

First breeding records for Damara Terns and density of other shorebirds along Angola's Namib Desert coast

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The Damara Tern *Sterna balaenarum* is a small coastal-nesting seabird that breeds in the Namib Desert, with a stronghold in Namibia. About 125 pairs are known from scattered localities in South Africa, and there are suggestions that it breeds in the northern end of the Namib in Angola. During a three-day survey in southern Angola in January 2009, from Tombua in the north to the Cunene River mouth in the south (a distance of 197 km), 573 Damara Terns, of which 7.5% were fledglings, were recorded in three main concentrations: two in the Baia dos Tigres region, and one 30 km north of the Cunene River mouth. A breeding colony was located at the southern site containing a minimum of six nests with single eggs (5) or a recently hatched chick (1). This represents the first known breeding record for Damara Terns in Angola and is a minimum estimate of the true numbers. Other shorebirds encountered on the survey included the first record of European Oystercatcher *Haematopus ostralegus* and the second record of Swift Tern *Sterna bergii* in Angola. A total of 26 species of shorebirds was recorded at a density (33 birds km⁻¹ coast) that was identical to that recorded 10 years previously. The probable stronghold of Damara Terns in Angola is the Baia dos Tigres region, where shorebird numbers are relatively high compared to other sections of the Namib Desert coast.

Introduction

Damara Terns breed primarily in Namibia from the Cunene River in the north to the Diamond area (Sperrgebiet) in the south (Crawford and Simmons 1997). They are also found at scattered localities in South Africa, from Port Nolloth on the west coast through to pockets of sandy habitat around Port Elizabeth on the south coast (Barnes 2000). In the Namib Desert they are confined mainly to inaccessible gravel plains and salt pans (Simmons 2005, Braby et al. 2009). Several studies have suggested they may breed in the northern limits of the Namib Desert in Angola. For example, Pinto (in Dean 2000) found birds in breeding plumage amongst specimens collected in November at the Cunene River mouth, while Brooke (1981) suggested the likelihood of breeding along the southern Angolan coast. Evidence that Damara Terns occur in Angola during their presumed breeding months of December–January (Dean 2000) was first provided by A Sakko from shorebird surveys conducted in 1998–99, when 280 Damara Terns were recorded along 203 km of desert coast at a density of 1.4 birds km⁻¹ (Simmons et al. 2006). No evidence of breeding was then found, nor by Dyer (2006) in a survey by sea from Luanda to Ilha dos Tigres and on Ilha dos Tigres.

This paper reports results from a survey along the southern Angolan coast timed to coincide with the breeding season of Damara Terns in the Namib Desert. Logistical constraints and time precluded a full population census of Damara Terns, so the aims were to locate all accessible tern flocks in coastal areas and then investigate each of them for evidence of breeding. Sightings of other shorebirds along the southern Angolan coast are also documented.

Methods

The coastline of the Namib Desert between Tombua and the Cunene River mouth, a distance of 197 km, was surveyed from 24–26 January 2009. All shorebirds seen were voice-recorded while driving at a maximum of about 40 km h⁻¹. Birds at sea—mainly Cape Cormorants *Phalacrocorax capensis*—were not included in the counts because they did not permit estimation of a density per kilometre of coast. All other species are reported as total numbers and as individuals per kilometre of coast. This allows a quantitative assessment of hotspots of shorebird numbers along a linear coastline and comparison with past and future counts. Birds at the Cunene River mouth also were excluded from totals because this represents a different freshwater habitat and has been monitored previously (Simmons et al. 1993, Anderson et al. 2001). All route distances were recorded on a Garmin GPSMAP 60Cx at a resolution of 0.5–5.0 km. Because the survey occurred over 3 d, all tidal cycles were experienced. The weather conditions were generally favourable with light winds and little cloud over the 3 d. Swells were relatively light.

Damara Terns were located mainly by call while driving slowly along high beach areas. Once located, the area was searched on foot with 8.5× Swarovski binoculars for further tern activity, particularly prey-carrying individuals. Single birds flying inland with fish were followed on foot and observed closely during descent. Birds that then walked purposefully over the rocks or gravel plains—a characteristic of breeding birds—were scrutinised and their final destination marked

and searched for eggs or flightless chicks. Eggs were measured with digital callipers accurate to 0.01 mm, while mass was measured on a 50 g Pesola balance, checked against an electronic scale accurate to 0.01 g.

