THE STATUS OF SEABIRDS ASSOCIATED WITH ISLANDS IN ALGOA BAY, SOUTH AFRICA, 1973 - 1981

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INTRODUCTION

The Algoa Bay Islands in the eastern Cape, South Africa (Fig. 1), have considerable significance for seabirds. Together with Seal Island in Mossel Bay they are the only islands in a 1 777 km stretch of coastline between Cape Agulhas and Inhaca Island in Mozambique on the Indian Ocean coastline of southern Africa.

The most comprehensive summary of seabirds on islands in Algoa Bay exists for the Bird Island group (Courtenay-Latimer & Gibson-Hill 1946). Since 1937 there have been a number of papers dealing with species breeding on the islands (Courtenay-Latimer 1937, 1957, Rand 1963, Randall & Ross 1979, Randall & Randall 1980, 1981a, 1981b), as well as some nonbreeding vagrants (Batchelor 1979, 1980).

In this article the population sizes, seasonal occurrence and breeding activity of seabirds during the period 1973 - 1981 at islands in Algoa Bay are discussed. Seabirds are regarded as those species found breeding or roosting on islands, and that feed partially or entirely at sea, excluding those species feeding in the intertidal zone. Species seen at sea from the islands are not included in this paper.

METHODS

Irregular daily visits were made to St Croix Island in 1973, 1974 and 1975, and visits of between three and ten days' duration, have been made about twice a month to St Croix Island since 1976. Visits of five days' duration to Bird Island were made irregularly in 1976 and 1977, and regularly at six-weekly intervals since January 1978. Irregular daily visits to the other islands have been made. On each visit to an island counts were made of the species present and notes were kept on breeding activity. The time spent at the different islands varied greatly (Table 1).

Unless otherwise stated all counts given in the text refer to head counts of adult birds.

STUDY AREA

Algoa Bay is situated on the south-eastern coast of the Cape Province, South Africa. There are five islands with bird faunas in Algoa Bay : St Croix (33 48S, 25 46E), Jahleel (33 48S,

