

EXTENDED POST-FLEDGING PARENTAL CARE IN THE RED-TAILED TROPICBIRD AND SOOTY TERN¹

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In an extensive literature search on post-fledging parental care in seabirds, Burger (1980) noted little evidence for the phenomenon in Red-billed and White-tailed tropicbirds (*Phaethon aethereus* and *P. lepturus*). On the basis of Fleet's (1974) observations of the Red-tailed Tropicbird (*P. rubricauda*), she concluded that parents feed their chicks up to 30 days after fledging, but that during this period young remain in the vicinity of the nest. The evidence heretofore available suggests that once young tropicbirds leave the colony, they are independent (see also Nelson 1983).

Among terns, extended parental care hundreds of kilometers from nesting colonies has been noted for a number of species (reviewed by Burger 1980). Before now, however, there was little evidence that Sooty Terns (*Sterna fuscata*) care for fledged young anywhere other than in the colony. Evidence that they might do otherwise is confined to two observations of parent-chick groups 8 and 20 km from Bird Island in the Seychelles (Feare 1975).

In this paper we report behaviors that indicate extended post-fledging parental care in Red-tailed Tropicbirds and Sooty Terns. Observations were made during seven cruises across the central and southern Pacific Ocean. The cruises were as follows: (1) from Panama City, Panama, to Wellington, New Zealand, 10 to 30 November 1976; (2) from Long Beach, California, to Wellington (via Tahiti), 15 November to 9 December 1977; (3) from Sydney, Australia, to Long Beach (via American Samoa), 13 March to 5 April 1979; (4) from Ushuaia, Argentina, to Long Beach (via Lima, Peru), 19 April to 28 May 1980; (5) from Seattle to the Equator, 90°W to 160°W, and return, 7 October to 5 December 1983; (6) from Miami to the same section of the Equator (via the Panama Canal) to Honolulu, Hawaii and then to Tahiti, 9 April to 4 June 1984; and, (7) Miami to Honolulu (same route), 9 October to 5 November 1984. Seabirds were censused 30 min each daylight hour that our ships were underway, or between 13 and 15 census periods per day (for details, see Ainley and Boekelheide 1983).

OBSERVATIONS

Tropicbirds. We made the following sightings of one or more birds: 29 of *P. aethereus*, 68 of *P. rubricauda*, 26 of *P. lepturus*, and 7 of *Phaethon* spp. In *P. aethereus* and *P. lepturus*, we never recorded juveniles associated with adults, but in *P. rubricauda* we observed a juvenile in the company of one, or usually two adults (six times, once in the Tasman Sea and nine times in the South Pacific. These observations contrasted with the usually solitary nature of tropicbirds (e.g., King 1970, Gould 1971). The adult-ju-

venile groups averaged 544 km from the nearest islands ($SD = 254$, range 172 to 821 km).

The adult-juvenile duos and trios approached and later departed the vicinity of the ship together, flying within 30 m of one another in the same direction. Responsive calling, where the call of the juvenile was "answered" immediately by the adult(s), was a feature of the association. Some groups came and went repeatedly over periods of five to six hours (usually within 55 to 70 km of our ship), often flying about a kilometer or so from the ship before leaving. Although in two cases, groups sat on the water with individuals within a meter of one another, we observed no feeding of young by adults.

Other than the above sightings, we observed groups only twice in 40 other sightings of Red-tailed Tropicbirds, twice in 24 sightings of White-tailed Tropicbirds, and never in 26 sightings of Red-billed Tropicbirds. In all cases these were birds in multispecies feeding flocks. We saw solitary juveniles on six occasions for *P. rubricauda* and twice for each of the other two species.

Sooty Tern. We logged 418 sightings of one or more Sooty Terns. In 71 of these sightings, we observed obvious adult-juvenile groups, almost always duos. These groups averaged 423 km from the nearest island ($SD = 272$, range 81 to 880 km). In all instances the young bird followed the adult closely, even as they swooped low over feeding tuna, and both called back and forth using the vocalizations typical of an adult and chick trying to locate one another at a colony (Dinsmore 1972). DGA, who participated in five cruises, was familiar with this vocal behavior from visits to the Dry Tortugas in the Caribbean. No feeding of young by adults was seen, although Feare (1975) noted aerial feeding of young over colonies in the Seychelles.