Study area

The Angolan portion of the Namib Desert extends c. 270 km from Namibe (15°10'19.6" S, 12°09'52.6" E) to the Foz do Cunene (Cunene River mouth, 17°15'4.6" S, 11°45'13.3" E) via Tombua (15°47'58.4" S, 11°50'45.9" E). The majority of the northern section of the coast comprises dunes that reach the sea, while the area opposite Ilha dos Tigres, known as Baia dos Tigres, comprises dunes to the east and a series of bays formed by shingle, sand and shell spits. The spit that once joined the island to the mainland, now broken (Figure 1), forms the largest of these and comprises wind-blown sand and shells. Further south the dunes move inland revealing rocky quartz and black rock backed about 2 km inland by low dunes. The area was divided into three broad habitat types for survey purposes: (1) sandy beach and backing dunes from Tombua to the start of Baia dos Tigres (opposite the end of the island), 113 km; (2) bays and sand spits (Baia dos Tigres), 38 km; (3) increasingly exposed rocky substratum and gravel plains backed by dunes (southern end of last spit to Cunene River mouth), 46 km. Ilha dos Tigres was not visited but some data for this locality have been reported by other researchers.

Results

A total of 11 152 shorebirds of 26 species was recorded over 197 km in the three-day survey (Table 1). This number was dominated by Cape Cormorants, comprising a minimum of 4 570 birds, and Sanderlings *Calidris alba*, comprising 2 080 birds (Table 1). The linear density of all shorebirds was 57 birds km⁻¹, with hotspots of birds in the embayments of Baia dos Tigres reaching 173 birds km⁻¹. Massive flocks of cormorants fishing offshore south of Baia dos Tigres were estimated conservatively to number 15 000 birds, but were excluded from estimates of linear density. Excluding Cape Cormorants altogether, because they were much less common 10 years earlier (Simmons et al. 1996), gives a total of 6 582 shorebirds at a linear density of 33 shorebirds km⁻¹.

Five species of terns were recorded, often in mixed flocks, of which the Swift Tern *Sterna bergii* (16 individuals) is the second record for Angola (Table 1). Damara Terns tended to flock on their own and 573 birds were recorded in three main locations. A flock of 212 birds was seen on the most northerly sand spits, opposite Armacao village of Ilha dos Tigres. The next day they were resighted and recounted close to their original location (A in Figure 1). A second flock of 75 birds was found 25 km south of the first flock on open salt flats near the base of the main spit that once joined the island to the mainland (B in Figure 1). The ratio of adults to flying juveniles in these two flocks combined was 248:39. A further 18 km to the south (30 km north of the Cunene River mouth) the largest flock was found comprising 280 birds, amongst which individuals were recorded carrying fish and calling while flying. In this flock only four

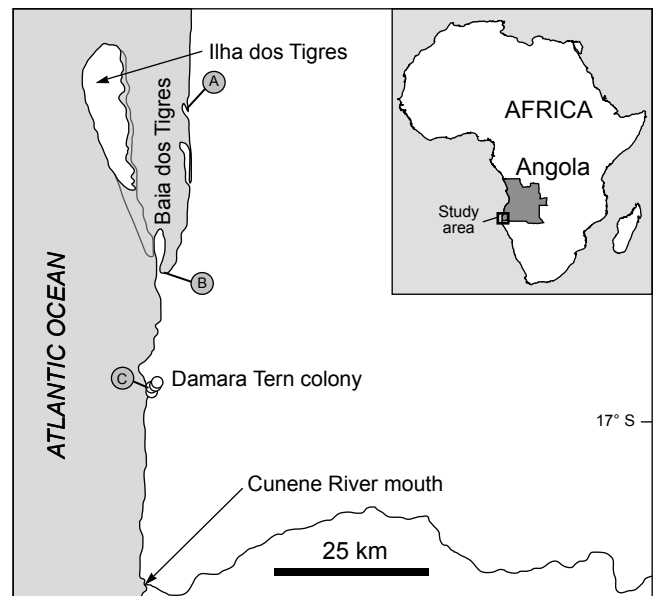


Figure 1: The Baia dos Tigres coast, Angola, indicating the locality of all major flocks of Damara Terns recorded from 24–26 January 2009. Flock sizes were as follows: A = 212 birds, B = 75 birds, C = 280 birds. At location C, 30 km from the Cunene River mouth, six breeding pairs were located. The outline from the Ilha dos Tigres southwards indicates how the island was once attached to the mainland

birds (1.4%) were juveniles. Between Tombua and the Baia dos Tigres region only six other Damara Terns were seen. They were fishing on open water. The density of Damara Terns over the entire 197 km coast was 2.9 birds km⁻¹. The main concentrations of Damara Terns (7.6 birds km⁻¹) and of other shorebirds (173 birds km⁻¹) were in the Baia dos Tigres region, which also held the greatest diversity of birds (26 species, Table 1).

