeding and energetic demands are greatest. Additionally, the timing and magnitude of floodplain inundation and recession is not yet optimal for prey base concentration and rookery formation due to operational constraints. Implementation of the regulation schedule for the Headwaters Revitalization Project in 2015 will allow water managers to more closely mimic the historical stage and discharge characteristics of the river, presumably leading to suitable hydrologic conditions for wading bird nesting colonies.

KISSIMMEE RIVER FORAGING ABUNDANCE

Methods

East-west aerial transects (n = 218) were established at 200 m intervals beginning at the S-65 structure and ending at the S-65D structure (see Figure 1 for structure locations). Each month, a minimum of 20 percent of the 100-year floodplain was surveyed in both the restored and un-restored portions of the river/floodplain. Surveys were conducted via helicopter flying at an altitude of 30.5 m and a speed of 80 km/hr. A single observer counted all wading birds and waterfowl within 200 m of one side of the transect line.

Results

Wading bird abundance within the restored portions of the river was 48.5 (±8.8) birds/km² during 2010, more than double last year's mean of 18.6 birds/km². However, last year's below average numbers were attributed to birds being attracted to the active Phase IVb construction area (included in this years' survey for the first time), where water levels were more suitable for foraging than within the previously restored areas. Despite above average rainfall and water depths within the restored areas this dry season (esp. Mar-Apr), mean abundance for the season was still held relatively high according to average estimates from Dec-Feb, when monthly abundance was 71.2, 61.2, and 58.8 birds/km², respectively. Record numbers of adult and juvenile wood storks (*Mycteria americana*) were observed this fall/winter

from Oct-Jan, with a peak number seen during October, including one flock of over 350 individuals. This is attributed largely to migratory birds arriving from outside of the basin in fall after a banner nesting season during 2009 (Cook and Kobza 2009).

Since completion of Phases I, IVa, and IVb, abundance of long-legged wading birds has exceeded the restoration expectation of 30.6 birds/km² each year except 2007 and 2009 (Figure 2)(Bousquin et al. 2008). The three year running average, on which the restoration evaluation is based, was 33.9 birds/km² in 2010.

Michael D. Cheek
Kissimmee Division
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33406
561.682.6616
mcheek@sfwmd.gov

Literature Cited

Bousquin, S., D. Anderson, M. Cheek, D. Colangelo, L. Dirk, L. Glenn, B. Jones, J. Koebel Jr., J. Mossa and J. Valdes. 2010. Chapter 11: Kissimmee Basin (Birds) *in* South Florida Environmental Report, South Florida Water Management District, West Palm Beach, Florida, USA.

Frederick, P., T. Towles, R. Sawicki, and T. Bancroft. 1996. Comparison of aerial and ground techniques for discovery and census of wading bird (ciconiiformes) nesting colonies. The Condor 98: 837-841.

National Audubon Society. 1936-1959. Audubon warden field reports. Everglades National Park, South Florida Research Center, Homestead, FL.

Perrin, L.S., M.J. Allen, L.A. Rowse, F. Montalbano, K.J. Foote, and M.W. Olinde. 1982. A report on fish and wildlife studies in the Kissimmee River basin and recommendations for restoration. Florida Game and Freshwater Fish Commission, Okeechobee, Florida, USA.

Toland, B.R. 1990. Effects of the Kissimmee River Pool B Restoration Demonstration Project on Ciconiiformes and Anseriformes. Pages 83-91 *in* M.K. Loftin, L.A. Toth, and J.T.B. Obeysekera, eds. Proceedings of the Kissimmee River Restoration Symposium, South Florida Water Management District, West Palm Beach, Florida, USA.

Toth, L.A. 1991. Environmental responses to the Kissimmee River demonstration project. Technical Publication 91-02, South Florida Water Management District, West Palm Beach, Florida, USA.

Williams, G.E. and S.L. Melvin. 2005. Studies of Bird Assemblages and Federally Listed Bird Species of the Channelized Kissimmee River, Florida. In: S.G. Bousquin, D.H. Anderson, G.E. Williams and D.J. Colangelo (eds) *Establishing a Baseline: Pre-Restoration Studies of the Kissimmee River.* Technical Publication ERA 432, South Florida Water Management District, West Palm Beach, FL.

Williams, G. E. and S. L. Melvin. 2005a. Density of long-legged wading birds on the floodplain. Expectation 24 *in* D. H. Anderson, S.G. Bousquin, G. E. Williams, and D. J. Colangelo, editors. Defining Success: Expectations for Restoration of the Kissimmee River. South Florida Water Management District, West Palm Beach, Florida, USA.


Estero Bay Aquatic Preserve

ESTERO BAY AQUATIC PRESERVE COLONIAL WADING BIRD NEST MONITORING AND PROTECTION PROGRAM

Estero Bay Aquatic Preserve (EBAP) was designated Florida's first aquatic preserve in 1966. EBAP consists of 11,000 acres of sovereign submerged lands and is located in southwest Florida, extending from Fort Myers Beach to Bonita Springs. The shallow estuary is fed by five fresh water tributaries and four passes connecting to the Gulf of Mexico. Designated as Outstanding Florida Waters because of its exceptional ecological significance, Estero Bay contains mangrove islands that are used as breeding colonies by a variety of bird species. EBAP started monitoring colonial nesting birds in 1977. A variety of survey methods have been employed over the history of the program. Brown Pelicans were monitored in May between 1977 and 1982. May surveys from 1983 through 1989 included all wading and diving birds. Survey schedules were changed in 1998 and surveys were conducted in April of that year and again in 2001 and 2007. Monthly nest counts of all active and historically active islands have been performed since 2008 using a direct count method.

Methods

Islands within the aquatic preserve and state owned islands bordering the aquatic preserve were monitored for nesting birds once a month, starting in January and continuing through the end of the nesting season. Nineteen islands were monitored during the 2010 season, 16 of which were active. Surveys were conducted on January 19 & 26; February 15 & 17; March 9 & 10; April 16, 19 & 20; May 12 & 13; June 10, 15 & 16.

A 17 foot Boston Whaler was used to conduct surveys. Each island was circled at a consistent speed while keeping a distance of approximately 100 feet from the island. Two observers conducted counts indicating the number of nests by species and nesting stage. Nests were recorded as *empty* if no birds or eggs were observed (those numbers were not included in any analyses); *unknown* if an adult was present at the nest but no eggs or chicks were visible or if the pair was copulating; *incubating* if the adult was in an incubating posture or if eggs were visible; or *chicks* if chicks were present in the nest or the vicinity of the nest. Survey data collected between February and June was analyzed for this report.

Results

A total of 19 islands were surveyed including, three new colonies not active in past years. Sixteen of the 19 islands contained active nests during the 2010 nesting season with a peak nest count of 395 (Table 1). Nesting success on active islands ranged from one nest on island 6619038c to 144 nests on Big Carlos Pass W of M-52. June was the peak of the nesting season with 276 active nests.

Species Summaries

Double-crested Cormorant (DCCO)

DCCO nested on four islands in the bay with a peak nest count of 55.

Brown Pelican (BRPE)

BRPE nested on four islands in the bay with a peak nest count of 77. BRPE peak nest numbers were 207 in 2008 and 108 in

2009 representing a 37% decrease in nesting success since 2008. The BRPE has also shown a shift in peak nesting season, with peaks in March of 2008; April of 2009; and June 2010.

Great Blue Heron (GBHE)
Peak nesting numbers for the GBHE were 112 a 56% increase since 2008 when the peak nest count was 63. Nests were documented on 15 islands in Estero Bay. Matanzas Pass and Big Hickory E of M-85 both had a peak nest count of 18. GBHE nesting peaked during April, with 67 active nests. Great White Herons (GWHE) were documented nesting on three islands. Two of the three nests were documented with one GWHE chick and one GBHE chick; at least one of the nests failed.

Great Egret (GREG)
GREG counts peaked in May, with 60 nests, and the peak nest count for the 2010 season was 61. In 2008 and 2009 GREG peak nest counts have been observed in April. GREG nested on six islands in the bay; 35 nests (57%) were located on Big Carlos Pass W of M-52.

Snowy Egret (SNEG)
SNEG nests were documented on three islands: Big Carlos Pass W of M-52, Matanzas Pass and North Coconut E of M-3 with a peak count of 19 nests. Nesting peaked in June, with 17 nests documented.

Little Blue Heron (LBHE)
LBHE were documented on two islands: Big Carlos Pass W of M-52 and Matanzas Pass, with peak nest counts of three and seven respectively.

Tri-colored Heron (TRHE)
TRHE nesting peaked in June, with nine nests documented. Peak nest counts were 13 and nesting was documented on four islands.

Reddish Egret (REEG)
Nesting was documented for REEG on two islands: Big Carlos Pass W of M-52 and Matanzas Pass, with a peak nest count of five.

Black-crowned Night-Heron (BCNH)
The peak number of BCNH nests was 24, with nesting documented on seven islands. Nesting peaked during June, with 21 nests.

Yellow-crowned Night-Heron (YCNH)
YCNH were documented on five islands and the peak nest count was 13. Nesting peaked in June, with 11 nests documented.

Green Heron (GRHE)
GRHE peak nest count was three, with nesting on two islands.

Acknowledgments
Special thanks to all of the volunteers who dedicated countless hours to this project and to Lover's Key State Park for providing launching and parking facilities.

Cheryl Parrott Clark
Environmental Specialist I
Department of Environmental Protection
Coastal and Aquatic Managed Areas
Estero Bay Aquatic Preserve
700-1 Fisherman's Wharf
Fort Myers Beach, Florida 33931
(239) 463-3240
Cheryl.Clark@dep.state.fl.us

Table 1. Peak numbers of nests found in Estero Bay Aquatic Preserve colonies between February and June 2010.

