Distribution of Sea Birds in Austral Summer Season in the Southern Ocean

Keijiro OZAWA*

夏季南極洋における主要鳥種の分布

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要　旨

(1) 海上において鳥種を判定する場合それぞれの分布区域をあらかじめ知っていることは重要な要素となる．このため，南大西洋および南インド洋を含む南極洋て，11月から3月の時期に出現する主要鳥種について，分布の北限および南限を求め図示し，簡単な説明をこころみた

(2) 本文において取り扱った鳥種はアホウドリ科6種，ミズナギドリ科13種，ウミツバメ科2種，モクリウミツバメ類，トウゾクカモメ科2種，およびペンギン科4種，計27種てある．

(3) 分布の北限および南限は，東京水産大学「海鷹丸」による3次にわたる航海，日本水産株式会社「第27興南丸」，「第20興南丸」（観察者，船長山田　巽）による航海，その他の航海中の観察資料によって求めた．

(4) 各種についてカラー写真を掲げ，また，分布図に繁殖地，産卵時期を付記し，今後の海上における観察および分布の考察に便ならしめた．

(5) 量的分布，産卵時期に対する分布密度の移動などについては今後考察する

Introduction

This paper deals with the distribution of the principal species of sea birds that are found in the Indian and Atlantic Sectors of the Southern Ocean including the Antarctic Ocean during the navigable season from November to March.

Both the northern and southern limits of their distribution are treated, but the quantitative studies are not considered in the present paper. The range of distribution is useful as an aid to identification of the species encountered at sea.

Photographs in colour of the species dealt with are given in Photos 1–27.

Materials

The materials used in locating the northern- and southernmost occurrences were taken from the data obtained during the cruises and also the references mentioned below:

The 2nd Antarctic cruise of UMITAKA-MARU of Tokyo University of Fisheries,

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1961–62 (UM 2)

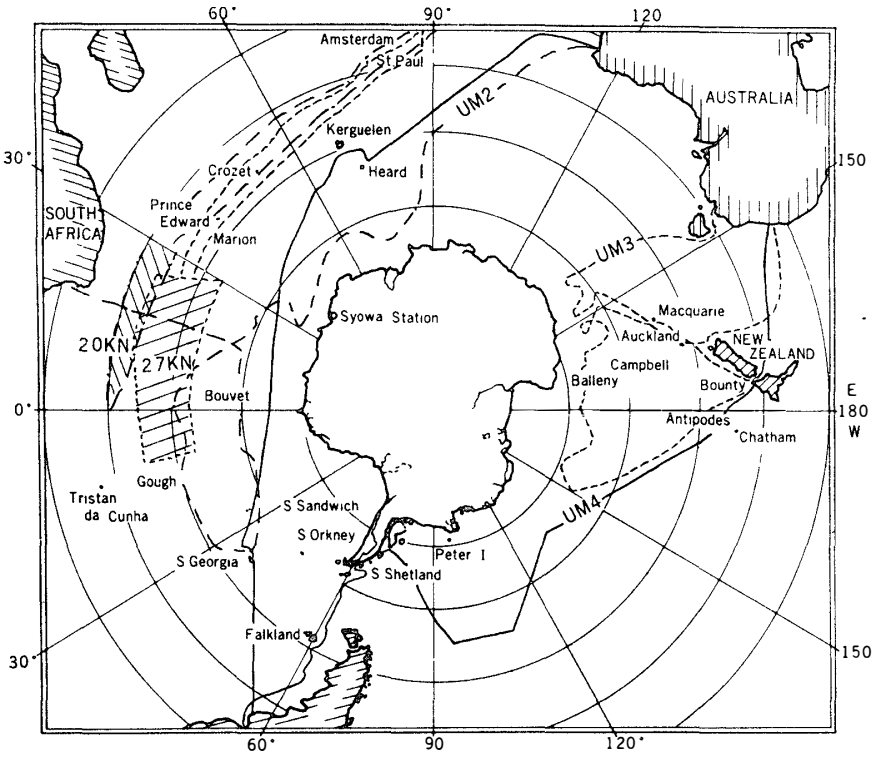
The 3rd Antarctic cruise of Umitaka-Maru, 1964–65 (UM 3).

The 4th Antarctic cruise of Umitaka-Maru, 1966–67 (UM 4).

The whaling cruise of Konan-Maru No. 27 of Nihon Suisan Kaisha Ltd., 1965–66 (27 KN).

The whaling cruise of Konan-Maru No. 20, 1966–67 (20 KN)

The ship's tracks or cruised areas of Konan-Maru No. 27 and No. 20 are mapped in the next figure.



The references of sea-birds were quoted from Falla (1937), Fleming (1950) and Dell (1960).

Of the known breeding grounds of the species, the below-mentioned reports are quoted, presenting only the author's names (see References); Falla (1937), Crawford (1952), Alexander (1955), Bailey and Sorensen (1962), Downes *et al.* (1959), Falla (1966), Murphy (1936), Solyanik (1959) and Carrick *et al.* (1967).

Species Dealt with in This Paper

As mentioned already, the present paper deals with the principal species of sea birds with which the voyagers encounter in the Indian and Atlantic sectors of the

Southern Ocean as far southward as the pack ice area.

The scientific names and common English and Japanese names of these birds are given below. English names are used in this paper.

Scientific name	Common name	Japanese name
Family *Diomedeidae*:	Albatrosses:	アホウトリ科
1. *Diomedea exulans*	Wandering albatross	ワタリアホウトリ
2. *Diomedea melanophris*	Black-browed albatross	マユクロアホウトリ
3. *Diomedea chrysostoma*	Grey-headed albatross	
4. *Diomedea chlororhynchos*	Yellow-nosed albatross	
5. *Phoebetria palpebrata*	Light-mantled sooty albatross	ハイイロアホウトリ
6. *Phoebetria fusca*	Sooty albatross	ススイロアホウトリ
Family *Procellariidae*:	Petrels, Shearwaters, Fulmars:	ミスナギトリ科
7. *Macronectes giganteus*	Giant petrel	オオフルマカモメ
8. *Procellaria aequinoctialis*	White-chinned petrel	アゴンロフルマカモメ
9. *Daption capensis*	Cape pigeon	マタラフルマカモメ
10. *Fulmarus glacialoides*	Silver-grey fulmar	キンフルマカモメ
11. *Thalassoica antarctica*	Antarctic petrel	ナンキョクフルマカモメ
12. *Pagodroma nivea*	Snow petrel	ユキトリ
13. *Halobaena caerulea*	Blue petrel	アオドリ
14. *Pachyptila* spp.	Prions	クジラトリ
15. *Pterodroma lessoni*	White-headed petrel	
16. *Pterodroma mollis*	Soft-plumaged petrel	
17. *Pterodroma incerta*	Schlegel's petrel	
18. *Puffinus gravis*	Greater shearwater	
19. *Puffinus griseus*	Sooty shearwater	ハイイロミスナキトリ
Family *Hydrobatidae*:	Storm-petrels:	ウミツバメ科
20. *Oceanites oceanicus*	Wilson's storm-petrel	アシナガコンシロウミツバメ
21. *Fregetta tropica*	Black-bellied storm-petrel	クロハラウミツバメ
Family *Pelecanoididae*:	Diving petrels:	モクリウミツバメ科
22. *Pelecanoides* spp.	Diving petrels	モクリウミツバメ
Family *Stercorariidae*:	Skuas:	トウゾクカモメ科
23. *Stercorarius skua lonnbergi*	Great skua	オオトウゾクカモメ
23′. *Stercorarius s. maccormicki*	McCormick's skua	
Family *Spheniscidae*:	Penguins:	ペンキン科
24. *Aptenodytes forsteri*	Emperor penguin	コウテイペンキン
25. *Aptenodytes patagonica*	King penguin	オオサマペンキン
26. *Pygoscelis adeliae*	Adelie penguin	アデリーペンキン
27. *Pygoscelis antarctica*	Chinstrap penguin	ヒゲペンキン

Distribution Limits

The northern and southern limits of occurrences recorded on the sea bird logs are tabulated by species in order in Appendices, and are marked with black dots and cross marks respectively in the figures; the serial numbers heading the names in the above list correspond to the numbers of the photographs and those of the figures showing the limits.

Asterisked record in Appendices means that the occurrence is expected in the more northerly or southerly waters, when the ship did not cruise farther north or south according to the alternation of the ship's course from the northward bound to the southward, and *vice versa*.

The locality asterisked in Appendices is shown by a circle in the figures.