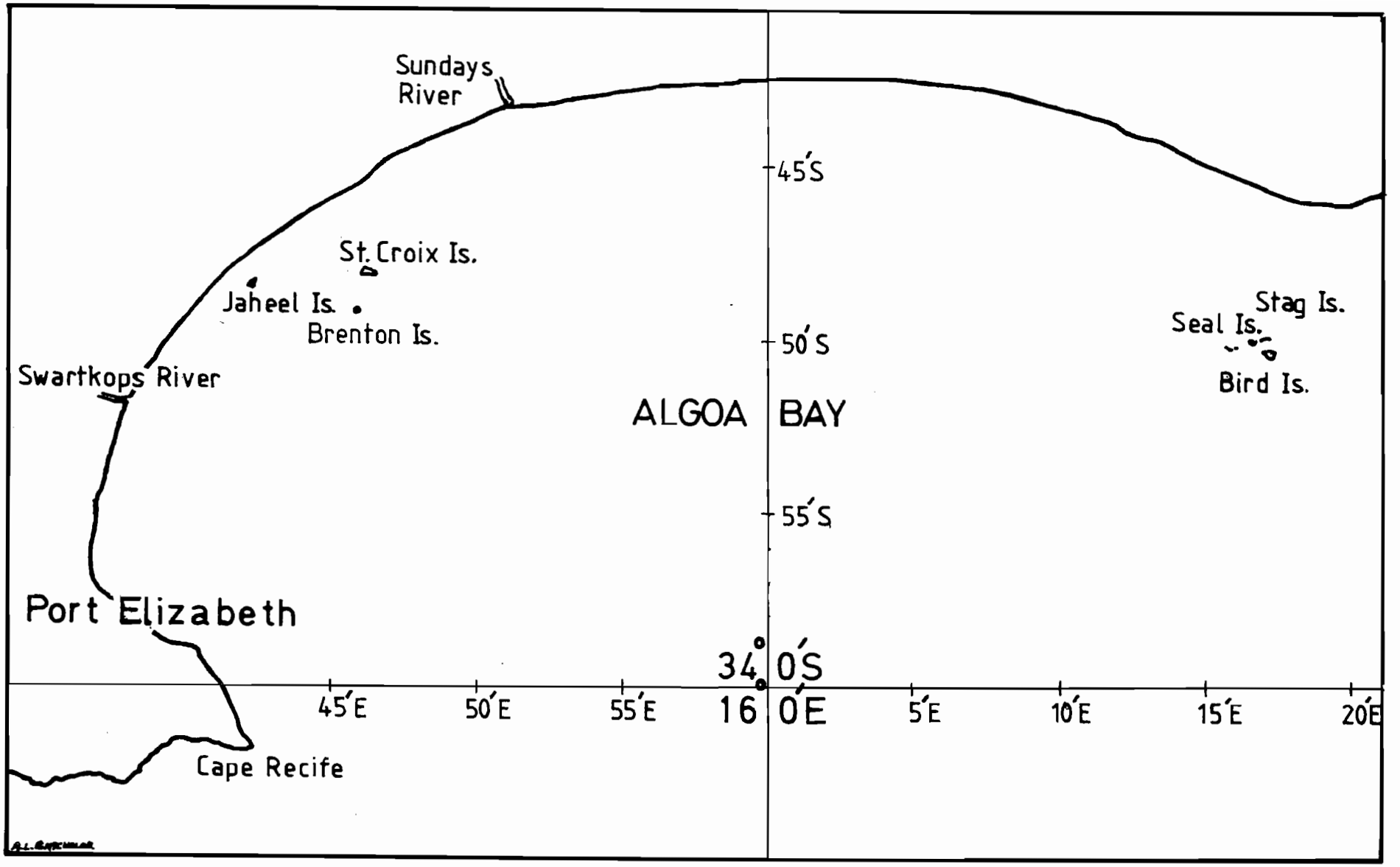

Figure 1

Map of Algoa Bay showing the position of the islands

TABLE 1

SEARCH EFFORT AT ISLANDS IN ALGOA BAY, SHOWING THE MONTHS IN WHICH ISLANDS HAVE BEEN VISITED, THE NUMBER OF DAYS SPENT AT THE ISLANDS, AND THE PERIOD COVERED (1973 - 1981)

Islands	Month												No. of days	No. of years
	J	F	M	A	M	J	J	A	S	O	N	D		
St Croix	x	x	x	x	x	x	x	x	x	x	x	x	634	9
Brenton	x		x	x	x	x	x		x	x	x	x	16	6
Jahleel			x	x	x	x	x	x	x		x	x	10	5
Bird	x	x	x	x	x	x	x	x	x	x	x	x	151	7
Stag/Seal	x		x			x	x				x	x	9	4

25 42E), Brenton Rock (33 49S, 25 46E), Bird (33 51S, 26 17E), Stag/Seal (33 50S, 26 17E). Stag and Seal Islands are grouped together because at low spring tide there is a land bridge between them. The islands vary in size, shape, elevation and substrate (Table 2).

The dominant vegetation on the islands is the fleshy herb *Mesembreanthemum aitonis*. The figures given in Table 2 for the surface areas covered by vegetation represent the maximum areas. No seasonality was evident in the growth of *M. aitonis* and at times died back so that even Bird Island was almost bare.

Surface water temperatures taken in Algoa Bay varied between 11°C and 25°C.

RESULTS

Jackass Penguin *Spheniscus demersus* (Tables 3, 4, 5)

Present and breeding on all islands, including both Stag and Seal Islands. Resident throughout the year, although individuals may be absent for up to six weeks before and after annual moult (Randall & Randall 1981a). Adult penguins moult at yearly intervals and the population is markedly synchronized, with the peak moulting season in October and November. Breeding is also synchronized, and, although eggs and chicks may be present in any month, the main breeding season extends from January to September with replacement laying after clutch failure occurring commonly (Randall & Randall 1981a). Penguins are surface nesters on all islands, but when a suitable substrate exists, as on part of Bird Island, they breed in burrows.

The number of penguins on the islands fluctuates greatly during the year with maximum numbers present shortly before the onset of laying, and lowest numbers present just before and after the annual moult.

The islands support very differently sized populations. The estimated number at St Croix Island is 21 000 (Ross 1971). Maximum counts during the survey period, which are underestimates, for the other islands were : Bird Island *c.* 2 100; Seal Island *c.* 2 200; Jahleel Island *c.* 1 170; Stag Island *c.* 118 and Brenton Rock *c.* 92.

Giant petrel *Macronectes* sp. (Tables 3, 4)

A single giant petrel roosted on Bird Island on 17 June 1978. The bird was first observed scavenging at a trawler in the late afternoon, and later swam ashore.

Courtenay-Latimer & Gibson-Hill (1946) recorded giant petrels as present on islands in the Bird Island group in November 1936. It is unclear from their records whether the birds landed, or were seen from the island. Giant petrels are not infrequently seen at sea in Algoa Bay (ALB pers.obs.).

TABLE 2

CHARACTERISTICS OF ISLANDS WITH BREEDING SEABIRDS IN ALGOA BAY

Islands	Planar area (ha)	Maximum height (m)	Distance from mainland (km)	Distance from nearest island (km)	Dominant substrate	% of area vegetated
St Croix	11,9	59	4,0	2,0	rock	1
Jahleel	2,3	14	1,3	3,2	rock	2
Brenton	1,3	15	5,5	2,0	rock	0
Bird	19,0	5	8,4	0,5	rock & guano	60
Stag	0,5	2	7,7)	0,5	shingle	40
Seal	3,7	3	7,7)		rock & shingle	80

