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NUMBERS, DISTRIBUTION, AND SUCCESS OF NESTING SNAIL KITES IN THE BLUE CYPRESS WATER MANAGEMENT AND CONSERVATION AREAS

1995 Final Report

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Introduction

Snail kites (Rostrhamus sociabilis) in the United States occur only within South Florida including watersheds of the Everglades, Lake Okeechobee, Kissimmee River, and Upper St. Johns River. Because Snail Kites feed almost exclusively on one species of aquatic snail, their survival depends directly on the hydrologic functioning of these watersheds.

Recent research has indicated that Snail Kites in Florida rely on an extensive network of habitats throughout Florida (Bennetts and Kitchens 1993, 1994a). Because habitats throughout the state are constantly fluctuating in response to climatic and management regimes, their quality as habitat for wildlife species also fluctuates. Snail Kites appear to cope with this fluctuation through regular movement among the habitats within their range. Hydrologic conditions, and consequently the quality of wildlife habitat, of wetlands within the same watershed are undoubtedly linked. Thus, unfavorable conditions (e.g., drought) in one wetland are likely to be accompanied by unfavorable conditions in other wetlands within that same watershed. This places an increased importance on the availability of suitable habitats in multiple watersheds. The Upper St. Johns River Basin (USJRB) is, for the most part, hydrologically disjunct from the other major habitats for Snail Kites in Florida. Thus, the USJRB is an extremely important habitat component for the long-term viability of Snail Kite populations in Florida. In 1991 at least 140 birds were observed in the USJRB (the annual count in 1991 was 372).

Study Area and Methods

Our study area consisted of the Blue Cypress Marsh Water Conservation Area (BCMCA) and the Blue Cypress Water Management Area (BCWMA), Indian River County,

Florida (Fig. 1). These areas comprise approximately 6,000 ha (15,000 acres) of marsh within the USJRB and the areas of primary use by kites in recent years (Toland 1991, 1992, 1994). Henceforth, we will refer to these areas collectively as the Blue Cypress Marshes (BCM). The vegetation and hydrologic characteristics in the BCM have previously been described (Toland 1991, 1992, 1994).

During the 1995 breeding season, we systematically searched the BCM approximately weekly for nesting Snail Kites. We located nests using a combination of adult behaviors (e.g., courtship flights and calls and flight patterns away from nest sites)(Bennetts et al. 1988). We considered a nest active if at least one egg had been laid (Postupalsky 1974, Bennetts et al. 1988). The location of each active nest was determined using a Global Positioning System (GPS). We recorded the nest substrate, height, and water depth at each nest. Nests were checked at approximately bi-weekly intervals to determine success.

We conducted systematic counts of total number of kites using the area five times during this study; but conducted periodic spot searches during nest searches approximately bi-weekly to detect any substantial changes in numbers or distribution.

RESULTS

We observed 20 active nests in the upper St. Johns River basin during the 1995 season. In contrast, we found only four active nests in the USJRB during the 1994 season (Bennetts and Kitchens 1994b). Toland (1994) found 26, 39, 59, and 43 active nests in 1990, 1991, 1992, and 1993, respectively (Toland 1991, 1992, 1994).

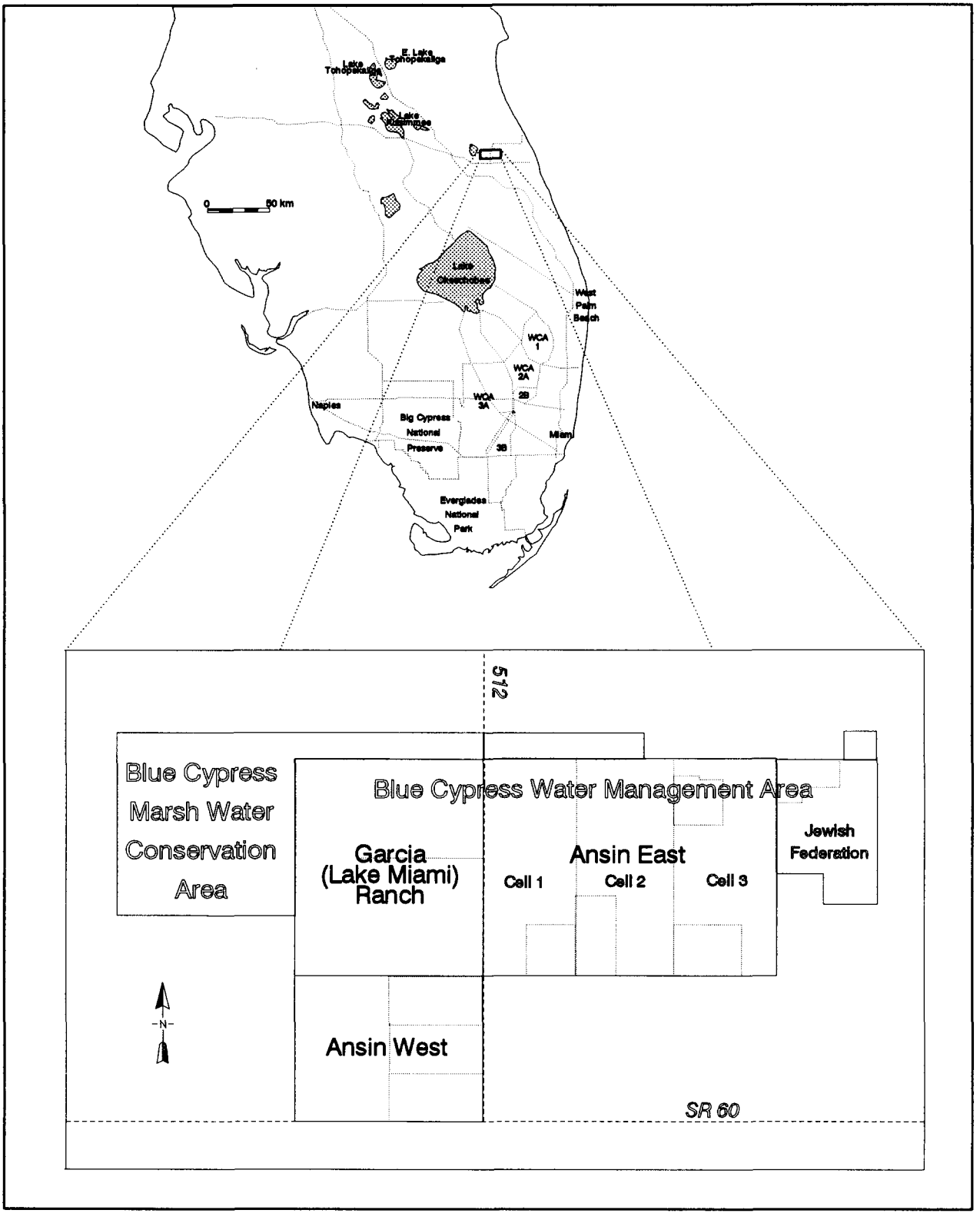

Figure 1. South Florida showing location of the study area, including the Blue Cypress Marsh Conservation Area and Blue Cypress Water Management Area.

