THE STATUS OF BIRDS AT SIGNY ISLAND, SOUTH ORKNEY ISLANDS

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ABSTRACT. The avifauna of Signy Island (60° 45′ S, 45° 36′ W) is reviewed for the first time, based for the most part on records accumulated since the opening of a research station there in 1947. There are 16 breeding species, 21 visitors and vagrants, whose identification has been confirmed, and six species which are unconfirmed. The status of breeding species is summarized, including current and past estimates of breeding populations and data on timing of breeding events. Adélie and chinstrap penguin populations have increased substantially during the last 40 years; southern giant petrels and Antarctic terns, however, appear to have decreased, perhaps as a result of the effect of increased activity at the research station. Antarctic skuas have become established within the last ten years. Of the vagrants, least and Baird's sandpipers are new to the Antarctic and seven species are recorded for the first time at Signy Island.

INTRODUCTION

The South Orkney Islands lie in the maritime Antarctic zone, about 500 km north-east of the Antarctic Peninsula. The islands of the Scotia arc are an important breeding area for Antarctic and sub-Antarctic avifauna, of which general descriptions and assessments of abundance are available in Watson (1975), Croxall (1984), and Croxall and others (1984*b*), as well as in papers dealing specifically with the Falkland Islands (51° 40′ S, 59° 30′ W) (Croxall and others, 1984*a*) and South Georgia (54° 20′ S, 36° 40′ W) (Prince and Payne, 1979; Prince and Croxall, 1983). There are, however, no recent published treatments of the avifauna of islands or island groups further to the south, although extensive data exist for the Elephant and Clarence islands (61° 10′ S, 55° 14′ W) (Furse and Bruce, 1975), Brabant Island (64° 15′ S, 62° 20′ W) (Furse, 1987; Parmelee and Rimmer, 1985) and, as a result of scientific research, at the South Shetland Islands (62° S, 58° W) (especially King George Island, 62° 00′ S, 58° 15′ W; Trivelpiece and others, 1987*a*), and Anvers Island (64° 35′ S, 63° 30′ W) (Parmelee and Maxson, 1975; Parmelee and others, 1977; Parmelee and Parmelee, 1987). Clarke (1906) gives details of the ornithological observations made by the Scottish National Antarctic Expedition (1901–04) (*Scotia* expedition) on Laurie Island (60° 44′ S, 44° 37′ W), South Orkney Islands, while Ardley (1936) gives the only general description of the avifauna of Signy Island in his account of the South Orkney Islands. The object of this paper is to review and update the accounts of breeding species and to include a full list of visitors and vagrants to Signy Island, South Orkney Islands.

Signy Island (60° 45′ S, 45° 36′ W) (Fig. 1) lies 1 km to the south of Coronation Island, the largest island of the South Orkney Islands group. For the purposes of this paper, Signy Island includes the offlying rocks and skerries, but not Moe Island, which lies 0.5 km to the south. Signy Island covers an area of about 20 km^2, is roughly triangular with maximum dimensions of 7.5 by 5 km, and rises to 242 m. The island experiences a similar climate to the Antarctic Peninsula. For the period 1947–86 the mean annual temperature was −3.8°C (range +19.8°C to −39.3°C), mean summer monthly temperatures ranging from −3.8°C (November) to +3.7°C (March); the mean wind speed was 13.7 kn, with an extreme mean hourly speed of 59 kn. Gales

Fig. 1. Map of Signy Island.

occur on about 60 days a year, and snowfall and drift on about 120 days; rain or drizzle are recorded on about 95 days. The South Orkney Islands lie in the track of prevailing westerly winds but local topography causes much turbulence. The islands are noted for their cloud cover and only about 14% of maximum possible sunshine is recorded.

Pack ice extends north of the group during most winters and fast ice forms in the bays and coves. In exceptional years fast ice may remain from April to December, but more usually it forms in May–June and disperses September–October. Pack ice may be sighted during any month but is generally present between April and December.

The island is glaciated but there are extensive areas of exposed rock, including much of the east and north-west parts of the island. An ice cap covers the centre of the island and a large glacier flows into the sea along part of the south coast. However, marginally higher temperatures over the past 20–25 years have caused a rapid recession of icefields and glaciers. Cliffs form much of the coastline, providing habitat for species such as Cape and snow petrels, *Daption capense* and *Pagodroma nivea*. Where the shoreline is more accessible, large penguin colonies have established, such as at North Point, Gourlay Peninsula, and along the south-west coast. Low-lying areas of undisturbed terrain are covered by a luxuriant growth of mosses and lichens, among which storm petrels and other burrowing species are able to find suitable habitats. At higher altitudes a sparser fellfield environment prevails where skuas, terns, and the larger petrels are found. A rich marine fauna surrounds the

island, which supports a breeding population of several hundred Weddell seals (*Leptonychotes weddellii*), small numbers of southern elephant seals (*Mirounga leonina*) and large numbers of male Antarctic fur seals (*Arctocephalus gazella*) the last two of which haul out in summer to moult.

A scientific station was established at Factory Cove in 1947 and has been continuously manned to the present day. Prior to this, the region had been visited by a variety of expeditions, including the *Scotia* expedition (1902–04) and *Discovery* Investigations (1927–37). Visits to Signy Island by vessels, other than relief ships for the station, were rare until the mid-1970s, since when there has been an increase in shipping activity, notably by trawling fleets. This increase has significantly affected the range of ship-following species that have been recorded at Signy Island.

The information presented in this paper has been collated from a number of sources. In the published literature are expedition accounts, reports of ornithological research projects undertaken at Signy Island (but not all the breeding species have been studied), population counts (the most recent being a full census of the breeding species of penguins), and opportunistic bird sightings. The unpublished literature covers scientific reports written by officers of the British Antarctic Survey (BAS) (referenced by author), station biological records and at-sea observations (referenced as BAS records). Since 1977 a register of breeding events on Signy Island has been kept by station personnel; however, in each case only the first observation of an event has been recorded and there are obvious biases inherent in recordings of first sightings. In the species accounts reference has been made to other published work only where there has been no study of the species at Signy Island, and only where it was done in the Atlantic sector of Antarctica.

Recent records of new breeding species, visitors and vagrants have made timely the publication of an up-to-date check list for the island, including details of breeding season events and a review of the status of non-breeding visitors to the island. Records up to 1987 have been considered. Breeding species at Signy Island now number 16, two more than recorded by Ardley (1936), 21 visitors and vagrants are confirmed, and the status of a further six species is uncertain.

List of species

Emperor penguin (*Aptenodytes forsteri*)

Occasional visitor. The nearest breeding colonies of this circumpolar, continental species are on the Dion Islands (67° 52′ S, 68° 48′ W), and along the east coast of the Weddell Sea at Norselbukta (71° 03′ S, 10° 56′ W), the Brunt Ice Shelf (75° 30′ S, 25° 00′ W) (B. Stonehouse, pers. comm.) and at Halley Bay (75° 40′ S, 27° 14′ W). The Signy Island visitors are most likely to come from Weddell Sea colonies. Emperor penguins are sporadic, perhaps even regular, winter visitors to the South Shetland Islands (Trivelpiece and others, 1987*a*) and South Orkney Islands (Ardley, 1936), with 25 adults reported at the Argentine station on Laurie Island during 1980 (Radio operator, pers. comm.); and occasional visitors to the South Sandwich Islands (58° S, 26° W) (Cordier and others, 1981), South Georgia (eight records, Prince and Croxall, 1983; Clark, 1986), and the Falkland Islands (two records, Woods, 1975). The first record for Signy Island was during September 1948 (Laws, 1948), and there have been seven sightings to date (Table I), all of which occurred between April and September, and at least four of which were of juveniles.

Table I. Sightings of emperor penguin *Aptenodytes forsteri* at Signy Island, 1947–87

Date	*Age*	*Site*	*Reference*
13. ix. 48	—	Off ice edge, Orwell Bight	Laws, 1948
8. vii. 59	Juvenile	Stygian Cove	O'Gorman, 1959
6. viii. 61	—	In ice off Oliphant Islands	Jones and Pinder, 1961
14–18. iv. 74	Juvenile	Orwell Moraines	BAS records
18. vi. 79	Juvenile	Hillier Moss	Price, 1979
16–18. viii. 80	Adult	Off North Point	Price, 1980
3. vii. 81	Juvenile	Starfish Cove	Forster, 1981

Table II. Sightings of king penguin *Aptenodytes patagonicus* at Signy Island, 1947–87

Date	*Age*	*Site*	*Reference*
1947	—	Balin Point	Ewer and Anderson, 1947
24. xi. 64	Adult	Beside Adélie colony	Burton, 1967
20–28. i. 78	Adult	Spindrift Col	Rootes, 1977
15–19. i. 79	Adult in moult	In chinstrap colony beside McLeod Glacier	Rootes, 1978
28. i. 82	Adult in moult	Sombre Lake outflow	Forster, 1981
21. i. 84	—	North Point	BAS records
23. xii. 85	Adult	Stygian Cove	Price, 1985
27. i–24. ii. 86	Adult in moult	Cemetery Bay	Price, 1985

King penguin (*Aptenodytes patagonicus*)

Occasional, perhaps annual, visitor. Circumpolar, breeding on sub-Antarctic islands with the nearest colonies at South Georgia (*c.* 100000 pairs, Croxall and others, in press) and the Falkland Islands (*c.* 70 pairs, Croxall and others, 1984*a*). Suspected breeding in the Cape Horn region (Murphy, 1936) has not been substantiated. Vagrants were seen at the South Orkney Islands shortly after their discovery in 1821 (Palmer in Fanning, 1833) but were not recorded during visits by the *Scotia* expedition or *Discovery* Investigations (Clarke, 1906; Ardley, 1936). The first record for Signy Island was March or April 1947 near Balin Point (Ewer and Anderson, 1947), and there have now been eight records, four since 1982 (Table II). The species has also been sighted at Elephant and Clarence islands (Furse and Bruce, 1975), and it is probable that these and the South Orkney Islands visitors are from South Georgia.