TABLE 3

SEABIRDS RECORDED AT ISLANDS IN ALGOA BAY

Species	St Croix	Brenton	Jahleel	Bird	Stag/Seal
Jackass Penguin *Spheniscus demersus*	b	b	b	b	b
Giant Petrel *Macronectes* sp.				r	
Cory's Shearwater *Calconectris diomedea*				r	
Wedgetailed Shearwater *Puffinus pacificus*				r	
Little Shearwater *Puffinus assimilis*	r				
Redtailed Tropic Bird *Phaethon rubricauda*	f	f		r	f
Whitetailed Tropic Bird *Phaethon lepturus*	f				
Cape Gannet *Sula capensis*				b	
Whitebreasted Cormorant *Phalacrocorax carbo*	b	r	b	r	b
Cape Cormorant *Phalacrocorax capensis*	b	b	r		b
Kalp Gull *Larus dominicanus*	b	r	b	b	b
Greyheaded Gull *Larus cirrocephalus*	f			f	
Caspian Tern *Hydroprogne caspia*	f				b
"Comic" tern *Sterna hirundo/ S. paradisaea*	r	r	r	r	r
Antarctic Tern *Sterna vittata*		r		r	r
Roseate Tern *Sterna dougallii*	b	r		b	r
Sooty Tern *Sterna fuscata*				f	
Sandwich Tern *Sterna sandvicensis*	r	r	r		r
Lesser Crested Tern *Sterna bengalensis*	r			r	
Swift Tern *Sterna bergii*	r	r		r	b

Key : b = breeding; r = roosting; f = flying over

TABLE 4

MONTHLY OCCURRENCE OF SEABIRDS ON ISLANDS IN ALGOA BAY
1973 - 1981

Species	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
Jackass Penguin	x	x	x	x	x	x	x	x	x	x	x	x
Giant Petrel						x						
Cory's Shearwater		x										
Wedgetailed Shearwater	x								x			x
Little Shearwater					x	x	x					
Redtailed Tropic Bird	x		x					x				
Whitetailed Tropic Bird										x		
Cape Gannet	x	x	x	x	x	x	x	x	x	x	x	x
Whitebreasted Cormorant	x	x	x	x	x	x	x	x	x	x	x	x
Cape Cormorant	x	x	x	x	x	x	x	x	x	x	x	x
Kelp Gull	x	x	x	x	x	x	x	x	x	x	x	x
Greyheaded Gull						x	x	x	x		x	
Caspian Tern	x	x	x			x		x	x	x	x	x
"Comic" Tern	x	x	x	x	x				x	x	x	x
Antarctic Tern						x	x	x	x			
Roseate Tern					x	x	x	x	x	x		
Sooty Tern							x					
Sandwich Tern		x	x	x	x			x		x	x	
Lesser Crested Tern	x							x				
Swift Tern	x	x	x	x	x	x	x	x	x	x	x	x

TABLE 5

MONTHS IN WHICH BREEDING ACTIVITY (EGGS, CHICKS) HAS BEEN RECORDED FOR SEABIRDS ON ISLANDS IN ALGOA BAY (e = eggs, c = chicks)

Species	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
Jackass Penguin	e	e	e	e	e	e	e	e	e	e	e	e
	c	c	c	c	c	c	c	c	c	c	c	c
Cape Gannet	e	e	e	e	e	e	e	e	e	e	e	e
	c	c	c	c	c	c	c	c			c	c
Whitebreasted Cormorant	e	e	e	e	e	e	e			e	e	
	c		c	c	c	c	c				c	c
Cape Cormorant		e					e	e	e	e		
	c		c							c	c	c
Kelp Gull	e								e	e	e	e
	c									c	c	c
Caspian Tern								e			c	
Roseate Tern						e	e	e				
							c	c	c	c		
Swift Tern						c	c					

Cory's Shearwater *Calonectris diomedea* (Tables 3, 4)

A single bird was found roosting at the base of the lighthouse on Bird Island on 11 February 1979. It is possible that the bird flew into the lighthouse the previous night, when there was a dense mist.

The species has regularly been recorded at sea in Algoa Bay during the summer months (ALB pers.obs.), but this is the first record on an island.

Wedgetailed Shearwater *Puffinus pacificus* (Tables 3, 4)

A single bird was captured on the ground near the Cape Gannet *Sula capensis* colony on Bird Island on 18 September 1979 (Batchelor 1980). Two additional sightings of this species at Bird Island have been made in December 1979 and January 1980. On one occasion a bird flew low over the gannet colony as if to land.

Owing to its similarity to the Sooty Shearwater *P. griseus* (Batchelor 1980), it is possible that this species has been misidentified in the past and it may be more common than records suggest.

Little Shearwater *Puffinus assimilis* (Tables 3, 4)

Rare vagrant only recorded at night from 21h00 onwards at St Croix Island. A single bird was captured and ringed on 24 May 1978, and recaptured at the identical position on 3 July 1978 and 15 June 1979. Despite many searches, it has not been observed at other times of the year, or since 1979.

The Little Shearwater was found roosting on the rocks in an exposed position near nesting penguins. It seems likely that searches at night on islands might reveal more individuals of this species.

A Little Shearwater was observed at sea in Algoa Bay on 15 August 1979 (ALB pers.obs.).

