DAMARA TERN | *Sternula balaenarum (Sterna balaenarum)*

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Conservation Status:	Near Threatened, near-endemic
Southern African Range:	Coastal waters of Namibia and South Africa
Area of Occupancy:	18,000 km^2
Population Estimate:	2,000 to 5,370 breeding individuals
Population Trend:	Declining
Habitat:	Coastal salt pans and gravel plains, inshore marine waters
Threats:	Vehicle disturbance to colonies, developments in colonies, diamond mining, climate change

DISTRIBUTION AND ABUNDANCE

This species breeds along the coasts of southern Angola, Namibia and South Africa (Crawford & Simmons 1997, Simmons 2010, Braby 2011). All but about 100 post-breeding birds migrate to West Africa (Braby *et al.* 1992, Underhill *et al.* 1999, Oschadleus 2001, Braby 2010) between April and June, where they spend about four months before returning in October (Braby 2010). A total of 70 known breeding colonies are found across its breeding range, of which 56 colonies (87% to 93% of the breeding population) occur in the expansive Namib Desert coastline of Namibia (Table 2.4: Braby 2011). Previous global breeding population estimates have varied widely from below 3,000 individuals in 1978 (Johnson & Frost 1978) to 7,000 birds in 1992 (Braby *et al.* 1992), 13,500 breeding individuals in Namibia alone in 1998 (Simmons *et al.* 1998b) and 930 pairs in 2007 (Kemper

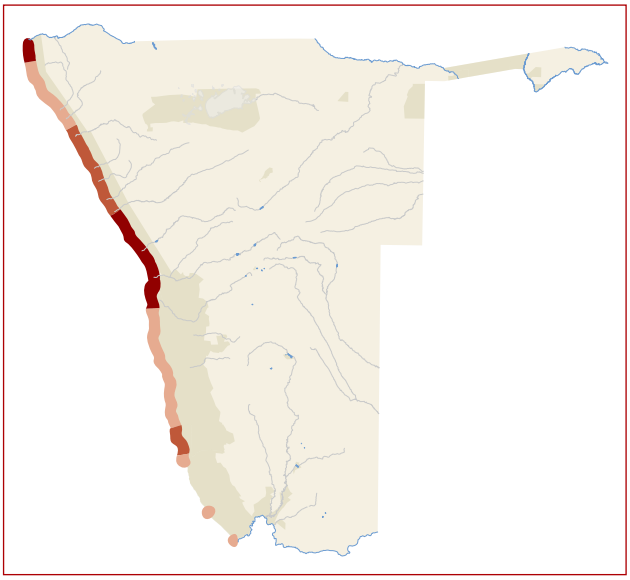

TABLE 2.4:

The location and estimated size of all presently known or extinct colonies of Damara Terns in Namibia, ordered north to south (adapted from Braby 2011). ORV = off-road vehicle.