Spatial Distribution

Snail Kite nests were distributed throughout the study area, but were most concentrated in Garcia Ranch and the eastern tracts of Ansin East (i.e., Cell 3 and Jewish Federation)(Fig. 2). It is important to note that birds nesting in Garcia Ranch were never observed foraging in Garcia Ranch during the 1995 nesting season. Rather, these birds appeared to forage primarily in Ansin East. Although there is considerable year to year variation in the relative use of different subunits by nesting kites (Fig. 3), all areas used during the 1995 breeding season have been used in previous years (Fig. 4).

Temporal Distribution

Snail Kites are capable of breeding in almost all months of the year (Snyder et al. 1989), but most nesting activity occurs between January and June (Sykes et al. in press). The first active nests discovered in the USJRB during the 1995 breeding season were initiated (i.e., eggs were laid) during the 1st week of March (Fig. 5). This is about two weeks later than has been previously reported (Toland 1994). In contrast, nesting activity in the southern part of the Snail Kite's range (e.g., the Everglades) was relatively early (i.e., December)(Bennetts and Kitchens 1995).

The peak of nest initiation also occurred in March, but a second, smaller peak occurred in May. This bi-modal distribution may indicate that birds nested more than once in the USJRB. One radio-transmittered female nesting in the USJRB confirmed that some re-nesting had occurred.

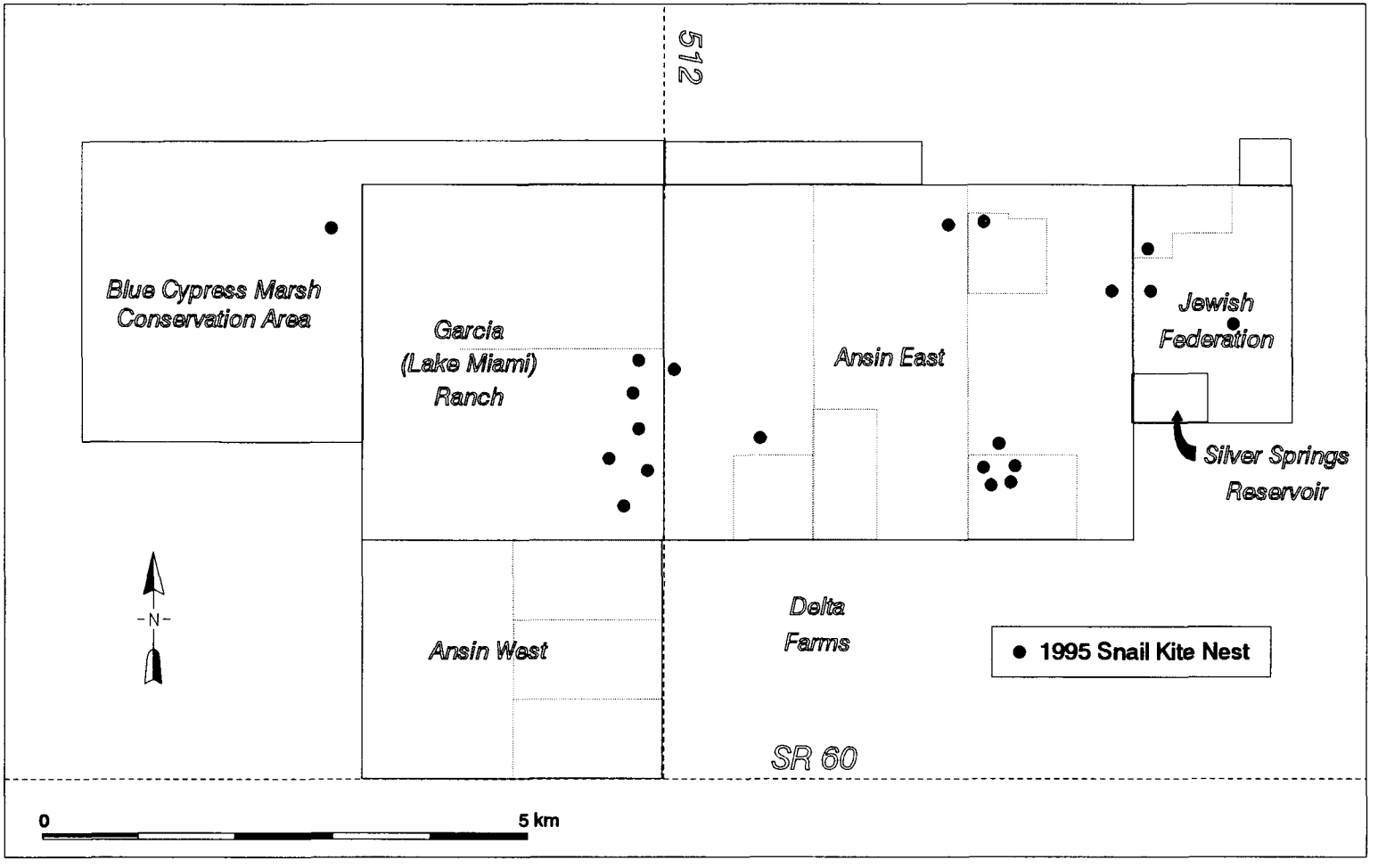

Figure 2. Blue Cypress Marshes showing location of active Snail Kite nests observed during 1995.

