Seasonal occurrence of Common *Sterna hirundo* and 'Cayenne' Terns *S. sandvicensis eurygnathus* in a tropical estuarine complex of northeast Brazil

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Abstract
This year-long study (October 2002–September 2003) documented the seasonal occurrence of Common Terns *Sterna hirundo* and 'Cayenne Terns' *S. sandvicensis eurygnathus* at the Coroa do Avião, a barrier islet located in an estuarine complex of the State of Pernambuco in northeast Brazil. Common Terns were present in the area almost all year round, except in December, February and March, with peak abundance in May–July. The islet is used by Common Terns as a stopover area during migration to and from their main wintering grounds in southern South America. 'Cayenne Terns' occurred mainly from August to October, being absent from December to April. In Brazil the 'Cayenne Tern' breeds from April to October and most birds at the islet were likely to have been individuals dispersing from colonies in southeast Brazil.

Introduction
In the New World, the Common Tern *Sterna hirundo* breeds in central and eastern Canada and northern USA but spends the non-breeding period in South America (Gochfeld & Burger 1996). The 'Cayenne Tern' *S. sandvicensis eurygnathus* breeds in the southern Caribbean Sea and along the Atlantic coast of South America (Gochfeld & Burger 1996; Yorio & Efe 2008). The 'Cayenne Tern' was formerly treated as a distinct species, but it is now generally regarded as a subspecies of the Sandwich Tern *S. sandvicensis* (Gochfeld & Burger 1996), because hybridisation between both taxa has been recorded in the Caribbean.

A recent study by Efe *et al*. (2009) based on genetic evidence, split 'Eurasian' and 'American' Sandwich Terns into two separate species, *S. sandivicensis* and *S. acuflavidus* respectively, and synonymised the 'Cayenne Tern' with the 'North American Sandwich Tern' because they are genetically very similar, even though the two taxa are morphologically distinct. A detailed comment on the taxonomy proposed by Efe *et al*. (2009) is currently in preparation and for the purposes of this paper 'Cayenne Tern' continues to be treated as subspecifically distinct from the 'American Sandwich Tern'.

Few studies focused on seabirds have been conducted on the coast of northeast Brazil between the States of Ceará and Sergipe (Lat. 2–10°S; Figure 1). Available data are mainly from ring recoveries, opportunistic non-systematic observations, and lists of species (e.g. Azevedo-Júnior *et al*. 2001; Sousa *et al*. 2005; Girão *et al*. 2008). In a three-year study of migratory birds on the northern coast of Pernambuco, Telino-Júnior *et al*. (2003) reported the occurrence of Common and 'Cayenne' Terns but not their seasonal numbers. In this paper we present the results of a year's study of the seasonal occurrence of Common and 'Cayenne' Terns in a tropical estuarine complex of the State of Pernambuco in northeast Brazil.

Study area and methods

The Santa Cruz Channel (7°41'S 34°50'W; 7°49'S 34°50'W) in the State of Pernambuco, northeast Brazil, is an estuarine complex bordered by c. 32 km^2 of mangrove forests. It is a U-shaped, 22 km-long and 0.6–1.5 km-wide tidal creek that separates Itamaracá Island from the continent (Figure 1). The Coroa do Avião (7°48'S 34°50'W) is a recently-formed barrier islet (950 m-long and 30–80 m-wide) located at the southern inlet of Santa Cruz Channel (Mendonça *et al*. 2006; Figure 1), at the eastern end of which is a hook-shaped sandy bank where shorebirds and terns roost (Figure 2).

From October 2002 through September 2003 CEF and CJC conducted three censuses a month (144 hours of field effort) at Coroa do Avião Islet. All censuses were made in the morning in good weather conditions and during the rising tide. At low and falling tides, terns often forage away from the estuary, and only a few