Adélie penguin (*Pygoscelis adeliae*)

Common breeding species. Circumpolar in Southern Ocean and the southernmost breeding pygoscelid. Signy Island is near the northern edge of its breeding range, which extends north of 60° S only at South Sandwich Islands and Bouvetøya (54° 25′ S, 3° 22′ 3E) (Wilson, 1983). In this sector vagrants have been reported from South Georgia (Prince and Croxall, 1983) and the Falkland Islands (Woods, 1975). The Adélie penguin breeds extensively throughout the South Orkney Islands and recent surveys estimated a population of *c.* 200000–300000 pairs (Poncet and Poncet,

1985). The Signy Island population was first reported by Ardley (1936) and a count, made during 1978–79 (Croxall and others, 1981), recorded *c.* 37200 breeding pairs. Croxall and others (1981) discussed previous records and suggested that the breeding population had doubled or so during the previous 20 years. The principal studies of Adélie penguins on Signy Island were by Sladen (1958) and Lishman (1985*a*, *b*).

Breeding information

Adults present at breeding colonies September to February and individuals recorded August to April. During mild winters birds may be seen at leads in the sea ice in any month.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	27 Sept.	20 Sept.–8 Oct.	6.3	25
Laying	28 Oct.	22 Oct.–4 Nov.	3.3	27
Hatching	4 Dec.	27 Nov.–12 Dec.	3.7	26

Chinstrap penguin (*Pygoscelis antarctica*)

Abundant breeding species. The chinstrap population is concentrated in the South Atlantic sector, with the main breeding sites on the South Sandwich, South Orkney and South Shetland Islands (Croxall and others, 1984*b*; Poncet and Poncet, 1985; Shuford and Spear, in press); there are few breeding sites in other sectors of the Southern Ocean (Wilson, 1983).

The Signy Island population was noted by Ardley (1936). A count of the population of the whole island in 1978–79 (Croxall and others, 1981) gave a total of *c.* 79500 breeding pairs, indicating a fivefold increase in the breeding population during the previous 20 years. Poncet and Poncet (1985) estimated the South Orkney Islands population at *c.* 600000 pairs. This is considerably more than the Adélie population for the same region and, in conjunction with the faster rate of increase of chinstrap penguins, may indicate that the South Orkney Islands nowadays are better suited to chinstrap than Adélie penguins. The species has been studied at Signy Island by Sladen (1958), Conroy and others (1975), and Lishman (1985*a*, *b*).

Breeding information

Adults present at breeding colonies October to March, and adults or juveniles are seen around the island from September to May.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	31 Oct.	24 Sept.–14 Nov.	6.5	26
Laying	24 Nov.	14 Nov.–1 Dec.	4.7	21
Hatching	31 Dec.	24 Dec.–11 Jan.	4.5	21

Gentoo penguin (*Pygoscelis papua*)

Breeding species. This is the least abundant species of pygoscelid penguin, breeding on many sub-Antarctic islands and possibly in the Cape Horn region (Wilson, 1983). In the South Atlantic sector, its distribution extends from the Falkland Islands to Petermann Island (65° 11′ S, 64° 11′ W) off the Antarctic Peninsula (Croxall and Kirkwood, 1979). Ardley (1936) did not report the species breeding at Signy Island, and the first breeding record was by Ewer and Anderson (1947). Poncet and Poncet (1985) estimated the South Orkney Islands breeding population as 5000–10000 pairs, but Signy Island has only a small population of *c.* 370 breeding pairs (Croxall and others, 1981). Compared to previous counts, there is no evidence of an increase in the Signy Island population, however, the breeding population fluctuates widely in the range 267–404 pairs (Croxall and others, in press). Only Despin (1977) has studied the species at Signy Island. The main study in the region is by Trivelpiece and others (1987*b*), at the South Shetland Islands.

Breeding information

Adults present at breeding colonies September to March but individuals may be sighted in any month during years of limited sea ice extent.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	28 Sept.	3 Sept.–28 Oct.	10.8	13
Laying	1 Nov.	18 Oct.–21 Nov.	8.5	20
Hatching	6 Dec.	17 Nov.–27 Dec.	11.6	14

Macaroni penguin (*Eudyptes chrysolophus*)

Uncommon breeding species. Widely distributed on sub-Antarctic islands, north to the Falkland Islands (Croxall and others, 1984*a*) and southern South America (Schlatter, 1984), with scattered colonies at the South Shetland Islands (Furse, 19[illegible]; Croxall and Kirkwood, 1979). The southernmost breeding colony is at Deception Island (62° 57′ S, 60° 38′ W) but a pair laid an egg in the Anvers Island area (64° S) in 1985–86 (Parmelee and Parmelee, 1987). The Signy Island population is small, with a maximum of 11 pairs (Croxall and others, 1981), and Poncet and Poncet (1985) found few breeding pairs in their survey of the South Orkney Islands. In comparison with the large colonies on Clarence Island and somewhat smaller ones on Elephant Island, the South Orkney Islands breeding population is surprisingly small, which may be related to the period of sea ice cover around this island group. The limited historical data indicate that the species has always been rare at the South Orkney Islands; Ardley (1936) doubted that it would breed there, recording no colonies in the group and Holgersen (1945) only included it on the basis of statements in the report of Captain Larsen's visit during November 1892; Choyce (1947) recorded lone birds at Cape Geddes, Laurie Island during 1946–47.

The first record for Signy Island was a lone bird sighted in November 1949 (Laws, 1949), but the first breeding record, of a pair at North Point, was not until the 1955–56 season (Tickell, 1956). Burton and Howie (1965) undertook a brief ringing

programme which indicated that some birds returned to the same nest site; no subsequent work has been done on the species at Signy Island. It has been studied mainly at South Georgia (Croxall and Prince, 1980; Croxall, 1984).

Breeding information

Present at breeding sites November to March but return often delayed by late dispersal of pack ice.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	22 Nov.	3 Nov.–27 Dec.	19.3	11
Laying	5 Dec.	18 Nov.–30 Dec.	14.4	9
Hatching	12 Jan.	25 Dec.–3 Feb.	11.6	10

Rockhopper penguin (*Eudyptes chrysocome*)

Rare vagrant. Circumpolar on sub-Antarctic islands (mostly north of Antarctic Polar Front), and in the Atlantic sector, north to southern South America (Schlatter, 1984), the Falkland Islands (Croxall and others, 1984*a*), Tristan da Cunha and Gough Island (Wilson, 1983). There have been four sightings of this species in the South Orkney Islands, including two at Signy Island: on 26 February 1957 among chinstrap penguins on the north-west coast (Tickell, 1960) and in January 1977 below the shag colony on Shagnasty Island (BAS records). Tickell (1960) also reported a sighting on 2 February 1957 on Moe Island, 0.5 km south of Signy Island, which may have been the same bird seen two weeks later. On 23 January 1947 an adult was sighted in the chinstrap penguin colony on Ferrier Peninsula, Laurie Island (Ewer and Anderson, 1947); this was the first record for the South Orkney Islands. The southernmost breeding record is from Clarence Island (61° 08′ S, 54° 06′ W) (Furse, 1978), and vagrants have been recorded at the South Shetland Islands (Trivelpiece and others, 1987*a*), and Brabant Island (Furse, 1987). It is a regular visitor to South Georgia, occasionally breeding (Prince and Payne, 1979; P. A. Prince, pers. comm.).

Magellanic penguin (*Spheniscus magellanicus*)

Rare vagrant. Breeding range is southern South America to Tierra del Fuego and Falkland Islands where it is abundant (Croxall and others, 1984*a*). First recorded at Signy Island on 25 February 1986 (Price, 1985), when a bird was seen swimming in Factory Cove, and a number of station personnel were able to approach aboard an inflatable craft to make a positive identification. The date suggested a juvenile or failed breeder. This was also the first record for the South Orkney Islands but there have been three records at South Georgia (Prince and Croxall, 1983), and one for the South Shetland Islands (Trivelpiece and others, 1987*a*). Presumably the Signy Island bird was a straggler from the Falkland Islands as Prince and Payne (1979) suggested for South Georgia sightings, although South American origin cannot be ruled out.

Wandering albatross (*Diomedea exulans*)

Vagrant. Circumpolar on sub-Antarctic islands. First recorded at Signy Island on 24 February 1976 when an immature bird followed a relief vessel into Borge Bay (BAS records). During the period 8–25 February 1978 a number of sightings were made in Orwell Bight associated with a trawling fleet fishing in the area (Rootes, 1977). On 15 January 1982 an immature bird was seen off Berry Head (Forster, 1981). The South Orkney Islands are within the normal pelagic range of wandering albatrosses, which are common at South Georgia (Croxall, 1979), and the southernmost sighting in this sector was 64° S during a cruise to the Weddell Sea (Thurston, 1982). It is surprising that more sightings have not been made at Signy Island, although there have been a few sightings to the north of Coronation Island (BAS records).

Black-browed albatross (*Diomedia melanophrys*)

Occasional, perhaps annual visitor. Circumpolar in the Southern Ocean. There were no records from Signy Island until 1975 when two were seen off Gourlay Peninsula on 9 November (BAS records). Since then they have been sighted regularly and on 14 occasions records have included more than one bird. Black-browed albatrosses range as far south as 67° S in the Weddell Sea (BAS records), and are common in the Bransfield Strait (63° S, 58° W), occasionally sighted at Anvers Island (Parmelee and others, 1977), and around the South Orkney Islands (BAS records). The Falkland Islands and South Georgia are the main breeding sites for the species in the south Atlantic (Croxall and others, 1984*a*, *b*). The increase in sightings at Signy Island probably reflects the greater intensity of fishing operations in the area and their closer proximity to Signy Island.