In the figures, the limits are shown for the northernmost or southernmost positions of occurrences, estimated limits being shown by broken lines. Known breeding grounds of the species are indicated by the figures of black arrows, places of suspected breeding are shown by that of white arrows.

The egg-dates are entered in the lower right corner of the figures, the data are according to "Birds of the Ocean" by Alexander.

Brief Description of Distribution Limits

The distribution limits, both northern and southern or longitudinal limits, by relative species are briefly described.

1. Wandering albatross (Fig. 1)

Immature birds and non-breeders are at sea throughout the year and many of them are probably circumpolar birds.

The northern limit in summer seems to lie parallel of 30°S, except for the offings of the south coast of Australia.

The southern limit appears and was reported at approximately 40 miles seaward from the pack ice.

2. Black-browed albatross (Fig. 2)

There are two known races, common black-browed albatross, *Diomedea melanophris melanophris*, a circumpolar type, and New Zealand black-browed albatross, *Diomedea melanophris impavida*, the distinctive race having pale horn-coloured eyes when matured (Photo 2–1); the former is slightly larger with dark eyes at all ages.

The northern limit in the Indian Ocean is found to deviate more southerly than that of the wandering albatross. Their southward range reaches the northern limit of the pack ice area in the sector south of New Zealand. However, they are

observed in the more northern waters elsewhere.

3. Grey-headed albatross (Fig. 3)

The grey-headed albatross ranges more southerly than that of the yellow-nosed albatross, these two species are the congeners each other.

This species appears to have a more restricted range than the black-browed albatross. The southern limit was recorded along the parallel of 60°S, but the northern extensions appear north of the Ross and Weddell Seas, where the northern extensions of cold water masses as well as ice bergs are observed.

4. Yellow-nosed albatross (Fig. 4)

This species breeds on Tristan da Cunha and Gough in the Atlantic and on Amsterdam and St. Paul Islands in the Indian Ocean, with its distribution range confined to temperate waters of the eastern part of the Southern Atlantic to the Indian Ocean including the southern sea of Australia, extending to the Bass Strait in the east.

The southern limit reaches to approximately 50°S between the south of the Tristan da Cunha group and long. 90°E.

5. Light-mantled sooty albatross (Fig. 5)

The light-mantled sooty albatross and the sooty albatross are very similar in appearance, but the former is known to have southern distribution in circumpolar regions, being frequently found along the edge of the pack ice.

It has more southerly range than the sooty albatross.

The northern limit is found along about lat. 45°S.

6. Sooty albatross (Fig. 6)

This species breeds in places almost similar to those of the yellow-nosed albatross, being limited to a narrow belt of the temperate zone of the Atlantic and Indian Oceans. Its range extends the Tristan da Cunha group in the west and off Cape Leeuwin, Western Australia in the east.

In the north-south direction, the ranges of these two similar-looking species overlap in the waters enclosing Bouvet, Crozet and Kerguelen Islands.

7. Giant petrel (Fig. 7)

The giant petrel is known as scavenger and ocean wanderer, particularly in immature stage. Scavenger flocks gather around whaling factory ships. They are rather in small numbers in the southern waters of Western Australia, whereas very common in New Zealand seas and around the Falkland Islands. The southern range extends as far as the pack ice or farther south.

8. White-chinned petrel (Fig. 8)

This species is found more frequently in larger numbers mostly in subantarctic seas of the Indian Ocean than elsewhere.

In the eastern South Pacific, no birds were seen between a meridian of 120°W and a route northward from the South Shetland Islands.

9. Cape pigeon (Fig. 9)

There are two subspecies, a New Zealand race *Daption capensis australis* and a southern race *Daption capensis capensis*. The former seems to range from Tasmania in the west and goes eastward to approximately 160°W in longitude. The latter has a circumpolar distribution and is common in the Antarctic waters off the pack ice edge.

10. Silver-grey fulmar (Fig. 10)

Silver-grey fulmar, Antarctic petrel and snow petrel are representative species in the Antarctic, and are usually seen on ice floating seas south of lat. 60°S. But the silver-grey fulmar is known as a breeder on Kerguelen and probably Crozet, Bouvet and South Sandwich Islands, because the birds have been sighted around Crozet and Bouvet Islands.

11. Antarctic petrel (Fig. 11)

The Antarctic petrel has its northern limit of range to about 100 miles seaward from the pack ice edge. However, some birds are found more than 400 miles outwards, where great amounts of ice bergs are encountered at all times.

The northern limit corresponds geographically with the northern extensions of cold waters as well as ice bergs drifting from the Ross and Weddell Seas.

One northernmost occurrence was recorded near Bouvet Island. The breeding ground on the Island was suspected.

12. Snow petrel (Fig. 12)

The snow petrel has its breeding places on the continent and on some scattered islands in the Antarctic; the South Orkney Islands, South Georgia and also Bouvet Island. Usually they are common within 40 miles seaward from the pack ice.

13. Blue petrel (Fig. 13)

Including blue petrel and six species of prions, they are commonly called the whale birds, but identification of each species is difficult at sea, except the blue bird which has a distinguishable white band at tip of the tail.

As shown in Fig. 13, the southern limit of the blue petrel is undoubtedly as far southward as the pack ice, but the northern limit is only estimated because of scarcity of data. Probably, they are distributed in the waters north of their known breeding grounds; approximately lat. 45°S in circumpolar.

14. Prions (Figs. 14–1, 2, 3, 4, 5, 6)

A study of birds from breeding places shows that there is an almost bewildering variety of distinguishable forms, but, as mentioned above, it is difficult to make identification of six species flying at sea.

The northern breeders are broad-billed prion, *Pachyptila vittata*, fairy prion, *Pachyptila turtur* and fulmar prion, *Pachyptila crassirostris*.

Lesser broad-billed prion, *Pachyptila salvini*, breeds on Marion and Crozet Islands in the Indian Ocean.

The southern dwellers are narrow-billed prion, *Pachyptila belcheri* (Photo 14–1) and Antarctic prion, *Pachyptila desolata* (Photo 14–2). These two species are widespread in the Southern Ocean in summer.

15. White-headed petrel (Fig. 15)

The distribution of white-headed petrel is almost circumpolar areas. The northern limit is observed north to approximately lat. 42°–40°S in the Atlantic and Indian Oceans, about lat. 45°S elsewhere except east of South America where no records are available. The southern limit appears southwards to nearly the outer edge of the pack ice.

16. Soft-plumaged petrel (Fig. 16)

This species has its breeding grounds on Tristan da Cunha and Gough Islands in the Atlantic as well as at Amsterdam, St. Paul and Kerguelen in the Indian Ocean. They are seen between South America and southwest of Australia in the east. The northern limit is likely to be along the parallel of 30°S in the Indian Ocean, the southernmost range is found east of Heard Island and around the Falkland Islands.

17. Schlegel's petrel (Fig. 17)

This species breeds on Tristan da Cunha, ranging between South American coast in the west and north of Prins Edward Island in the east.

The northern limit ranges along the parallel of 40°S, but the extreme northward range could be north of Tristan da Cunha. The southern limit lies along the parallel of approximately 50°S.

18. Greater shearwater (Fig. 18)

The greater shearwater is the representative species in the South Atlantic, occurring in flocks of great numbers. The range is found in the area of the Schlegel's petrel, but a somewhat northerly distribution is expected.

The eastern limit is found along the meridian of 30°E.

19. Sooty shearwater (Fig. 19)

This species is known as a distant navigator, and its movements extend northward as far as the Bering Sea in summer of the northern hemisphere. In the austral summer season, they are, in large flocks, reported from south to the Pack ice edge. Its breeding grounds are located in New Zealand region, mainly south of 44°S, extending to Macquarie Island, 55°S as well as the little known nesting regions of South America.

The occurrence extends eastwards to 62°S, the Greenwich meridian.

20. Wilson's storm-petrel (Fig. 20)

This species is the most common and widespreaded storm-petrel in the Southern Ocean, the most abundant occurrence was reported around the South Shetland Islands. The southern limit goes as far as the pack ice because the nesting grounds are known on the Antarctic continent. The northern limit shows variation on account of the migrating movements.

21. Black-bellied storm-petrel (Fig. 21)

The black-bellied storm-petrel is a circumpolar species, breeding on many subantarctic islands. Its range appears between approximately lat. 40°S in the north and the pack ice in the south, but no birds were seen in the northern part of Drake Passage in December, 1966.

22. Diving petrels (Fig. 22)

Four species in total are known in the Southern Ocean. Diving petrels are confined to the southern hemisphere. Figure shows their occurrences in areas enclosing the breeding grounds and also recorded localities. The southernmost range appears in the South Shetland waters. The northern limit was observed in the Bass Strait and off Rio de la Plata, Argentina.