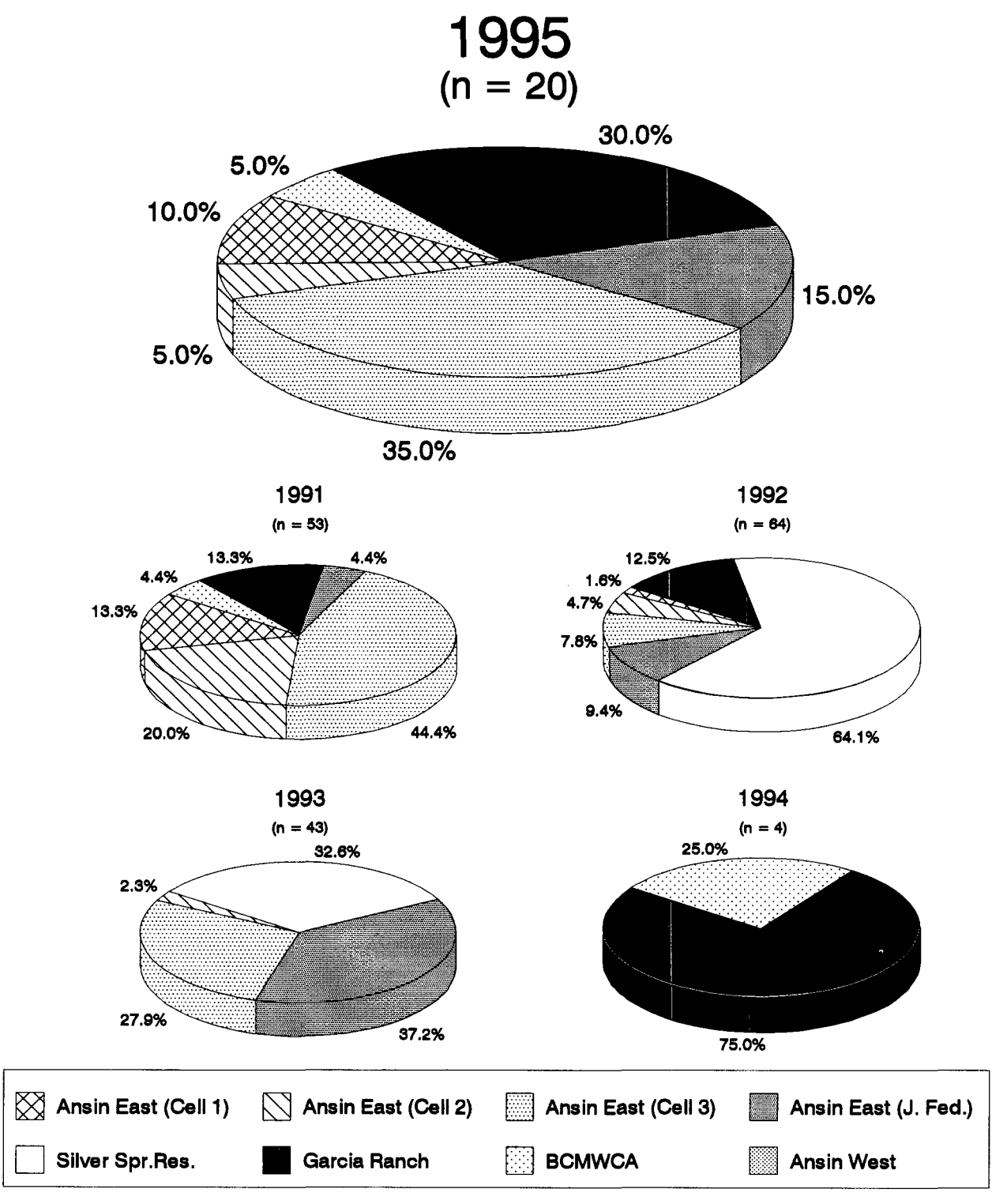

Figure 3. The percentage of active nests in each subunit of the Blue Cypress Marshes during the 1995 breeding season. Percentages are also shown for 1991-1994 (Toland 1991, 1992, 1994, Bennetts and Kitchens 1994b) for comparison.

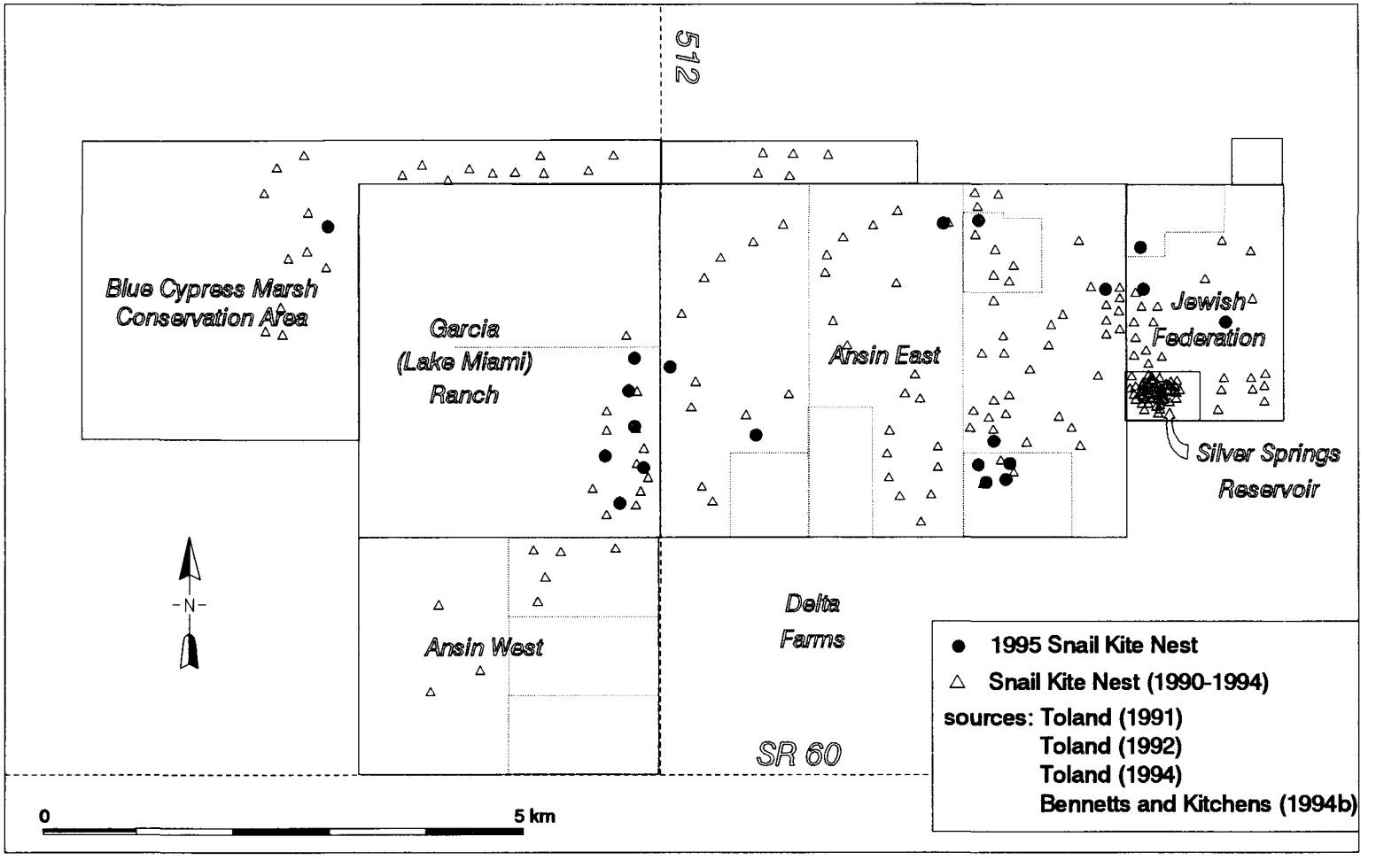

Figure 4. Blue Cypress Marshes showing location of active Snail Kite nests during the 1995 breeding season in relation to the location of nests previously reported by Toland (1991,1992,1994) and Bennetts and Kitchens (1994).

