appear common on the San Jacinto Ranger District, despite the lack of cane habitat. The paired individuals and nesting activity observed in pine plantations and logged sites suggests such areas may be important breeding habitat.

Apparent flexibility of habitat use by Swainson's Warblers may explain its relatively stable population in contrast to the decline of the Bachman's Warbler (*Vermivora bachmani*). The Bachman's Warbler may have been a cane specialist, and the probable extinction of the species parallels the decline of cane stands throughout the southeastern United States (Widmann 1897, Remsen 1986). The more generalist strategy of the Swainson's Warbler may have enabled it to continue exploiting alternative habitats such as dense thickets in forest openings to maintain population levels.

Acknowledgments.—I thank the staff of the San Jacinto Ranger District, Sam Houston National Forest, for assistance during this project. L. J. Carmical provided access to the district and Forest Service records. Comments from R. E. Brown, D. K. Carrie, R. N. Conner, J. Nelson, and D. C. Rudolph improved an earlier draft of this manuscript.

LITERATURE CITED

BROOKS, M. AND W. C. LEGG. 1942. Swainson's Warbler in Nicholas County, West Virginia. Auk 59:76–86.

CORRELL, D. S. AND M. C. JOHNSTON. 1970. Manual of the vascular plants of Texas. George Banta Co., Inc., Menasha, Wisconsin.

EDDLEMAN, W. R., K. E. EVANS, AND W. H. ELDER. 1980. Habitat characteristics and management of Swainson's Warbler in southern Illinois. Wildl. Soc. Bull. 8:228–233.

GRAVES, G. R. 1992. A case of aggregated nest placement and probable polygyny in the Swainson's Warbler. Wilson Bull. 104:370–373.

MEANLEY, B. 1945. Notes on Swainson's Warbler in central Georgia. Auk 62:395–401.

———. 1966. Some observations on habitats of the Swainson's Warbler. Living Bird 5: 151–165.

———. 1969. Pre-nesting and nesting behavior of the Swainson's Warbler. Wilson Bull. 81:246–257.

———. 1971. Natural history of the Swainson's Warbler. North Am. Fauna 69:1–90.

REMSEN, J. V., JR. 1986. Was Bachman's Warbler a bamboo specialist? Auk 103:216–219.

WIDMANN, O. 1897. The summer home of Bachman's Warbler no longer unknown. Auk 14:305–309.

N. ROSS CARRIE, *Dept. of Wildlife and Fisheries Sciences, Texas A&M Univ., College Station, Texas 77843.* (Present address: *HQ JRTC & Ft. Polk, AFZX-PW-EC, Ft. Polk, Louisiana 71459–7100*). *Received 21 Aug. 1995, accepted 2 March 1996.*

Wilson Bull., 108(4), 1996, pp. 804–807

Measurements of Snail Kite eggs from central Florida.—The Snail Kite (*Rostrhamus sociabilis*) is a raptor with a disjunct distribution among several lake and everglade wetlands in central and south Florida (Sykes et al. 1995). The objectives of the present study were to collect measurements of kite eggs, delimit egg size variation among wetlands, and determine if egg size was correlated with clutch size, hatching success, fledging success, and breeding chronology of kites in central Florida.

Methods.—I visited Snail Kite nests every 1–2 weeks during 1991 at East Lake Toho-

TABLE 1
LINEAR MEASUREMENTS AND CALCULATED VOLUMES OF SNAIL KITE EGGS FROM CENTRAL FLORIDA[a]

Site	Variable	N	$\bar{x} \pm$ SD	Range
East Lake Tohopekaliga	Length	15	44.27 ± 1.16 mm	41.9–47.2 mm
	Breadth	15	36.56 ± 0.74 mm	35.1–37.8 mm
	Volume	15	30.20 ± 1.58 cm^3	26.33–32.37 cm^3
Lake Tohopekaliga	Length	254	44.33 ± 1.74 mm	40.0–48.4 mm
	Breadth	254	36.38 ± 0.90 mm	32.3–38.5 mm
	Volume	254	29.97 ± 2.27 cm^3	22.67–34.77 cm^3
St. Johns Marsh	Length	57	44.46 ± 1.53 mm	40.2–47.5 mm
	Breadth	57	36.41 ± 1.22 mm	33.6–40.1 mm
	Volume	57	30.14 ± 2.87 cm^3	24.07–37.64 cm^3
Lake Kissimmee	Length	129	43.90 ± 1.64 mm	40.5–49.1 mm
	Breadth	129	35.91 ± 1.11 mm	33.2–38.5 mm
	Volume	129	28.94 ± 2.61 cm^3	22.77–35.61 cm^3
Lake Okeechobee	Length	250	44.21 ± 1.35 mm	41.0–48.6 mm
	Breadth	250	36.21 ± 0.98 mm	33.7–39.4 mm
	Volume	250	29.61 ± 2.21 cm^3	24.67–38.28 cm^3
Total	Length	705	44.22 ± 1.57 mm	40.0–49.1 mm
	Breadth	705	36.24 ± 1.01 mm	32.3–40.1 mm
	Volume	705	29.67 ± 2.38 cm^3	22.67–38.28 cm^3