Redtailed Tropic Bird *Phaethon rubricauda* (Tables 3, 4)

A rare vagrant to Algoa Bay occurring mainly in the summer months. The first record during the survey period was of a single bird at Bird Island on 10 August 1978 (Batchelor 1979). Additional sightings of single birds were made at St Croix Island on 19 January 1979 and 16 January 1981. On two occasions sightings of two Redtailed Tropic Birds together have been made at Bird Island, once on 10 January 1980 and the other on 4 March 1981.

The Redtailed Tropic Birds usually flew around for less than an hour before leaving, but on 4 March 1981 when two birds were present, they remained for most of the day and one returned the next day.

A feature of all observations was the tendency of the birds to fly low over the islands, frequently making attempts to land. Only once, however, on 4 March 1981, did a bird land on Bird Island, about 20 m from the gannet colony, and remained on the ground for about an hour.

Batchelor (1979) traced 12 records of this species in South Africa, to which Cooper (1980) added a further two records. One additional record is given by Pringle (1952). Of these 15 South African records, six are from Algoa Bay.

Whitetailed Tropic Bird *Phaethon lepturus* (Tables 3, 4)

A rare vagrant recorded on two occasions at St Croix Island. The sightings were made on 4 - 6 October 1977 and 24 - 25 October 1977, and were probably of the same individual. The behaviour of this bird was similar to that of the Redtailed Tropic Birds.

Batchelor (1979) traced six other records of this species in South African waters, two of which were from Algoa Bay. Both records were from Cape Receife in November 1977, and most likely concerned the same individual sighted at St Croix Island.

Cape Gannet *Sula capensis* (Tables 3, 4, 5)

A breeding resident at Bird Island. Numbers fluctuate markedly through the year, with the lowest numbers in May and June, and the highest in early December. Although eggs or chicks have been recorded in all months of the year, the main breeding season extends from September to April, and those breeding outside this period represent a small part of the population. Eggs are recorded during the first week of September and one month later about 75 % of the breeding birds have laid eggs. Replacement laying is common amongst birds nesting on the edge of the colony. Chicks fledge from mig-January to April and rapidly disperse from Algoa Bay.

Breeding success can be adversely affected by direct human disturbance and associated Kelp Gull *Larus dominicanus* predation of eggs and chicks and also indirectly through poor management by guano contractors. During guano scraping, excessive amounts of guano have been removed, resulting in some areas becoming basin-shaped, causing nest flooding after rain and low breeding success (Randall & Ross 1979).

The most recent estimate of the population was from 1975 when the breeding population was estimated to number 77 000 birds and the total population 100 000 birds (Randall & Ross 1979). This indicated a doubling of the population over 18 years and it is believed that this increase continued until the 1978/1979 breeding season when it levelled off.

Whitebreasted Cormorant *Phalacrocorax carbo* (Tables 3, 4, 5)

Resident species occurring on all islands in Algoa Bay, and recorded breeding at St Croix, Jahleel and Seal Islands. In 1957/1958 they were found on Stag Island (Rand 1963). Numbers fluctuate during the year, decreasing considerably out of the breeding season when birds may be absent for weeks at a time.

During the survey period, breeding at St Croix Island was only noted between January and July. There is, however, a record of chicks in November 1971 (Every 1972). The breeding season at Jahleel Island also extends from January to July. By contrast, at Seal Island in 1977 eggs and chicks were recorded in January,

St Croix Island laying replacement clutches, since little relaying was noted at St Croix Island while the birds were laying at Brenton Rock. Brenton Rock normally serves as an important roost for Cape Cormorants and on 22 April 1981, 260 were counted roosting on the island. At the same time only five were present at St Croix Island, providing further evidence that these two islands do not have discrete populations.

The breeding habitat at St Croix Island consists of ledges on the steep north and east facing slopes. This is in contrast to the situation on many islands, including Dyer Island (RMR pers.obs.) and the guano platforms in South West Africa/Namibia (RMR pers. obs.) where the species breeds on open flat areas. This suggests that where conditions permit, Cape Cormorants will preferably breed on ledges.

In 1977 the number of Cape Cormorants increased markedly in August. Most of these birds appeared to be young and remained away from the breeding colonies, sometimes forming dense roosts on flat areas near the water. This period was also remarkable for the high incidence of dead emaciated birds found. It is probable that these birds were from the southern Cape, possibly from Dyer Island. Vernon (1978) describes a mass movement of Cape Cormorants into the East London area in August 1977, which was presumably related to the one observed in Algoa Bay. He also remarked on the large number of dead cormorants on beaches at the time. Large influxes of this nature have been recorded previously in Algoa Bay when an estimated 7 000 Cape Cormorants were present in August and September 1965 (Donnelly 1966), when there was also a high incidence of dead individuals.

The highest numbers of Cape Cormorants counted at the breeding areas on the islands were : St Croix Island 502 adults (24 September 1979) and 208 nests (27 October 1978), Seal Island 44 nests (9 November 1977). In addition *c.* 80 nests (15 November 1980) were counted at Brenton Rock, but these are believed to be St Croix Island birds.