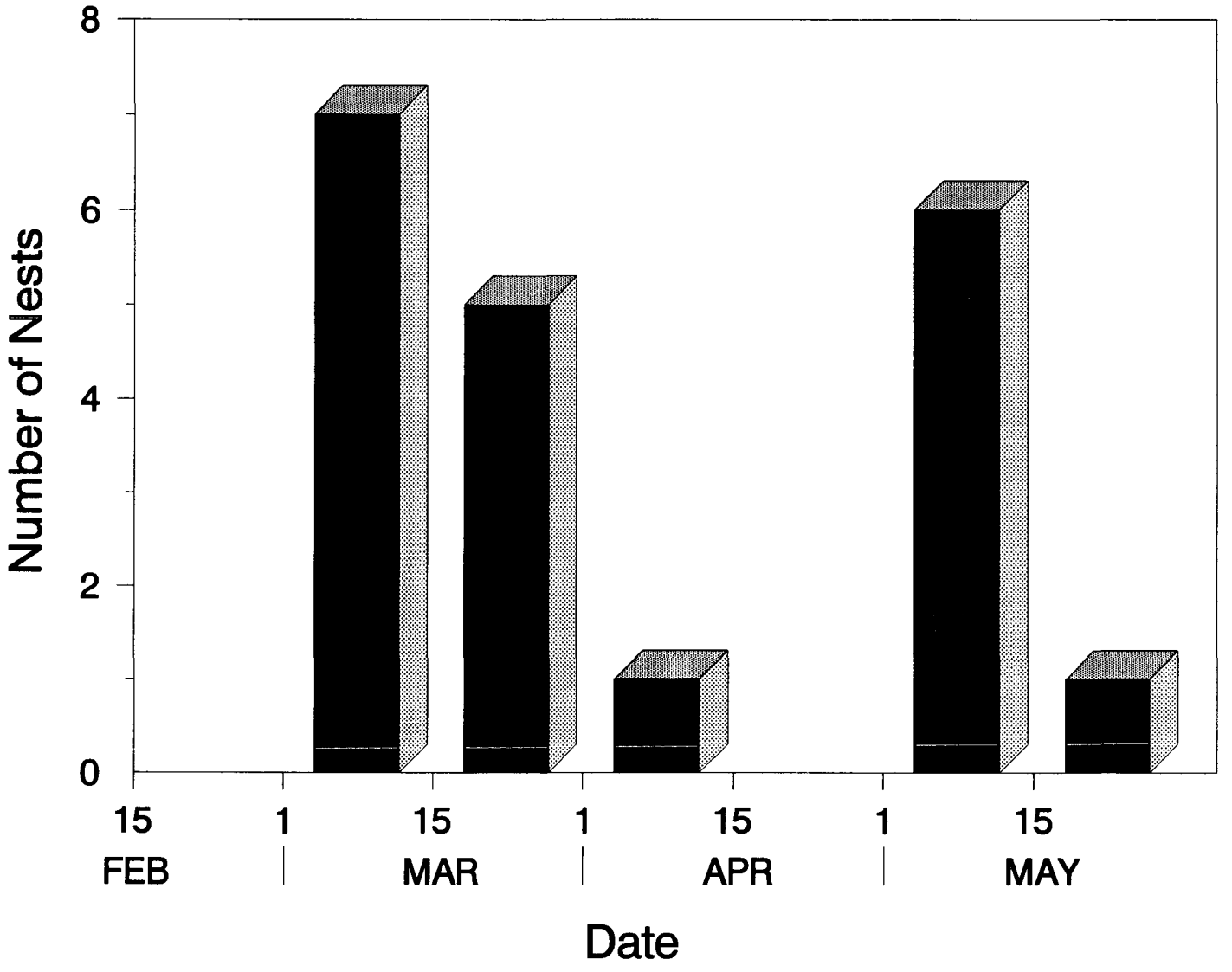

Figure 5. The number of active nests initiated in each bi-monthly date class during the 1995 breeding season.

Nest-Site Characteristics

Nest Substrate-- Nests found during the 1995 nesting season were in a variety of substrates (Fig. 6). Cabbage palm was the most frequently used substrate in 1995 and was used in relatively higher proportion than in previous years. Similarly, cypress was used relatively more than in previous years and willow was used less than in previous years.

Water Depth-- Water depth at nest sites averaged 0.73 m (±0.34 sd)(Fig. 7). This is similar to the average depths previously reported for the USJRB (Table 1).

Nest Height-- The average height of nests during 1995 was 3.2 m (± 2.0 sd)(Fig. 8). This was within the range of average nest heights reported for the USJRB in previous years (Table 1).

Table 1. Average water depth and nest height reported for the Upper St. Johns River Basin in previous studies.

Year	$\bar{x}$ Water Depth (m)	$\bar{x}$ Nest Height (m)	Source
1991	0.55	3.6	Toland 1991
1992	0.75	2.6	Toland 1992
1993	0.78	2.0	Toland 1994
1994	0.62	3.3	Bennetts and Kitchens 1994b

Nest Success

Overall nest success (i.e., percentage of nests that fledged at least one young) in the USJRB during 1995 was quite low (20%). Reports of the average success of active nests throughout Florida ranges from 32% (Snyder et al. 1989) to 50% (Sykes 1987)(reviewed by Sykes et al. In press). This was also low compared to reported success from the USJRB during most previous years, but was similar to the success during 1991 (Table 2).