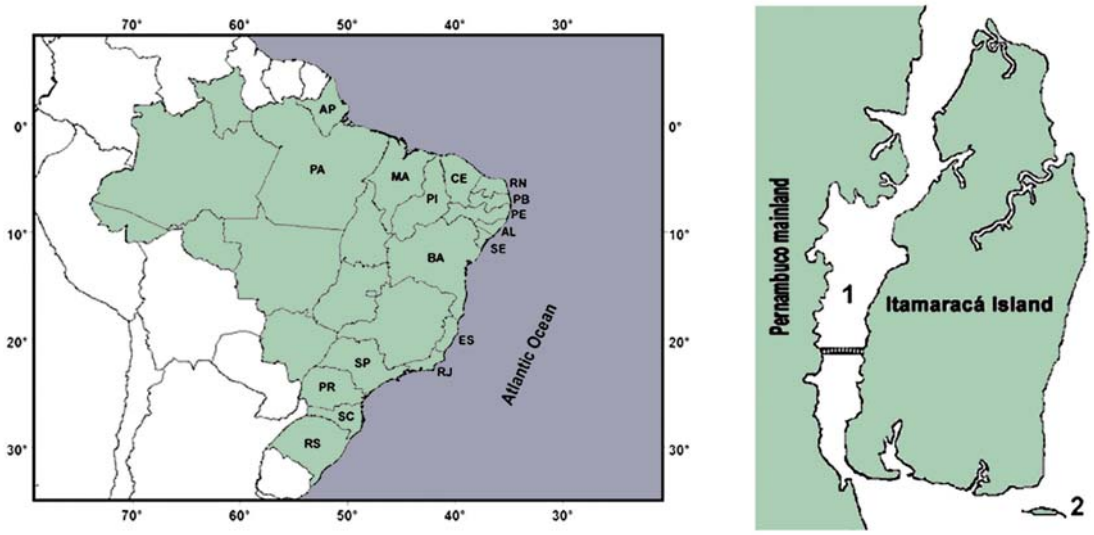

Figure 1. Map of Brazil showing the 17 coastal states: AP (Amapá), PA (Pará), MA (Maranhão), CE (Ceará), RN (Rio Grande do Norte), PB (Paraíba), PE (Pernambuco), AL (Alagoas), SE (Sergipe), BA (Bahia), ES (Espírito Santo), RJ (Rio de Janeiro), SP (São Paulo), PR (Paraná), SC (Santa Catarina) and RS (Rio Grande do Sul). In detail, (1) the Santa Cruz Channel on the northern coast of Pernambuco and (2) location of Coroa do Avião Islet.

Figure 2. Flocks of shorebirds (background) and Common *Sterna hirundo* and 'Cayenne' Terns *S. sandvicensis eurygnathus* at a sandbank on the eastern end of Coroa do Avião Islet the Santa Cruz Channel, northeast Brazil, May 2003. © *C. E. Fedrizzi*

are seen fishing near the islet (pers. obs.). Towards high tide, terns approach the eastern end of the islet and roost on the sandbank where they are easily counted with binoculars (10x50) and spotting scopes (20–60x). Their frequency of occurrence was calculated by dividing the number of censuses in which a taxon occurred by the number of all censuses and multiplying by 100.

Results

Common Terns were observed at Coroa do Avião almost year-round, except in December, February and March. Overall, the species was recorded on 20 (55.6%) of 36 censuses. Between May and September, however, Common Terns was present on 100% of censuses, with highest counts (> 40 birds) during May, June and July (Figure 3). A few birds in breeding plumage and with orange-red, dark-tipped bills were seen at the islet in May and July. 'Cayenne Terns' were observed in May, and from July to November, with highest counts (> 40 birds) between August and October (Figure 3). They were recorded on 47.2% of all censuses, but on 100% between July and November. Most birds at the islet were either in breeding plumage with a black cap from base of bill to crested nape or moulting to non-breeding plumage. In August and September, respectively, 15 and two recently fledged individuals, recognised by their streaked, brownish-grey crown, hind-neck and mantle, and pale bill were seen being fed by their parents.

Discussion

The Common Tern breeds from May to July, after which it migrates to non-breeding grounds in South America (Gochfeld & Burger 1996). At Coroa do Avião, the species was present from April–November, but virtually absent during December–March. Common Terns seen at the islet from August to October will have been birds en route to their main wintering grounds in southern South America, where Lagoa do Peixe in southern Brazil and Punta Rasa in Argentina support large concentrations during November–April (Lara-Resende 1988; Hays *et al*. 1997; Sapoznikow *et al*. 2002). Evidence from ringing studies also suggests that Coroa do Avião is a stopover site for Common Terns migrating along the Atlantic coast of South America, as three individuals ringed there in September 1992 were subsequently recovered at Punta Rasa on 14 February 1995, 11 March 1996, and 10 March 1997 (Azevedo-Júnior *et al*. 2001).

Common Terns at Coroa do Avião in April and May, a few already in breeding plumage, suggest this species also uses the islet as a stopover site during northward migration. Birds seen in June and July (when the species breeds in the northern hemisphere) exhibited white forehead and lores, a black bill and blackish carpal bars, and were probably immature birds hatched the previous year. In Common Terns, immature birds spend all of their two pre-breeding years on the wintering grounds (Gochfeld & Burger 1996).