Colony	Latitude	Longitude	DCCO	BRPE	GBHE	GWHE	GREG	SNEG	LBHE	TRHE	REEG	BCNH	YCNH	GRHE	Total
Big Carlos Pass M-43	26.43155	-81.90066	0	0	2	0	1	0	0	5	0	3	1	0	12
Big Carlos Pass M-48	26.42771	-81.90050	0	0	0	0	0	0	0	0	0	0	0	0	0
Big Carlos Pass M-50&52	26.42244	-81.89527	6	2	7	0	0	0	0	0	0	1	1	0	17
Big Carlos Pass S of M-48	26.42672	-81.89852	0	0	0	0	0	0	0	0	0	0	0	0	0
Big Carlos Pass W of M-46	26.42926	-81.90137	0	0	0	0	0	0	0	0	0	0	0	0	0
Big Carlos Pass W of M-52	26.42469	-81.89359	14	57	7	1	35	14	3	1	2	10	0	0	144
Big Hickory E of M-85	26.35315	-81.84164	18	1	18	0	6	0	0	0	0	1	0	0	44
Big Hickory M-83	26.35057	-81.84388	0	0	3	0	0	0	0	0	0	0	4	0	7
Coconut Point East	26.38411	-81.84905	0	0	12	0	0	0	0	0	0	0	0	0	12
Coconut Point West	26.38111	-81.84976	0	0	9	0	1	0	0	0	0	0	0	0	10
Hogue Channel M-78	26.34988	-81.84644	0	0	6	0	0	0	0	0	0	3	6	2	17
Matanzas Pass	26.46092	-81.95717	13	17	18	0	6	3	7	6	3	1	1	0	75
New Pass M-21	26.38865	-81.85925	0	0	7	0	0	0	0	0	0	0	0	0	7
New Pass M-9	26.40465	-81.86816	0	0	2	0	0	0	0	0	0	0	0	0	2
North Coconut E of M-3	26.41131	-81.85486	4	0	14	1	12	2	0	1	0	5	0	0	39
North Coconut M-4	26.40737	-81.85998	0	0	1	1	0	0	0	0	0	0	0	0	2
6619038c	26.36737	-81.84357	0	0	0	0	0	0	0	0	0	0	0	1	1
Big Hickory M-49 2NW	26.36766	-81.84658	0	0	2	0	0	0	0	0	0	0	0	0	2
Big Hickory M-49 3NW	26.36831	-81.84698	0	0	4	0	0	0	0	0	0	0	0	0	4
Total			55	77	112	3	61	19	10	13	5	24	13	3	395

CHARLOTTE HARBOR AQUATIC PRESERVES & DING DARLING NWR COLONIAL WADING BIRD NEST MONITORING

Introduction

For three consecutive years, staff at J.N. "Ding" Darling National Wildlife Refuge (NWR) and Charlotte Harbor Aquatic Preserves has been conducting colonial nesting bird surveys within Matlacha Pass Aquatic Preserve, Pine Island Sound Aquatic Preserve, and part of the "Ding" Darling NWR Complex. Goals of this continuous study include documenting population trends; nesting shifts; biodiversity on islands; and the nesting efforts of wading and diving bird species.

Methods

Islands within the study area were determined to be either state owned or federally owned. The study area was divided between the two agencies based on location. J.N. "Ding" Darling staff monitored islands in South Matlacha Pass, San Carlos Bay, and South Pine Island Sound. Whereas, Charlotte Harbor Aquatic Preserves staff monitored islands in North Matlacha Pass and North Pine Island Sound. Due to lack of staff time, islands in Lemon Bay Aquatic Preserve and Gasparilla Sound/Charlotte Harbor Aquatic Preserve were not monitored. Both agencies employ a direct count method, with a primary observer, secondary observer, boat captain, and data recorder. Islands were circled by boat and individual nests were recorded according to species. Nests were identified as incubating, chicks or unknown if a determination could not be made. Data collected during the months of February through June, 2010 were analyzed for this report. Peak numbers reflect the highest number of nests per species throughout the survey period. The number of total peak nests for all species combined was calculated for each island, as well. Surveys will continue through September.

Results

A total of 33 islands were surveyed during the 2010 nesting season. Of the 33 islands, 24 were active. Five islands peaked with over 100 nests; Hemp Key having the greatest peak count with 400 nests.

<u>Pine Island Sound Island Summaries</u>

Hemp Key NWR

Since 2008, Hemp Key has remained the most productive island monitored. The high nesting results include peaks of 237 Double-crested Cormorants; 72 Brown Pelicans; 16 Great Blue Herons; and 54 Great Egrets. The counts also represent the highest nesting effort for these species of any island surveyed in this study.

Useppa Oyster Bar

Useppa Oyster Bar is a series of small islands just south of Useppa Island. The peak nest count was 279, which included 153 Double-crested Cormorants; 100 Brown Pelicans; and 14 Great Egrets. A Great White Heron was documented incubating during June.

Broken Islands North

Broken Islands, North had only one month of high nest counts: April with 154 nests. The majority of nests were Double-crested Cormorants (75), Brown Pelicans (62), and Great Blue Herons (10). The counts for March, May and June were five, eight, and zero, respectively.

Broken Islands South

A low peak nest count of one Great Blue Heron was documented on Broken Islands, South.

Broken Islands East

Broken Islands, East also had a low peak nest count of two. One Green Heron nest was documented, the only one in the entire survey area. The other nesting species present was the Double-crested Cormorant.

Cork Islands

The peak number on Cork Island was four, with three Great Blue Heron nests and one Great Egret nest.

SW of Pumpkin Key

SW of Pumpkin Key had a peak nest count of six, of which was one Double-crested Cormorant and five Great Blue Heron nests.

NW of Pumpkin Key

NW of Pumpkin Key had a peak nest count of three, all Great Blue Herons.

SW of Mason Island

This island had a peak nest count of two: one Double-crested Cormorant and one Great Blue Heron nest.

N of Mason Island

The peak nest count on this island was eight. Nesting species documented were: Double-crested Cormorants, Great Blue Herons, and Black-crowned Night Herons.

N of York Island

The peak nest count for N of York Island was 44, with over half being Double-crested Cormorants, which had a peak number of 23. Five Great White Herons were documented nesting in April.

Bodiford Key

Bodiford Key had a peak nest count of 38. One of the four Reddish Egret nests documented on all the islands during this study was found on this island. The majority of nests were Brown Pelicans, with a peak count of 18.

Fish Hut Island

Fish Hut Island had a peak nest count of 28, including three Black-crowned Night Heron nests.

NE of York Island

This island had a peak nest count of five, including two Tri-colored Heron nests.

Clam Key

Clam Key had a peak nest count of three: two Great Blue Heron nests and one Yellow-crowned Night Heron nest. This was one of only two islands in which a Yellow-crowned Night Heron nest was documented.

Matlacha Pass Island Summaries

Givney Key NWR

Givney Key NWR had a peak nest count of 53 nests. Over half of the nests were Double-crested Cormorants, which peaked at 31. Two White Ibis were documented nesting in June. This is the only island on which nesting White Ibis were present.

Bird Rookery Keys, Lumpkin Island, N of Big Smokehouse Key, S of Indian Field, Upper Bird Island

The islands listed above had a collective peak nest count of nine, all of which were Great Blue nests.

San Carlos Bay Island Summaries

Skimmer Island

Skimmer Island had a peak nest count of 184. Notably, the Snowy Egret had a successful nesting effort in March with a peak number of 33 nests. This island also represents the highest diversity of bird species nesting. 12 species of wading and diving birds were documented including: Double-crested Cormorants, Brown Pelicans, Great Blue Herons, a Great White Heron, Great Egrets, Snowy Egrets, Tri-colored Herons, Reddish Egrets, a Black-crowned Night Heron, Yellow-crowned Night Heron, a Green Heron, and Cattle Egrets.

Tarpon Bay Keys

The peak nest count at Tarpon Bay Keys was 119. Species observed nesting on this island were: Double-crested Cormorants, Brown Pelicans, Great Blue Herons, Great Egrets, Tri-colored Herons, and Black-crowned Night Herons.

Lower Bird Island

Lower Bird Island had a peak count of 60 nests in June. The majority of nests were Double-crested Cormorants and Brown Pelicans. The peak numbers for each species were 16 and 37, respectively.

Mary McMurray
Charlotte Harbor Aquatic Preserves
12301 Burnt Store Road
Punta Gorda, FL 33955
(941) 575-5861 x 111
Mary.McMurray@dep.state.fl.us

Tara Wertz
J.N. Ding Darling National Wildlife Refuge
1 Wildlife Drive
Sanibel, FL 33957
(239) 472-1100 x 231
Tara_Wertz@fws.gov

Table 1. Colonial nesting bird survey peak estimates for Pine Island Sound AP, Matlacha Pass AP and J.N "Ding" Darling NWR complex between February and June 2010. Counts reflect the maximum number of pairs of adults with nests by species.