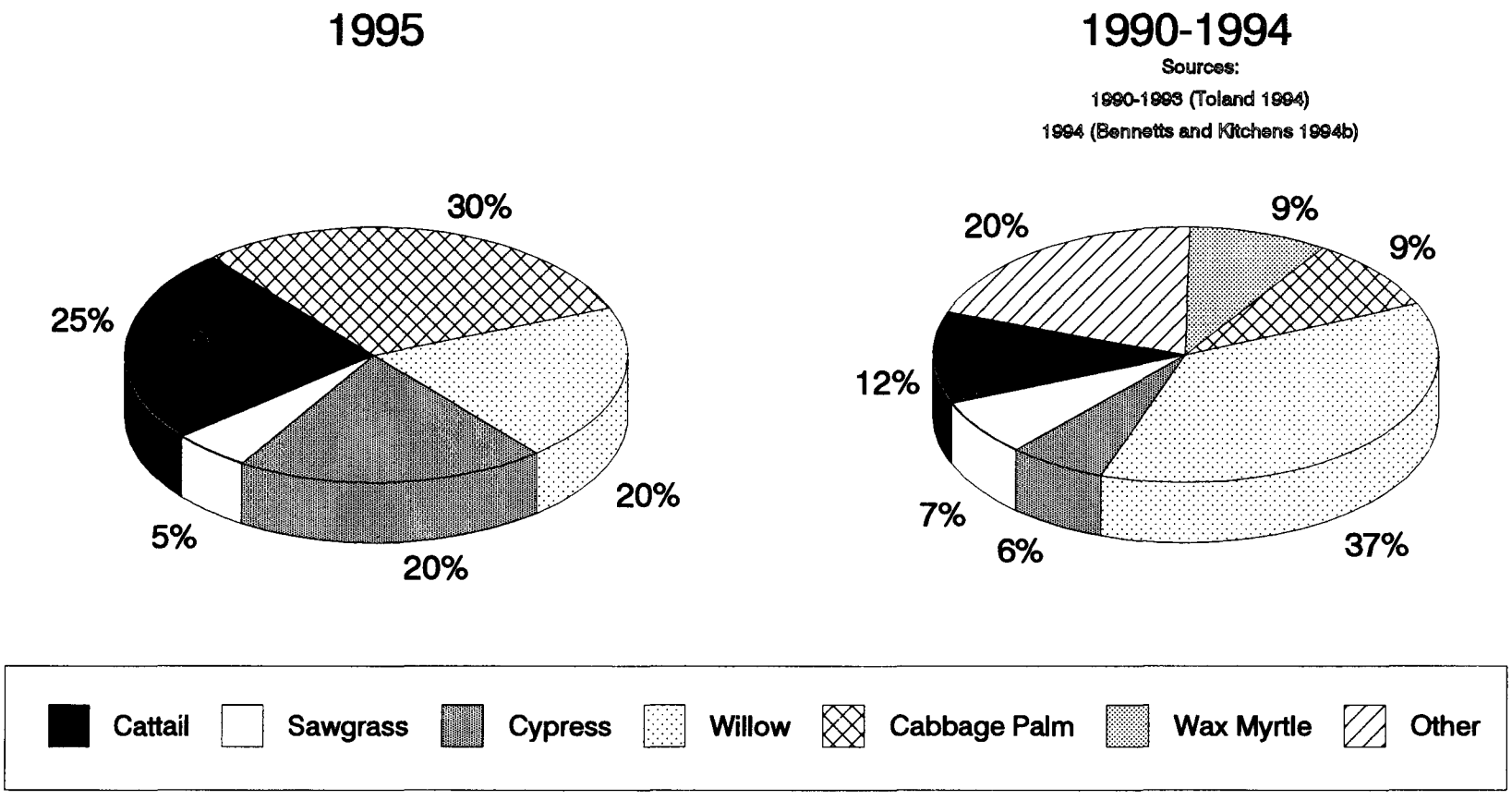

Figure 6. The percentage of active nests in each substrate during the 1995 breeding season. The percentage for 1991-1994 (Toland 1994, Bennetts and Kitchens 1994) are shown for comparison.

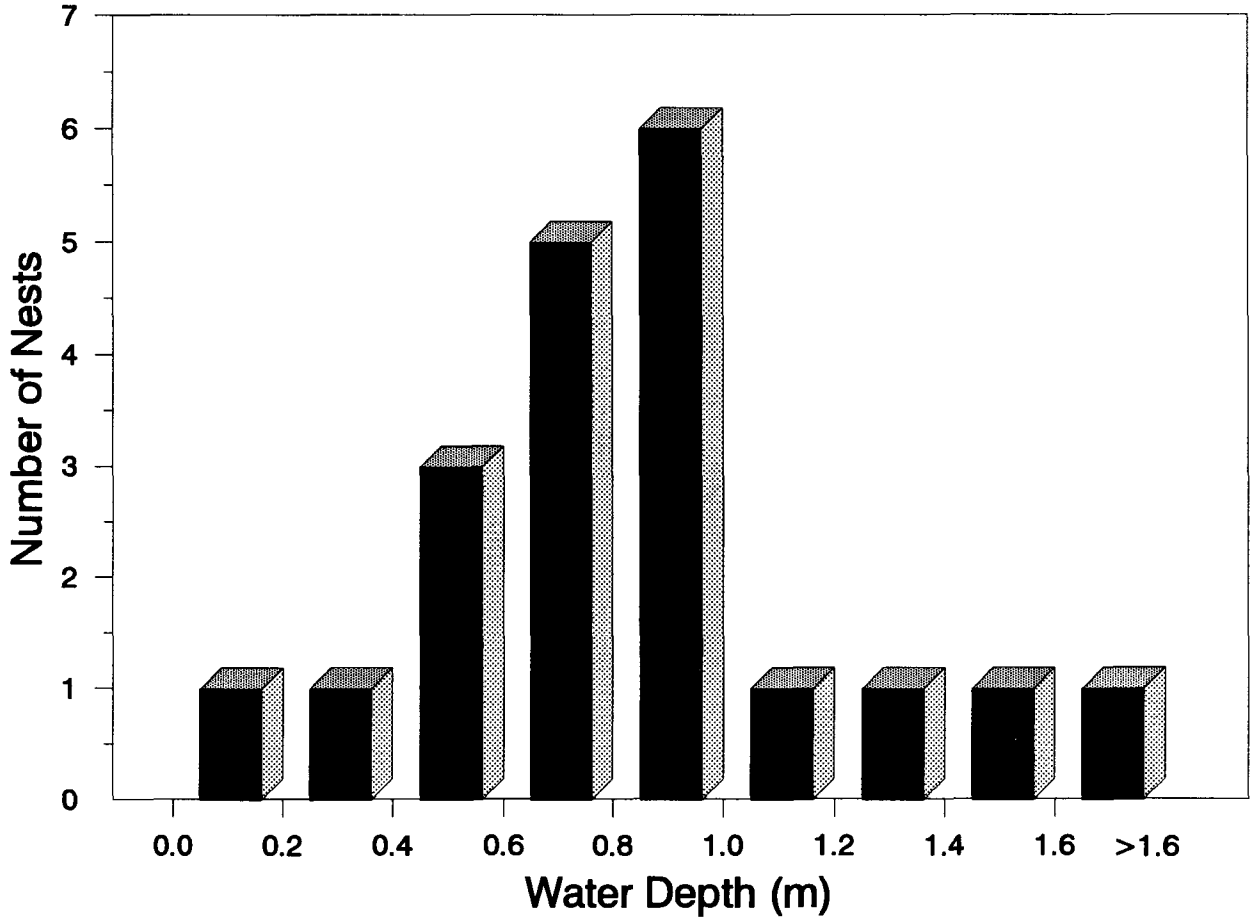

Figure 7. The number of active nests initiated in each 0.2 meter water-depth class during the 1995 breeding season.