Colony location	Latitude	Number of pairs	Population trends and comments	Potential threats
Kunene mouth area	17.4°S	2–20		
40 km south of Kunene River	17.6°S	5–20		
100 km south of Kunene River	18.1°S	3–50	Stable	
Angra Fria to Cape Fria	18.2°S	15–70	Stable	
Sarusas	18.7°S	2–20	Declined from 50–60 pairs?	
Westies Mine	19.2°S	2–20	Declined from 25–45 pairs?	
5 km north-east of Möwe Bay	19.3°S	3–6	Stable	
Möwe Bay airstrip	19.4°S	62–120	Stable	
13 km south of Möwe Bay		4–30		
30 km south of Möwe Bay		5–30		
50 km south of Möwe Bay		8–30		
60 km south of Möwe Bay	19.7°S	27–60	Stable	
North of Terrace Bay and saltpans	19.9°S	10–18	Declined from 40–80 pairs?	
Swallow Breakers		18–20		
6 km north of Torra Bay		4–10		
Torra Bay	20.3°S	14–30	Fluctuates	Mineral prospecting, tourism
Henriette Pashette Saltpan	20.4°S	4–10		
Black gravel plains north of Koigab	20.5°S	2–10	-	
Montrose Saltpan	20.5°S	11–16	-	
Red Plains	20.6°S	15–30	-	
Toscanini Saltpan	20.7°S	22–80	Fluctuates	Diamond mining
Huab (Oil Rig)	20.9°S	39–50	Stable	
Odgen Rocks	21.1°S	24–50	Stable	Diamond prospecting
Skeleton Coast National Park fence to 6 km south of Ugab	21.2°S	2–14		
Durissa Bay pans	21.4°S	80–123	Fluctuates	ORV disturbance
Ugab Saltworks	21.4°S	0–1		
Mile 108	21.4°S	3–7	Declined	Area floods
Horing Bay	21.5°S	10–15	Fluctuates	ORV disturbance
Mile 100	21.5°S	30–3	Declined?	
White Stones	21.6°S	16–50	Fluctuates	ORV disturbance
Cape Cross surrounds	21.8°S	3–10		
Mile 72 Saltworks	21.8°S	10–80	Fluctuates	
Omaruru Delta	22.0°S	28–40	Fluctuates	ORV disturbance
Hentiesbay	22.1°S	0	Extinct; up to 12 pairs recorded	
Jakkalsputz	22.2°S	25–30	Fluctuates	ORV disturbance
Shipwreck	22.2°S	2–11	Fluctuates	
Pebbles	22.2°S	1–3	Stable	
Mile 30	22.3°S	0–11	Fluctuates	ORV disturbance
Wlotzkasbaken	22.3°S	0–17	Fluctuates	ORV disturbance
Mile 14	22.4°S	30–40	Fluctuates	ORV disturbance
Mile 8	22.5°S	18–30	Fluctuates	ORV disturbance
Mile 4	22.6°S	0	Extinct since 1980; up to 20 pairs recorded	Development
Horses Graves	22.7°S	30–60	Stable	ORV disturbance

Colony location	Latitude	Number of pairs	Population trends and comments	Potential threats
Caution Reef	22.7°S	60–100	Fluctuates inversely with Horses Graves colony	
Dolphin Park	22.8°S	0	Extinct in 2005/06; up to 32 pairs recorded	Development
Walvis Bay (Pelican Point)	23.0°S	8–15		Development disturbance
Sandwich Harbour north Saltpans	23.2°S	10–25	Stable	
Sandwich Harbour	23.4°S	0–10	Fluctuates widely, often no breeding	
Conception Bay	23.9°S	14–50	Increasing?	
Meob Bay	24.5°S	18–100	Increasing?	
Easter Point	25.3°S	10+	Unknown	
Hottentot Bay pan	26.2°S	187–300	Increasing? Evidence of two-egg clutches	
Guano Bay	26.6°S	0–1	Stable	
Grosse Bucht	26.7°S	11–17	Stable	
Possession Island	26.9°S	2–2	Stable	
Elizabeth Bay	26.9°S	4–13	Declined since the 1970s from 20 pairs	
Marmora Pan	27.7°S	13–55	Increasing	
Chameis Pan	27.9°S	1–7	Stable	
Total: 56 extant colonies, three extinct colonies		**0–300 pairs**	**Mainly stable, 6 declined**	

et al. 2007b). These discrepancies probably do not represent intrinsic fluctuations in population size, but rather reflect a combination of a greater understanding of their distribution, breeding habitats and breeding seasonality, as well as differences in census methods. A more recent comprehensive review of the species' population status estimates the global population to number up to 5,370 breeding individuals (Braby 2011). Colony sizes vary from fewer than 10 pairs (24 colonies) to 300 pairs (Braby 2011) and colony densities are greatest in central Namibia.

There is some evidence of local declines in Namibia, particularly where residential areas have expanded into breeding habitat, e.g. north of Swakopmund (R Braby pers. obs.) and in a previously pristine gravel plain at Dolphin Beach (between Swakopmund and Walvis Bay), where a colony of 32 pairs has become extinct after development in 2005/2006 (Braby 2011). In some areas in southern Namibia, diamond mining may have impacted breeding populations (Simmons 2005d, Braby 2011), particularly in the high intensity diamond mining area near Oranjemund, where coastal substrates have been disturbed extensively. Where diamondiferous layers have been removed in Alexander Bay, South Africa, terns resorted to breeding on the exposed bedrock (Underhill 2000b).