[a] Egg volume = 0.51 × length × $breadth^2$.

pekaliga, Lake Tohopekaliga, Lake Kissimmee, Lake Okeechobee, and an impounded marsh at the headwaters of the St. Johns River (hereafter St. Johns Marsh). Eggs were numbered with an indelible felt-tip pen according to deposition sequence when known. Length and breadth measurements were made with a Tajima dial caliper (model dial-15) to the nearest 0.1 mm. Egg volume was estimated using the equation of Hoyt (1979): volume = 0.51 × length × $breadth^2$. Relative egg volume used in some statistical analyses was calculated after Arnold (1991): individual egg volume minus the mean egg volume of the clutch divided by the standard deviation of egg volume for the clutch.

All computations were preformed using SAS Institute, Inc. software. Length, breadth, and volume were found to be normally distributed (Shapiro-Wilk test, $P > 0.05$; SAS Institute 1990). A plot of the residuals versus the predicted values from an ANOVA model using PROC GLM (SAS Institute 1990) yielded a random scatter that suggested homogeneity of variance for the three variables. Thus, parametric statistics were used in all subsequent analyses. Mensural variables were determined for both complete and incomplete clutches. However, only data from complete clutches were used when comparing egg size with clutch size, hatching order, hatching success, and fledging success. Logistic regression in PROC GENMOD (SAS Institute 1996) was used to analyze hatching and fledging success since these data are binomial. Hatch date was a convenient index for breeding chronology and was determined as the week of hatching for the first egg in each clutch.

Results.—I calculated mean, standard deviation, and range of length, breadth, and volume of 705 eggs from 260 complete and incomplete clutches of Snail Kites (Table 1). The relation of mensural variables was length = 0.81 breadth (Pearson's r^2_{704} = 0.52, P < 0.0001). No significant difference (ANOVA, F = 1.97, df = 704, P = 0.10) was detected in length among the five wetlands. However, significant differences were found in breadth (ANOVA/Fisher's LSD test, F = 5.58, df = 704, P = 0.0002) and volume (ANOVA/Fisher's LSD test, F = 4.87, df = 704, P = 0.0007). Eggs from Lakes Kissimmee and Okeechobee consistently exhibited the smallest mean breadth and volume (Table 1).

No significant difference was found in length (ANOVA, F = 1.70, df = 46, P = 0.19), breadth (ANOVA, F = 0.15, df = 46, P = 0.86), or relative volume (ANOVA, F = 0.60, df = 46, P = 0.55) among the first, second, or third egg hatched. There also was no significant difference (ANOVA, F = 1.41, df = 238, P = 0.24) in mean relative egg volume among clutches of one (N = 3), two (N = 52), three (N = 169), and four (N = 8) eggs. Thus, egg size was similar regardless of laying order or clutch size.

Relative volume was not correlated with hatch date at East Lake Tohopekaliga (r^2_{13} = 0.05, F = 0.63, P = 0.44), Lake Tohopekaliga (r^2_{252} = 0.002, F = 0.60, P = 0.44), Lake Okeechobee (r^2_{248} = 0.006, F = 1.52, P = 0.22), and St. Johns Marsh (r^2_{55} = 0.001, F = 0.04, P = 0.84), except at Lake Kissimmee (r^2_{127} = 0.059, F = 5.18, P = 0.02). Thus, volume generally did not exhibit intraseasonal variation at most wetlands. Finally, relative volume was not correlated with hatching success (P = 0.88, df = 155) or fledging success (P = 0.99, df = 227) of kite nestlings.

Discussion.—The mensural values of my study are similar to the average length (44.6 mm, N = 317 eggs) and breadth (36.1 mm) reported by Sykes (1987). Although Snail Kite eggs exhibited differences in breadth and volume among my study sites, I found little correlation with clutch size, laying sequence, and hatching date. Kites are similar to other avian species whose egg sizes do not correlate with laying sequence (Pulliainen and Saari 1993), clutch size (Ojanen et al. 1981, Jover et al. 1993), or laying date (Arnold 1991, Potti 1993, Pulliainen and Saari 1993).