23. Skuas (Fig. 23)

There are two known species of the skua in the southern hemisphere, great skua, a northern race, and McCormick's skua, a southern race; the former breeds mainly on the subantarctic islands, and the latter on the continent.

The range extends from temperate seas in the north to the continent in the south.

24. Emperor penguin (Fig. 24)

The emperor penguin has the most southerly range, only coming northward to the outer edge of the pack ice.

25. King penguin (Fig. 25)

This species breeds on the subantarctic islands, showing a more northerly range than the emperor penguin. The king penguin seems to stay on land and

very seldom strays out far from the land.

26. Adelie penguin (Fig. 26)

Its range is confined within short distances from the pack ice edge or from the land where they nest. Stragglers are seldom seen at sea.

Recently the nests of the Adelie penguin were discovered at Bouvet Island, indicating the northernmost breeding place.

27. Chinstrap penguin (Fig. 27)

The chinstrap penguin is the most active penguin, sometimes straying out farther distant from the breeding grounds; the major grounds are located on the South Shetland, South Orkney and South Sandwich Islands.

Its range seems to extend eastward and westward along the pack ice, showing an almost circumpolar distribution. The northern breeding grounds are found on Bouvet and Heard Islands.

Summary

(1) In the present paper maps give the distribution limits of the principal species of sea birds which are observed in the Atlantic and Indian Ocean sectors of the Southern Ocean in the austral summer.

(2) The species dealt with are: 4 species of Family *Spheniscidae*, 6 species of Family *Diomedeidae*, 13 species of Family *Procellariidae*, 2 species of Family *Hydrobatidae*, *Pelecanoides* spp. and 2 species of Family *Stercorariidae*; 27 species in total.

(3) The quantitative study of the distribution is not attempted.

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(*Received June 3, 1967*)

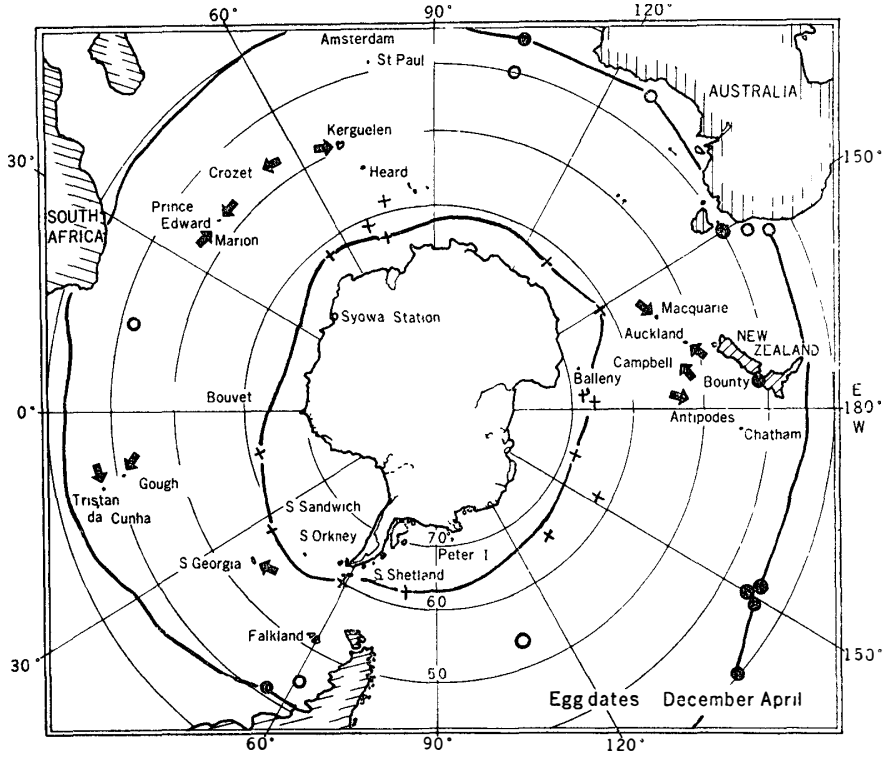

Fig. 1. Map showing the distribution limits of wandering albatross

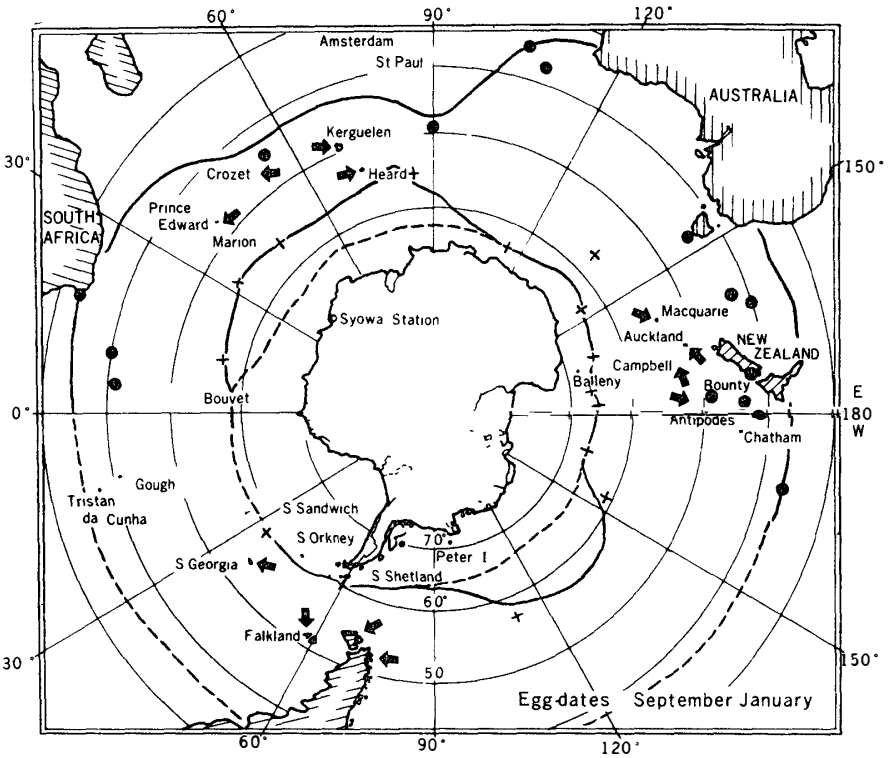

Fig. 2. Map showing the distribution limits of black-browed albatross.

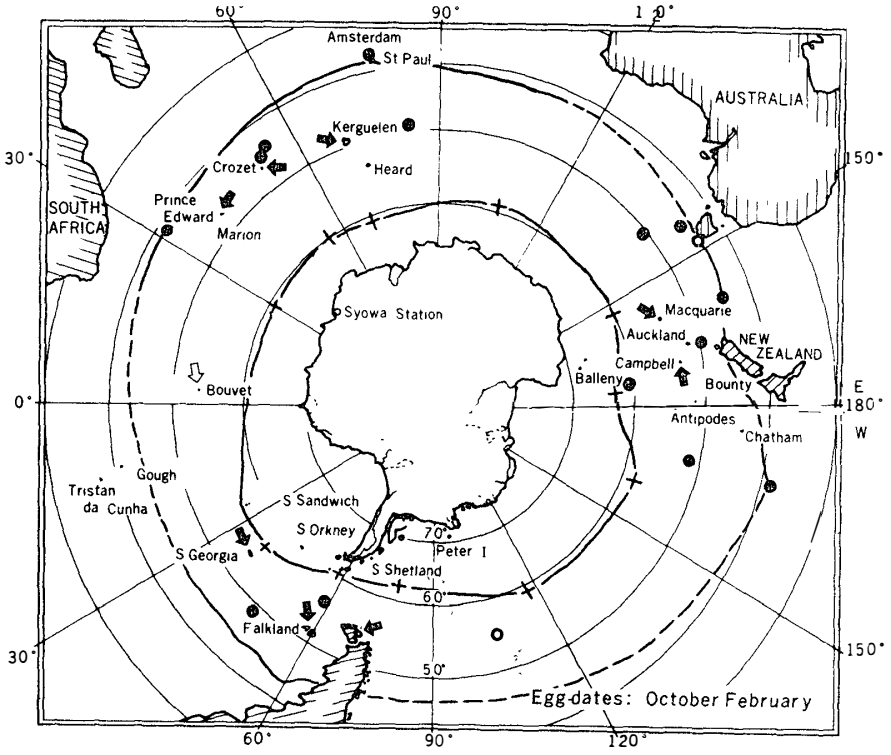

Fig. 3. Map showing the distribution limits of grey-headed albatross.