ECOLOGY

In Namibia, the Damara Tern occurs entirely along the arid Namib Desert coastline. Salt pans and gravel plains within three to five kilometres of the ocean are preferred nesting areas. In southern Namibia, salt pans are preferred as nesting areas, whereas in northern Namibia, gravel plains are favoured (Simmons *et al.* 1998b), possibly because temperatures get too high on some salt pans in the northern desert. It also breeds between barchan dunes on exposed gravels in central and southern Namibia and in dune slacks in vegetated areas on the south coast of South Africa (Watson & Kerley 1995). It rarely nests on dunes, as the eggs are covered by moving sand (Johnson 1979, Braby 2011, N Hess unpubl. data).

It breeds mainly from October through to March; the timing varies between colonies. The peak of the egg-laying season is in November and December in central regions (Swakopmund), in December farther north (22° S), and in January to February at Möwe Bay (Simmons & Braine 1994, Braby 1995, Braby *et al.* 2001). Clutch size is typically a single egg (99.9% of 2,528 records: Braby 2011), which is unusual for terns. The egg is laid on the ground in exposed locations in a small depression that is sometimes lined by shell fragments or small stones. Nest location is strongly influenced by jackal activity; nests are located

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farther inland where density of jackal tracks at the coast is high (RE Simmons, R Heber-Percy, J Braby unpubl. data), and well studied colonies have shifted from their core to peripheral areas as jackals moved in (R Braby pers. obs.). Moreover, the presence of jackals and humans reduced breeding success (Braby *et al.* 2001, Williams *et al.* 2004, Braby *et al*. 2009).

Pre-migratory flocks typically contain tens to hundreds of birds. Flocks of 1,000 to 2,400 birds have been observed in the vicinity of the Kunene River mouth on five occasions and there is one record of over 5,000 post-breeding birds north of Möwe Bay (Braby *et al.*1992). Damara Terns rarely roost with other terns on desert coasts and appear to roost independently where they co-occur (Braby 2010, Simmons 2010).

The probability of a bird surviving from fledging to adulthood was found to be high at 0.59; that of annual adult survival was also high at 0.88 (Braby *et al*. 2011b, 2012). Age at first breeding is between three and four years (Braby *et al*. 2011b). A low probability of 0.06 of a breeding bird moving to another colony indicates that they are faithful to their breeding colonies (Braby *et al*. 2012).

The Damara Tern forages mainly over shallow water, often in bays, over reefs or in salt works, probably because surf zone fish are concentrated here and less common in open water (B Clark pers. comm.). It catches fish by plunge-diving. It also occasionally feeds behind breakers in the open ocean and may do so at night (Braby *et al.*1992).

Foraging birds tend to avoid murky, sediment-filled water and prefer low turbidity water (Simmons & Braine 1994, Braby *et al*. 2011a); prey capture success was shown to be highest in low turbidity at 37% (Braby 2011). However, where turbidity was increased through sediment discharge from diamond mining activities, prey capture success did not differ between periods of high discharge and those without discharge (Braby 2011). It dives most successfully at high tide and in strong winds (Braby *et al.* 2011a) and feeds on small fish that are rarely longer than bill length (three centimetres). Diet in northern Namibia, based on 42 prey items (Clinning 1978a, Simmons & Braine 1994), was dominated by Needlefish (*Tylosaurus* spp., 43%) and larval blennies (Blennidae, 36%). Diet in central and southern Namibia, determined from 50 identifiable prey items (Braby *et al*. 2011a), was dominated by Cape Silverside (*Atherina breviceps*, 18%), blennies (Blennidae, 14%), Southern Mullet (*Liza richardsonii*, 13%) and Anchovy (*Engraulis encrasicolus*, 11%). Courting birds may, however, carry larger fish (possibly including eels) in their bills while looking for a mate.

THREATS

The most obvious threat to breeding colonies is disturbance caused by off-road vehicles and direct fatalities due to crushed eggs and chicks (Braby 1995, Braby *et al.* 2001, 2009). It is probable that this form of disturbance will increase in Namibia due to three factors. Firstly, the banning of off-road vehicles on South African beaches resulted in more quad-bikes and four-wheel drive vehicles

coming to Namibia and abusing beach habitats (Braby 2011). Secondly, as coastal tourist density increases, more remote areas where terns breed will be impacted. Thirdly, jackal and gull densities are artificially high because of the increasing numbers of seal colonies on the mainland and an increase in shore-based line fishing activities and associated incidence of fish offal and rubbish along the shorelines (Braby 2011). The intensity of jackal predation at tern colonies is likely to increase in future as jackal populations increase.