COLONY (ISLAND)	Lat	Long	GBHE	GWHE	TRHE	LBHE	SNEG	GREG	REEG	CAEG	YCNH	BCNH	GRHE	WHIB	BRPE	DCCO	ANHI	Total
Benedict Island	26.6200	-82.1585	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bird Keys	26.6679	-82.2276	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bird Rookery Keys	26.6742	-82.0897	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Bodiford Key	26.4977	-82.1125	5	3	0	0	0	2	1	0	0	0	0	0	18	9	0	38
Broken Isl. N	26.6768	-82.1940	10	0	1	0	3	3	0	0	0	0	0	0	62	75	0	154
Broken Isl. S.	26.6742	-82.1944	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Broken Isl. E.	26.6777	-82.1920	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2
Captiva Rocks	26.6173	-82.1672	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clam Key	26.5063	-82.1128	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
Cork Island	26.5861	-82.1283	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Crescent Island	26.5979	-82.0639	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Darling Key	26.6669	-82.1811	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fish Hut Island	26.5467	-82.1245	5	0	0	0	0	2	0	0	0	3	0	0	5	13	0	28
Givney Key	26.5144	-82.0552	9	1	1	0	1	5	0	0	0	3	0	2	0	31	0	53
Hemp Key	26.6004	-82.1525	16	0	8	1	2	54	1	4	0	3	2	0	72	237	0	400
Lower Bird Island	26.5125	-82.0330	2	0	0	0	2	3	0	0	0	0	0	0	37	16	0	60
Limpkin Island	26.6016	-82.0526	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Masters Landing	26.5666	-82.0749	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mondongo Rocks	26.6849	-82.2129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N of Big Smokehouse Key	26.6998	-82.1226	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
N. of Mason Island	26.5581	-82.1219	1	0	0	0	0	0	0	0	0	2	0	0	0	5	0	8
N. of Regla Island	26.5464	-82.1245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N. of York Island	26.4945	-82.1043	2	5	2	0	2	6	0	0	0	0	0	0	4	23	0	44
N. E. of York Island	26.4939	-82.1021	2	0	2	0	0	0	0	0	0	0	0	0	0	1	0	5
NW of Mason Island	26.5545	-82.1252	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N. W. of Pumpkin Key	26.5660	-82.1279	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Skimmer Island	26.5101	-82.0250	10	1	7	0	33	18	2	2	1	1	1	0	72	36	0	184
South of Indian Field	26.6526	-82.1043	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
SW of Mason Island	26.5534	-82.1249	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
S. W. of Pumpkin Key	26.5642	-82.1276	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	6
Tarpon Bay Keys	26.4573	-82.0745	6	0	5	0	9	24	0	0	0	5	0	0	31	39	0	119
Upper Bird Island	26.5592	-82.0714	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Useppa Oyster Bar	26.6522	-82.2144	8	1	2	1	0	14	0	0	0	0	0	0	100	153	0	279
TOTAL			100	11	28	2	52	132	4	6	2	17	4	2	401	641	0	1,402

REGIONAL WADING BIRD ABUNDANCE

ABUNDANCE AND DISTRIBUTION OF WADING BIRDS IN EVERGLADES NATIONAL PARK DURING THE 2010 NESTING SEASON INCLUDING POPULATION TRENDS FROM 1985 TO 2010

Introduction

Wading birds are especially sensitive to changes in seasonal cycles of wet and dry surface conditions (Bancroft & Jewell 1987, Kushlan *et al* 1975, Frederick & Spalding 1994, Russell *et al* 2002). As a consequence, they have been utilized as indicator species to evaluate human impact and restoration efforts in the Everglades (DeAngelis *et al* 1996). The greatest concentration of wading birds in south Florida typically occurs from December to May when water level under natural conditions gradually recedes, making prey easier to capture. These changes in hydropattern have a profound effect on prey availability (Frederick & Spalding 1994) and thus on wading bird abundance and distribution (Gawlik & Sklar 2000).

Standard aerial transect counting techniques in conjunction with a systematic sampling design, better known as Systematic Reconnaissance Flights (SRF) has been used since 1985 to document wading bird abundance, distribution and changes in hydrologic patterns in Everglades National Park. For more detailed methodology description see Alvarado & Bass (2009). Despite fluctuations in wading bird populations observed since 1985, the overall trend is an increase. Furthermore, the number of wading birds observed in 2010 represents the highest since 1985. Data obtained during each SRF not only provides information on the status and trends of wading bird populations in Everglades National Park, but also provide information needed for modeling evaluations to select the best management options.

Results

Pooled wading bird abundance was higher in 2010 than in any previous survey year. The estimated abundance for all the species combined increased by 34% (Figure 2) in relation to the previous year. Since 1985, there has been an overall significant increase in the total abundance of all the species combined (R^2=0.354, F=13.133, P=0.001). Six species showed an increase in numbers from 2009 to 2010 (Figure 3). Those species are: white ibis (WHIB) 69%, great white heron (GWHE) 65%, glossy ibis (GLIB) 47%, roseate spoonbill (ROSP) 34%, wood stork (WOST) 16% and great egret (GREG) 9%. Three species decreased in abundance: great blue herons (GBHE) 20%, small white heron (SMWH) 18% and small dark herons (SMDH) 12%.

Despite the annual fluctuations observed for each species over time (Figure 3), an overall significant increase was observed in five of the species. Those species are: GREG (R^2=0.507, F=24.665, P<0.001), GBHE (R^2=0.223, F=6.894, P=0.015),


SFWMD, Pat Lynch

WHIB (R^2=0.203, F=6.096, P=0.021), WOST (R^2=0.193, F=5.751, P=0.025) and SMWH (R^2=0.171, F=4.955, P=0.036). Three species, SMDH (R^2=0.006, F=0.149, P=0.703), GLIB (R^2=0.008, F=0.188, P=0.669) and ROSP (R^2=0.050, F=1.265, P=0.272) have remained stable in the number of individuals with no significant increases or decreases. GWHE is the only species that displayed an overall significant decline in numbers (R^2=0.379, F=14.673, P=0.001) since 1985.

During 2010, the maximum number of wading birds, regardless of the species, occurred between December and February (Table 1); with the highest number recorded in January. During this month, the highest numbers of GREG, WOST and GBHE were observed. Other species such as, WHIB, GLIB, and SMDH reached their peak numbers in February. ROSP and GWHE were more abundant in March; while SMWH were more numerous in December. The fewest number of birds for all species combined, as well as for all the individual species, with the exception of ROSP, occurred in May.

The most abundant species was WHIB which represented approximately fifty seven percent of the total number of birds, followed by GREG (28.4%). These two species combined accounted for more than 85% of the total number of birds; the remaining 15% in order of abundance were SMWH (4.9%), WOST (4.3%), SMDH (1.8%), GBHE (1.7%), ROSP (1.0%), GLIB (1.0%), and GWHE (0.05%).

Differences in distribution and abundance of birds were observed among the various drainage basins regardless of the total area (Table 2). Shark Slough (SS) contained the highest number of wading birds (27%), followed by East Slough (ES) and Shark Slough Mangrove Estuary (SSME) with 16% each. These three basins contained 59% of the total number of birds recorded during the survey period. The remaining birds were distributed in the following basins: Southern Big Cypress (SBC) 9%, Big Cypress Mangrove Estuary (BCME) 8%, Cape Sable (CS) 6%, Northeast Shark Slough (NESS) 5%, Long Pine Key/South Taylor Slough (LPK/STS) 4%, Long Pine Key/South Taylor Slough Mangrove Estuary (LPK/STSM) 3%, Northern Taylor Slough (NTS) and Eastern Panhandle (EP) 2% and Eastern Panhandle Mangrove Estuary (EPME) with only 1%. If the total area for each basin is taken into consideration, ES was the basin with the highest density of birds for almost of the season, except for May. SBC was the second highest in

December, CS in January, and SS from February to April. In May, the highest densities of birds were found in LPK/STSME, LPK\STS and SS respectively. Drainage basins also showed temporal differences within the same basin as the 2010 survey progressed from December 2009 to May 2010 (Figure 4). SBC, EP and NTS showed the highest densities of birds in December; ES, CS, BCME, SSME and EPME showed their peak numbers in January; while (SS, NESS and LPK/STS) showed the highest densities in February. LPK/STSME basin had the highest density of birds in May.

Changes in hydro-patterns and bird distribution (Figure 5) were less pronounced this year than in 2009 (see Alvarado & Bass, 2009). The maximum changes in the area covered by the different hydro-patterns during 2010 took place at the WW category, followed by DT. From December to May, the extent of area covered by WW was reduced 1,752 Km^2, while DT area experienced an increase of 960 Km^2 from December to April and a decreased of 368 Km^2 from April to May. The other intermediate categories WD and WT showed moderate changes throughout the season. The areal extend of WD increased 724 Km^2 from December to May, while WT increased 248 Km^2 from December to January, decreased 692 Km^2 from January to April and finally increasing again 352 Km^2 from April to May. The driest category, DD, showed only an increase of 528 Km^2 from December to May. During the entire season, except for February, highest densities of birds occurred in the WW hydro-pattern followed by WT and DT respectively.

Figure 6 shows the results of Kriging's interpolations generated with the hydro-patterns obtained for each individual 2x2Km cells, as well as the bird abundance and distribution for each month. During December and January, birds were widely distributed across the entire area with zones of higher concentrations in East Slough and Southern Big Cypress. From January to March, as water recedes, zones of higher concentrations of birds begin to become more numerous and dispersed, occupying areas with more suitable water surface condition for foraging; especially at the edges of Shark Slough and East Slough. By April and May, when the driest conditions occurred, the few remaining birds were found once again dispersed with few zones of high concentration at the lower portions of Shark Slough and East Slough, as well as in some estuarine basins. Very few birds were recorded at the Whitewater Bay area during the entire survey.

The spatial use of ENP by wading birds during the 2010 survey did not show the gradual decrease observed in 2009 as the dry season progressed. Birds were found foraging in 74% of the study area at the beginning of the season and by the end of the season they were using 48% of the total area (Figure 7).

Stage values and numbers of estimated birds showed clearly that wading birds are less abundant during extreme water conditions (Figure 8). During 1995, a particularly wet year, the number of wading birds was the lowest for the period of record. In 1990, a very dry year, the number of birds was also low. A quadratic function model (Figure 9) was used to analyze this type of behavior where too much or too little water in the system can lead to drastic changes in wading bird abundance. A significant relationship was found between the number of birds observed and the average stage at the NP-203 (R^2=0.421, P=0.002). The curve also suggests an optimal stage value for wading bird abundance somewhere around 1.77 m, using NP-203 station as a reference.


SFWMD, Pat Lynch

Figure 1. Map of ENP and southern Big Cypress National Preserve with sampling transects and drainage basins.