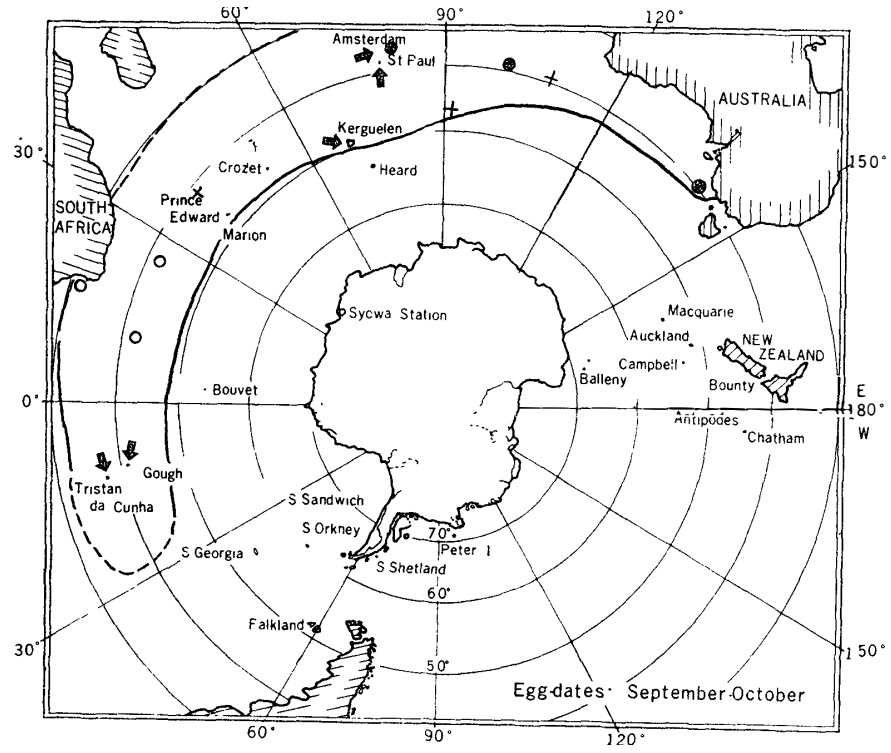

Fig. 4. Map showing the distribution limits of yellow-nosed albatross.

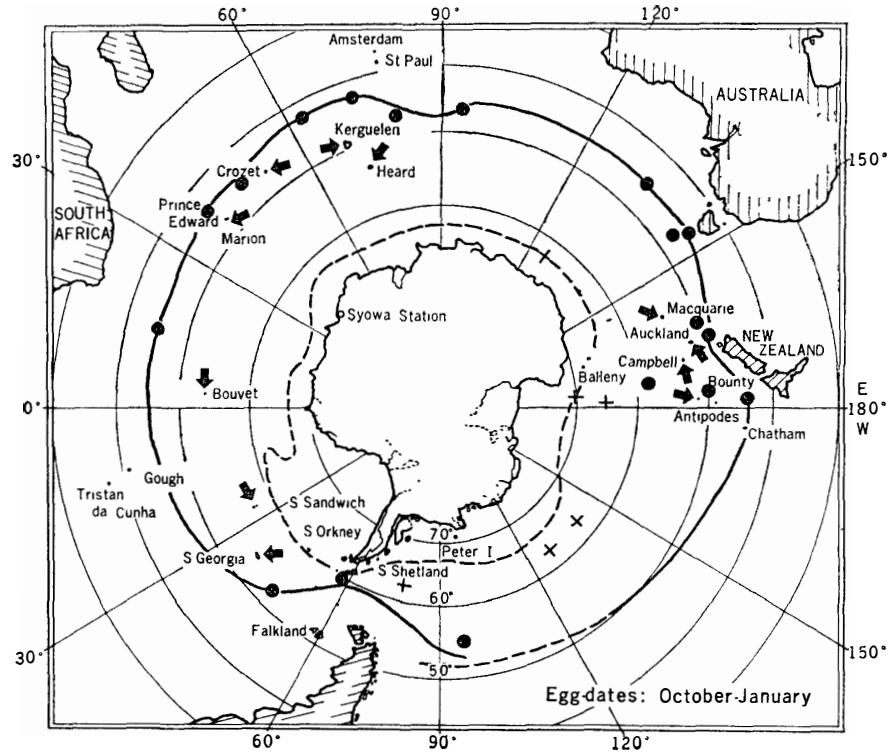

Fig. 5. Map showing the distribution limits of light-mantled sooty albatross.

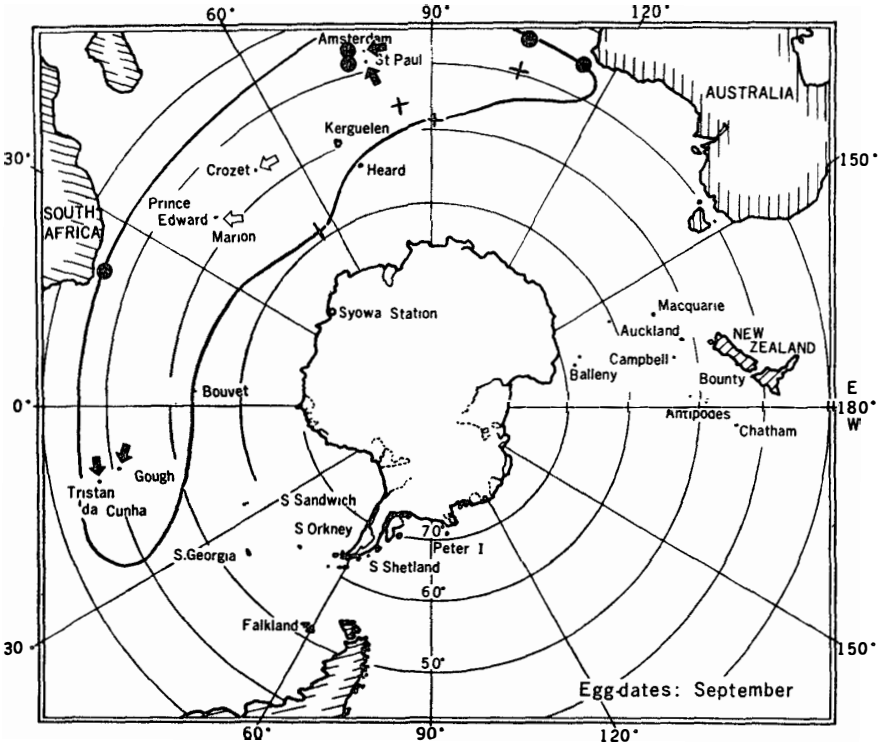

Fig. 6. Map showing the distribution limits of sooty albatross.

