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## LITERATURE CITED

- BROWN, C. R. 1984. Laying eggs in a neighbor's nest: benefit and cost of colonial nesting in swallows. *Science* 224:518-519.
- EMLEN, S. T., AND P. H. WREGE. 1986. Forced copulations and intraspecific parasitism: two costs of social living in White-throated Bee-eaters. *Ethology* 71:2-29.
- FETTEROLF, P. M., AND H. BLOKPOEL. 1984. An assessment of possible nest parasitism in Ring-billed Gulls. *Can. J. Zool.* 62:1680-1684.
- FREDERICK, P. C., AND M. A. SHIELDS. 1986. Suspected intraspecific egg dumping in the White Ibis (*Eudocimus albus*). *Wilson Bull.* 98:476-477.
- GOWATY, P. A., AND A. A. KARLIN. 1984. Multiple maternity and paternity in single broods of apparently monogamous Eastern Bluebirds (*Sialia sialis*). *Behav. Ecol. Sociobiol.* 15:91-95.
- YOM-TOV, Y. 1980. Intraspecific nest parasitism in birds. *Biol. Rev.* 55:93-108.
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**Recoveries of Sooty Terns (*Sterna fuscata*) on Saba Cay, St. Thomas, U.S. Virgin Islands.**—Movements of terns within the Caribbean region are not well known (Halewyn and Norton 1984), yet recent reports of population mixing (Furniss 1983, Norton 1984, W. B. Robertson, pers. comm., Schaffner et al. 1986) document recruitment between colonies 35-1700 km apart.

Saba Cay is a 30 ha islet located 6 km WSW of Charlotte Amalie (Fig. 1). The south coast rises 60 m above the sea and on the north coast two brackish ponds occupy most of the lowlands. We estimated over 40,000 Sooty Terns (*Sterna fuscata*) nest on the slopes among cacti (*Cactus inornatus*, *Opuntia ripens*), shrubs (*Leucaena glauca*, *Clerodendron acutatum*), *Ficus* sp., sedge (*Cyperus* sp.) and a thick growth of grass (*Panicum maximum*).

Between 1976 and 1985 teams of volunteers and staff from the Division of Fish and Wildlife visited Saba Cay to band Sooty Terns. We hoped by banding young and adults over a period of time to determine whether young we banded returned to Saba to breed, at what age they returned, and whether or not birds banded in other colonies were nesting at Saba. From 1976 to 1980 we visited Saba weekly or biweekly from late April to August, banding from 0800 to 1100 hr and from 1400 to 1600 hr. Banding groups included up to 20 people. We stopped banding during the middle of the day because the sun was too intense and we did not want to keep the birds off their nests during the hot period.

In May we concentrated on capturing adults on or near their nests by hand. Adults incubating in tall grass seemed reluctant to fly when approached slowly and could be caught on the nest, but we caught most of them as they left the nests. Almost all of the young hatched by the first week of June and from this date on we banded young almost exclusively. Young terns hid under vegetation. We searched likely areas and banded juveniles as we found them.

Between 1981 and 1985, although our methods were similar to those outlined above, we reduced the number of volunteers and staff to less than 5 on each visit to lessen colony disturbance. We visited the island once a week during May and June and weekly or biweekly in July.

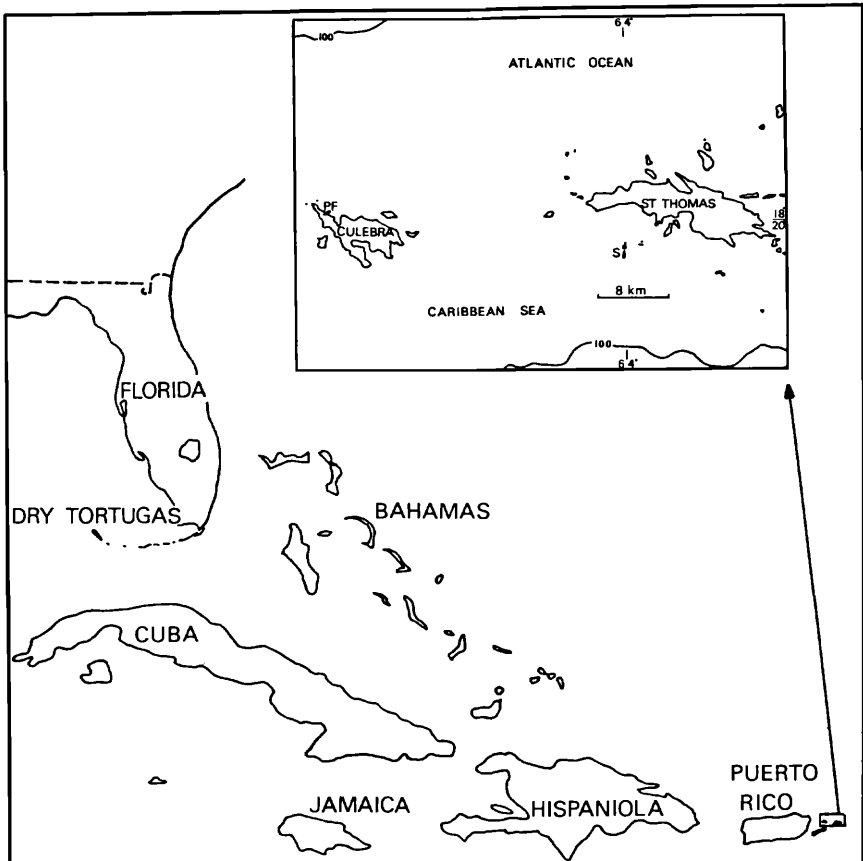


FIGURE 1. Colony site locations of Sooty Terns (*Sterna fuscata*) recovered in Florida and the eastern Puerto Rico Bank (inset; S = Saba Cay and PF = Peninsula Flaminco).