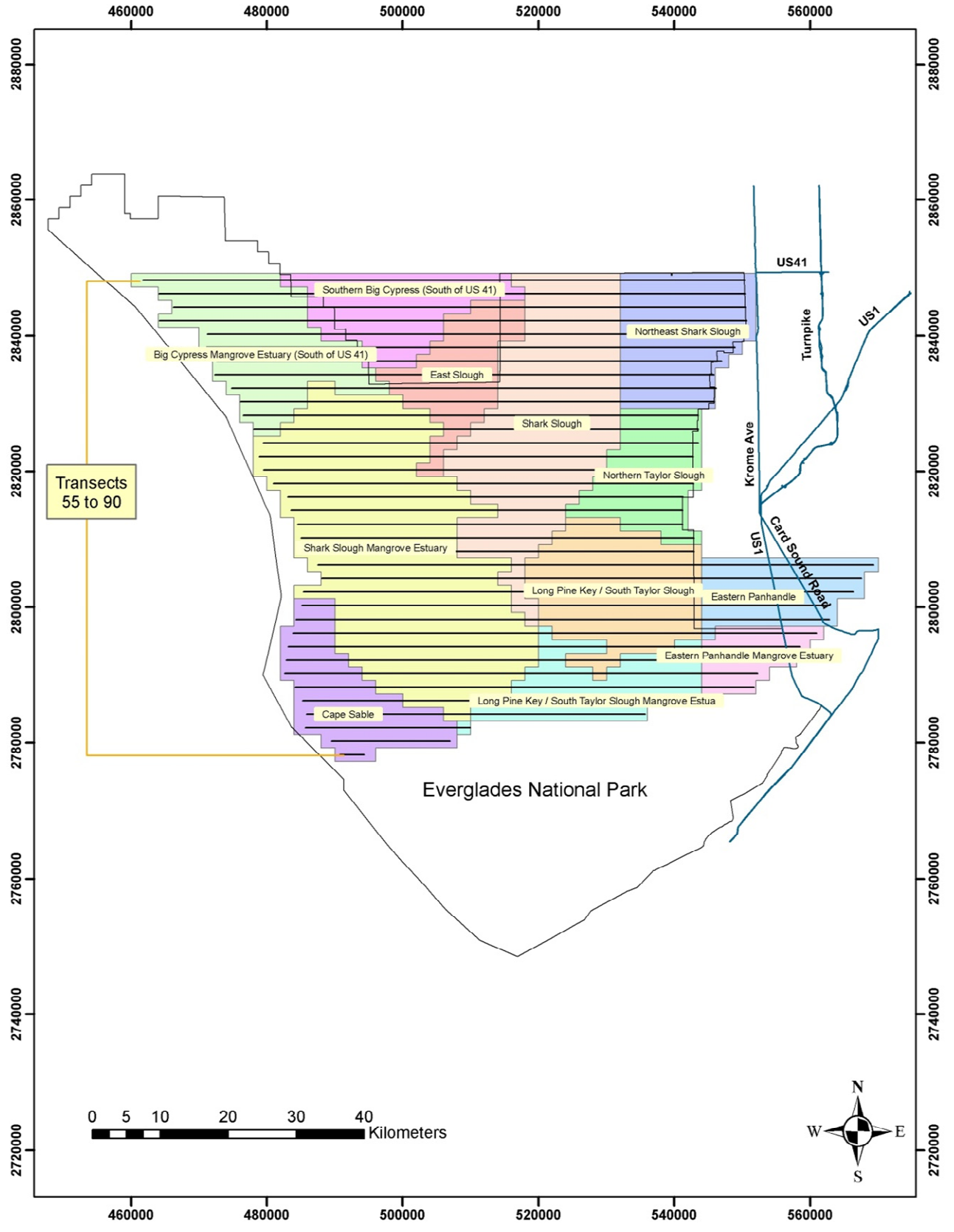


Figure 2. Estimated number of wading birds (all species pooled) observed from the months of December to May from 1985 to 2010. Red marks represent years with estimated missing data for one month.

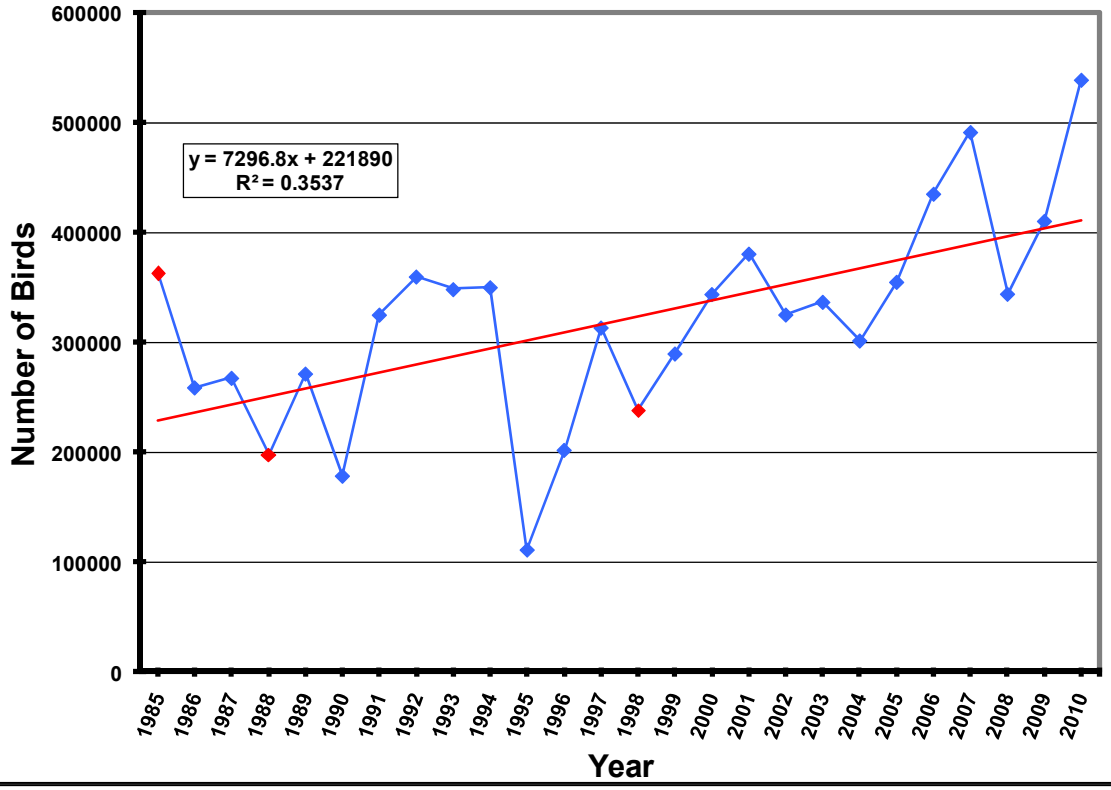


Figure 3. General trends in wading bird populations based on the total number of birds estimated during the surveys performed each year in the Everglades National Park from 1985 to the present.

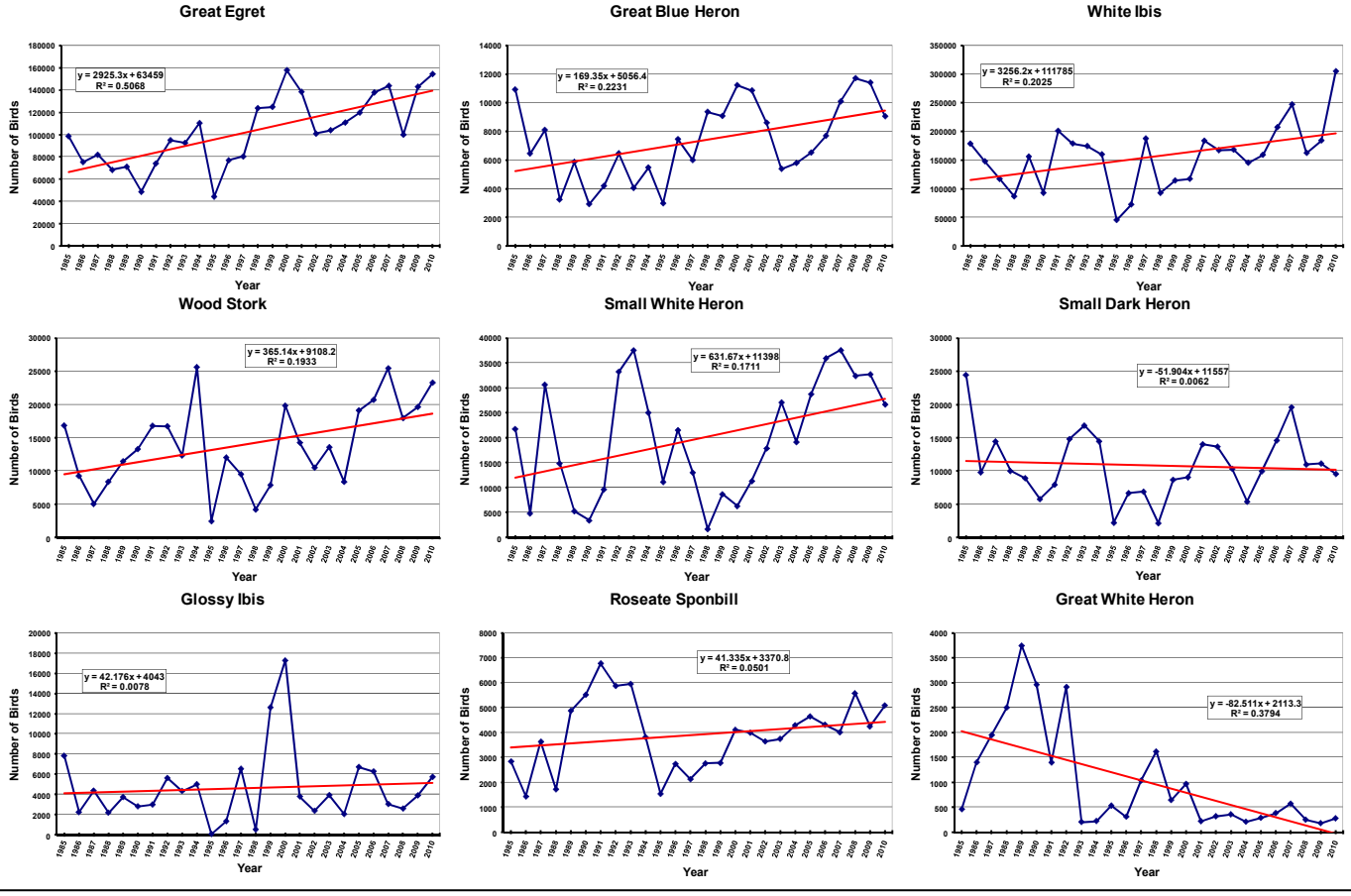


Table 1. Estimated abundance of wading birds in the Everglades National Park and adjacent areas, December 2009 to May 2010.