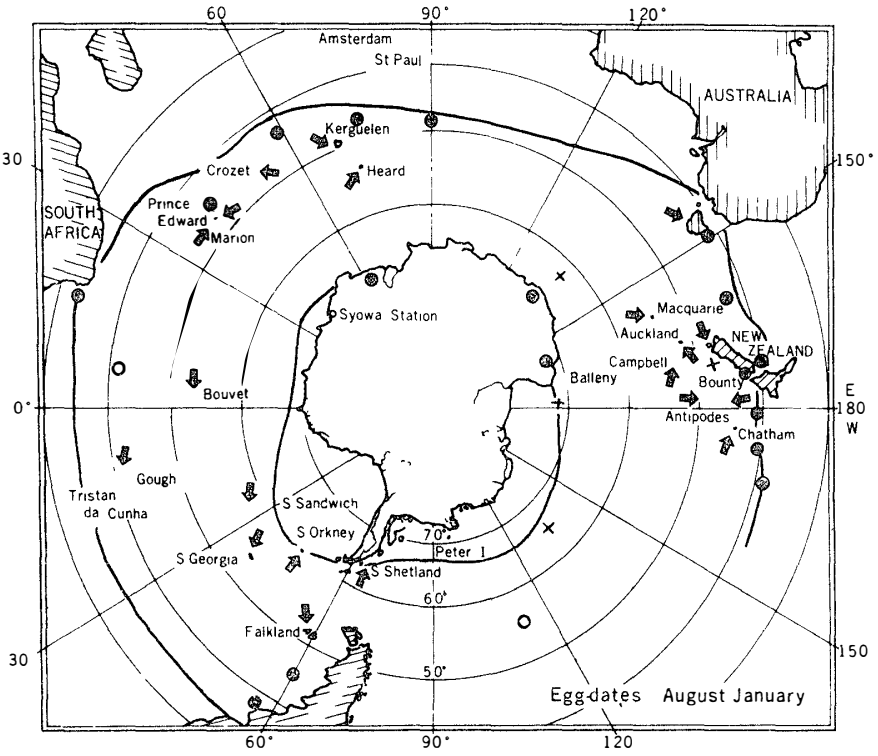

Fig. 7. Map showing the distribution limits of giant petrel

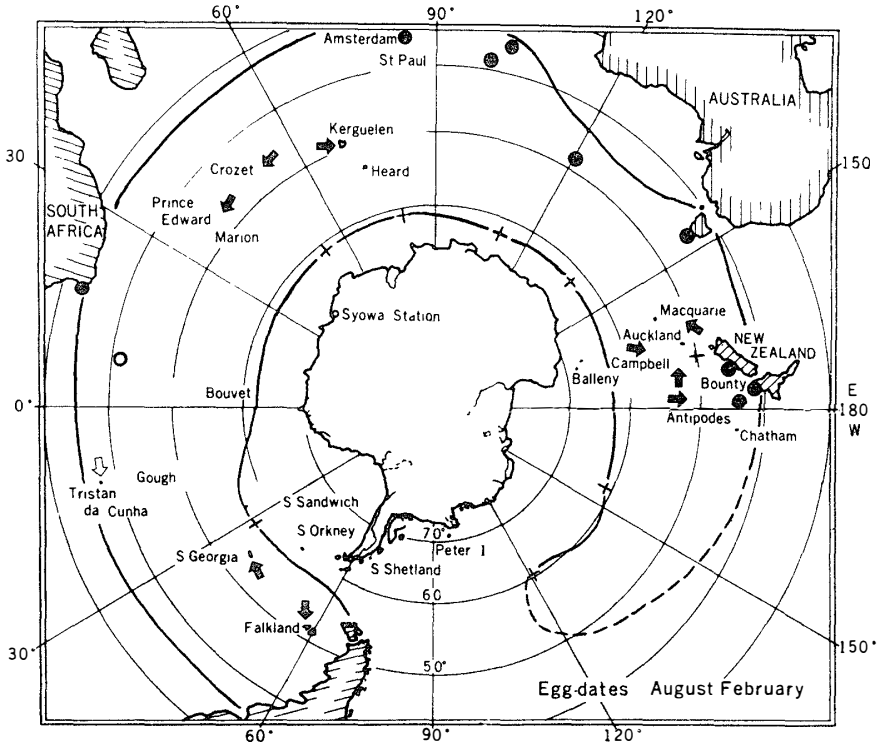

Fig 8 Map showing the distribution limits of white-chinned petrel

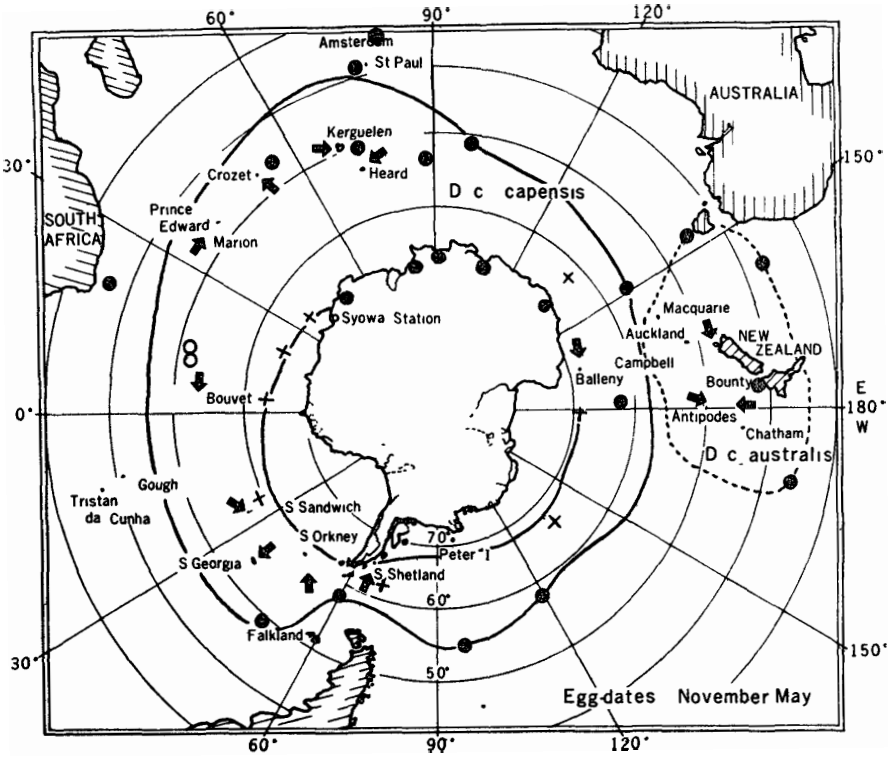

Fig. 9. Map showing the distribution limits of cape pigeon.

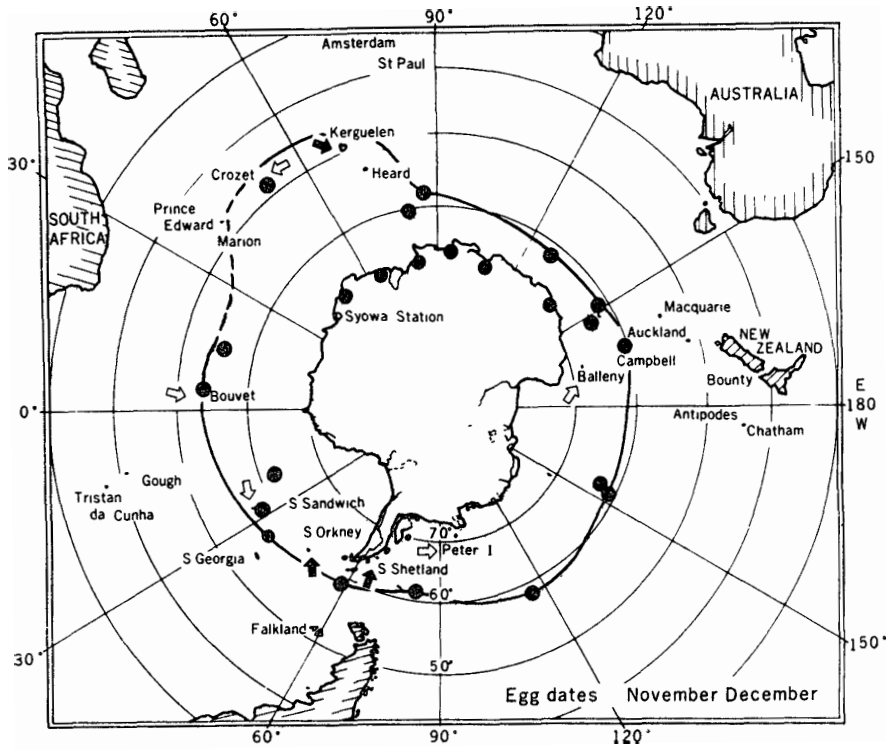

Fig. 10. Map showing the distribution limits of silver-grey petrel.