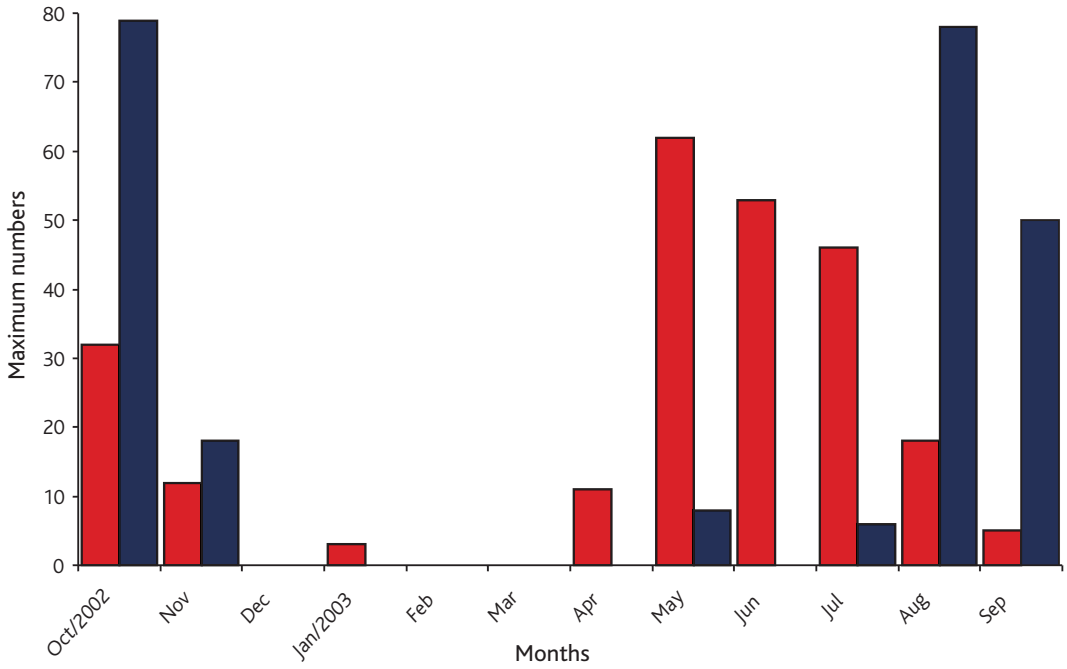

Figure 3. Maximum monthly number of Common *Sterna hirundo* (red bars) and 'Cayenne Terns' *S. sandvicensis eurygnathus* (blue bars) observed at Coroa do Avião, northeast Brazil, from October 2002 to September 2003.

It is reasonable to assume most Common Terns observed at Coroa do Avião are from North America, because five out of six ringed Common Terns recovered at the islet were ringed as nestlings at Great Gull Island, New York. A single bird from the Azores was caught on 21 May 1993 (Azevedo-Júnior *et al*. 2001), and some Common Terns ringed at the Azores have been recovered on the northern coast of the State of Bahia (Lat. 11°S; Figure 1), suggesting regular transatlantic movements (Hays *et al*. 1999).

In Brazil, the 'Cayenne Tern' breeds on small coastal islands between the States of Espírito Santo and Santa Catarina (Branco 2004; Yorio & Efe 2008; Figure 1). The breeding season of these populations is from April to October, but with a peak in June–July (Efe *et al*. 2000; Branco 2004). After breeding, birds disperse north and south along the Brazilian coast. Of the more than 24,000 birds ringed on three coastal islands in the state of Espírito Santo (Lat. 20°S) during 1988–1997, there have been recoveries throughout coastal Brazil, including three at Coroa do Avião (Efe *et al*. 2000). The islands of Espírito Santo hold the largest nesting concentration of 'Cayenne Terns' in Brazil, with approximately 6,400 pairs breeding each year (Efe *et al*. 2000; Yorio & Efe 2008).

At Coroa do Avião, 'Cayenne Terns' were recorded in May and July–November, with highest numbers in August–October. Those in August–October were probably birds dispersing from colonies in southeast Brazil. In other parts of northeast Brazil, 'Cayenne Terns' appear to be seen more often from September onwards, as suggested by records in the states of Ceará (Lat. 3–4°S; Girão *et al*. 2008), Alagoas (Lat. 9°S; Sousa *et al*. 2005), and Bahia (Lat. 11°S; Lima *et al*. 2008; Figure 1). The few birds at the islet in May and July may have been immatures that would not breed that year.

Since the Coroa do Avião has only a small roosting area available for birds, it harbours relatively low numbers of both Common and 'Cayenne' Terns compared to other sites in southeast and southern Brazil. However, throughout the whole area of the Santa Cruz Channel there are other suitable roosting places (sandy beaches and banks) for terns and it would be advisable to conduct surveys of the entire estuarine complex, because so far studies of migratory birds have been confined to Coroa do Avião (Azevedo-Júnior *et al*. 2001; Telino-Júnior *et al*. 2003). Despite the low abundance of terns recorded in this study, their seasonal pattern of occurrence was demonstrated.

Acknowledgments

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