A further threat is the expansion of housing developments in coastal areas for the burgeoning tourist industry and for vacationing residents. Developments at Dolphin Beach by the Walvis Bay Municipality in 2005 turned an Important Bird Area (Simmons *et al.* 2001b) and tern breeding site into a high-income housing development; the colony of 32 pairs has not returned to the area (Braby 2011).

The consequences of global warming are hard to gauge, but could include a reduction in winds driving the Benguela upwelling system and an increase in the frequency and severity of Benguela Niño events, and are likely to negatively affect primary productivity and fish populations available to all marine species (Roux 2003). Other potential effects of climate change, such as sea level rise, more frequent or intense storm surges and an increase in rainfall variability may cause colony flooding, for example of Hottentot Pan, a low-lying extinct lagoon (Braby 2011).

CONSERVATION STATUS

This species is classified as a *Near Threatened Near-endemic* in Namibia. Although there is little evidence for population declines, apart from the extinction of three colonies and declines at six more (Table 2.4), the continuing demand on Namibia's beaches by off-road vehicles will probably impact all but the most remote colonies in the future. Risk of catastrophic extinction is relatively low because most of the colonies and suitable breeding habitat are in protected areas, and the population is reasonably healthy at between 2,000 and 5,370 breeding individuals and appears to be stable (Braby 2011). Some populations, however, are threatened (Table 2.4). The species is also classified as globally *Near Threatened* (IUCN 2012a) but is *Critically Endangered* in South Africa (Taylor *et al*. in press) because of its small, fragmented and declining population there. It has been included in Annex 2 of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), and in Appendix II of the Convention for the Conservation of Migratory Species of Wild Animals (CMS). It needs to be accorded *Specially Protected* status in any revised or new legislation relating to wildlife management in Namibia. The Damara Tern has held a special status among Namibian conservation authorities for many years (e.g. Clinning 1978a) and crucial information on its life history, threats and required conservation actions has been collected through a number of long-term monitoring projects (summarised in Braby 2011). The future of the species is thus well mapped out and it remains for conservation authorities to implement these plans to secure it. However, a comprehensive survey of the entire breeding population is urgently needed to reassess its conservation status (Braby 2011).

ACTIONS

Either the complete banning of off-road vehicles from Namibian beaches or the strict regulation of these vehicles is required to control the rise in abuse of beaches and pristine gravel plains. Conservation efforts to date have focused on central Namibia, where tern colony density is greatest and have been crucial to the species' survival there (Braby *et al.* 2001, Braby 2011, Braby *et al.* 2012). Studies on the Caution Reef Colony have confirmed that banning vehicles (and thus people) from breeding tern colonies is a successful protection measure (Braby *et al*. 2009). Tern breeding density and hatching success increased there after the erection of a one-strand cable fence to protect the area from off-road vehicles, which had previously put thousands of vehicle tracks per month across the colony (Braby *et al.* 2001). The result in the first year was a doubling of the number of chicks hatched from the colony (Braby *et al.* 2001, 2009). This may become necessary for other colonies as beach traffic is expected to increase in future. Access restrictions need to be considered in conjunction with education and public awareness campaigns involving intensive stakeholder consultation and engagement (Braby 2011).

Further coastal development needs to take new framework legislation such as the draft Coastal Policy and coastal Strategic Environmental Assessments into account, and acknowledge the breeding and foraging habitat requirements of Damara Terns (as well as thousands of migratory shorebirds from elsewhere) during environmental impact assessments. In coastal diamond mining areas where tern breeding and foraging habitats may have been reduced or degraded by mining activities and sediment discharge (Simmons 2005d, Braby 2011), simple rehabilitation measures are needed. These include depositing mining silts onto nearby salt pans rather than the bays in which terns feed and returning gravel plains to their former levels and topography.

With the entire Namibian coastline proclaimed as a series of national parks, all Damara Tern breeding colonies are formally protected. However, it is imperative that the relevant rules and regulations are understood, respected and enforced in order to mitigate the pressure of developments and off-road vehicles on the species.