Species	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Total
GREG	29,586	44,385	32,807	22,190	16,554	10,586	156,108
GBHE	1,920	3,725	1,723	1,041	423	333	300
SMDH	2,144	1,857	2,649	1,743	1,170	277	9,165
SMWH	5,936	5,270	4,906	4,904	3,691	2,251	311,366
WHIB	59,274	72,517	74,315	53,548	32,648	19,064	5,731
GLIB	860	999	2,228	1,244	374	26	23,512
WOST	1,446	7,094	6,474	5,157	2,614	727	26,958
ROSP	1,161	876	689	1,297	527	1,155	9,840
GWHE	49	84	42	90	21	14	5,705
TOTAL	102,376	136,807	125,833	91,214	58,022	34,433	548,685

Table 2. Estimated abundance of wading birds (all species combined) for the different drainage basins in the Everglades National Park, December 2009 to May 2010.

Month	SBC	BCM	SS	NESS	ES	SSME	NTS	LPK/S	EP	CS	LPK/ST	EPM	Total
9-Dec	21,634	9,208	18,581	3,594	22,157	9,093	4,053	2,913	5,928	3,966	479	770	102,376
10-Jan	4,646	11,849	29,533	9,217	25,701	28,885	2,158	1,688	1,765	15,164	3,683	2,518	136,807
10-Feb	9,547	11,628	42,593	9,654	20,667	13,838	3,615	4,792	961	3,940	4,002	596	125,833
10-Mar	5,398	5,727	33,810	3,636	11,484	16,272	3,217	2,961	1,440	4,247	2,157	865	91,214
10-Apr	3,955	3,425	17,333	2,369	6,412	12,566	722	3,118	1,760	3,520	2,572	270	58,022
10-May	1,898	2,158	7,192	1,775	2,343	6,750	174	4,202	778	2,438	4,389	336	34,433
Total	47,078	43,995	149,042	30,245	88,764	87,404	13,939	19,674	12,632	33,275	17,282	5,355	548,685


SFWMD, James Beerens

Figure 4. Spatial and temporal changes in wading bird density among the different drainage basins between Dec-09 and May-10.

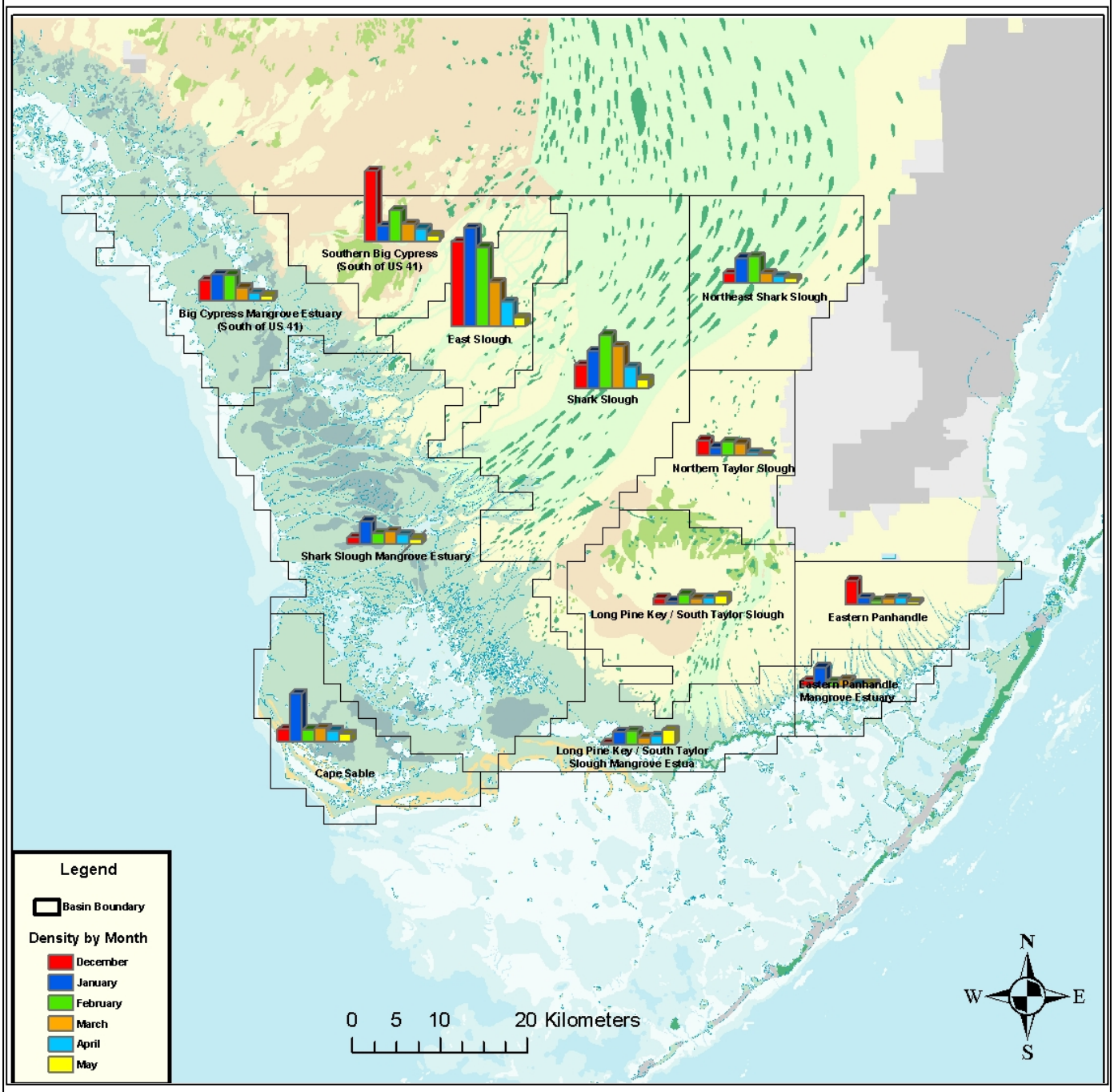


Figure 5. The 2010 areal extent and density of wading birds (all species pooled) in each surface water category: WW = continuous surface water; WT = mostly wet with scattered dry areas; DT = mostly dry with small scattered pools of water; WD = dry with water only in solution holes; DD = dry surface.

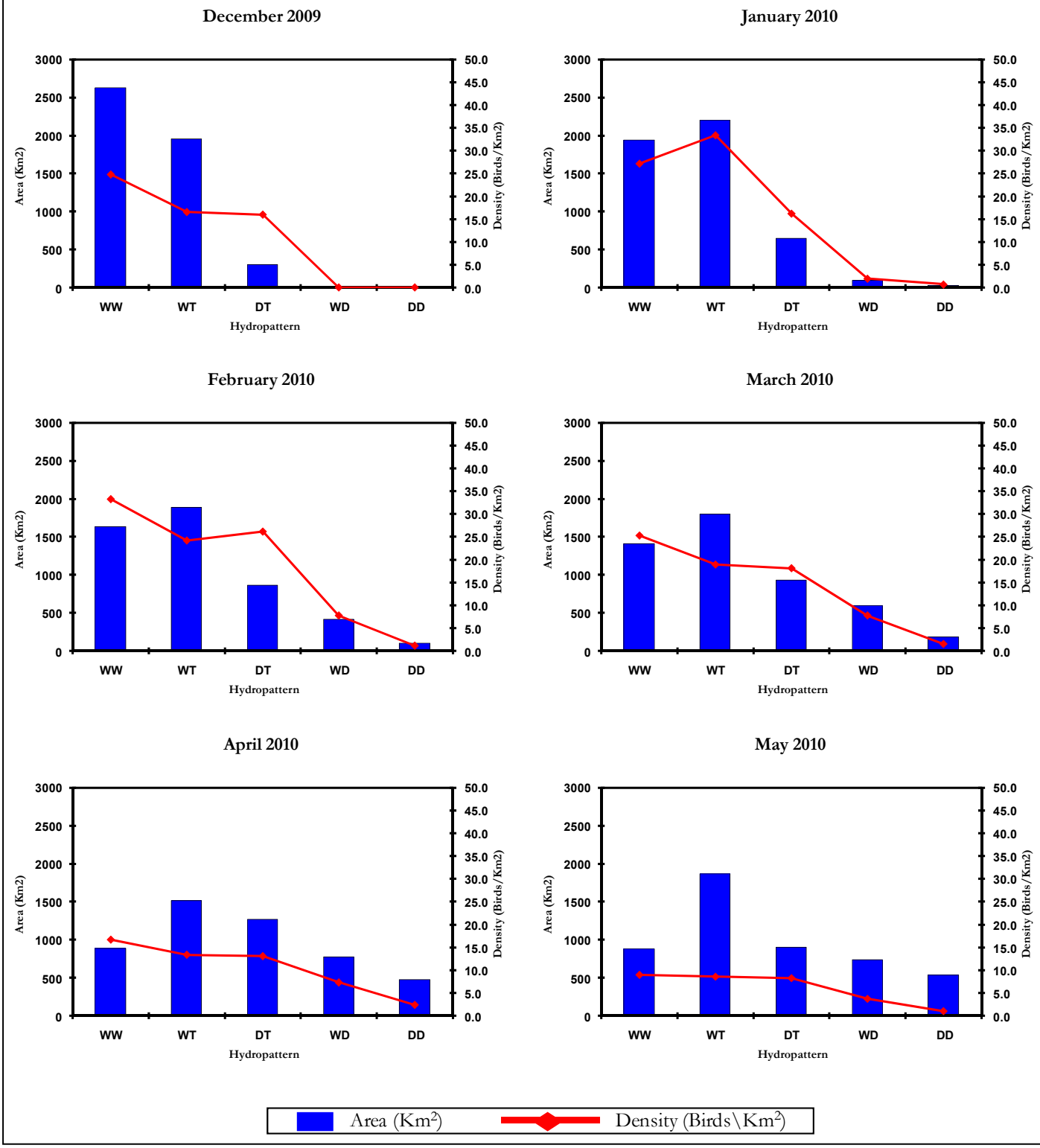


Figure 6. Kriging's interpolation of changes in hydropatterns observed between December 2009 and May 2010 and correspondent wading bird distribution.