Grey-headed albatross (*Diomedea chrysostoma*)

Possible vagrant. Circumpolar in the Southern Ocean. There is one record, without supporting description, for this species at Signy Island; on 17 March 1978, one was sighted off Outer Islet (BAS records). They are not uncommon north of Coronation Island (BAS records) and a ringed bird recovered in this area was a breeding bird from South Georgia (Prince and Francis, 1984), which together with Islas Diego Ramírez (56° 30′ S, 68° 45′ W) (Schlatter, 1984), is the main breeding site for the sector. Although recorded south to 67° S, grey-headed albatrosses are rare to the south of the South Sandwich and South Orkney islands (Thurston, 1982; BAS records). A good description is required to confirm this species at Signy Island.

Light-mantled sooty albatross (*Phoebetria palpebrata*)

Vagrant. The first record of this species at Signy Island was a sighting from a relief ship south of the island on 30 January 1957 (Hall, 1956). The previous day, two birds of the same species had been sighted off Saddle Island, South Orkney Islands and it is likely that they had followed the ship to the islands. There have been three further records for the South Orkney Islands: on 12 February 1966 off Polynesia Point (Beck, 1968*a*); between 31 January and 1 February 1969 off Balin Point (Conroy, 1968); on 31 January 1982 off Atriceps Island (Forster, 1981). The species is circumpolar in the Southern Ocean, and South Georgia is one of the main breeding areas (Croxall and others, 1984*b*), birds ranging south to about 65° S on the Antarctic Peninsula (Thomas, 1982); there are many reports for the South Shetland Islands (BAS records).

Southern giant petrel (*Macronectes giganteus*)

Common breeding species. Circumpolar in the Southern Ocean, breeding south to Avian Island (67° 46′ S, 68° 54′ W) off the Antarctic Peninsula in this sector. The species is common at Signy Island, although nests are confined to the west and south coasts; the present breeding population is *c.* 1100 pairs (BAS records). Adults may be present in any month of the year, especially when conditions are mild and leads appear in the sea ice, indicating that adult dispersal in April may be to local areas, whereas juvenile dispersal is circum-Antarctic (Tickell and Scotland, 1961; Conroy and Jones, 1974; Hunter, 1984*a*). Both Clarke (1906) and Ardley (1936) recorded the species as abundant, and the latter estimated the Signy Island population at *c.* 5000 birds.

Table III. Population counts for southern giant petrel *Macronectes giganteus* at Signy Island, 1936–87

Year	*Count*	*Comments*	*Reference*
1936–37	5000 birds	Estimate from *Discovery* Investigations	Ardley, 1936
1968–69	3200 pairs	From estimates of breeding success and chick count	Conroy, 1972
1975–76	1600 pairs	From estimates of breeding success and chick counts	Brook, 1975
1984–85	1093 nests	Whole island survey	Price, 1985

M. giganteus was one of the first species to show the effects of disturbance associated with the BAS research station. Borge Bay colonies, noted by Ardley (1936) as small, numbered *c.* 200 pairs in 1947 when the station opened (Ewer and Anderson, 1947), but had ceased to exist by 1955 (Tickell, 1956). Egg mortality is often high even in undisturbed colonies (Conroy, 1972) and the presence of a research station with associated activity may have been sufficient to prevent successful breeding. There also appears to have been a general decrease in the total population of the island especially between the census in 1968–69 and the most recent counts (Table III). Banding of the population has occurred since the station opened in 1947 and, with some interruptions, continued until 1979–80 season; skuas invariably accompanied banding operations and were quick to take unguarded eggs. The apparent increase in sub-Antarctic skua (*Catharacta lönnbergi*) numbers (*q.v.*) coupled with banding disturbance, may have contributed to the decrease in numbers of giant petrel breeding pairs.

Both colour phases of the southern giant petrel breed at Signy Island, and Conroy (1971*a*) estimated that about 8% were white-phase birds. The only full study of the species undertaken at Signy Island was by Conroy (1971*a*, 1972). The South Georgia population was studied in detail by Hunter (1983*a*, 1984*b*, 1985).

Breeding information

Adults present at breeding colonies October to late April. Some chicks may not leave the nest site until May but adults typically have left before then. During winters of little sea ice extent, individuals or groups may be seen in any month.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	Insufficient data			
Laying	5 Nov.	30 Oct.–11 Nov.	2.8	23
Hatching	6 Jan.	31 Dec.–10 Jan.	2.6	24

Northern giant petrel (*Macronectes halli*)

Occasional visitor, possibly increasing in frequency. This species breeds sympatrically with *Macronectes giganteus* on the sub-Antarctic islands of South Georgia, Crozet, Marion, Macquarie, and possibly Kerguelen (Hunter, 1984*b*). *M. halli* is primarily a scavenger, especially on Antarctic fur seal (*Arctocephalus gazella*) carrion, and is an assiduous ship follower. Recently, the South Georgia population has increased, which is attributed to increases in the fur seal population (Hunter, 1984*b*). There have been few sightings of *M. halli* at Signy Island and none until 1981; in particular Conroy (1972) did not observe any during his detailed study during the period 1966–69.

It is likely that recent sightings were due to the increased frequency of ships' visits to Signy Island since 1977, and to the increased population at South Georgia. There have been seven sightings between 1981 and 1983, which were often of more than one bird and which on several occasions were in association with *M. giganteus*; all the sightings fall in the period January to March (Hemmings, 1982*a*). Bill and plumage colour were used to identify the species (see Hunter, 1983*b* for full details) but no individuals have been caught for measurements to be taken. There are few records of *M. halli* south of 60° S but it has been recorded at Anvers Island (Parmelee and others, 1977).

Antarctic fulmar (*Fulmarus glacialoides*)

Common visitor. In the Atlantic sector this circumpolar species is abundant at the South Sandwich, South Orkney, and South Shetland islands, and south on the Antarctic Peninsula to *c.* 68° S. Surprisingly, it is absent from Signy and Moe islands despite apparently suitable nesting terrain. Individuals and small groups are frequently seen around Signy Island, presumably on their way to, or from, feeding grounds. Large colonies exist elsewhere in the South Orkney Islands, notably at Sandefjord Bay (Cordall, 1956) and Cape Faraday, and at the Inaccessible Islands (60° 34′ S, 46° 44′ W) (S. and J. Poncet, pers. comm.). Clarke (1906) saw many individuals at Laurie Island but no nests; however, Ardley (1936) noted several colonies in the group during *Discovery* Investigation cruises. Ewer and Anderson (1947) reported sightings of 'grey gulls' (*Larus modestus q.v.*) at Signy Island during several weeks in November 1947 but these were probably Antarctic fulmars which had not previously been recorded there.

Antarctic petrel (*Thalassoica antarctica*)

Annual visitor. The species is circumpolar on the Antarctic continent with the nearest known colony at the Theron Mountains (79° 05′ S, 28° 15′ W), about 200 km inland from the Weddell Sea (Brook and Beck, 1972). The species disperses north to

53° S during the winter, and is widespread in the Weddell Sea (Thurston, 1982). It has been recorded in the South Shetland Islands at Elephant and Clarence islands (Furse and Bruce, 1975), on one occasion at South Georgia (Prince and Payne, 1979), and twice at the Falkland Islands (Woods, 1975). The species was first recorded at the South Orkney Islands during the *Scotia* expedition (Clarke, 1906). At Signy Island it is usually seen between August and December (see Table IV), either singly or in groups of up to 20 birds.

Table IV. Frequency of sightings of Antarctic petrel *Thalassoica antarctica* at Signy Island, 1955–85 (from BAS records)

Month	*Number of sightings*	*Month*	*Number of sightings*
July	0	January	1
August	3	February	0
September	5	March	1
October	2	April	0
November	4	May	0
December	4	June	3

Cape petrel (*Daption capense*)

Abundant breeding species. Common on the Antarctic continent and many sub-Antarctic islands, and as far north as South Georgia in the Atlantic sector. The species was first recorded in the South Orkney Islands, with dates of laying and hatching, by Clarke (1906). During January 1933, Ardley recorded colonies in Borge Bay but noted that only one in four nests were occupied due, he suspected, to a reduction in numbers following the cessation of whaling activities (Ardley, 1936). Pinder (1966) estimated the breeding population of Signy Island at *c.* 12000 pairs and Price (1985) made an identical estimate in 1985–86. The *Scotia* expedition estimated the Laurie population at 20000 pairs (Clarke, 1906) but there are no figures for Coronation Island, the largest island in the group. Nevertheless, the South Orkney Islands probably forms one of the more important breeding areas for the species (Croxall and others, 1984*b*).

At colonies near the BAS research station, banding has been undertaken intermittently from 1950 to 1976 but the low level of philopatry reduced the research value of this work. Since 1976, banding has been confined to the occupants of 50 nests on Factory Bluffs, beside Factory Cove, whose breeding performance is recorded annually, and to a small colony in Pinder Gully on Polynesia Point. Dispersal of Cape petrels was documented by Murphy (1936); Signy Islands birds have been retrapped north to 3° N off Colombia and east to 169° E at Vanuatu (New Hebrides) (British Trust for Ornithology ringing records). More detailed studies of the Signy Island population were undertaken by Pinder (1966) and Beck (1969).