Kelp Gull *Larus dominicanus* (Tables 3, 4, 5)

Present at all islands and breeding on all except Brenton Rock. Resident throughout the year, although numbers fluctuate considerably reaching their peak at the onset of the breeding season. The breeding season is well defined with the first eggs being laid in the last few days of September. Replacement laying after clutch failure is common, and results in an extended laying season with eggs being recorded as late as early January. Nests are usually located in small colonies, but may also be isolated. Nest habitat varies from open flat unvegetated areas to vegetated areas with dense growths of *Mesembreanthemum aitonis* up to half a metre in height.

Gulls frequently prey on the eggs and young of penguins, gannets, cormorants, Roseate Terns *Sterna dougallii* and African Black Oystercatchers *Haematopus moquini*. This usually occurs as a result of human disturbance, but has been observed when eggs or small chicks are left unguarded such as during periods of hot weather when penguins temporarily desert their nests to cool off in the sea.

March and November. This extended breeding season at Seal Island was also noted in 1979 when eggs were present in July and November, and chicks in December.

There are two laying peaks at St Croix Island in most years, occurring in January/February and April. It is most likely that the second peak represents failed breeders laying replacement clutches, and others laying late clutches. A feature of breeding in Whitebreasted Cormorants is their habit of frequently changing breeding sites from one locality to another on the same island. This often occurred in the same year, when for the second peak in laying activity, the cormorants settled at a different position. Despite the absence of marked individuals to substantiate the idea, it is also believed that individual Whitebreasted Cormorants use more than one island for breeding. For instance, in March 1979 large numbers bred at Jahleel Island when few bred at St Croix Island, whereas in other years the reverse applied.

Maximum numbers counted on the islands were : St Croix 46 nests (26 April 1980); Jahleel *c.* 30 pairs (13 March 1979) and Seal Island 24 nests (4 March 1977). The total population for Algoa Bay islands is most likely the sum of the St Croix and Seal Island figures, owing to the probably inter-island movement of the St Croix and Jahleel Island birds. In April 1958 a total of 86 nests, mostly with eggs, was counted at St Croix Island and in 1957/1958 there were 22 nesting pairs at Stag Island (Rand 1963). On 1 June 1970 there were three colonies on St Croix Island in one of which there were 100 nests (McGill 1970a).

Cape Cormorant *Phalacrocorax capensis* (Tables 3, 4, 5)

Resident species recorded breeding at St Croix, Brenton and Seal Islands and possibly also Jahleel Island, but there have been insufficient surveys to confirm this. Breeding at St Croix Island takes place mainly from August to December, but chicks have been recorded as late as March. Eggs are usually laid in August, but have been recorded in the last week of July. Nests containing eggs in February and March were uncommon and at the most numbered 20. No clutches laid in these months were known to produce fledged young. If the period July-December and January-March are regarded as the early and late parts of the breeding season respectively, then in five consecutive seasons at St Croix Island the presence of nests with eggs was as follows : 1976/1977 early and late, 1977/1978 early, 1978/1979 early and late, 1979/1980 early, 1980/1981 early. Breeding at Seal Island occurred at the same time as at St Croix Island.

Large scale desertions followed by replacement laying are common. Although no individuals were marked, and although the colony could not be closely monitored due to disturbance and the associated depredations by Kelp Gulls, it appeared from following general cycles that up to two replacement clutches may be laid following clutch failure.

Cape Cormorants bred once (November 1980) at Brenton Rock during the survey period. This occurred after the almost complete failure of the first laying at St Croix Island in August. It is suggested that those breeding at Brenton Rock were birds from

Accurate counts of the highest number of Kelp Gull nests recorded on three islands were : St Croix Island 410 (26 October 1977), Seal Island 390 (9 November 1977) and Bird Island 20 (10 November 1980). Approximate maximum numbers of nests during the study period for the other two islands were : Jahleel Island *c.* 100 and Stag Island *c.* 50 (11 November 1977).

The numbers in the Bird Island group, and at Bird Island in particular, have been kept artificially low by control methods including shooting and nest destruction. This was to prevent fouling of water supplies and to reduce predation by gulls at the gannet and penguin colonies. Control measures have been in force since at least 1945 when no gulls were breeding on Bird Island, but about 200 nesting pairs were present on Seal Island (Courtenay-Latimer & Gibson-Hill 1946). In recent years gull control measures have been less intense and the gulls have recolonized Bird Island, with their number of nests increasing from two nests in 1977 to 20 in 1980.

Greyheaded Gull *Larus cirrocephalus* (Tables 3, 4)

Rare vagrants recorded in winter through to early summer. A total of eight observations has been made of this species, seven of which were made at St Croix Island and one at Bird Island. On all occasions the birds were observed to fly low over the islands without landing. A maximum number of 22 was recorded in one flock, but usually the numbers varied between one and four.