Six Damara Tern nests were found 30 km north of the Cunene River. They represent the first recorded breeding of this species in Angola. All occurred on fissured black rock on a high open gravel plain affording good visibility of any possible terrestrial predators. The nests varied from 714 m to 1.7 km from the sea and all contained a single egg (five nests) or a day-old chick (one nest). Egg measures averaged 31.35 mm × 23.71 mm (Table 2). Assuming all nests were found within a searched area of c. 1.8 km², the tern colony had a nesting density of c. 3.3 nests km⁻².

Caspian Terns *Sterna caspia* were reported breeding at the southern end of Ilha dos Tigres (A Balaban pers. comm.) but that locality was not visited in this survey. Caspian Terns have bred at Ilha dos Tigres (Dyer 2006). Fledged Caspian Terns were seen and heard calling to their parents at the base of the main spit (B in Figure 1).

Wading shorebirds were dominated by Sanderlings and Curlew Sandpipers *Calidris ferruginea* and comprised nine species in total (Table 1). The rarely reported African Black Oystercatcher *Haematopus moquini* was present, numbering 44 individuals, accompanied by single European Oystercatchers *Haematopus ostralegus* on consecutive days.

Table 1: All shorebird species recorded along the Angolan coast between Tombua and the Cunene River Mouth, 24–26 January 2009. The surveyed area was 197 km long comprising sandy desert coast (113 km) in the north, followed by a series of bays (38 km) and then more open rock and gravel plains in the south (46 km)

Species	Region on coast			Total
	Tombua to Baia dos Tigres 24 January	Baia dos Tigres 24–25 January	Baia dos Tigres to Cunene 26 January	
Egyptian Goose <i>Alopochen aegyptiaca</i>		1		1
White Pelican <i>Pelecanus onocrotalus</i>		207	70	277
White-breasted Cormorant <i>Phalacrocorax lucidus</i>		6		6
Cape Cormorant <i>Phalacrocorax capensis</i>	4 000	570		4 570
Grey Heron <i>Ardea cinerea</i>		11		11
Little Egret <i>Egretta garzetta</i>		36		36
Greater Flamingo <i>Phoenicopterus ruber</i>		210		210
African Black Oystercatcher <i>Haematopus moquini</i>	4	40		44
European Oystercatcher <i>Haematopus ostralegus</i>		1		1
Grey Plover <i>Pluvialis squatarola</i>	1	163		164
White-fronted Plover <i>Charadrius marginatus</i>	3	72		75
Ringed Plover <i>Charadrius hiaticula</i>		106		106
Eurasian Curlew <i>Numenius arquata</i>		1		1
Common Whimbrel <i>Numenius phaeopus</i>		3		3
Greenshank <i>Tringa nebularia</i>		4		4
Sanderling <i>Calidris alba</i>	22	2 058		2 080
Curlew Sandpiper <i>Calidris ferruginea</i>		790		790
Little Stint <i>Calidris minuta</i>		30		30
Bar-tailed Godwit <i>Limosa lapponica</i>		26		26
Kelp Gull <i>Larus dominicanus</i>	240	60	30	330
Grey-headed Gull <i>Larus cirrocephalus</i>		4		4
Caspian Tern <i>Sterna caspia</i>		62		62
Royal Tern <i>Sterna maxima</i>		2		2
Swift Tern <i>Sterna bergii</i>		16		16
Sandwich Tern <i>Sterna sandvicensis</i>		1 210		1 210
Damara Tern <i>Sterna balaenarum</i>	6	287	280	573
Unidentified waders		590		590
Total	4 276	6 566	310	11 152
Number of species	7	26	3	26

Table 2: Details of locations, habitat and egg/chick measurements for the first Damara Tern nests recorded in Angola

Nest number	Location	Habitat	Measurements: length (mm), breadth (mm), mass (g)
1	16°58.927' S, 11°46.024' E	780 m from coast, gravel plain and rock	Egg 30.53, 23.82, 9.0
2	16°58.721' S, 11°46.183' E	1.02 km from coast, black rock	Day-old chick 11.0
3	16°59.014' S, 11°46.209' E	1.11 km from coast, gravel on rock	Egg 30.46, 24.07, 9.9
4	16°58.274' S, 11°46.549' E	1.64 km from coast, gravel plain	Egg 31.59, 23.01, 9.6
5	16°58.328' S, 11°46.626' E	1.80 km from coast, gravel plain	Egg 32.98, 23.92, 9.4
6	16°58.544' S, 11°46.408' E	1.41 km from coast black rock	Egg 31.19, 23.71, 6.0*

* Egg was pale-coloured on one side suggesting incomplete contents

Amongst the few non-shorebird species recorded was a Peregrine Falcon *Falco peregrinus*, perched on the sand flats just south of Tombua, two Pied Crows *Corvus albica* within 2 km of the first flock of Damara Terns (A in Figure 1) and flocks of Grey-backed Sparrowlarks *Eremopterix verticalis* in coastal areas supporting the only grasses.