We banded 792 adult and 3900 juvenile Sooty Terns between 1976 and 1980. In 1981 we recovered 2 young birds banded in 1977 and 1978 at Saba Cay. In the last 4 yr, 1982–1985, we recovered an additional 19 birds of known age, 0.005% of the total young banded, suggesting that there is still space to accommodate young birds of breeding age. Sooty Terns reportedly breed at age 6–8 yr and probably earlier (Dinsmore 1972, Harrington 1974). Seven of the Saba Cay recoveries were found on an egg or chick. The remaining 14 were captured as they ran from their nest. Ages of the seven brooding terns ranged from 5–8 yr with a mean of 6.7 (SD = 1.25); the others ranged from 3–8 yr with a mean age of 5.4 (SD = 1.22,  $n = 14$ ).

In addition to recovering birds we had banded previously, we also recovered 5 Sooty Terns that had been banded originally in the Dry Tortugas (W. B. Robertson, in litt.). Two of the 5 Dry Tortugas terns were on eggs at Saba Cay. Our banding data not only suggest that the Saba Cay colony is a substantial colony where young return to breed, but adds the Virgin Islands to areas of exchange for Sooty Terns in the Caribbean. Furniss (1983) reporting on Sooty Terns on Culebra, Puerto Rico, noted an adult Sooty Tern nesting on Culebra that had originally been banded in the Dry Tortugas, and in addition

he reported a chick banded in Culebra that was recovered the following year in the Tortugas. J. Taylor and S. Furniss (in litt.) found terns in the Culebra colony originally banded on Saba Cay. These reports of exchange of Sooty Terns between colonies give some indication of the distance individuals of this species may range to breed. The reports also raise the question of numbers and sizes of the species' breeding concentrations in the Caribbean and the amount of exchange between colonies.

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#### LITERATURE CITED

- DINSMORE, J. J. 1972. Sooty Tern behavior. *Bull. Fl. State Mus. Biol. Sci.* 16:129-179.
- FURNISS, S. 1983. Status of the seabirds of the Culebra archipelago, Puerto Rico. *Colonial Waterbirds* 6:121-125.
- HALEWYN, R. VAN, AND R. L. NORTON. 1984. The status and conservation of seabirds of the Caribbean. Pp. 234-269, in J. Croxall, P. G. H. Evans, and R. W. Schreiber, eds. *Status of the world's seabirds*. ICBP Tech. Report No. 2.
- HARRINGTON, B. A. 1974. Colony visitation behavior and breeding ages of Sooty Terns (*Sterna fuscata*). *Bird-Banding* 45:115-144.
- NORTON, R. L. 1984. Cayenne × Sandwich Terns nesting in Virgin Islands, Greater Antilles. *J. Field Ornithol.* 55:243-246.
- SCHAFFNER, F. C., R. L. NORTON, AND J. TAYLOR. 1986. Range extension of Cayenne Terns on the Puerto Rico Bank. *Wilson Bull.* 98:317-318.
- ROBERT L. NORTON, *Division of Fish and Wildlife, 101 Estate Nazareth, St. Thomas, U.S. Virgin Islands 00830*. Received 1 Oct. 1985; accepted 19 Mar. 1986.

**Seasonal Changes in the Hour of Oviposition by Red-winged Blackbirds in Southwestern Ontario.**—The time at which birds lay their eggs has not been intensively studied, especially for North American passerines. Skutch (1954, 1976) made observations on laying times of approximately 40 tropical species by visiting nests at intervals beginning shortly before the "expected laying time." He found that by continuous nest watches he could bracket the period during which laying occurred and that in many cases species laid shortly after sunrise. Schifferli (1979) lists 43 European passerine species known to lay just after sunrise. Nolan (1978) recorded laying times of Prairie Warblers (*Dendroica discolor*) in relation to sunrise and found no significant correlation.

To determine the hour of day when Red-winged Blackbirds (*Agelaius phoeniceus*) lay their eggs, I watched female blackbirds in May and June 1984 at their nests along the banks of the Thames River in London, Ontario. I located, mapped, and observed nests daily to determine the onset of egg laying. After the first egg of a clutch was laid, it was marked with a waterproof marker and a blind was set up close enough to allow observation of the nest with a spotting scope. On the day when a female was expected to lay the second egg (blackbirds lay one egg a day until a clutch is complete), I approached the nest shortly before sunrise and checked for the presence of another egg. In no instance had the female already laid the next egg, but twice she had roosted on the nest. Only those times that the female was not on the nest upon my arrival are included in the analysis. Females observed were on different male territories to maximize the likelihood that different individuals were studied.

I observed the nest from the blind, recording the time the female arrived and her behavior on the nest. When she left, the new egg was marked. All observations were made on clear mornings with times recorded in E.S.T. Sunrise data were obtained from the London Free Press Weather Service. Linear regression was used for analysis of the relationship between time of arrival and sunrise.