The species is not infrequently encountered on the mainland at Port Elizabeth. The largest number seen together that can be traced from Algoa Bay is a flock of 32 at Cape Receife in April 1970 (McGill 1970a).

Caspian Tern *Hydroprogne caspia* (Tables 3, 4, 5)

Uncommon resident recorded breeding at Stag and Seal Islands. Two pairs, including one with a nest containing a single egg, were recorded on 31 August 1977 at Stag Island. The second pair had a nest scrape about two metres from the nest with an egg. A single large chick, attended by its parents, was found on Seal Island on 6 November 1979. Two pairs have often been observed out of the breeding season feeding in the channel between Bird and Stag/Seal Islands. Three sightings, all of single birds, have been made at St Croix Island in August, October and December. Up to four Caspian Terns have frequently been observed at the Swartkops River out of the breeding season (RMR pers.obs.).

Numbers appear to have decreased drastically since the 1930s when between 70 and 100 Caspian Terns were reported breeding on Stag Island (Courtenay-Latimer 1937).

"Comic" Tern *Sterna hirundo* & *S. paradisaea* (Tables 3, 4)

Included under "comic" terns are both Common Terns and Arctic Terns owing to the difficulty in distinguishing these two species in the field.

"Comic" terns have been recorded roosting on all islands in Algoa Bay. These migrants have been recorded in all seasons, with

numbers low during the winter. At St Croix, Brenton and Jahleel Islands "comic" terns have usually been observed in mixed tern flocks, including Swift Terns *Sterna bergii*, Sandwich Terns *S. sandvicensis* and Lesser Crested Terns *S. bengalensis*. "Comic" terns have invariably greatly outnumbered other species in these flocks. At the Bird Island group other tern species are seldom present in the "comic" tern flocks.

Maximum numbers of "comic" terns recorded at the islands were : St Croix Island *c.* 100 (20 November 1980), Brenton Rock *c.* 300 (3 December 1980), Jahleel Island *c.* 40 (20 November 1980), Bird Island 150 - 200 (11 November 1980), and Stag/Seal Island 1 500 - 2 000 (6 November 1979).

The total number of "comic" terns in Algoa Bay is probably much larger than indicated above owing to these species frequently forming large roosts on sandbanks at points on the mainland. Frequently used positions are Cape Receife, Sundays River and Swartkops River (RMR pers.obs.). Roosts numbering *c.* 2 000 at Cape Receife and *c.* 550 at Swartkops were recorded by Every (1976).

Antarctic Tern *Sterna vittata* (Tables 3, 4)

Winter, nonbreeding migrant recorded roosting on all islands except St Croix and Jahleel Islands. On arrival in June, Antarctic Terns were generally in breeding plumage but moulted during their stay. Antarctic Terns in full breeding plumage have been observed and photographed roosting amongst breeding Roseate Terns at Bird Island (ALB pers.obs.). On no occasion, however, have Antarctic Terns been observed at nests. It is likely that this habit led Courtenay-Latimer (1957) to conclude that the species actually bred on islands in the Bird Island group. Cooper (1976) in a review of the species in South Africa also came to the conclusion that this breeding record was incorrect, using as evidence the fact that Antarctic Terns are summer breeders elsewhere in their range and also the fact that they moult during their visit to South Africa.

The maximum number of Antarctic Terns recorded at Bird Island was *c.* 250 (6 August 1979) and at Brenton Rock 24 (6 June 1979). Roosts of small unidentified terns numbering between 1 000 and 1 500 individuals were recorded on Stag/Seal and Bird Islands. These terns were present in late August and early September 1977, at a time when "comic" terns have not been recorded in large numbers and it is therefore probable that they were Antarctic Terns. A sighting of over 900 terns, tentatively identified as "comic" terns, on 22 July 1973 at Cape Receife (Blake 1975) were almost certainly Antarctic Terns.

Cooper (1976) estimated that the maximum number of Antarctic Terns in Algoa Bay was 25, but the figures in this paper indicate that at least 250 and possibly in excess of 1 000 may be present at times.

Roseate Tern *Sterna dougallii* (Tables 3, 4, 5)

Winter breeding migrant recorded breeding at both St Croix Island and Bird Island, sometimes at both islands in the same year (Randall & Randall 1980). Formerly also recorded breeding on

Seal Island in the 1930s and 1940s (Courtenay-Latimer & Gibson-Hill 1946, Randall & Randall 1980). Roseate Terns have not been recorded at the islands out of the breeding season, but birds in nonbreeding plumage have been caught at Cape Receife between November and January (Tree & Every 1977).

Roseate Terns arrived at the islands in late May and increased in number until maximum numbers were reached in mid-June. The birds started leaving the islands in late September and all left shortly after the last chicks fledged in early October. Replacement laying after clutch failure was common, and clutch size decreased with replacement clutches (Randall & Randall 1981b). Human disturbance, accompanied by Kelp Gull predation, has adversely affected breeding success, and has probably been responsible for the terns abandoning the former breeding site at Cape Receife.