Discussion

This shorebird survey revealed a slightly higher density of birds (57 birds km⁻¹) but similar locations of flocks to those in a survey conducted 10 years earlier in January 1999. After excluding cormorants from shorebird totals in the 2009

survey, the density of other shorebirds (33 birds km⁻¹) was identical to that recorded 10 years earlier (Simmons et al. 2006), indicating stability in summer numbers. Species richness was also similar at 26 vs 25 species but a few new species were evident. Whereas few Royal Terns were found, the presence of Swift Terns in flocks of Sandwich Terns at Baia dos Tigres constitutes only the second time they have been recorded for Angola (Dean 2000, Dyer 2006). Amongst the 16 individuals was one freshly dead specimen found on shore with no outward sign of injury and no evidence that it had been scavenged upon. Why Swift Terns are so rare along the southern Angolan coast is unknown given that this area is just north of the Cunene River mouth where they frequently occur (Simmons et al. 1993, Anderson et al. 2001).

A European Oystercatcher was seen flying on consecutive days with African Black Oystercatchers, and probably represents the same individual. It is the first record for Angola (Dean 2000, Simmons et al. 2009). African Black Oystercatchers were relatively uncommon before 2000 (Dean 2000, Dean et al. 2002) but appear to be increasing based on results from the 2009 survey (44 birds) and that 10 years earlier (73 birds). African Black Oystercatchers have increased in Namibia and South Africa (Simmons and Roux 2001 and unpublished data, Hockey 2005, Leseberg in press). Whereas the oystercatchers encountered in southern Angola are likely to be young birds (Leseberg in press), this could not be confirmed and no ringed birds were seen.

A species expected because of its year-round presence in southern Angola (Dean et al. 2002) but not recorded on the 2009 survey was the Osprey *Pandion haliaetus*. Given that three days were spent travelling through and camping along the coast, it was unlikely to be overlooked. This indicates that there is a turnover in species composition in the region and that the total number of species exceeds the 26 reported here. Both the number of species and density of birds are somewhat higher than those for other coastal sectors of the northern Namib Desert (Ryan et al. 1984, Tarr and Tarr 1987), suggesting that the southern Angolan coast is a richer habitat than equivalent sandy beaches in Namibia's Skeleton Coast.

The main finding of the 2009 survey was that Damara Terns, as suspected (Brooke 1981), breed in the northern extension of the Namib Desert coast in southern Angola. The six nests may have represented the start of a breeding colony, given that there were 276 adult birds, many of which were flying inland with fish, calling or displaying (cf. Simmons 2005). The behaviour, inland location and adult:juvenile ratio of birds in this flock were different to the passive and silent nature of flocks seen at coastal spits further north, where a minimum of 14% of the birds were flying juveniles. The northern flocks were judged to be resident post-breeders because of the presence of flying young, their coastal location and the quiet behaviour of the adults relative to the flock found further south.

The recorded density of 3.3 nests km⁻² for Damara Terns in the breeding area is a minimum estimate of the likely final density. Nest density can exceed 50 nests km⁻² on the central Namibian coast (Braby et al. 2009). Average egg sizes found in southern Angola (Table 2) were

fractionally smaller than those for 263 eggs from Namibia: 32.2 mm × 23.8 mm (Simmons 2005). Can we estimate the potential breeding population of Damara Terns in Angola from this survey? The possible number of Damara Terns that may later have bred in southern Angola is 132 pairs, assuming that all adults in the southern flock would breed, that the flock had an equal adult sex ratio and subtracting 12 birds for the six nests that were found. If one adds to this the six pairs that were already breeding and 43 pairs for the juveniles that were seen flying on the coastline (clutch size is one: Simmons 2005), a maximum estimate of the number of Damara Terns breeding in Angola is about 190 pairs. Clearly this is an upper estimate given that not all the adults in the flock would have bred. These calculations also assume that juveniles seen in Angola were not hatched in Namibia. This is based on findings that Damara Terns only depart Namibian shores in winter after April or May (Crawford and Simmons 1997) and in Namibia usually only form large post-breeding flocks from January onwards, e.g. January (1 065 birds), February (1 703 and 1 085 birds), March (5 068 birds) and May (2 000 birds) (Braby et al. 1992). The only earlier flock of post-breeding birds that has been recorded was of 2 404 birds in November, at the Cunene River mouth. A rigorous survey of numbers breeding is required for a more accurate population estimate for Angola.