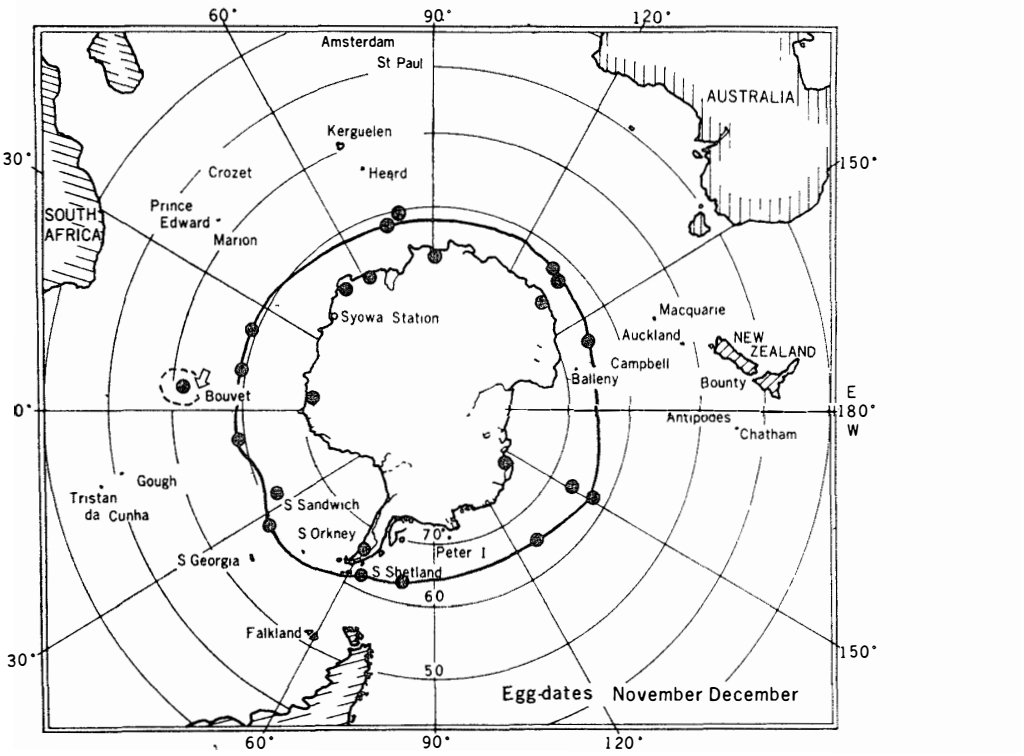

Fig. 11. Map showing the distribution limit (northern limit) of Antarctic petrel

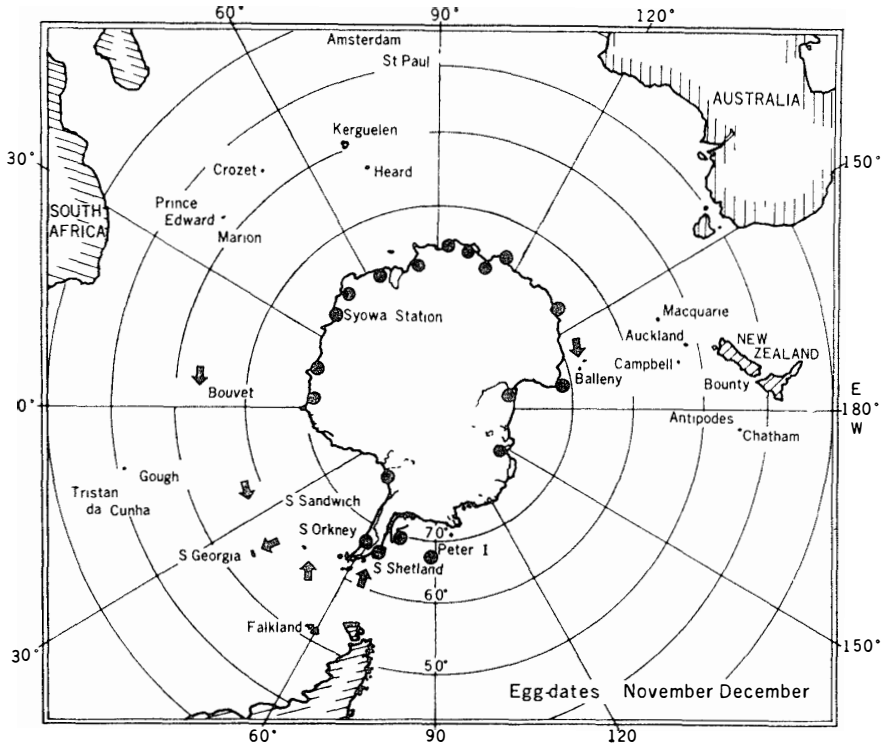

Fig 12 Map showing the known breeding grounds of snow petrel

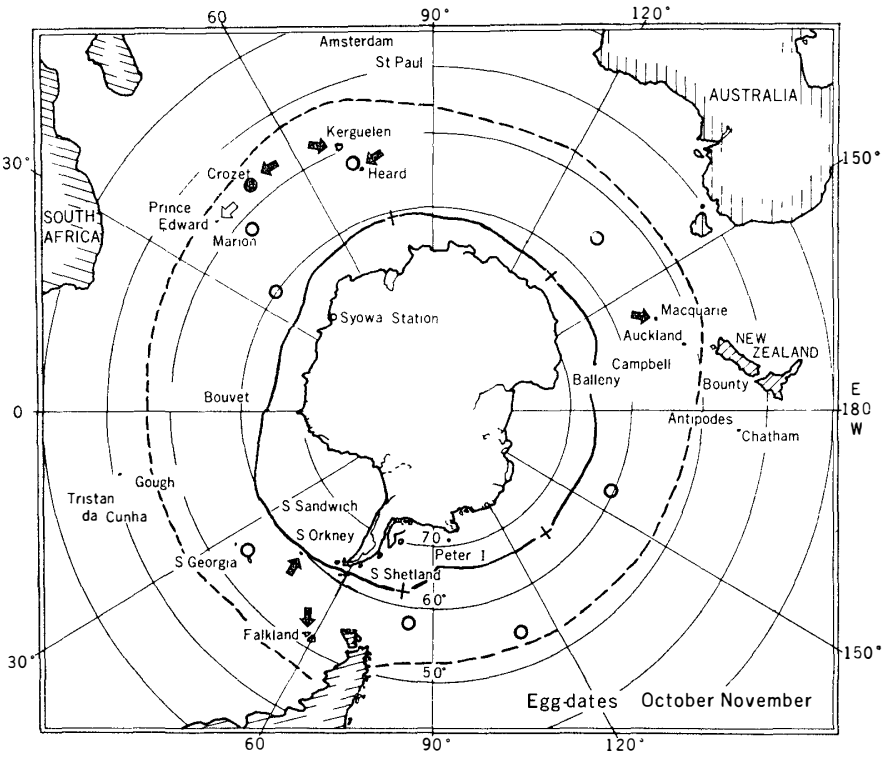

Fig 13. Map showing the distribution limits of blue petrel.

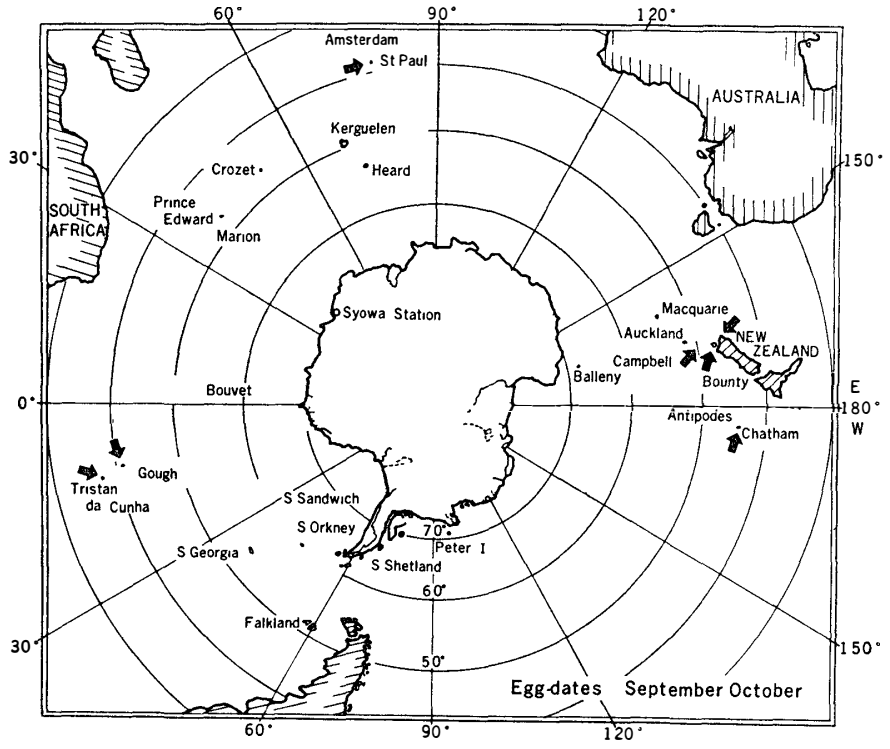

Fig. 14–1. Map showing the known breeding grounds of broad-billed prion.