A feature of breeding in Roseate Terns is their habit of frequently shifting breeding sites, not only from year to year but also within one breeding season. Breeding sites have been shifted from one position to another on an island, and also from one island to another, probably as a result of human disturbance. During the survey period breeding has taken place at two islands : 1975 at St Croix Island, 1976 St Croix and Bird Islands, 1980 Bird Island. The population in Algoa Bay is estimated to number between 70 and 80 breeding pairs (Randall & Randall 1980).

The numbers appear to have decreased since 1937 when "hundreds" of Roseate Terns were found nesting at Stag/Seal Islands (Courtenay-Latimer 1937).

In 1977 30 fledglings were ringed at St Croix Island. One was recovered sick five months later on the beach at Morgan Bay (32 42S, 28 20E) about 280 km northeast of St Croix Island. Another was photographed in August 1979 at Bird Island, and although the ring number could not be read, the distinctive ring design could be clearly discerned. This two year old bird was not in full breeding plumage having shorter tail feathers than the breeding adults, a lighter rosy wash on the ventral surface and an incomplete black cap, with the forehead partly speckled with white (*cf.* Randall & Randall 1981b). The red on the bill covered about one-third of the proximal end.

Sooty Tern *Sterna fuscata* (Tables 3, 4)

A single adult was seen flying over Bird Island on 9 July 1979. Sooty Terns are considered to be rare vagrants, to South African waters, although at times there have been "many" records from the east coast as far south as Algoa Bay (Liversidge 1959). Courtenay-Latimer (1937) found between 20 and 30 freshly dead on Bird Island in November 1936, and a further 12 flying around. At the same time a freshly dead Sooty Tern was found on the beach at the Kariega River about 40 km east of Bird Island (Hewitt 1937). Hewitt (1937) explained their appearance in relation to abnormally strong onshore winds which lasted for several days.

Sandwich Tern *Sterna sandvicensis* (Tables 3, 4)

Uncommon migrant occurring at the islands predominantly in the summer and autumn months. Sandwich Terns have been observed on

10 island visits, seven of which were at St Croix Island. On all except one occasion, when a single individual was observed, Sandwich Terns were in mixed flocks of terns. The percentages of occasions on which other tern species were represented in these mixed flocks were Swift Terns 55 %, "comic" terns 44 %, Antarctic Terns 11 % and Lesser Crested Terns 11 %. On 22 % of occasions there were two other tern species in these mixed flocks. With the exception of Lesser Crested Terns, the Sandwich Terns were always heavily outnumbered in these flocks and as a result it is likely that they have been overlooked and thus under-represented.

One sighting of three Sandwich Terns on 23 May 1977 may have been of overwintering birds since they normally depart before May. Five observed in a large mixed flock of Swift and Antarctic Terns on 31 August 1977 at Stag Island were probably early returning birds, rather than overwintering individuals. Occasional overwintering Sandwich Terns have been recorded in Algoa Bay in July (Every 1978a).

The numbers of Sandwich Terns observed varied from one to six individuals.

Lesser Crested Tern *Sterna bengalensis* (Tables 3, 4)

Rare vagrants recorded on three occasions, once at Bird Island and twice at St Croix Island. A small flock settled on the rocks at Bird Island on 31 August 1977. Two other sightings, of a single bird each, were made at St Croix Island on 4 February 1981 and 20 February 1981. These two sightings may have been of the same individual. On the 4 February 1981 the Lesser Crested Tern was in a mixed flock with three Sandwich Terns and *c.* 30 "comic" terns.

A single Lesser Crested Tern was observed at Cape Receife in December 1977 (Every 1978b). The species is a tropical non-breeding migrant mostly restricted to the Natal coast in both summer and winter, with flocks of up to 20 in summer (Liversidge 1959). There is also a specimen from Knysna in the southern Cape (Liversidge 1959).

Swift Tern *Sterna bergii* (Tables 3, 4, 5)

Resident recorded on all islands except Jahleel Island, and breeding at Stag Island. Numbers fluctuate during the year reaching their highest number at Stag Island at the onset of the breeding season. The date of first egg laying is not accurately known but downy chicks were present in mid-June 1978, and almost fledged chicks were present in mid-July 1979. Egg laying therefore probably begins in May. It is not known if Swift Terns breed every year at Stag Island, but breeding was recorded in 1977, 1978 and 1979. Birds in breeding plumage were observed in July 1980 and March 1981. No checks were made in 1976 and 1980. The breeding area is on the crest of Stag Island in a growth of *Mesembreanthemum aitonis*.

Maximum counts of roosting Swift Terns on islands other than Stag Island were : St Croix Island 50; Brenton Rock 20; Bird Island 35. The breeding population on Stag Island was estimated from photographs (15 June 1978) to number between 200 and 250

individuals, and this should be regarded as the Algoa Bay population since those observed at the other islands were recorded out of the breeding season.

That the numbers counted roosting have not equalled the numbers estimated to breed at Stag Island, suggests that part of the breeding population may disperse out of the breeding season.