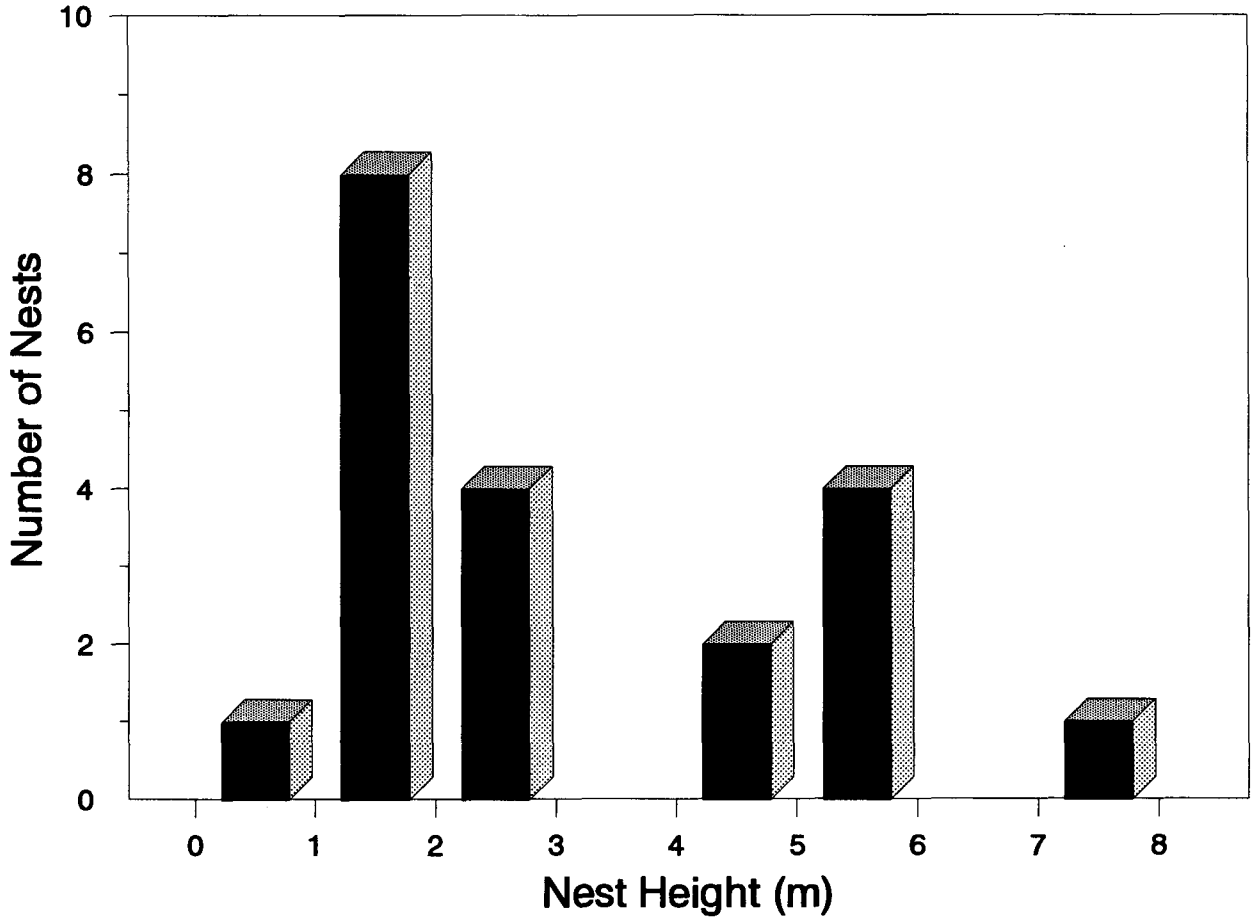

Figure 8. The number of active nests initiated in each 0.1 meter height class during the 1995 breeding season.

Table 2. Nest success reported for the Upper St. Johns River Basin during previous years.

Year	Nest Success	N	Source
1991	20.5%	39	Toland 1991
1992	56.0%	59	Toland 1992
1993	32.5%	43	Toland 1994
1994	25.0%	4	Bennetts and Kitchens 1994b

Influences of Nest Success-- There was an insufficient sample of nests (given that only 4 were successful) to statistically evaluate the influences of success. Toland (1994) suggested that successful nests tended to be over deeper water than unsuccessful nests; however, differences were not statistically significant. The mean water depth of successful nests ($\bar{x}$ 0.87 m) during 1995 was higher than the mean for unsuccessful nests ($\bar{x}=0.74$); however, similar to Toland's result, differences also were not significant ($t=0.84$, $P=0.43$). There also was no significant difference between the heights of successful (2.4 m) and unsuccessful (3.3 m) nests ($t=0.97$, $P=0.37$). Several late-season-nest failures also coincide with a late-June storm, but we cannot make inferences as to the causality of these failures.

There was also no apparent pattern to the spatial distribution of successful and unsuccessful nests throughout WCA-2B (Fig. 9).