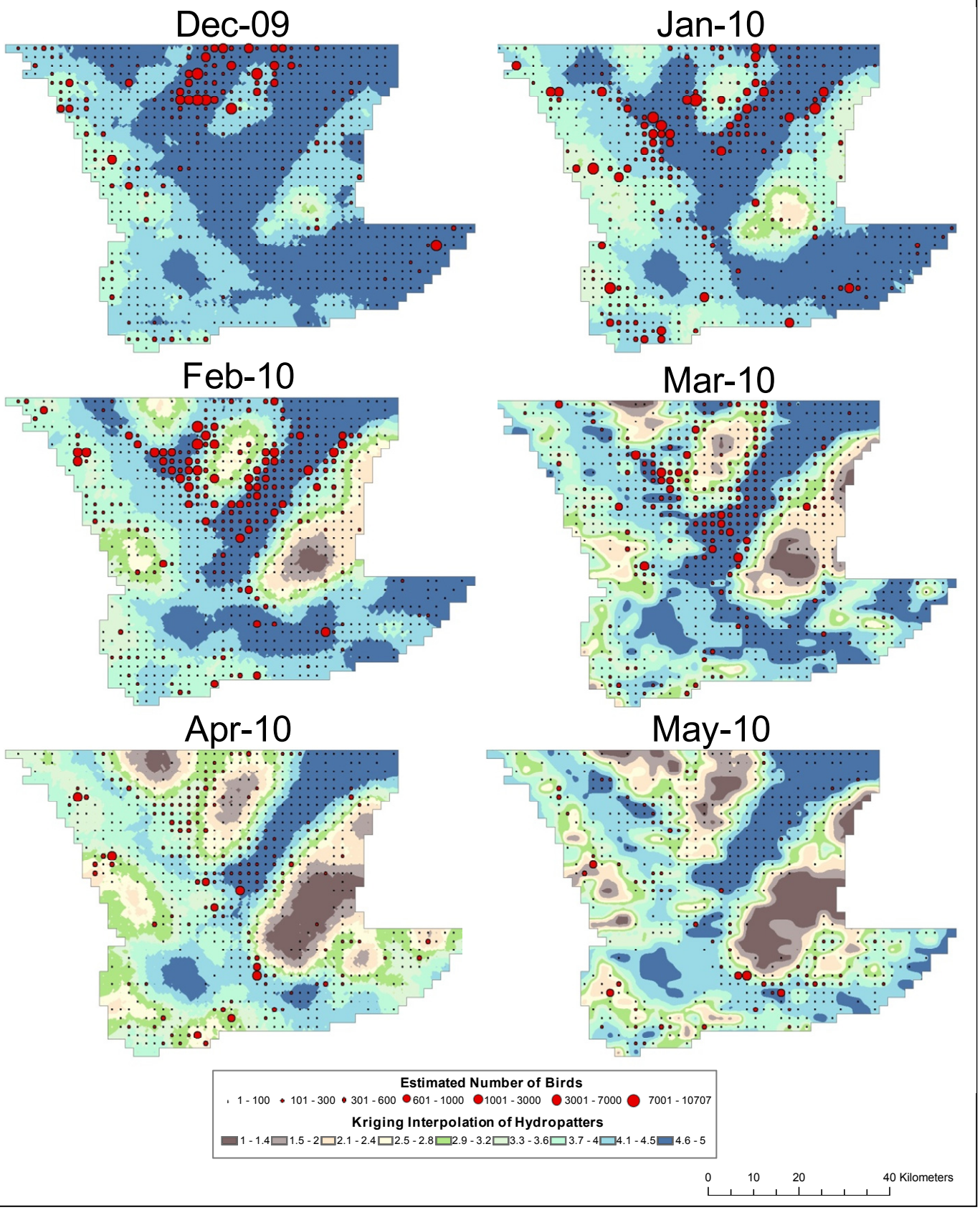


Figure 7. Monthly changes in wading bird areal utilization in the Everglades National Park from December 2009 to May 2010.

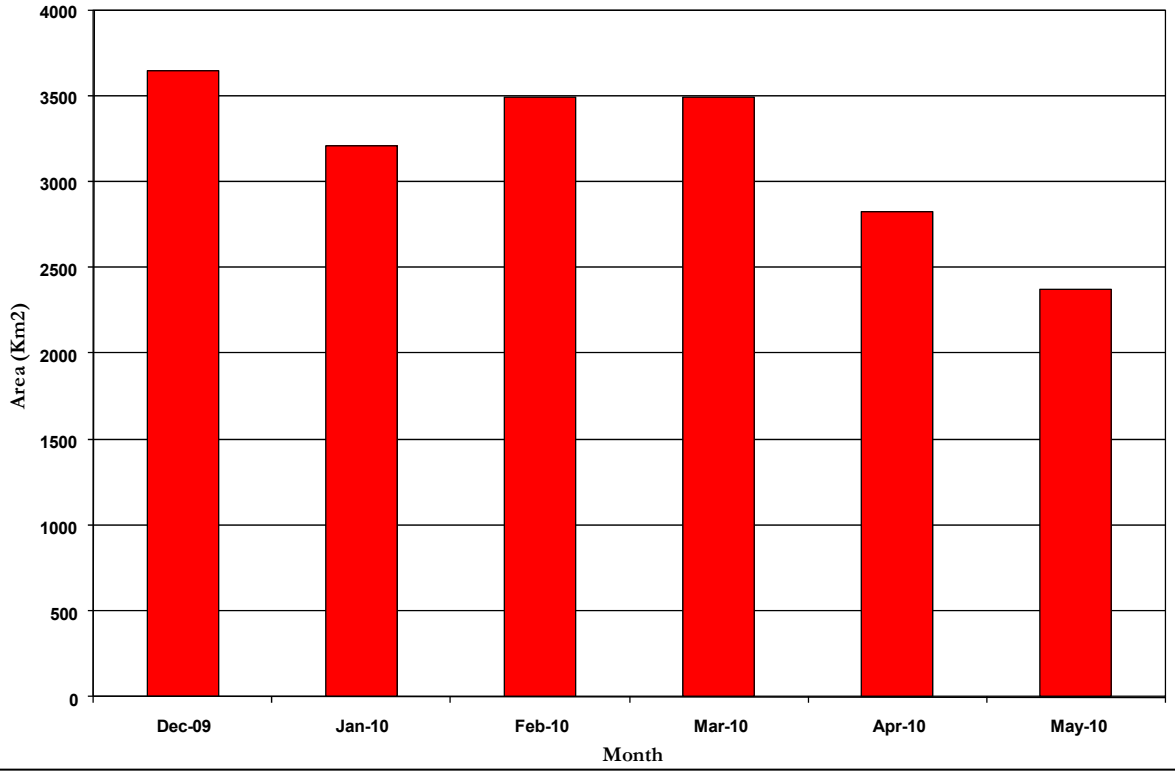


Figure 8. Relationship between numbers of birds observed for every year since 1985 to 2010 and the stage elevation in meters at the NP-203 hydrological station.