Breeding information

Adults present at breeding colonies from mid-August if the sea ice has begun to disperse, otherwise they may not return until late September or October. Once the chicks fledge, in late February to early March, the adults disperse from the colonies for a period of 4–6 weeks, returning during April. Final departure is dependent on sea ice conditions, but usually by June.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	13 Sept.	21 Aug.–22 Sept.	10.7	14
Laying	26 Nov.	17 Nov.–3 Dec.	4.6	15
Hatching	9 Jan.	3 Jan. –20 Jan.	5.0	13

Snow petrel (*Pagodroma nivea*)

Common breeding species. Circumpolar on the Antarctic continent where colonies have been recorded up to 300 km inland (Watson, 1975). In the Atlantic sector snow petrels breed on islands of the Scotia arc north to South Georgia, and at Signy Island the species breeds wherever suitable rock crevices occur. Individual nests are frequently found but snow petrels usually form loose colonies, often associated with Cape petrels; the former preferring deeper crevices which offer a more protected nest site. Clarke (1906) recorded snow petrels breeding at Laurie Island and Ardley (1936) first recorded nests at Signy Island. The Signy Island population was first counted during 1984–85 season when 195 nests were found with indications of further sites (BAS records).

Intermittent banding of the Signy Island population occurred from 1950 to 1976 whereafter banding was restricted to 50 nests on Factory Bluffs, beside Factory Cove, and to a small colony in Pinder Gully on Polynesia Point. The principal study of Signy Island snow petrels was by Beck (1966, 1967, 1968*b*, 1970); morphometric data were published by Croxall (1982).

Breeding information

Adults may be seen at breeding colonies during any month of the year and are commonly seen in groups on sea ice near leads. Significant numbers are seen at the colonies from October to March, when a general dispersal occurs following fledging of the chicks. The range of laying dates may result from blocking of nest sites by snowfall during November.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	Insufficient data			
Laying	23 Nov.	11 Nov.–3 Dec.	5.4	21
Hatching	5 Jan.	30 Dec.–17 Jan.	4.7	20

Antarctic prion (*Pachyptila desolata*)

Abundant breeding species. Possibly circumpolar in the Southern Ocean and sub-Antarctic islands but status in some areas is uncertain. In the Atlantic sector, this species breeds at South Georgia, the South Sandwich Islands (Croxall and others, 1984*b*), South Orkney Islands, and Elephant and Clarence islands (Furse and Bruce, 1975) but it has not been reported breeding elsewhere in the South Shetland Islands (Trivelpiece and others, 1987*a*).

Antarctic prions are abundant at Signy Island. Many were seen by the *Scotia* expedition but no nests were recorded at Laurie Island (Clarke, 1906); however, Bennett (1926) and later Ardley (1936) reported nests on Signy Island. Ardley (1936) and Tickell (1962) argued that Signy Island was the main breeding centre in the South Orkney Islands as few other islands supported the right terrain; Tickell (1962) estimated the Signy Island breeding population at *c.* 50000 pairs. Over recent years, the number of Antarctic fur seals has dramatically increased, and their habit of hauling-out around the coast to moult, often destroying moss banks in the process (Caldwell and Kightley, 1982), may have reduced the number of prions by destroying nest sites. The Signy Island population has been studied by Tickell (1962) and Beck (1970).

Breeding information

Adults present at breeding colonies October to March or April, although arrival may be delayed by sea ice conditions.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	27 Oct.	11 Oct.–10 Nov.	7.5	18
Laying	30 Dec.	15 Dec.–13 Jan.	12.1	10
Hatching	31 Jan.	5 Jan.–16 Feb.	12.5	11

Blue petrel (*Halobaena caerulea*)

Possible, but unconfirmed, visitor. Breeds at a number of sub-Antarctic islands, including South Georgia (population estimated at *c.* 70000 breeding pairs, Prince and Croxall, 1983), Prince Edward Islands (Williams, 1984), Iles Crozet and Kerguelen (Jouventin and others, 1984), and is abundant at Islas Diego Ramírez (Schlatter, 1984). In this sector blue petrels are common in the Drake Passage and around South Georgia and have been recorded south to 64° S off Brabant Island (Furse, 1987) and to 57° S in the Weddell Sea (Thurston, 1982), and north to the Falkland Islands (Woods, 1975). Recently, one was sighted off the Argentine Islands (65° 15′ S, 64° 17′ W) during a storm (Edwards, 1986). Ardley (1936) recorded breeding at Borge Bay, which was based on an egg, later broken, collected by Seaman A. Jones. The nest was among those of *Pachyptila desolata*, but no further sightings of the species were made at the South Orkney Islands. Ewer and Anderson (1947) and Tickell (1956) noted the absence of the species at Cape Geddes, Laurie Island, and Signy Island and during 40 years' occupation of the BAS research station on Signy Island there have been no further records. It is certain that blue petrels do not breed at Signy Island.

Early reports of blue petrel sightings are unreliable because of confusion of this species with prions. Clarke (1907) and Murphy (1936) note the confusion in the *Scotia* log between *Prion banksi* and *Halobaena caerulea*, both of which appear under the name 'blue petrel', and which were recorded to about 69° S. Bennett (1926) referred to *Heteroprion desolatus banski*, Bank's blue prion, as breeding at the South Orkney Islands in 1915, but *Halobaena caerula murphyi*, blue petrel, was listed separately and noted as breeding at the Falkland Islands (presumably an error for *Pachyptila belcheri*, thin-billed prion, which is an abundant breeder there), and possibly South Georgia.

Kerguelen petrel (*Pterodroma brevirostris*)

Rare vagrant. Breeds on Tristan da Cunha, Gough Island, Prince Edward Islands (Williams, 1984), Iles Crozet, and Kerguelen (Jouventin and others, 1984). On 11 March 1975 the remains of a freshly killed petrel were discovered at the top of the 'Stonechute' near to the BAS research station. This was identified as a Kerguelen petrel (Prince and Payne, 1979), and was the first record of the species for the South Orkney Islands.

The species is frequently seen around South Georgia, usually during late summer, and has been recorded in the Drake Passage (Prince and Croxall, 1983), but Furse and Bruce (1975) did not sight it at Elephant or Clarence islands, and there are no records for Brabant Island (Parmelee and Rimmer, 1985; Furse, 1987). An at-sea sighting was made close to the South Orkney Islands during January 1963, and a number of sightings were made east of the South Sandwich Islands, between latitudes 55° and 62° S (Thurston, 1982). Thurston recorded penetration of the Weddell Sea to 66° S by this species, well south of the ice edge.

White-chinned petrel (*Procellaria aequinoctialis*)

Vagrant. Abundant at many sub-Antarctic islands; the South Georgia population has been estimated at *c.* 2 million pairs (Prince and Croxall, 1983). In this sector, uncommon at sea south of 60° S, although there are sightings to 64° S (BAS records). There have been six sightings at Signy Island: during 1974, white-chinned petrels were sighted on three occasions in Borge Bay and Factory Cove (Tappin, 1974); on 3 February 1978 several were seen feeding off refuse from anchored trawlers in Orwell Bight (Rootes, 1977); on 28 December 1981 in Orwell Bight (Forster, 1981); and on 20 January 1982 in Paal Harbour (Forster, 1981). The birds had no doubt followed shipping to the vicinity of the station and the dates suggest that they were immatures or failed breeders. The species is wide-ranging and these birds were probably from South Georgia. The species has been studied at South Georgia by Hall (1987).

Wilson's storm petrel (*Oceanites oceanicus*)

Abundant breeding species. Circumpolar breeding species, which in the Atlantic sector is common on South Georgia (Prince and Croxall, 1983), the South Orkney Islands, and on the Antarctic Peninsula south to Anvers Island (Parmelee and others, 1977), but uncommon on southern South America (Schlatter, 1984) and the Falkland Islands (Croxall and others, 1984*a*). The species is abundant at Signy Island, nesting in holes and crevices in the fellfield, with an estimated breeding population of *c.* 97000 pairs (Beck and Brown, 1972). Wilson's petrels breed at many of the islands in the South Orkney Islands, and were first recorded by Clarke (1906) during the *Scotia* expedition; Ardley (1936) first observed the species breeding at Signy Island.

Arrival of birds at the South Orkney Islands appears to be fairly well synchronized between years; Clarke (1906) recorded 11–12 November at Laurie Island; Ardley (1936) noted that there were no Wilson's petrels in the Bransfield Strait on 6 November 1932; Beck and Brown (1972) reported that the main influx to Signy Island was during the period 4–13 November, and analysis of station records for the period 1946–1985, gave a mean of 7 November (17 records). The Signy Island population was studied by Beck and Brown (1972) and compared with those of South Georgia and elsewhere by Beck (1970) and Copestake and Croxall (1985). Wilson's

petrel was also studied on the Argentine Islands by Roberts (1940), and there have been recent studies at Anvers Island by Obst and others (1987).

Breeding information

Adults present at breeding colonies from early November to April. Arrival is during the early summer melt period and appears unaffected by sea ice extent. Egg laying is dependent on birds clearing the nesting crevices of snow and ice and results in a wide range of dates. No birds are seen outside of the breeding period, the species migrating to the northern hemisphere.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	7 Nov.	30 Oct.–18 Nov.	5.0	17
Laying	1 Jan.	8 Dec.–20 Jan.	11.4	14
Hatching	17 Feb.	3 Feb.–1 Mar.	10.4	6

Black-bellied storm petrel (*Fregetta tropica*)

Breeding species. Although circumpolar on sub-Antarctic islands, there are few studies of the black-bellied storm petrel, and islands off the Antarctic Peninsula may be the headquarters of the Southern Ocean population in this sector. Thus, it is common at Elephant Island (*c.* 21000 breeding pairs. Furse and Bruce, 1975), widespread in the South Shetland Islands and possibly in the South Orkney Islands where there is suitable habitat, but very local at South Georgia (Prince and Croxall, 1983). Breeding has been recorded on the Antarctic Peninsula south to Anvers Island (Parmelee and others, 1977). Breeding was confirmed at the South Orkney Islands by Clarke (1906), and first recorded at Signy Island by Sladen (1950). The small Signy Island population was studied by Beck and Brown (1971), who estimated its size at between 100 and 200 pairs, considerably fewer than Wilson's storm petrel. Beck (1970) has compared black-bellied storm petrels with other small Antarctic petrels.