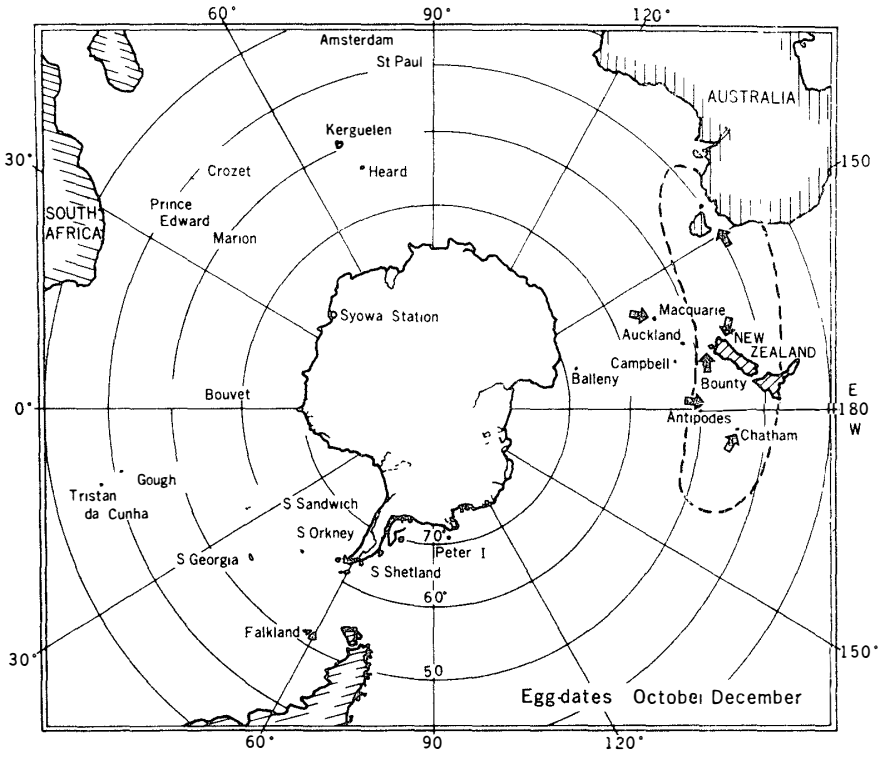

Fig 14–2 Map showing the distribution limit of fairy prion

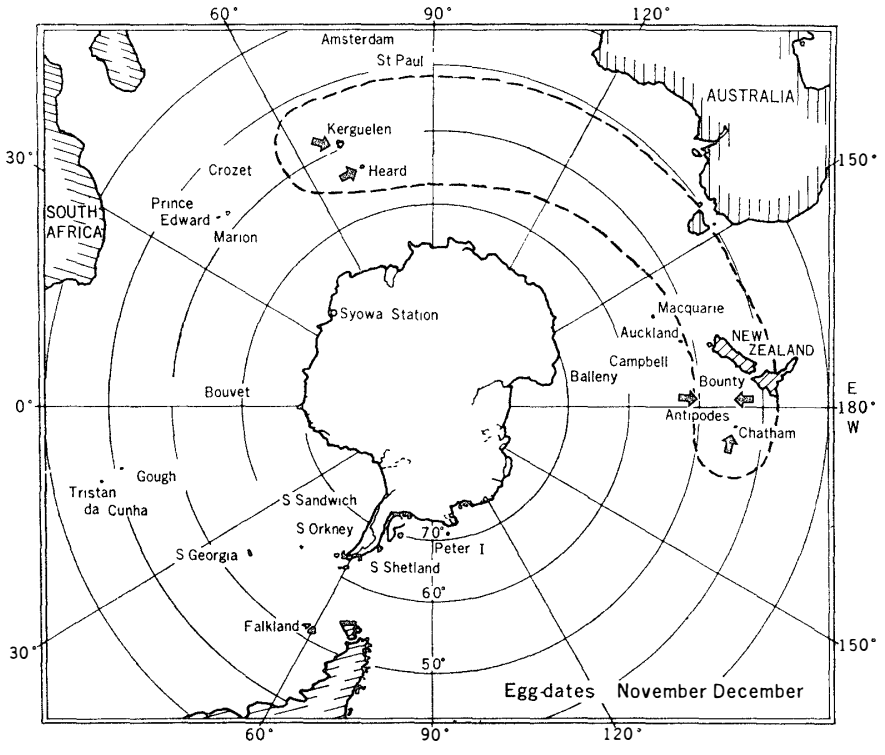

Fig. 14–3 Map showing the distribution limit of fulmar prion

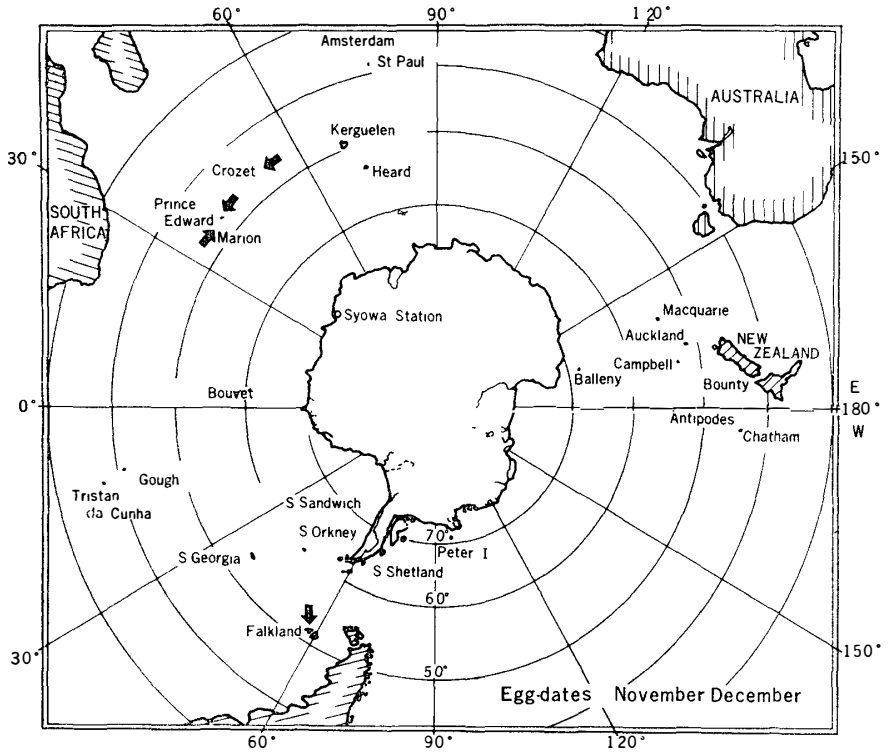

Fig 14–4 Map showing the known breeding grounds of lesser broad-billed prion.

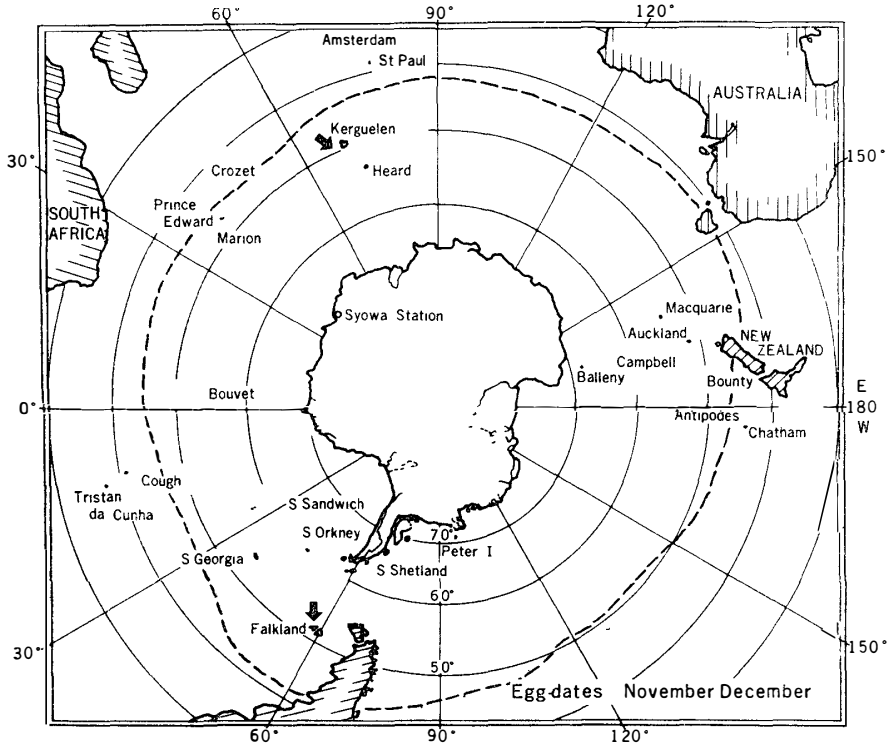

Fig. 14–5. Map showing the distribution limit (northern limit) of narrow-billed prion.