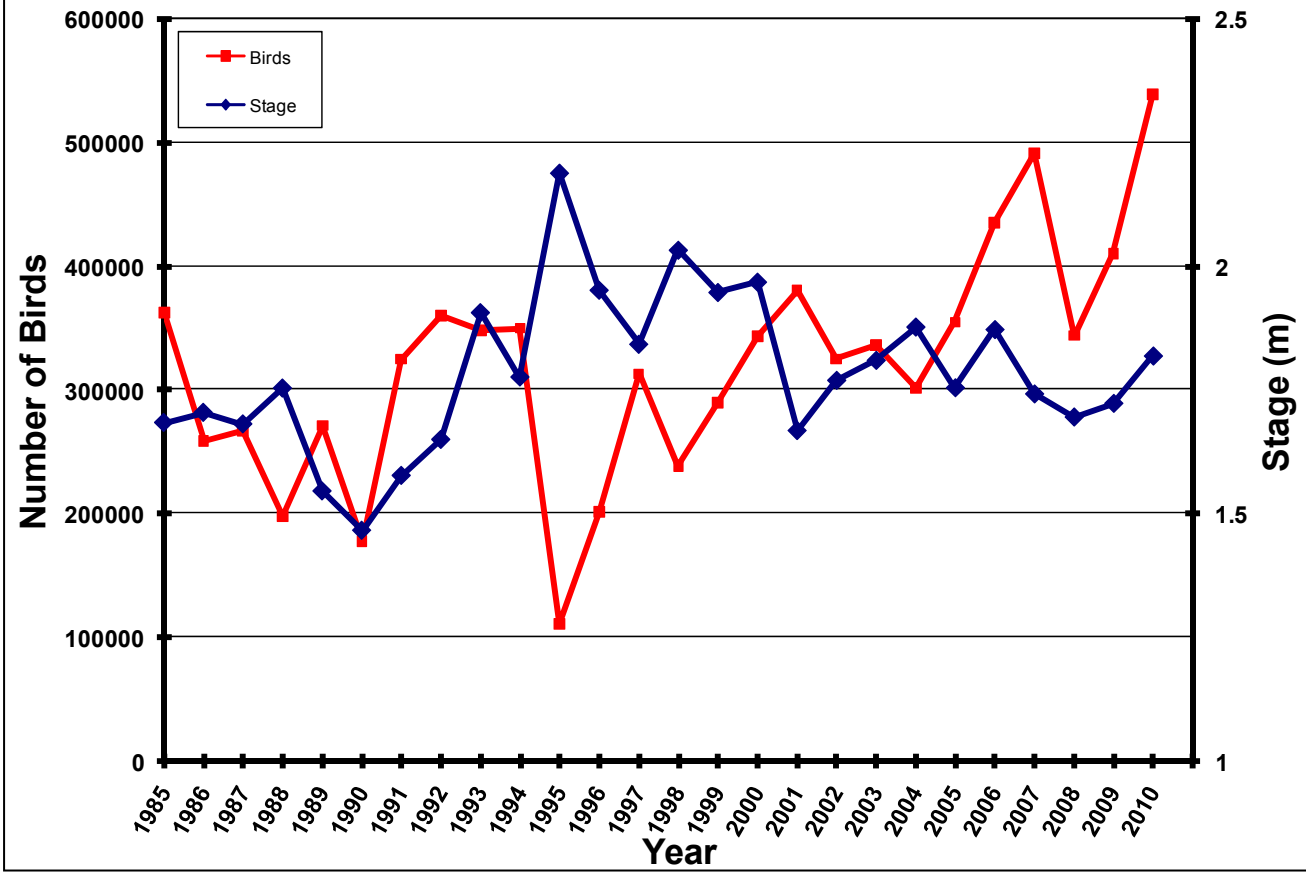
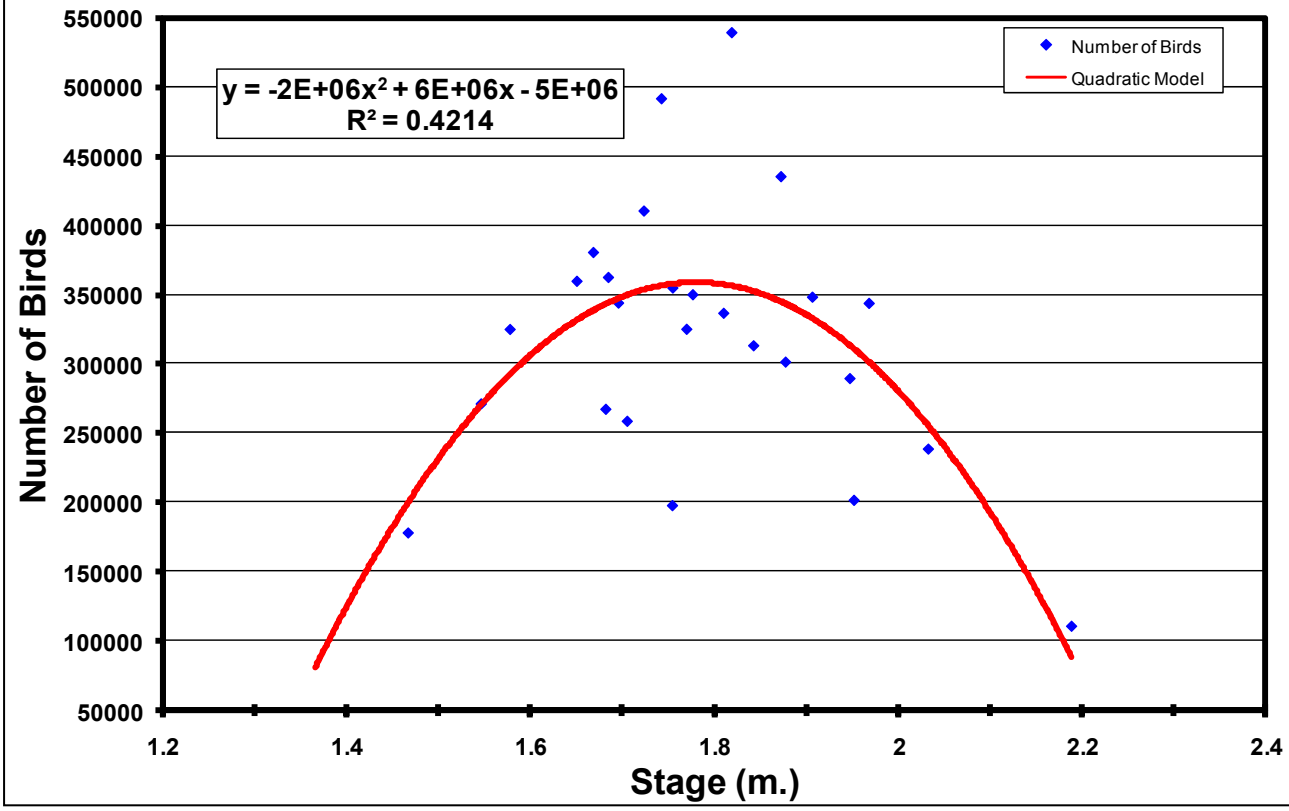


Figure 9. Quadratic function model used to test the relationship between wading bird abundance and average stage height using the NP-203 hydrological station data.



Discussion:

Data obtained over a 26-year period suggests that wading bird populations are slowly but significantly increasing in Everglades National Park. Furthermore, the largest number of birds since 1985 occurred this year. This successful increase in wading bird populations may be a consequence of the ongoing Everglades restoration efforts. The successful increase in wading bird populations has been identified by Gawlik & Sklar (2000) as a major component in the Everglades restoration. Currently, most species are showing an increasing trend or overall stable populations. Unfortunately for GEWH, that is not the case. Despite the increases observed during the last two years, the overall trend shows a significant population decrease.

Even though the recent increase observed in wading bird populations, suggest some success in the ongoing restoration efforts, more research is needed in order to fully support this statement. Wading bird populations in the Everglades are dynamic, changing constantly and are influenced by many other aspects (Russell *et al.* 2002). However, the most influential aspect is perhaps human habitat alteration; particularly changes in the natural hydrological conditions. Despite the idea that food availability is the most important factor limiting populations of wading birds in the Everglades (Frederick & Spalding 1994), it is the hydrological conditions that ultimately determines the availability of food. Data obtained during each SRF over the years, support the important role that hydrological conditions plays on the abundance and distributions of wading bird populations in the lower Everglades. The concept of too much/too little or just the right amount of water and the too late/too early or just at the right time seem to be of particular importance for wading birds. Although this preliminary analysis can provide some general ideas of the trends in the number of individuals observed for each species or groups of birds through the years, additional studies and more data analysis will be necessary in order to evaluate the significance of these observations and its relevance to the wading bird populations occurring in Everglades National Park.

Mario A. Alvarado
Oron L. Bass Jr.
Everglades National Park
South Florida Natural Resources Center
40001 State Road 9336
Homestead, FL 33034-6733
(305) 242-7884
(305) 242-7833
Mario_Alvarado@nps.gov
Sonny_Bass@nps.

References

Alvarado, M. A.. and S. Bass. (2009). Abundance and distribution of Wading birds in Everglades National Park during the 2010 nesting season including population trends from 1985 to 2010 In: South Florida Wading Bird Report (15): 38-49. Cook, M. I. & Kobza, M. (Eds.). South Florida Water Management District.

Bancroft, G. T. and S. D. Jewell. (1987). Foraging habitat of *Egretta* herons relative to stage In the nesting cycle and water conditions. (Second Annual Report) West Palm Beach: South Florida Water Management District.

DeAngelis D., L. J. Gross, S. Hartley, J. Johnston, F. J. Mazzotti, L. Pearlstine and K. G. Rice. (1996). Across Trophic Level System Simulation (ATLSS) Program. Unpublished manuscript.

Frederick, P.C. and M.G. Spalding. (1994). Factors affecting reproductive success of wading birds (Ciconiiformes) in the Everglades ecosystem. Pgs. 659 - 691 in: Everglades: the ecosystem and its restoration. S. Davis and J. C. Ogden (eds.) St. Lucie Press, Delray Beach, Florida.

Gawlik, D.E. and F.H. Sklar. (2000). Effects of Hydrology on Wading Bird Foraging Parameters. In: Higer, A.L. (Ed.). Greater Everglades Ecosystem Restoration (GEER) Conference, December 11-15, 2000, Naples, Florida. Section III p. 95-97.

Kushlan, J. A., J. C. Ogden, and J. L. Tilmant, (1975). Relation of water level and fish availability to wood stork reproduction in the southern Everglades, Florida. (Open File Report 75-434). Tallahassee: US Geological Survey.

Russell, G. J., Bass, O. L. and Pimm, S. L. (2002). The effect of hydrological patterns and breeding-season flooding on the numbers and distribution of wading birds in Everglades National Park. Anim. Conserv. 5: 185-199.

SFWMD, Pat Lynch

FORAGING WADING BIRD SURVEYS FOR WATER CONSERVATION AREAS AND BIG CYPRESS NATIONAL PRESERVE, 2010

Methods

Wading bird surveys were flown with a fixed wing aircraft at an altitude of about 60 meters along parallel transects with 2-km spacing each month from April to June 2010. Wading birds were identified to species when possible, enumerated, their locations recorded, their data entered into a database, and summarized into tables. Densities of each species were separated into 4-km^2 cells and plotted onto maps. Data were recorded using HP720 palm top computers linked to GPS. The data were downloaded into a computer spreadsheet, edited for errors, and compiled.