Breeding information

Adults present at breeding colonies November until April. Similar to Wilson's storm petrel, sea ice conditions do not appear to affect the arrival date of this species, but egg laying is delayed by snow or ice blocking nest crevices. Birds are not seen outside the breeding period.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	13 Nov.	14 Nov.–26 Nov.	8.2	9
Laying	Insufficient data	—	—	—
Hatching	Insufficient data	—	—	—

Common diving-petrel (*Pelecanoides urinatrix berard*)

Rare vagrant. The remains of a petrel were discovered at Tern Cove on 12 February 1967 by R. Ralph, but only the head was collected; a search the following day failed to recover any more of the remains. By comparison with skins at the British Museum it was concluded that the specimen was a common diving-petrel, *P. u. berard* (Beck, 1968*a*). *P. urinatrix* has a circumpolar breeding distribution and various subspecies breed in the Atlantic sector (Bourne, 1968). Thus, *P. u. berard* is widespread on the Falkland Islands (Croxall and others, 1984*a*), *P. u. exsul* is abundant where suitable habitat occurs on South Georgia, with an estimated population of 3.8 million pairs (Prince and Croxall, 1983), and *P. u. coppingeri* is common on southern archipelagos of South America (Schlatter, 1984). Signy Island is south of the breeding range of diving petrels, although there are a few sightings, either of *P. urinatrix* or of the South Georgia diving petrel *P. georgicus*, to 60° S (BAS records).

Blue-eyed shag (*Phalacrocorax atriceps*)

Common, resident breeding species. Now often regarded as conspecific with *P. albiventer* (king shag) under the vernacular name, imperial cormorant. Common throughout the Scotia arc from southern South America, to the Falkland Islands, South Georgia, South Orkney, South Sandwich, and South Shetland islands, and south to *c.* 65° S on the Antarctic Peninsula.

Clarke (1906) estimated *c.* 2500 pairs on Laurie Island, considered by Ardley (1936) to be the main site in the South Orkney Islands, although he recorded colonies on a number of rocky islets. In particular, he did not report any at Signy Island, but possible breeding colonies there were first noted by Strong (1937), and Ewer and Anderson (1947) found a shag colony on Shagnasty Island, off the south coast of Signy Island, and Laws (1948) first recorded a colony of nine nests at North Point. In 1979 this colony numbered 65 nests (Shaw, 1984) and in 1986, 53 nests (Cobley, 1986); this appears to indicate that the North Point colony is a recent expansion on the island. The colony on Shagnasty Islet is much larger, numbering 618 breeding pairs in 1986–87, and fluctuating between 450–770 pairs (Cobley, 1986) over the last decade. The Signy Island population has been studied by Shaw (1984, 1985*a*, *b*, 1986*a*).

Breeding information

Adults roost all year at the colonies unless sea ice conditions are too severe for them to feed, when they move to nearby open water. During the 1980 winter, colour-ringed individuals from Signy Island were seen at open water in the Lewthwaite Strait (South Orkney Islands) whilst the colonies on Signy Island were empty (BAS records). Chicks fledge by mid-February at the latest.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Nesting	25 Sept.	7 Sept.–12 Oct.	10.6	9
Laying	3 Nov.	10 Oct.–26 Nov.	12.5	15
Hatching	6 Dec.	28 Nov.–25 Dec.	9.0	9

Cattle egret (*Bubulcus ibis*)

Vagrant. An Old World species that has spread to South America, regularly appears on the Falkland Islands (Strange, 1979), and, in recent years, annually at South Georgia (Prince and Croxall, 1983). The first record at the South Orkney Islands consisted of the remains of an egret found on Confusion Island, 500 m off the south coast of Signy Island, on 24 February 1981 (Price, 1980). There were no further reports until 23 March 1986 when a bird was seen flying over Factory Cove, followed the next day by three more (Price, 1985). On 19 April 1986, several sightings were made including a skua attacking and killing an egret (Burren, 1986), and the following season, after the summer melt, remains of at least five birds were discovered at skua nests, amongst penguin colonies and below Robin Peak (Burren, 1986). It was assumed that these birds had arrived during the previous March or April and this coincides with an influx of cattle egrets into the Falkland Islands and South Georgia during April 1986 (Falkland Islands Foundation, 1986; Delany, 1987).

Various vagrant herons have been recorded at South Georgia (Prince and Payne, 1979; Prince and Croxall, 1983) but cattle egrets are by far the most common. Trivelpiece and others (1987*a*) found dead cattle egrets at King George Island and reported sightings in the Weddell Sea and Bransfield Strait.

Chiloë wigeon (*Anas sibilatrix*)

Rare vagrant. There is only one report for this species at Signy Island, when the body of an emaciated drake was found at the foot of Robin Peak on 16 October 1966; it was suggested that the bird may have been attacked by a leopard seal (*Hydrurga leptonyx*) (Beck, 1968*a*). Four records involving six birds have been recorded at South Georgia (Prince and Croxall, 1983), four birds remained for 46 days at Point Thomas, King George Island (Trivelpiece and others, 1987*a*), and a lone bird was seen repeatedly during a period of 12 days at Palmer Station, Anvers Island (Maxson and Bernstein, 1980). The species breeds on the Falkland Islands and southern South America to Tierra del Fuego, nesting between September and late December.

South Georgia pintail (*Anas georgica*)

Vagrant. Burton (1967) recorded two ducks among ice floes off Signy Island on 26 October 1965 which he assumed to be *A. g. spinicauda* rather than *A. g. georgica*. He argued that the prevailing westerly wind direction would have been more likely to have carried strays from South America than South Georgia which is closer, by 480 km to the north-east of the South Orkney Islands. On 19 October 1974 a duck was seen at North Point, Signy Island (Tappin, 1974), but was recorded simply as *A. georgica* (sub-species unknown) and without supporting description. The subspecific identity of vagrants to Signy of this species remains to be determined.

Aagaard (1930) noted a report by Capt. Larsen of 'wild ducks' at Laurie Island some time after 16 November 1892. Larsen described the ducks as not shy and some were taken by hand when they alighted on the ship, others were shot. During a severe drought in Argentina during 1916–17, numbers of ducks were recorded at Deception Island, South Shetland Islands, including *Oxyura vittata*, Argentine ruddy duck (Holgersen, 1945) and *A. g. spinicauda*, South American pintail (Bennett, 1926). *A. georgica* (unknown subspecies) was recorded from Breaker Island, off Anvers Island (Parmelee and others, 1977), at Palmer Station, Anvers Island (Maxson and Bernstein, 1980), and at Point Thomas, King George Island (Trivelpiece and others,

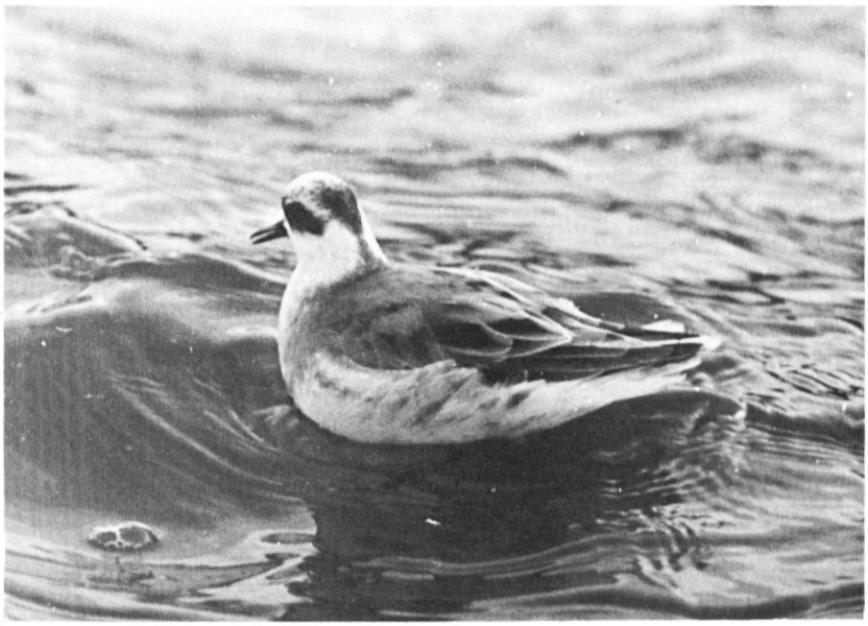

Fig. 2. Photograph of grey phalarope at Signy Island (by R. A. Luxmoore).

1987*a*). Bennett (1926) suggested that the cause of such vagrants was the combination of violent gales at migration time and periodic bouts of severe drought in South America, forcing ducks to shift grounds to feed.

Grey phalarope (*Phalaropus fulicarius*)

Vagrant. The grey or red phalarope has a circumpolar breeding distribution in the Arctic, migrating to South America, the Falkland Islands, and wintering at sea (Murphy, 1936). Migrants also reach west Africa, extending south to the Cape of Good Hope, and New Zealand. There have been two records at Signy Island: between 10 and 14 March 1977 an individual was seen on numerous occasions in Factory Cove (Rootes, 1977). Various unsuccessful attempts were made to capture the bird, but good photographs were taken which confirmed the identification (Fig. 2); and on 4 March 1982 a freshly dead and intact grey phalarope was found on the beach near Elephant Flats (Forster, 1981).