Swift Terns from the west coast of South Africa enter Algoa Bay, and chicks bearing colour rings fitted by J. Cooper at Jutten Island in Saldanha Bay have been observed at St Croix Island and recovered dead at Bird Island.

DISCUSSION

Eight seabird species presently breed on islands in Algoa Bay. During the period 1976 - 1981 the number of species breeding at the five islands in decreasing order were : Stag/Seal Island 6, St Croix Island 5, Bird Island 4, Jahleel Island 3 and Brenton Rock 2. The population sizes of these eight species at all the islands combined were Cape Gannet *c.* 100 000, Jackass Penguin *c.* 27 000, Kelp Gull *c.* 1 950, Cape Cormorant *c.* 600, Swift Tern *c.* 220, Roseate Tern *c.* 150, Whitebreasted Cormorant *c.* 140 and Caspian Tern *c.* 4. A further 12 species were recorded at the islands, of which six were represented by a single individual each.

Historical trends can only be reliably traced for five of the breeding species, viz. Cape Gannet, Whitebreasted Cormorant, Kelp Gull, Caspian Tern and Roseate Tern. Cape Gannets have increased markedly in numbers since the mid-1950s (Randall & Ross 1979). Kelp Gulls have increased at both Seal Island and Bird Island, the only islands for which historical records exist. By contrast Whitebreasted Cormorants, Caspian Terns and Roseate Terns (Randall & Randall 1980) have decreased in number. The most marked decrease has apparently occurred for Caspian Terns, which are now very rare in Algoa Bay. It appears unlikely that Antarctic Terns bred at the Bird Island group, and their presence in breeding plumage among breeding Roseate Terns probably led to the conclusion that they were breeding.

Human disturbance is probably the major reason for the relatively low number of penguins, and the absence of breeding colonies of Whitebreasted Cormorants, Cape Cormorants, Caspian Terns and Swift Terns at Bird Island.

Bird Island has had a permanent presence for about 130 years. Visits for guano collecting at Bird Island began in about 1844 and in 1852 a lighthouse was erected (Rand 1963). At one stage prior to the automation of the lighthouse the island was permanently occupied by a headman and his family, two resident lighthouse keepers and their families and an unknown number of assistants. In addition to the permanent residents on the island, labourers were sent to the island for months at a time in order to scrape and collect guano. Guano has only been scraped twice since 1974 so that this form of disturbance has decreased, and since the automation of the lighthouse in 1968, the number of permanent residents has been gradually reduced to the present total of three.

Nevertheless, Bird Island still receives regular five day visits, at six-weekly intervals, by an average of eight personnel to do maintenance work on the lighthouse.

It has been documented that Roseate Tern colonies in the Bird Island group have been plundered for eggs in the past (Courtenay-Latimer 1937, Nichol 1967), and the taking of penguin eggs still continues (RMR pers.obs.). Due to their inaccessibility, Stag and Seal Islands are probably the least disturbed islands in Algoa Bay, and this may account for the diversity of species breeding there.

Brenton Rock has little importance as a breeding island but has considerable importance as a roost, especially for terns and Cape Cormorants. The importance of islands in Algoa Bay as roosts will attain greater significance in future owing to human disturbance at mainland roosts. The large mainland tern roosts in Algoa Bay at Cape Receife, Swartkops River and Sundays River experienced a marked increase in disturbance in recent years due to the increased popularity of angling and the proliferation of off-road vehicles on the beaches.

St Croix Island, Jahleel Island and Brenton Rock have recently been proclaimed marine reserves, including an area of 300 m around the islands. The jurisdiction of the islands has been transferred from the Sea Fisheries Institute of the Department of Agriculture and Sea Fisheries to the Department of Nature and Environmental Conservation of the Provincial Administration of the Cape of Good Hope. The latter body is in a better position to restrict illegal landings at these islands and has acquired a patrol boat for this purpose. The Bird Island group still falls under the Sea Fisheries Institute and permits must be obtained in order to visit these islands. A resident headman at Bird Island is empowered to enforce these regulations.

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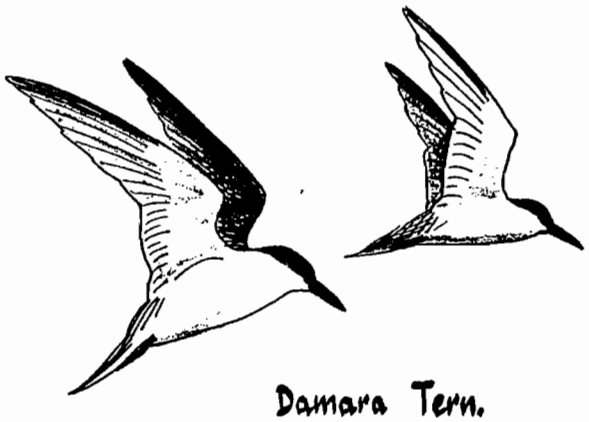

Damara Tern.