Results

The surface water conditions for the water conservation areas decreased from 100 % wet cells in April 2010 to 97 % wet cells in May 2010. The percent of wet cells increased in June 2010 (99 %). Since only three months (April to June) were surveyed in 2010 comparisons with other years should be viewed with caution. In 2010, the population estimates for wading birds (all species combined) in the Water Conservation Areas increased from April (14,193) to May (19,287); then decreased in June (17,933). Even though water levels were relatively conducive to wading birds in 2010 numbers were low. The winter of 2010 in Florida had unusually cold (freezing) temperatures that likely delayed or prevented birds from nesting in the spring thus reducing numbers. The surface water conditions in Big Cypress National Preserve during 2010 decreased from 78 % wet cells during April to 26 % wet cells in May and 28 % wet cells in June. Big Cypress National Preserve Wading bird average monthly relative abundance was low in 2010 (5,152). Final reports from 1996 to 2010 are currently available.

David A. Nelson
9458 Halls Ferry Road
Vicksburg, MS 39180
601-831-3816
drdavenelson@netscape.com

Table 1. Water Conservation Areas wading bird estimated abundance, 2010.

Species	Apr	May	Jun
GREG	7,353	9,727	9,920
GBHE	533	553	433
SMDH	180	120	73
SMWH	247	227	300
WHIB	3,313	6,127	4,133
GLIB	40	20	20
WOST	180	227	447
ROSP	67	40	7
GWHE	2,280	2,247	2,600
Totals	14,193	19,287	17,933

Table 2. Big Cypress National Preserve wading bird estimated abundance, 2010.

Species	Apr	May	Jun
GREG	2,967	1,733	3,653
GBHE	20	0	33
SMDH	7	0	27
SMWH	40	53	60
WHIB	1,180	1,620	1,693
GLIB	0	0	0
WOST	80	147	420
ROSP	0	0	0
GWHE	787	373	593
Totals	5,080	3,927	6,480

SFWMD, Pat Lynch

STATUS OF WADING BIRD RECOVERY: 2010 ANNUAL WADING BIRD REPORT

Sustainability of healthy wading bird populations is a primary goal (RECOVER 2005) and indicator of Everglades restoration (Frederick et al. 2009). The central hypothesis regarding restoration is that return of more natural hydrology, including the timing, depth and duration of flows (and attainment of corresponding downstream estuarine conditions), will result in increased wet season density and size structure of wading bird prey. The return of more natural patterns of prey production and concentration are *then* expected to help reestablish large wading bird colonies in the coastal and tributary regions of the southern Everglades.

The Restoration Coordination and Verification Program (RECOVER), the system-wide science arm of the Comprehensive Everglades Restoration Plan (CERP), established performance measures and related goals for both wading bird breeding and nesting parameters. The metrics are the number of pairs of wading birds for target species (which include Great Egret, Snowy Egret, Tricolor Heron, White Ibis, and Wood Storks) and the location of wading bird colonies. In addition, the timing of nesting for Wood Storks, which has shifted from historical dates ranging from November through December to January through March, is also a metric.

For information on RECOVER performance measures:

www.evergladesplan.org/pm/recover/perf_ge.aspx

www.evergladesplan.org/pm/recover/recover_docs/ret/pm_ge_wadingbirdnesting.pdf

Number of Nesting Pairs

Ogden et al. (1997) proposed specific restoration target minima (and ranges) for the number of nesting pairs for five species of wading birds common to the Everglades. These include a minimum of 4000 nesting pairs of Great Egrets, 10,000-20,000 pairs of Snowy Egrets and Tricolored Herons combined, 10,000-25,000 pairs of White Ibis, and 1,500 to 3,000 pairs of Wood Storks.

The 2010 combined total of nesting pairs for the five target species was 17,047. The distribution included 4627 pairs of Great Egrets, 1529 pairs of Snowy Egrets, 844* pairs of Tricolored Herons, 9047 pairs of White Ibis, and 1000 pairs of Wood Storks. The three-year running average for 2008-2010 for the four groups was 6715 for Great Egrets, 2442 for Snowy Egrets and Tricolored Herons combined, 21,415 for White Ibis, and 1736 for Wood Storks (Table 1). Ogden et al. (1997) recommend a three-year running average for assessing status and recovery trends. All five species experienced declines in the number of nesting pairs observed relative to 2009 and only Great Egrets met the target minima of 4,000 nesting pairs. Although significant declines in annual totals were observed relative to 2009, the three-year running average exceeded the target minima for all species but the Snowy Egret/Tricolored Heron grouping (Table 1).

Colony Locations
Historical estimates from the 1930s and 1940s indicated that over 90% of wading bird nesting occurred in the southern Everglades ecotone region. Of the five indicator species, approximately 44% nested in the southern Everglades marsh, including the marsh mangrove ecotone. Wood Storks were the exception to this trend with 100% of nests located in the southern Everglades. Although the 2010 spatial distribution results indicate significantly lower numbers and percentages in the southern ecotone, the 44% of nesting pairs observed in the southern Everglades is greater than the 26% observed during the baseline period of 1986-1995 used to establish the performance measure.

Timing of Wood Stork Nesting
The initiation of Wood Stork nesting in 2010 occurred in January. Although earlier than most previous years (and the same as 2009) nest initiation still occurred outside the onset target of November to December. Even with a relatively early start to nesting, no nests had successful fledglings. This falls well under the performance measure target of 1.5 chicks per nest.

Hydrology and Prey Availability (RECOVER 2009)
Following the severe dry-down of the 2009 dry season, water levels rose relatively rapidly and peaked in late September. Initial conditions were favorable with high water levels slowly receding into the 2010 dry season. As the dry season progressed, water levels receded only marginally. Early rains not only slowed the recession rate (thereby negatively affecting nesting) but the conditions also resulted in extremely low prey density and biomass. When corrected for available habitat, prey biomass was high. This suggests high numbers of prey may have been in the system but recession rates were too low to adequately concentrate prey to a point readily available for wading birds. Hydrologic conditions that negated a concentration of prey also led to less than 24% of the landscape becoming available for wading bird foraging, an area of approximately 1611 km^2 (relative to the approximately 83% of the landscape that became available in 2009, resulting in 5,633 km^2 of habitat, and the 3100 km^2 available in 2008). Thus, in addition to the slow recession rate, wading birds in 2010 were likely limited by the concentration of prey as well as the amount of available foraging habitat throughout the landscape (Botson and Gawlik 2010).

This system wide synthesis of Everglades wading bird recovery provides an overview of performance for 2010 as well as well a comparison of the three year moving average to related Performance Measure targets for both species distribution and abundance. Detailed discussion of individual wading bird and aquatic prey studies can be found throughout the South Florida Wading Bird Report as well as in the RECOVER 2009 System Status Report (RECOVER 2010).

Andrew Gottlieb
South Florida Water Management District
Everglades Division/RECOVER
West Palm Beach, FL 33406
(561) 682-2428
agottlie@sfwmd.gov

Table 1. Three year running averages of the number of nesting pairs for the five indicator species in the Everglades.

Time Period	GREG	SNEG / TRHE	WHIB	WOST
Target minima	4000	10,000 to 20,000	10,000 to 25,000	1,500 to 2,500
1986-88	1946	2057	2974	175
1987-89	1980	1680	2676	255
1988-90	1640	1229	3433	276
1989-91	1163	903	3066	276
1990-92	2112	1965	8020	294
1991-93	2924	2792	6162	250
1992-94	3667	2939	6511	277
1993-95	3843	2060	2107	130
1994-96	4043	1508	2172	343
1995-97	4302	1488	2850	283
1996-98	4017	1334	2270	228
1997-99	5084	1862	5100	279
1998-00	5544	2788	11270	863
1999-01	5996	4270	1655	1538
2000-02	7276	8614	23983	1868
2001-03	8460	8088	20758	1596
2002-04	9656	8079	24947	1191
2003-05	7829	4085	20993	742
2004-06	8296	6410	24926	800
2005-07	6600	4400*	21133	633
2006-08	5869	3778	17541	552
2007-09	6956	1723	23953	1468
2008-10	6715	2442**	21415	1736

* Tricolored Herons are exduded from this total due to incomplete surveys for this species in 2007.

** Tricolored Herons in Everglades National Park from 2010 were not induded in this estimate.


SFWMD, James Beerens

References

Botson, Bryan, and D. Gawlik, 2010. Aquatic Fauna Seasonal Concentrations 2010 Annual Report. Submitted for contract 4500042572 to the South Florida Water Management District, West Palm Beach, FL by the Department of Biological Sciences, Florida Atlantic University, Boca Raton, FL.

Frederick, P., D. E. Gawlik, J. C. Ogden, M. I. Cook, and M. Lusk. 2009. The White Ibis and Wood Stork as indicators for the restoration of the Everglades ecosystem. Ecological Indicators 9S:S83-S95.

Ogden, J. C., G. T. Bancroft, and P. C. Frederick. 1997. Ecological success indicators: reestablishment of healthy wading bird populations. In: Ecologic and Precursor Success Criteria for South Florida Ecosystem Restoration. A Science Subgroup report for South Florida Ecosystem Restoration Working Group.

RECOVER. 2009. 2009 Assessment Strategy for the Monitoring and Assessment Plan. Final Draft. c/o United States Army Corps of Engineers, Jacksonville District, Jacksonville, Florida, and South Florida Water Management District, West Palm Beach, Florida.

RECOVER 2010. 2009 System Status Report. Restoration Coordination and Verification program c/o U.S. Army Corps of Engineers, Jacksonville, FL, and South Florida Water Management District, West Palm Beach, FL.

SFWMD, James Beerens

SFWMD, Pat Lynch

This document is the result of continued cooperation among a diverse group of ecologists. It is not a peer-reviewed scientific publication; narratives reflect the views of individual authors rather than the collective participants. Photos provided by James Beerens, Dale Gawlik, Rebecca Jenkins, Pat Lynch, Lori Oberhofer, and Estero Bay Aquatic Preserve. The South Florida Wading Bird Report is available on the web at www.sfwmd.gov.

Mark I. Cook
Mac Kobza
Everglades Division, SFWMD
3301 Gun Club Rd.
West Palm Beach, FL 33406
(561) 686 – 8800 x4539
mcook@sfwmd.gov
rkobza@sfwmd.gov