An increase in egg size during the laying sequence has been suggested as a strategy by females to adjust their egg contribution to the initial nestling size disadvantage due to asynchronous hatching (reviewed by Magrath 1992). However, size and volume of Snail Kite eggs were not correlated with laying sequence and fledging success. Kites neither support the brood reduction strategy (reviewed by Magrath 1992) that egg size decreases with laying order nor the bet-hedging strategy (reviewed by Slagsvold et al. 1984) that egg size increases with laying order. Because egg volumes within a clutch and among different clutch sizes were similar, the competitive ability of Snail Kite nestlings results mainly from hatching asynchrony and the ability of parents to secure adequate snails to feed their young. Magrath (1992) suggested hatching asynchrony was more important than egg mass in determining hatch size hierarchies and resultant early nestling survivorship. Significant differences in egg breadth and volumes among wetlands suggest local effects on egg sizes but not the fledging success of Snail Kites during the single breeding season of my study. These differences warrant further study to establish if a relationship exists between habitat quality and condition of females with nestling survival during more stressful years.

Acknowledgments.—Funding for this study was provided by Section 6 funding from the U.S. Fish and Wildlife Service and the Nongame Wildlife Program of the Florida Game and Fresh Water Fish Commission. S. T. Schwikert assisted me with the data collection. S. B. Linda provided statistical consultation. I thank M. F. Delany, S. A. Nesbitt, D. A. Wood, P. W. Sykes, C. R. Blem, and an anonymous referee for reviewing an earlier draft of the manuscript. This research was part of study number 7520 of the Bureau of Wildlife Research.

LITERATURE CITED

ARNOLD, T. W. 1991. Intraclutch variation in egg size of American Coots. Condor 93:19–27.
HOYT, D. F. 1979. Practical method of estimating volume and fresh weight of bird eggs. Auk 96:73–77.
JOVER, L., X. RUIZ, AND M. GONZÁLEZ-MARTÍN. 1993. Significance of intraclutch egg size variation in the Purple Heron. Ornis Scand. 24:127–134.
MAGRATH, R. D. 1992. Roles of egg mass and incubation pattern in establishment of hatching hierarchies in the Blackbird (*Turdus merula*). Auk 109:474–487.
OJANEN, M., M. ORELL, AND R. A. VÄISÄNEN. 1981. Egg size variation within clutches: effects of ambient temperature and laying sequence. Ornis Fenn. 58:93–108.
POTTI, J. 1993. Environmental, ontogenetic, and genetic variation in egg size of Pied Flycatchers. Can. J. Zool. 71:1534–1542.
PULLIAINEN, E. AND L. SAARI. 1993. Egg size of the Dotterel *Charadrius morinellus* in Finland. Ornis Fenn. 70:44–46.
SAS INSTITUTE. 1990. SAS procedures guide, version 6, third edition. SAS Institute, Inc., Cary, North Carolina.
———. 1996. SAS/STAT software changes and enhancements through release 6.11. SAS Institute, Inc., Cary, North Carolina.
SLAGSVOLD, T., T. SANDVIK, G. ROFSTAND, Ö. LORENTSEN, AND M. HUSBY. 1984. On the adaptive value of intraclutch egg-size variation in birds. Auk 101:685–697.
SYKES, P. W., JR. 1987. Some aspects of the breeding biology of the Snail Kite in Florida. J. Field Ornithol. 58:171–189.
———, J. A. RODGERS, JR., AND R. E. BENNETTS. 1995. Snail Kite (*Rostrhamus sociabilis*). *in* The birds of North America, no. 171 (A. Poole and F. Gill, eds.). Acad. Nat. Sci. Phil., Philadelphia, Pennsylvania, and Amer. Ornithol. Union, Washington, D.C.

JAMES A. RODGERS, JR., *Wildlife Research Laboratory, Florida Game and Fresh Water Fish Commission, 4005 South Main Street, Gainesville, Florida 32601.* *Received 14 Feb. 1996, accepted 10 May 1996.*

Wilson Bull., 108(4), 1996, pp. 807–808

The Andean Flamingo in Brazil.—Bege and Pauli (1990a, b) recorded the Andean Flamingo (*Phoenicoparrus andinus*) for the first time in Brazil, based on an emaciated juvenile found in May 19, 1989 in Erval Velho (27°13′S, 51°23′W), midwest of Santa Catarina State that had been banded in Chile. The specimen is now housed in the Museu Nacional, Rio de Janeiro (MN 36.548). Antas (1990) also recorded a subadult bird foraging at the Lagoa do Peixe (31°20′S, 51°05′W), southeastern Rio Grande do Sul, along with the Chilean Flamingo (*Phoenicopterus chilensis*).

The Museu do Seminário Coração de Jesus, in Corupá, Santa Catarina, houses a juvenile specimen (MSCJ 220) obtained in 1952 at Jaraguá do Sul (26°28′S, 49°06′W), northeastern Santa Catarina, which was wrongly identified by Sick et al. (1981) as an American Flamingo (*Phoenicopterus ruber*). This specimen is a well preserved, mounted skin. To Rio Grande do Sul we have an additional record based upon a color photograph of three adult birds in Lagoa do Peixe, taken in the fall of 1992 (A. Hoffmann, pers. comm.). It was published