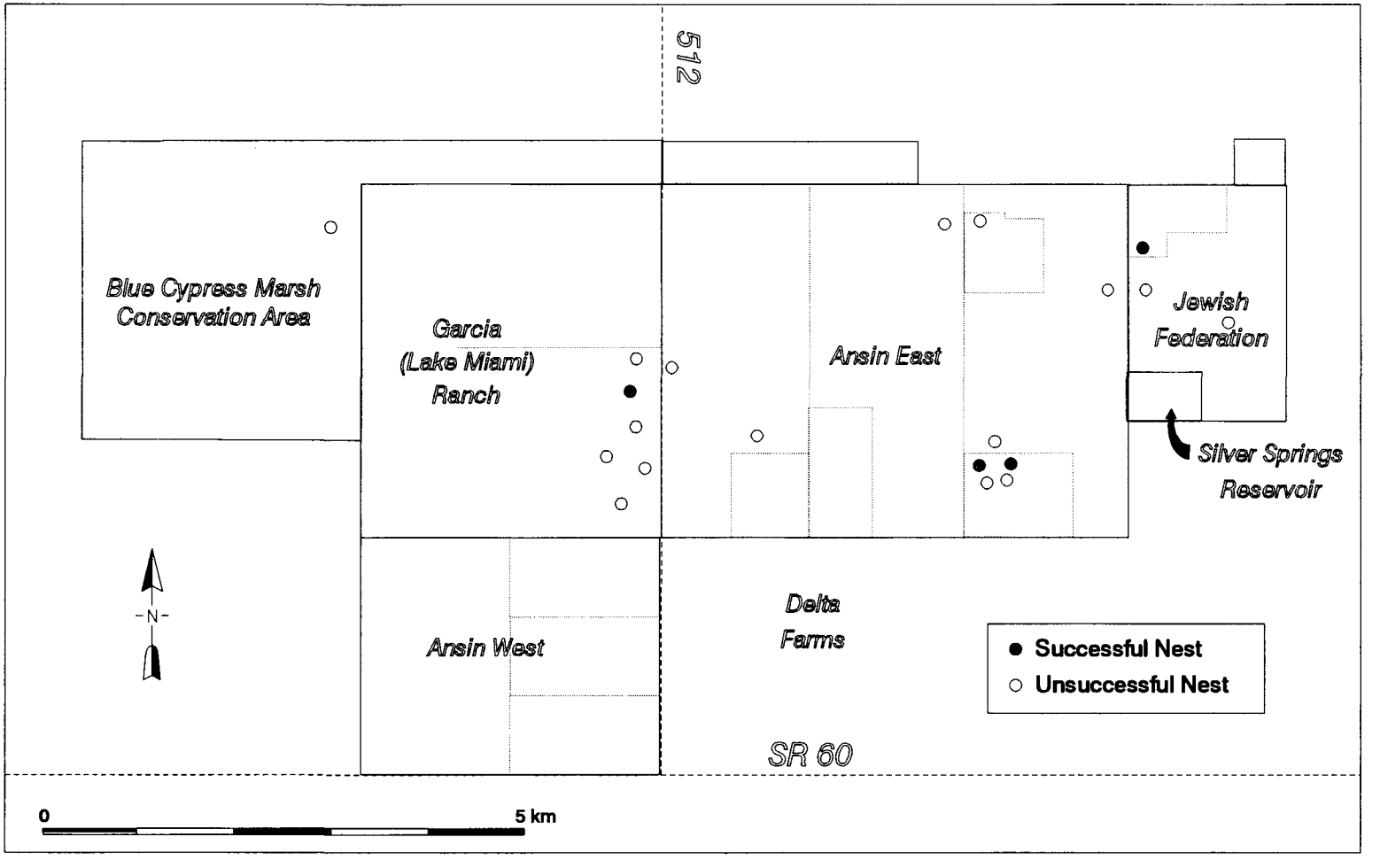

Figure 9. Blue Cypress Marshes showing location of successful and unsuccessful Snail Kite nests observed during 1995.

Productivity

A minimum of 7 young Snail Kites fledged from the USJRB during the 1995 nesting season. The average number of young per nest was 0.35. This was lower that the 0.60 previously reported by Toland (1994). The average number of young per successful nest was 1.8. This was similar to the previous reports from the USJRB of 1.9 for 1991- 1993 (Toland 1994) and to reports from other areas within Florida (1.9 [Sykes 1987] for 1968-1978 and 1.96 [Snyder et al. 1989] for 1966-1983).

Numbers of Kites Using the USJRB During the 1995 Breeding Season

The number of Snail Kites counted in the USJRB during the 1995 breeding season ranged from 13 (11 August 1995) to 41 (March 1995). Numbers of kites during the 1995 breeding season were similar to 1994 which ranged from 7 to 30 (Bennetts and Kitchens 1994b). However, few of the birds counted during 1994 were actively nesting. In contrast, most of the birds counted during 1995 were in some stage of nesting, either courtship or with active nests.

The correlation between water levels and numbers of kites in the USJRB persisted during 1995 ($r=0.60$, $P=0.002$)(Figs.10 and 11); however inclusion of the 1995 data resulted in a weaker relationship than that reported during 1994 ($r=0.86$)(Bennetts and Kitchens 1994b).

Sightings of Banded Birds During 1995

At least five different banded individual Snail Kites were observed in the USJRB during the 1995 breeding season. The natal areas of two of the five are unknown. Both of these individuals were captured and banded as adults. One was captured while nesting in

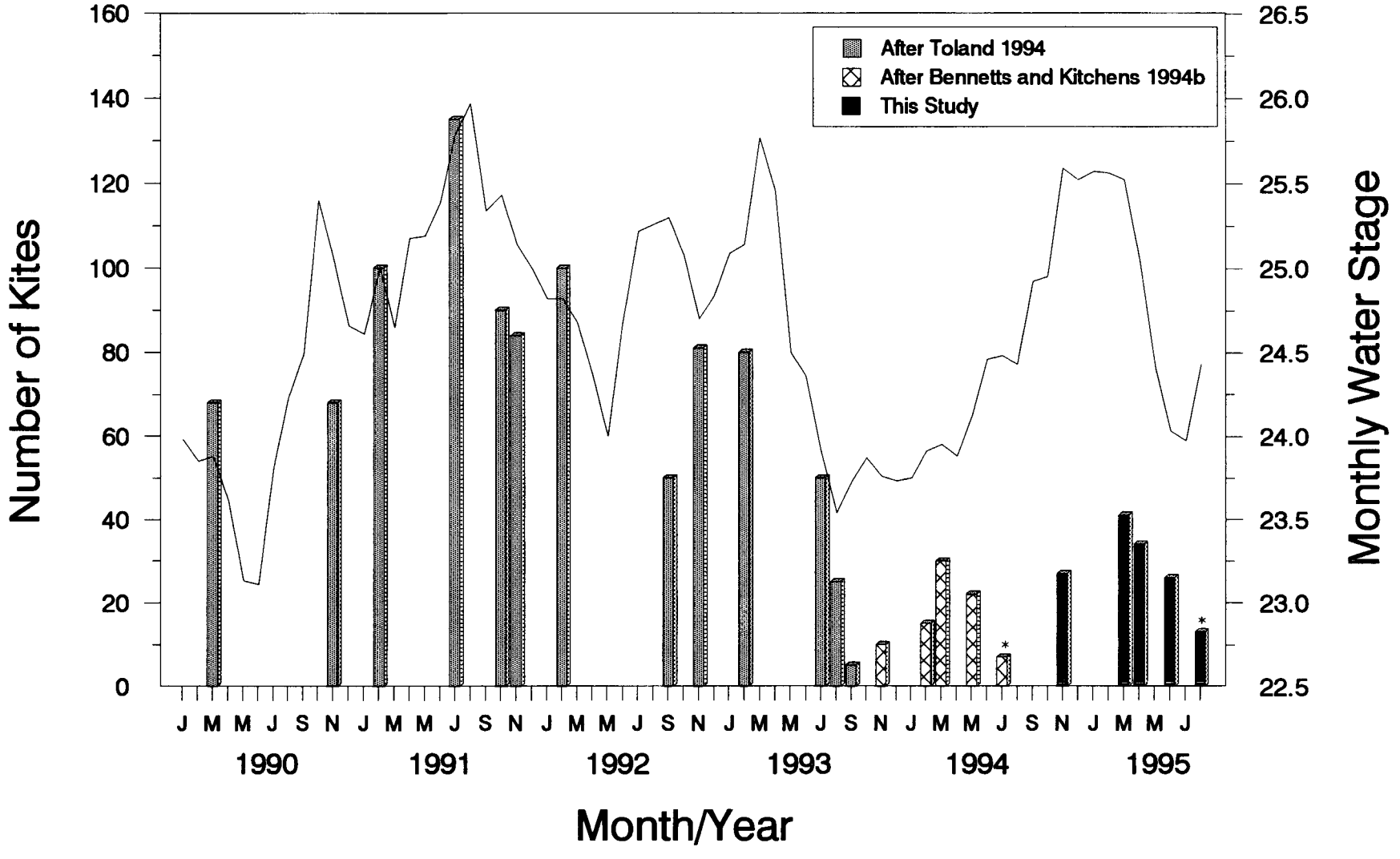

Figure 10. Numbers of Snail Kites counted in the Blue Cypress Marshes since 1990. Counts marked with a (*) did not include some tracts (e.g., Ansin West) where kites had not been seen during recent visits. Also shown are the monthly water stages reported for gauging station S251-E for that same time period.