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References

- Anderson MD, Anderson RA, Anderson SL, Anderson TA, Bader U, Heinrich D, Hofmeyer JH, Kolberg C, Kolberg H, Komen J, Paterson B, Paterson J, Sinclair K, Sinclair W, van Zijl D, van Zijl H. 2001. Notes on the birds and other animals recorded at the Cunene River mouth from 6–8 January 2001. *Bird Numbers* 10: 52–56.
- Barnes KN (ed.). 2000. *The Eskom red data book of birds of South Africa, Lesotho and Swaziland*. Johannesburg: Birdlife South Africa.
- Braby R, Braby SJ, Simmons RE. 1992. 5000 Damara Terns on the northern Namibian coast: a reassessment of world population numbers. *Ostrich* 63: 133–135.
- Braby J, Braby N, Braby R, Simmons RE. 2009. Protecting Damara Terns *Sterna balaenarum* from recreational disturbance in the Namib Desert increases breeding density and overall success. *Ostrich* 80: 71–75.
- Brooke RK. 1981. The seabirds of Mocamedes Province, Angola. *Gerfaut* 71: 209–225.
- Crawford RJM, Simmons RE. 1997. Damara Tern *Sterna balaenarum*. In: Harrison JA, Allan DG, Underhill LG, Herremans M, Tree AJ, Parker V, Brown CJ (eds), *The atlas of southern African birds*. Johannesburg: Birdlife South Africa. pp 480–481.
- Dean WRJ. 2000. The *birds of Angola*. BOU Checklist 18. Tring: British Ornithologists' Union.

- Dean WRJ, Dowsett RJ, Sakko A, Simmons RE. 2002. New records and amendments to the birds of Angola. *Bulletin of the British Ornithologists Union* 122: 180–185.
- Dyer B. 2006. Report on top-predator survey of southern Angola including Ilha dos Tigres, 20–29 November 2005. In: Kirkman SP (ed.), *Top predators of the Benguela system*. Cape Town: Avian Demography Unit, University of Cape Town. pp 303–306.
- Hockey PAR. 2005. African Black Oystercatcher *Haematopus moquini*. In Hockey, PAR, Dean WRJ, Ryan PG (eds), *Roberts birds of southern Africa* (7th edn). Cape Town: Trustees of the John Voelcker Bird Book Fund. pp 389–391.
- Leseberg A. In press. African Black Oystercatcher. In: Simmons RE, Brown CJ (eds), *Birds to watch in Namibia: red, rare and endemic species*. Windhoek: National Biodiversity Programme and Namibia Nature Foundation.
- Ryan PG, Cooper J, Stutterheim CJ. 1984. Waders (Charadrii) and other coastal birds of the Skeleton Coast, South West Africa. *Madoqua* 14: 71–78.
- Simmons RE. 2005. Damara Tern *Sterna balanearum* In: Hockey PAR, Ryan PG, Dean WRJ (eds), *Roberts birds of southern Africa* (7th edn). Cape Town: Trustees of the John Voelcker Bird Book Fund. pp 464–465.
- Simmons RE, Braby R, Braby SJ. 1993. Ecological studies of the Cunene River mouth: avifauna, herpetofauna, water quality, flow rates, geomorphology and implications of the Epupa Dam. *Madoqua* 18: 163–180.
- Simmons RE, Sakko A, Paterson J, Nzuzi A. 2006. Birds and conservation significance of the Namib Desert's least known coastal wetlands – Baia and Ilha dos Tigres, Angola. *African Journal of Marine Science* 28: 713–717.
- Simmons RE, Roux J-P. 2001. A survey of African Black Oystercatchers on Namibia's Diamond Coast. *Lanioturdus* 34: 14–18.
- Simmons RE, Mills MSL, Dean WRJ. 2009. Oystercatcher (*Haematopus*) records from Angola. *Bulletin of the African Bird Club* 16: 211–212.
- Tarr JG, Tarr PW. 1987. Seasonal abundance and distribution of coastal birds on the northern Skeleton Coast, South West Africa/Namibia. *Madoqua* 15: 63–72.