The only other record of this species south of the Antarctic Polar Front was an adult male collected on Humble Island, off Anvers Island on 12 January 1970 (Risebrough and others, 1976). There are no reports from the Falkland Islands (Woods, 1975) or South Georgia (Prince and Croxall, 1983). Harrison (1983) suggests that the Asiatic breeders move south-east across the north Pacific Ocean to winter off western South America and small numbers from North American breeding grounds occur in the South Atlantic Ocean off Argentina. Presumably, freak weather conditions in the Drake Passage carried the birds from these areas to the South Orkney Islands and Anvers Island.

Wilson's phalarope (*Phalaropus tricolor*)

Rare vagrant. The only record of this bird at Signy Island was one seen swimming in Light Lake on 23 March 1982 (Forster, 1981). The bird was described as having a bill length roughly twice head length, long black legs and a black flash behind the eye; the breast and rump were white, and the upper wings were grey with no bar. The bird swam in a circular manner and made frequent stabs at the turbulent water with its bill. On occasions it emerged onto rocks near the lake edge but seemed reluctant to move to other lakes in the vicinity.

The description agrees with that of the Wilson's phalarope except for the colour of the legs, which are generally yellowish-grey in the non-breeding adult but black when in breeding plumage (Murphy, 1936). There are only three other records for the species south of about 43° S. A bird was collected at Fossil Bluff, Alexander Island (71° 21′ S, 68° 17′ W) on 13 October 1968 (Willey, 1969 in Conroy, 1971*b*), one was recorded at Bird Island (54° 00′ S, 38° 05′ W) (Lidstone Scott, 1983), and one at the Falkland Islands (Woods, 1975). *P. tricolor* has a far more restricted breeding range than *P. fulicarius* and is confined to the south-western and south central regions of Canada. Wilson's phalarope migrates to South America and Hurlbert and others (1984) recorded large numbers (more than 500000) wintering on the shallow, saline lakes of the Bolivian puna; thus, Harrison (1983) is probably wrong to suggest that Patagonia is the main wintering area.

Least sandpiper (*Calidris minutilla*)

Rare vagrant. On a number of occasions between 8 December 1981 and 2 February 1982 a small sandpiper was seen at Hillier Moss (Hemmings, 1985). Although not collected, sufficient observations were made to establish with reasonable certainty that the bird was a least sandpiper. A full field description was made on 26 January when key features noted were straw-coloured legs, pale bill, darkening towards the tip, and dark rump and tail, including the outer tail feathers. Hemmings (1985) discussed the field description, reducing the choice to between the long-toed stint *C. subminuta* and least sandpiper *C. minutilla*. The long-toed stint is a bird of the eastern Palaearctic, migrating to Malaysia and Australia; it is highly unlikely to occur in the Americas. The least sandpiper breeds in Alaska and Arctic Canada and migrates southwards through the Americas, occasionally reaching northern Chile and central Brazil. The Signy Island sighting is the southernmost and only Antarctic record for this species.

Baird's sandpiper (*Calidris bairdii*)

Vagrant. On 5 December 1985, G. Collett saw a small wader at Gourlay Peninsula which remained in this area and around Hillier Moss until the end of January 1986 (Price, 1985). A full field description was compiled by J. Pickup: small, erect, standing wader, dunlin size. Straight black bill, almost the length of the head, crown streaked, possibly lighter eye-stripe. Upper parts brownish with scalloped pattern caused by lighter feather margins, no noticeable wing bar. Under parts white with buff streaking on upper breast, longish black legs. Tail, dark central band surrounded by greyish sides. Typical 'tchurp' call of small sandpiper. Good photographs were obtained (Fig. 3) from which an identification of Baird's sandpiper was confirmed by J. H. Marchant of the British Trust for Ornithology.

C. bairdii breeds in Arctic North America from western Alaska to Baffin Island and

Fig. 3. Photograph of Baird's sandpiper at Signy Island (by J. Pickup).

south to about 64° N. It migrates south in large numbers to 18–40° S in Chile; migrants also occur throughout Argentina and south to Tierra del Fuego. There are two sightings for the Falkland Islands (Woods, 1975) but no records for South Georgia (Prince and Croxall, 1983). This is the southernmost and only Antarctic record for this species.

Upland sandpiper (*Bartramia longicauda*)

Possible, but unconfirmed, vagrant. Some doubt still remains over the occurrence of this species at Signy Island. Holdgate (1965) reported that small waders were sighted about Elephant Flats and Three Lakes Valley on 6 and 30 December 1962 and on 26 January 1963. The birds were wary and collection proved impossible. Holdgate concluded from the field description and habitat preference that upland sandpiper was the most plausible identification.

The upland sandpiper breeds from north-western Alaska to about 39° N in central United States, migrating to southern Brazil and to about 42° S in Argentina. There are three sightings for the Falkland Islands (Woods, 1975) and one was shot on 9 February 1923 at Deception Island, South Shetland Islands (Bennett, 1926).

Greater sheathbill (*Chionis alba*)

Common breeding species, partial resident. The species is limited to the Antarctic Peninsula and Scotia arc, breeding only south of the Antarctic Polar Front. Widespread at South Georgia (Prince and Payne, 1979), South Orkney Islands, South

Shetland Islands (Trivelpiece and others, 1987*a*), and south on the Antarctic Peninsula to Booth Island (65° 05′ W, 64° 00′ W), where they are uncommon (Ménégaux, 1907). During winter, there is a general northwards migration of the population which takes some birds to the Falkland Islands and the coast of South America (Woods, 1975).

Breeding at the South Orkney Islands was first recorded by Clarke (1906), and Ardley (1936) noted two nests at Borge Bay. The greater sheathbill is common on Signy Island and the most recent estimate is *c.* 150 pairs (BAS records). There is some doubt as to whether the winter population, often found near the BAS research station, is the same group as the summer breeding population, and Jones (1963) suggested they may be birds from colonies farther south. A bird marked at the Falkland Islands during August 1961 was recovered at Signy Island in January 1962 and a Signy Island nestling was recovered in December 1962 by a Soviet ship at [illegible]° 14′ S, 62° 07′ W, near the South Shetland Islands (Jones, 1963). Before his untimely death whilst working on sheathbills at Signy Island, R. Filer undertook homing experiments which demonstrated that the species can cross large tracts of ocean, albeit rather slowly (Jones, 1963). The main study of the Signy Island breeding population was by Jones (1963) and incorporated studies of their unique endoparasite fauna (Jones and Williams, 1969). Dominance relationships among the wintering population were studied by Shaw (1986*b*).

Breeding information

Adults present at breeding colonies October to mid-May and the chicks fledge in March. Adults are present all winter in the vicinity of the BAS research station, feeding off kitchen scraps and at the outflow of the waste pipe, and may be seen around the island attending Weddell seals (*Leptonychotes weddellii*) and southern elephant seals (*Mirounga leonina*) during pupping, feeding on placental scraps and blood, or at the blue-eyed shag colonies where birds may be roosting (Shaw, 1986*b*). The species seems little affected by the extent of pack ice.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	Insufficient data	—	—	—
Laying	9 Dec.	4 Dec.–18 Dec.	3.9	13
Hatching	11 Jan.	4 Jan.–22 Jan.	10.9	14

Sub-Antarctic (brown) skua (*Catharacta lönnbergi*)

Common breeding species. The taxonomy and nomenclature of the genus *Catharacta* is still controversial; Watson (1975) is followed here. *C. lönnbergi* breeds on South Georgia, the South Sandwich, South Orkney, and South Shetland islands, the Antarctic Peninsula to about 65° S, and many sub-Antarctic islands. It breeds sympatrically with the Antarctic (McCormick's) skua *C. maccormicki*, on the Antarctic Peninsula and, recently, on the South Orkney Islands (Hemmings, 1984).