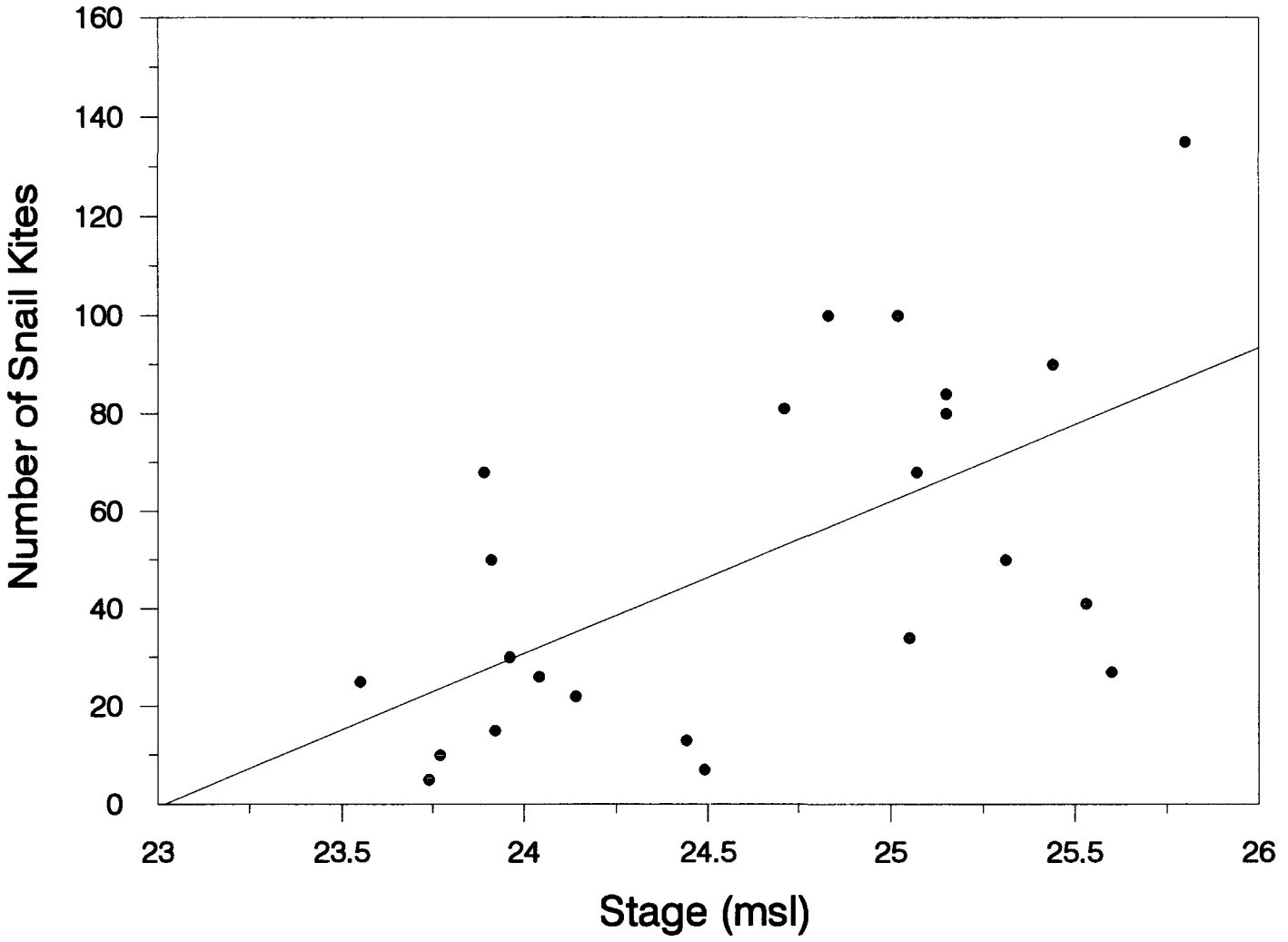

Figure 11. Scattergram showing the relationship between numbers of Snail Kites counted in the Blue Cypress Marshes since 1990 and water stage measured at the S251-E gauge. Data prior to this study from Toland (1992, 1993, 1994) and Bennetts and Kitchens (1994). The regression line shown is a straight line fitted by least squares approximation.

the Everglades (WCA-3A) during 1994. The other was captured at nest in the USJRB in 1994. Two of the three banded birds of known origin were from the USJRB. One of these fledged in 1992 and the other in 1993 (both were banded by B. Toland). The remaining bird of known origin was from Lake Kissimmee (age unknown).

Any use of the USJRB by radio-transmittered birds during 1995 will be included in a forthcoming report (Bennetts and Kitchens, in prep.).

DISCUSSION

The relative use of different substrates among years probably reflects differences in the location of nesting activity, rather than any changing preferences. Snail Kites tend to use substrates that offer good support and occur in inundated conditions (Bennetts et al. 1988). This is probably not a major management concern for nesting Snail Kites unless long-term hydrologic conditions result in the elimination of suitable substrates.

It is unclear why nest success was low during 1995. Water conditions in the USJRB were quite favorable and similar to other years having higher success. Some anecdotal evidence suggests that food resources were low. Observations of some foraging birds indicated relatively long times were spent capturing prey compared to other areas. Although decomposition precluded any definitive diagnosis, one radio-transmittered adult found dead in the USJRB in February was severely emaciated (based on necropsy performed by University of Florida Laboratory of Wildlife Disease Research). Additionally, one nest was found with a dead nestling which also appeared emaciated. However, we emphasize that these observations are anecdotal and no definitive conclusions can be drawn.

The low numbers of Snail Kites using the USJRB compared to 1990-1992 could reflect diminished food resources. However, it is also very likely that the relatively

high numbers of kites during these previous years were a result of poor conditions in the southern portion of the kite's range (e.g., the Everglades) due to a drought. Similarly high numbers of kites occurred at Lake Tohopekaliga during 1991 (J. Buntz, pers. Comm.). It is not uncommon, rather it is expected, for Snail Kite numbers to fluctuate in wetlands throughout the state. We recommend that management concerns focus on long-term trends in numbers and habitat quality, rather than on short-term fluctuations, which are a normal part of the Snail Kite's life history.

Acknowledgments

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