On the first six of our cruises we encountered only 13 adult-juvenile groups, but on the last in October 1984 we observed such associations on 58 occasions involving 156 groups. This was concurrent with a dramatic increase in the proportion of juveniles (Fig. 1). The latter perhaps resulted from a surge in breeding effort following the 1982 to 1983 El Niño and the apparent El Niño-related switch from bimodal to unimodal, in the annual breeding effort within equatorial populations at least at Christmas Island (Schreiber and Ashmole 1970, Schreiber and Schreiber 1984, R. W. Schreiber, pers. comm.). Both factors would serve to concentrate the breeding effort.

DISCUSSION

Burger (1980) and Nelson (1983) discussed the factors associated with extended post-fledging parental care. Disregarding procellariids (where the phenomenon is unknown) these included small clutch, prolonged pre-fledging period of chicks, difficulty of feeding technique, and lowered food availability. They noted that the phenomenon is particularly prevalent among seabirds that breed in the tropics where feeding is presumably difficult relative to areas of cooler waters. In that tropicbirds conform to all of the above criteria, the apparent absence of extended

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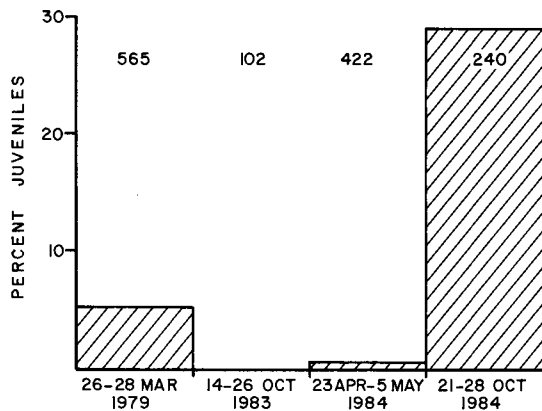


FIGURE 1. The proportion of juveniles among Sooty Terns observed within 5° latitude of the Equator, between 130° and 150°W longitude. Confinement of observations to this region increased year-to-year comparability of data. The total number of terns and specific dates in the above area for each sample are given.

parental care in their breeding strategy was thought by Burger and Nelson to be particularly enigmatic. It is not 100 percent certain that the adult-juvenile groups of Red-tailed Tropicbirds and Sooty Terns seen by us involved parents and their offspring, because we saw no parental feeding of chicks. The close associations and responsive calling, however, is strong circumstantial evidence. We therefore suggest that parental care in the Red-tailed Tropicbird and Sooty Tern may, or in some of their populations, does extend beyond colony departure.

Among the most acrobatic of seabirds are the tropicbirds that feed by deep plunging and the species like Sooty Terns that feed by dipping and aerial pursuit. The material reviewed by Burger (1980; especially her Table VI) and Nelson (1983) suggest that extended parental care is most typical of seabirds that feed this way, although opinions of researchers vary about the degree to which chicks of various species (mostly terns) learn to feed by observing their parents. The contradictions have probably been affected by "differences in our knowledge rather than real differences among species" (Burger 1980:420), and differences between populations within species (Spear, Ainley and Henderson, unpubl.). Certainly, continued association with adults should increase the feeding success of juveniles of species that must learn specialized foraging techniques and must locate concentrated but widely distributed prey (see Porter and Sealy 1982). In the case of the Sooty Tern, Feare (1975) also noted the difficulty with which the young learned to drink on the wing. That young may learn how or where to feed by observing parents, of course, does not preclude the possibility that extended parental care by Red-tailed Tropicbirds and Sooty Terns might also include feeding of young. The chances of our observing such behavior, however, would be small due to (1) our rapid transit and our concentration on censusing seabirds, activities which prohibited prolonged observation of parent-chick groups; and (2) the possible disruptive intrusion of our large ships.

It was curious that we saw parent-chick groups only in the one tropicbird species. The fact that 8 of 10 instances occurred in the depleted central waters of the South Pacific Gyre, where food capture may be difficult and where we saw no Red-billed Tropicbirds and few White-tailed Tropicbirds, suggests that factors related to distribution and ocean productivity may have been involved. In the Galapagos, which are surrounded by rich waters, Nelson (1983) observed that Red-billed Tropicbird young reach 120% of adult weight and presumably fledge with reserves to carry them through the transition to independence. He noted that many species use such a strategy in lieu of extended post-fledging parental care.

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