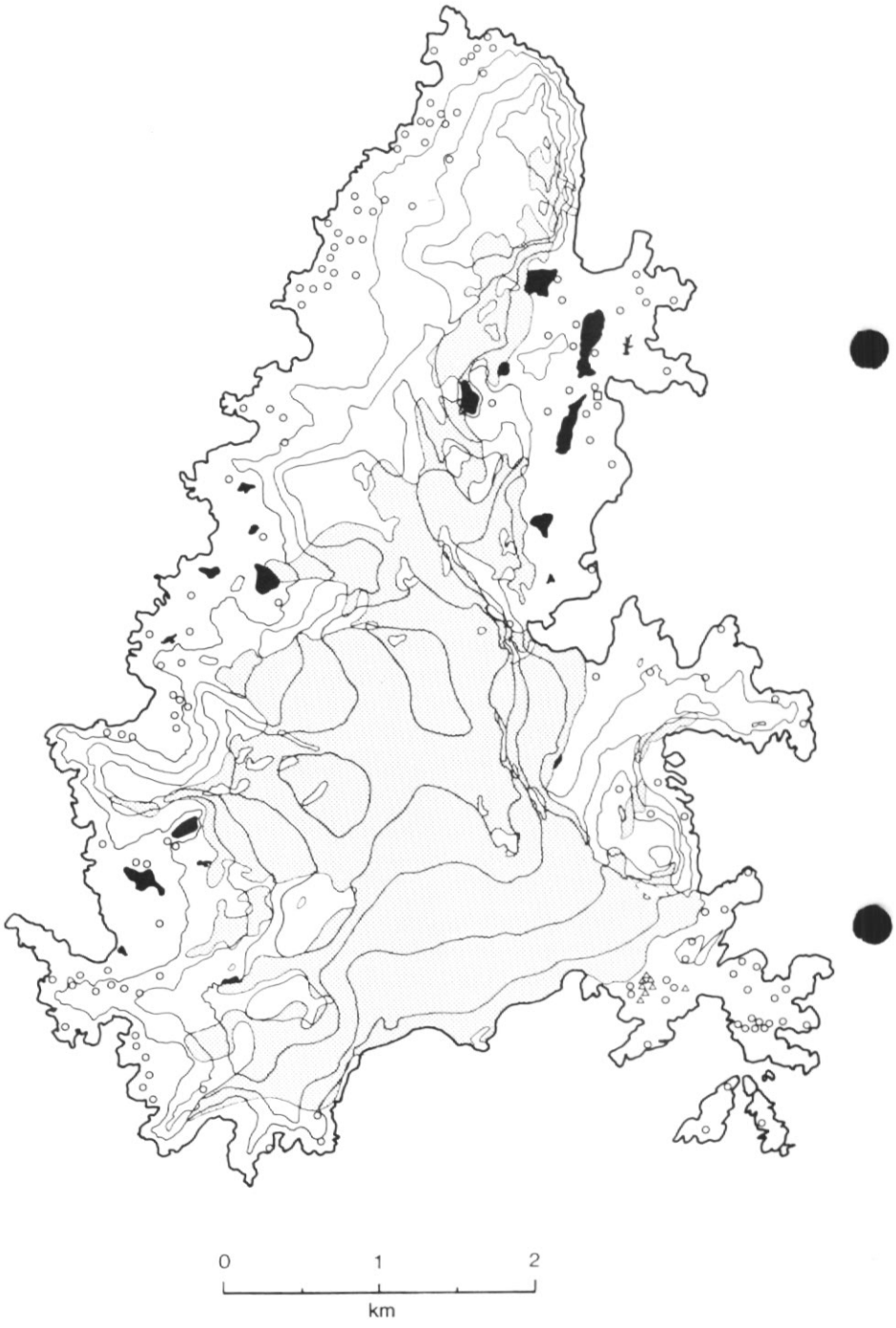

Fig. 4 Distribution of nests of sub-Antarctic skua *Catharacta lönnbergi* ○, Antarctic skua *C. maccormicki* △ and mixed pairs □ on Signy Island, 1982–83, (Hemmings, 1982*b*).

Table V. Population counts for sub-Antarctic skua *Catharacta lönnbergi* at Signy Island, 1958–83

Year	*Count (pairs)*	*Comments*	*References*
1958–59	59	First banding of skuas	Richards, 1958
1960–61	71		Pinder, 1960
1963–64	67	Burton's study period	Burton, 1968
1964–65	84	Burton's study period	Burton, 1968
1965–66	81	Burton's study period	Burton, 1968
1982–83	143	Hemmings' study period	Hemmings, 1984

Skuas were first noted at the South Orkney Islands by Clarke (1906), and Ardley (1936) recorded breeding at Signy Island. The Signy Island breeding population was fairly stable at 60–80 pairs over the period 1959–67 (Burton, 1968) but appears nearly to have doubled subsequently. This is confirmed by detailed comparison of present nest sites (see Fig. 4) with Burton's (1968) map. Such an increase is in accord with the fivefold increase in chinstrap penguins since 1957-58 (Croxall and others, 1981), because the sub-Antarctic skua depends extensively on penguin colonies (Trivelpiece and Volkman, 1982), penguin eggs and chicks providing the main sources of food. During 1982–83, the breeding population of Signy Island was 143 pairs plus a further mixed pair with *C. maccormicki* (Hemmings, 1984) (Table V). Large batchelor groups are frequently reported but rarely counted and it is impossible to estimate the total skua population of the island.

During November 1960 and again in January 1961 colour-ringed birds, banded either at Deception or King George islands, South Shetland Islands, were sighted at Signy Island (Burton, 1968). In 1970 a ring was found on Elephant Island which was from an adult skua banded on Signy Island in 1960, and during 1984 a skua banded at Signy Island in 1964 was retrapped at Bellingshausen Station, King George Island (British Trust for Ornithology Records). The Signy Island population of *C. lönnbergi* was studied by Burton (1968) and compared with *C. maccormicki* by Hemmings (1984). Skua populations at Anvers Island were studied by Pietz (1984, 1985), and, at South Shetland Islands, by Trivelpiece and Volkman (1982).

Breeding information

Adults present at breeding colonies from October to March or April. Non-breeding groups form shortly after the breeding pairs have established their territories and remain a month or so longer (Burton, 1968). Sea ice extent does not appear to affect the arrival or breeding success of skuas.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	10 Oct.	2 Oct.–25 Oct.	4.9	27
Laying	27 Nov.	21 Nov.–9 Dec.	5.0	22
Hatching	24 Dec.	20 Dec.–30 Dec.	3.1	20

Antarctic (McCormick's) skua (*Catharacta maccormicki*)

Breeding species. Valette (1906) recorded sightings of Antarctic skuas in November and December 1904 among sub-Antarctic skuas at Laurie Island; one was shot on 11 November 1904 and examined by the *Scotia* expedition (Clarke, 1906). The first record for Signy Island is a bird sighted on 26 December 1962 (Jones and Pinder, 1961) but during 1978–79 the Antarctic skua was recorded breeding at Signy Island (Rootes, 1978), the northernmost breeding record for the species. Prior to this the Antarctic skua was known to breed only as far north as the South Shetland Islands (Trivelpiece and Volkman, 1982), but was common further south on the Antarctic Peninsula, especially south of the limit (at about 65° S) of *C. lönnbergi*, and circumpolar on the Antarctic continent.

Hemmings (1984) recorded ten pairs in 1982–83, of which nine bred, and one mixed pair with *C. lönnbergi*. About a dozen single birds were present during the summer. Hemmings suggested that enhanced availability of *Pleuragramma antarctica*, a pelagic nototheniid which feeds on krill (*Euphausia*), and prominent in the diet of Antarctic skuas at Signy Island, may have been the cause of the spread into the South Orkney Islands. The only study of the Antarctic skua at Signy Island was by Hemmings (1984). The population at the South Shetland Islands has been studied by Trivelpiece and Volkman (1982), and that at Anvers Island by Pietz (1984, 1985).

Breeding information

Adults present at breeding colonies late October to March. *C. maccormicki* appear to breed about two weeks later than sympatric *C. lönnbergi* (Hemmings, 1984).

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	Insufficient data	—	—	—
Laying	Insufficient data	—	—	—
Hatching	8 Jan.	3 Jan.–10 Jan.	3.1	4

Arctic skua (*Stercorarius parasiticus*)

Vagrant. An Arctic skua was shot at Signy Island on 26 January 1951 (Sladen, 1952). The bird had been seen several times over a period of a week and was in first-winter plumage. Between 16 and 22 January 1966 an unusual skua was seen at Gourlay Peninsula and Three Lakes Valley, in company with sub-Antarctic skuas (Beck, 1968*a*). This was almost certainly an immature Arctic skua although Beck was unable to rule out the possibility that it may have been a long-tailed skua, *S. longicaudus*.

On 4 December 1980 an immature Arctic skua was seen flying with brown skuas at Hillier Moss (Price, 1980). The following notes are from R. Booth's field description: strong flight, long pointed wings, white wing flashes, short scarcely projecting central tail feathers, more slender and lightly built than *C. lönnbergi*, wings proportionately larger, much thinner and more strongly pointed.

The Arctic skua is circumpolar in the Arctic tundra zone, migrating south to winter. It is generally considered not to migrate beyond 50° S, which is further south than the Pomarine skua, *S. pomarinus*, but similar to the long-tailed skua. The three species are easily confused; *S. longicaudus* has not been reported from the Antarctic but Watson (1975) listed four sightings of *S. pomarinus* on the Antarctic Peninsula. For *S. parasiticus* only Sladen's identification can be regarded as certain, but the size of the bird reported by Booth and the nature of the central tail feathers are strongly indicative of Arctic skua.

Dominican gull (*Larus dominicanus*)

Breeding species, partially resident. Circumpolar in the Southern Ocean, in the Atlantic sector it breeds in South America (north to 7° S), the Falkland Islands, [illegible]nds of the Scotia arc, and on the Antarctic Peninsula to 68° S. Some birds winter at colonies in the sector but during periods of exceptionally severe weather gulls may be absent. In the South Orkney Islands, Clarke (1906) reported *L. dominicanus* at Laurie Island indicating the species was widely distributed but not very abundant. Ardley (1936) recorded breeding at Signy Island and commented that the birds bred in small numbers around the coast of most of the islands.

The present Signy Island breeding population is *c.* 50 pairs of which about half nest at Stygian Cove, the remainder in small groups around the rest of the island (BAS records). Richards (1958) recorded 42 breeding pairs on the island and the population appears to be stable. Bennett (1926), Murphy (1936), and Ardley (1936) comment that *L. dominicanus* breeds as early, or earlier, in the south of its range as the birds further north. Thus, gulls at Anvers Island (64° S) lay 12–18 November (Parmelee and others, 1977); the mean date for Signy Island (60° S) is 13 November (BAS records), and most eggs are laid during the first half of December at the Falkland Islands (52° S) (Woods, 1975). The population of dominican gulls at Signy Island has not been studied. The Anvers Island population was studied by Parmelee and others (1977) and Maxson and Bernstein (1980, 1984).

