

## Predation on Tern Eggs by European Starlings in the Azores

In 2003 a Glasgow University Exploration Society expedition visited the Azores archipelago, with the primary objective of carrying out a variety of studies of Azores seabirds. One aspect of this work was to collect data on the roseate tern population of the Azores, as this is now one of the largest populations of roseate terns remaining in Europe.

During the last few years, the mixed common and roseate tern colony at Vila islet (Santa Maria island, Azores archipelago) has been suffering from increasing rates of egg predation. Depredated eggs were noted in the islet since annual monitoring was initiated in 1989, when Adrian del Nevo counted 154 roseate tern nests and found “several eggs predated” (IMAR-Açores unpublished data). In 1999, 167 nests of roseate tern and 181 nests of common tern *Sterna hirundo* were counted at Vila islet and 112 eggs (of both species) were found depredated (Neves, pers. obs.). Hays *et al.* (2002) report pecked and partially eaten eggs on Vila islet in 1999 and 2000. These two studies mention the fact that a pair of Eurasian buzzards (*Buteo buteo rothschildi*) was also nesting on the islet and have regularly taken large chicks and adult terns, but it is not suggested that the buzzard ate the eggs. On another colony in the Azores, Ramos & del Nevo (1995) observed a grey heron *Ardea cinerea* preying on eggs and chicks of roseate tern.

Ramos & del Nevo (1995) concluded that in the early 1990s the role of predation on tern colonies was insignificant as a factor influencing nest-site selection by terns in the Azores. The high rates of egg predation observed at Vila islet in the recent years are presumed to have very serious adverse effects on the Azores population, since Vila islet is one of the most important tern colonies in the archipelago. Vila islet has been declared an Important Bird Area (IBA 014) and holds a mixed colony of common and roseate terns that also include the only known breeding pair of sooty terns (*S. fuscata*) in Europe (Monteiro 2000). Vila Islet has no mammalian predators and holds about 20% of the Azores roseate tern population (201 pairs in 2002 when the total breeding population was 991). Egg laying in the Azores occurs between late April and late July (Hays *et al.*, 2002; Ramos & del Nevo, 1995), prior to which terns concentrate in clubs and gradually start displaying, courting, and nesting behaviour.

During this study only starlings were observed eating tern eggs. However gulls and turnstones (*Arenaria interpres*) were also observed in the islet and could have been undetected as predators. During 2003 more than 48% of the nests from a defined observation area were depredated during 12 days. Eleven complete sequences of egg predation by starlings were observed and several more incidents indicated predation. Observations from predation sequences showed that predation usually occurred by actions of more than one starling. A small group of starlings (up to 6 individuals) would approach the area of a nest even when a bird was incubating. The incubating bird would fly up to mob one of the starlings, at which point the other individuals moved quickly towards the nest and broke the eggs. On many occasions starlings were also seen returning to the exact places where predation had occurred, and sometimes even removing egg remains from the nest and taking them away from the nest to eat them, while in other cases unsuccessful predation attempts were observed. However, starlings seemed quite persistent even when they were mobbed, usually returning to exactly the same place they were feeding in a number of seconds. Starlings tend to roost up to 200 m above sea level (Feare 1985); in the Azores they roost abundantly on remote sea cliffs and on islets (pers. obs.) and the roosting areas largely overlap with tern breeding areas. However starling predation of tern eggs has not been detected at other colonies in the Azores. Caloura islet off São Miguel is a good example. The number of Common and Roseate terns breeding in this islet has increased over the last years. A few hundreds of starlings roost in the islet and adjacent coast (according to local people the numbers are increasing). However no depredated eggs were found during several visits to the islet. As opposed to Vila islet, breeding of European starlings at Caloura islet has never been confirmed. This fact together with the fact that Caloura is much more rocky and has little vegetation may contribute to the absence of resident starlings.

Starlings are not the only threat to terns in the Azores. Observations conducted during this study suggest that tern colonies in the Azores may not be sufficiently protected from human disturbance. Fishermen were seen landing on Mós islet, Terceira Island to harvest rock pigeons and they caused considerable disturbance in the tern colony. The main roseate tern colonies in the Azores, which are protected by European Union and Portuguese conservation legislation, should be clearly identified with notice boards to warn people to avoid entering tern colonies during the breeding season.

Predator control has long been considered necessary for the survival of the north eastern American population of roseate terns (Nisbet 1981) and many studies have reported on management strategies in tern colonies and the results of their implementation. In the Azores, some form of controlling the impact of starlings on roseate tern seems necessary if the Azores population of roseate terns is to be maintained.

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