Breeding information

[illegible]Adults return during September, although a small number may remain at the island [illegible]ughout winter. It is not clear whether the winter population are Signy Island breeders or migrants from further south (cf. greater sheathbill). Departure was dependent on ice conditions but is generally by June. Mean date of fledging is 23 January (SD = 7.0, $n = 14$) during the period 1948 to 1986.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	Insufficient data	—	—	—
Laying	13 Nov.	31 Oct.–30 Nov.	8.2	21
Hatching	11 Dec.	1 Dec.–28 Dec.	6.4	24

Dolphin gull (*Larus scoresbii*)

Possible vagrant. Ewer and Anderson (1947) reported a sighting at Signy Island by J. H. Anderson and P. E. Biggs of a Magellan gull (i.e. dolphin gull) on 5 and

17 October 1947 and of six on 10 October 1947, but provided no description. Saunders (1901) cited a record of *L. scoresbii* off the South Shetland Islands, and Murphy (1936) commented that the species was no more than a casual straggler to the southerly islands of the Scotia arc. *L. scoresbii* is common in the Falkland Islands and southern South America north to Chiloë Island (42° S), and disperses north in winter to about 35° S. There are no records for South Georgia (Prince and Croxall, 1983) and no records in the Antarctic or sub-Antarctic during the last 40 years. The earlier records, therefore, must be regarded with distinct reservation.

Grey gull (*Larus modestus*)

Possible vagrant. Ewer and Anderson (1947) recorded sightings of grey gulls at Signy Island from 5 November 1947 for several weeks but provided no description. Antarctic fulmars (*q.v.*) are commonly seen at Signy Island during November [redacted] March–April and it is most likely that this record refers to them and not grey gulls. Ewer and Anderson recorded 17 species from the South Orkney Islands but did not include the Antarctic fulmar. *L. modestus* breeds in northern Chile and Peru, dispersing on the Pacific coast in winter; not recorded in Argentina, there is only one record for the Falkland Islands (Woods, 1975).

Antarctic tern (*Sterna vittata*)

Breeding species. Clarke (1906) recorded 200–300 terns nesting on Laurie Island, listing them as *S. hirundinacea*, the South American tern. This species is restricted to South America and it is clear that his records related to *S. vittata*, as noted by Ardley (1936). Antarctic terns were first recorded breeding at Signy Island by Ardley (1936), who estimated a population of *c.* 1000 birds. His account indicated that Borge Bay supported extensive colonies which are not now extant. Recent estimates give a breeding population of 150–200 pairs (BAS records) and activity associated with the BAS research station may well have displaced some birds; unfortunately, there are no reliable counts to assess changes to the population size.

S. vittata has an almost circumpolar distribution in the Southern Ocean and in the Atlantic sector is widespread at South Georgia (Prince and Croxall, 1983), the South Orkney and South Shetland islands, and on the Antarctic Peninsula south to 68° S. Its status on the South Sandwich Islands requires confirmation. Antarctic terns h[redacted] been studied at Anvers Island by Parmelee and Maxson (1975).

Breeding information

Adults arrive at breeding colonies late September to early October and depart, depending on conditions, from March to June. Dispersal of Antarctic terns is little known but there appears to be at least a local migration because the species is not generally seen during winter.

Date of	*Mean date of first sighting*	*Range*	*SD*	*n*
Return	27 Sept.	3 Sept.–14 Oct.	12.2	17
Laying	18 Nov.	31 Oct.–2 Dec.	9.0	18
Hatching	24 Jan.	4 Dec.–15 Jan.	16.5	11

Arctic tern (*Sterna paradisaea*)

Possible vagrant. A number of sightings at Signy Island have been attributed to the Arctic tern. Tickell (1956) shot several specimens (weighing 171, 175 and 168 g) but he was unable to make a conclusive identification. Although the birds were returned to UK, their fate is unknown (W. L. N. Tickell, pers. comm.). Since that time there have been further reports of Arctic terns at Signy Island but no specimens have been taken and descriptions remain inadequate for critical identification.

Parmelee (1977) demonstrated that Arctic terns winter in the Weddell Sea, observing more than 500 during one particular count. He is of the opinion, based on examination of Tickell's data and noting especially the weights, that the Signy Island observations were *S. vittata* (D. F. Parmelee, pers. comm.). In this sector, Arctic terns have been reported from South Georgia (one record, Prince and Croxall, 1983), Elephant Island (Furse, 1987), and the Weddell Sea (Parmelee, 1977; Thurston, 1982).

Discussion

Breeding species

Sixteen species of birds breed on Signy Island, 15 of which do so regularly, and one, the macaroni penguin, only maintains a toe-hold on the island. The size of the breeding population is not known for all these species, but since 1978–79 accurate estimates have been made for half (eight) of them (Table VI). We need accurate counts for snow petrel, greater sheathbill, dominican gull and Antarctic tern, further estimates, if possible, for Cape petrel and new estimates for the two storm petrels and especially for Antarctic prion whose numbers may have been significantly diminished through breeding habitat destruction by Antarctic fur seals.

Comparisons of the size of the breeding population between recent and earlier counts have been made for several species (Croxall and others, 1981; Hemmings, 1984; Shaw, 1984), and this paper has indicated changes to the size of others. Thus the breeding population of five species has increased: Adélie penguins have shown a twofold increase between 1957–58 and 1978–79; chinstrap penguins have shown a fivefold increase over the same period; blue-eyed shags appear to have established a second colony on the island which showed a sevenfold increase between 1947–48 and 1978–79, but which now seems more or less stable; sub-Antarctic skuas have shown a threefold increase between 1958–59 and 1982–83; Antarctic skuas established on the island in 1978 and ten pairs bred in 1982–83. Of the other species, it seems the wintering population of dominican gulls has increased (BAS records), which could indicate a genuine population increase, or more likely a response to availability of food (as kitchen waste) resulting from the larger number of wintering personnel (four in 1947 to an average of 15 in the 1980s) at the research station.

These increases indicate that regular monitoring of some of the breeding populations should be established. Croxall and others (1981) recommended that the 1978–79 penguin census should be repeated in not more than 10 years time, and this interval seems appropriate also for the blue-eyed shag. However, the spread of the Antarctic skua into Signy Island indicates that the skua breeding populations should be counted every five years.

The breeding population of two species appears to have decreased: southern giant petrels have decreased by two-thirds between 1968–69 and 1984–85; Antarctic terns appear to have decreased between 1936 and 1984–85, although the estimates on both occasions are poor. For other species there is less indication of a decrease. Ardley

Table VI. Estimates of size of breeding populations of Signy Island birds

Species	*Breeding population size (pairs)*	*Date*	*Reference*	*Comments*
Adélie penguin	37207	1978–79	Croxall and others, 1981	Accurate nest count
Chinstrap penguin	79504	1978–79	Croxall and others, 1981	Accurate nest count
Gentoo penguin	267–404	1978–86	Croxall and others, in press	Accurate nest counts
Macaroni penguin	2–11	1978–86	Croxall and others, in press	Accurate nest counts
Southern giant petrel	1093	1984–85	Price, 1985	Nest count
Cape petrel	*c.* 12000	1984–85	Price, 1985	Estimate
Snow petrel	*c.* 195	1984–85	Price, 1985	Minimum estimate
Antarctic prion	*c.* 50000	1956–57	Tickell, 1962	Estimate
Wilson's storm petrel	97375	1966–67	Beck and Brown, 1972	By extrapolation
Black-bellied storm petrel	100–200	1966–67	Beck and Brown, 1971	By extrapolation, including Moe Island
Blue-eyed shag	450–770	1976–86	Cobley, 1986	Accurate nest counts
Greater sheathbill	*c.* 150	1984–85	BAS records	Minimum estimate
Sub-Antarctic skua	143	1982–83	Hemmings, 1984	Accurate nest count
Antarctic skua	10	1982–83	Hemmings, 1984	Accurate nest count
Dominican gull	*c.* 50	1984–85	BAS records	Minimum estimate
Antarctic tern	150–200	1984–85	BAS records	Minimum estimate

(1936) suggested the Cape petrel population showed signs of a reduction, but estimated numbers have remained stable between 1966 and 1984–85. Snow petrels are sensitive to handling during banding and there may have been local reductions in the study colonies.

These decreases clearly need further study. The southern giant petrel and Antarctic tern populations should be monitored at 5-year intervals to determine future changes to the breeding population, and discrete colonies of Cape and snow petrels should be monitored on a similar basis. New estimates are required for Antarctic prion, and Wilson's and black-bellied storm petrel populations for comparison with earlier figures.

Visitors, vagrants and unconfirmed sightings

A total of 27 species make up the list of visitors, vagrants and unconfirmed sightings at Signy Island.

Three species regularly visit Signy Island and will continue to be recorded annually: the Antarctic fulmar is frequently seen but it has not been recorded breeding on Signy Island despite extensive colonies elsewhere in the South Orkney Islands. Antarctic petrels are most often seen on migration to and from colonies farther south, and black-browed albatross sightings have increased in proportion to the number of fishing or other vessels around the South Orkney Islands.

There are 18 vagrants, whose identification has been confirmed, of which six species, emperor and king penguin, wandering albatross, northern giant petrel, white-

chinned petrel, and cattle egret, have been sighted on 5–10 occasions, and are likely to continue to be recorded. A further 12 species have been recorded on fewer than five occasions and include two species of penguin, light-mantled sooty albatross, two species of petrel, two species of duck, four species of wader, and Arctic skua. There is no evidence to suggest that these species are likely to be seen with any greater frequency in future at Signy Island, but in view of the four waders recorded it is surprising that the white-rumped sandpiper, a common vagrant at South Georgia (Prince and Croxall, 1983) and recorded for the South Shetland Islands (Trivelpiece and others, 1987*a*), has not been seen. This species should be looked out for at Signy Island.

Records are not accepted for six species. The grey-headed albatross is very likely to be seen but a good description is needed. The blue petrel is also likely to be seen; however, confusion of at-sea sightings with prions means a detailed description will be required for this species to be accepted. The upland sandpiper which has been reported previously in this sector of Antarctica is not unlikely to occur at Signy. However, the dolphin gull is an unlikely vagrant, and the report of grey gulls almost certainly arose from confusion with Antarctic fulmars. The Arctic tern undoubtedly visits the South Orkney Islands but a really good description is needed to confirm this.

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