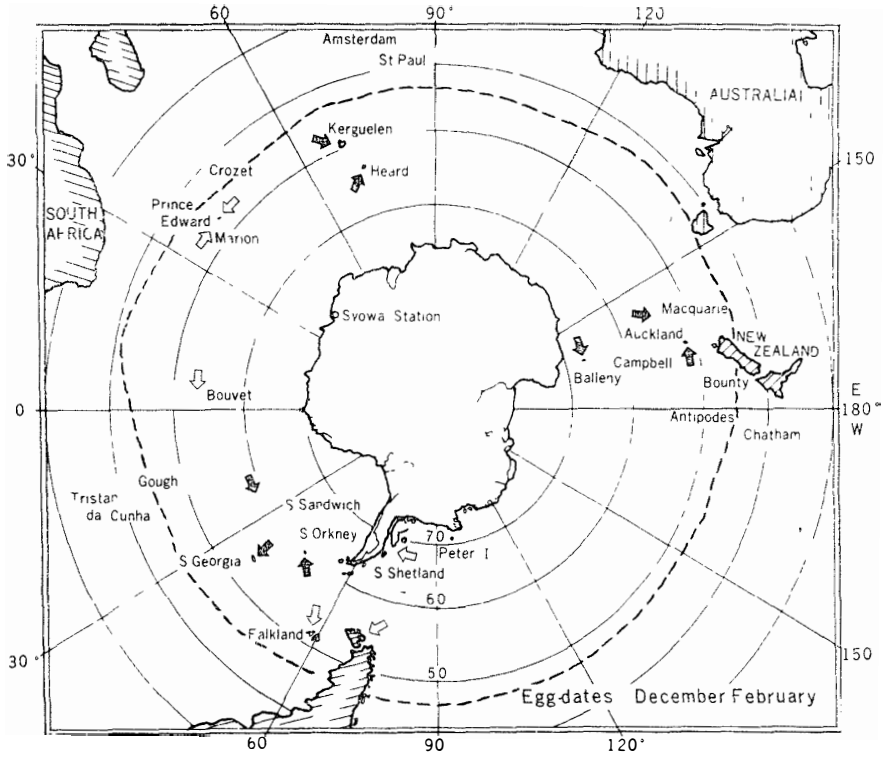

Fig 14–6. Map showing the distribution limit (northern limit) of Antarctic prion.

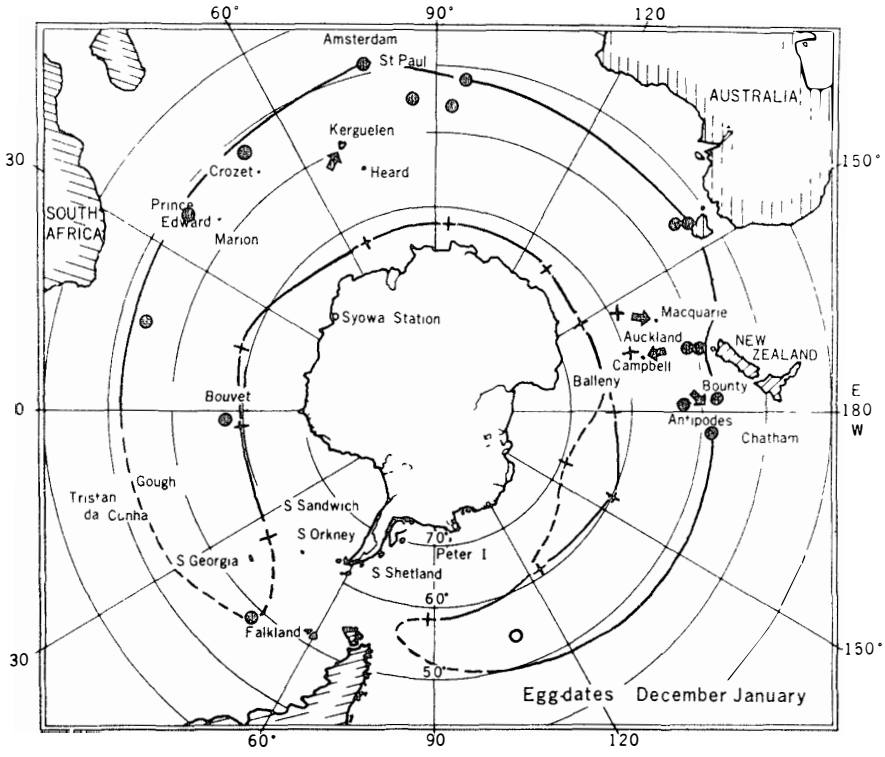

Fig 15 Map showing the distribution limits of white-headed petrel.

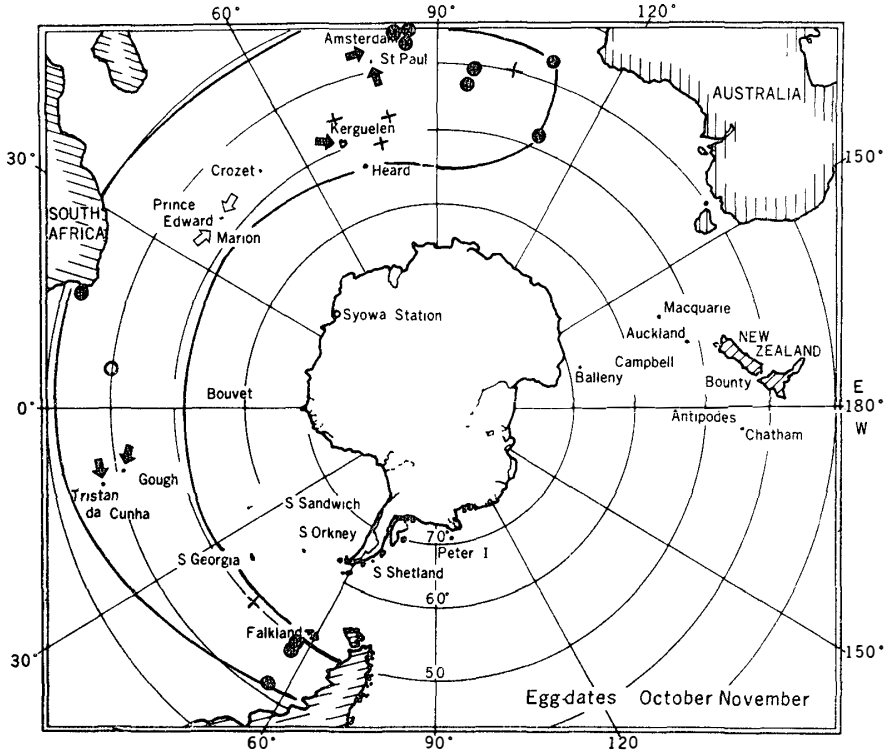

Fig. 16. Map showing the distribution limits of soft-plumaged petrel.

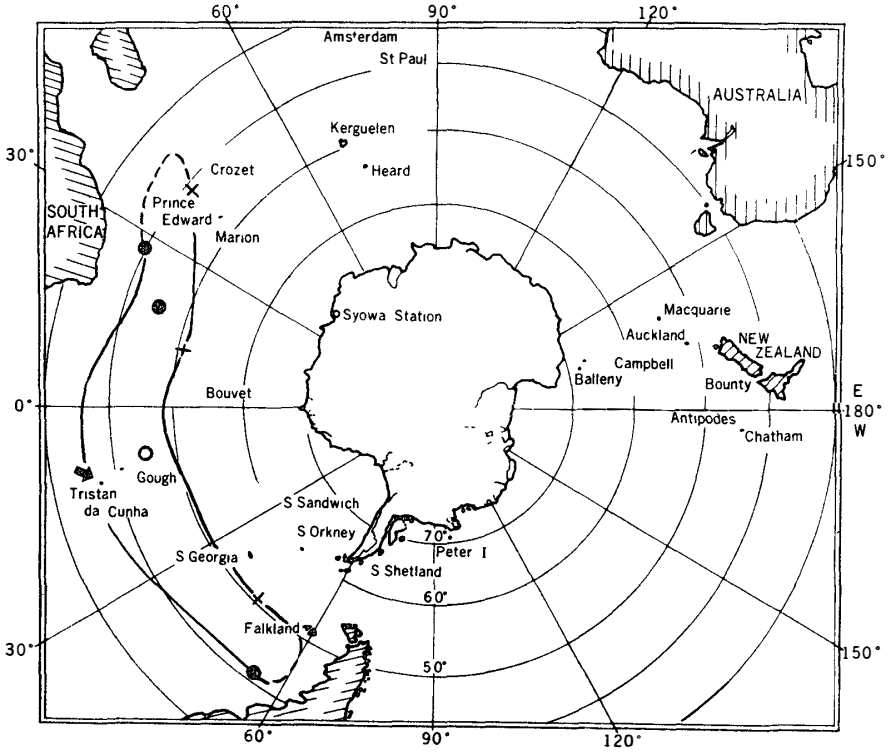

Fig. 17. Map showing the distribution limits of Schlegel's petrel.

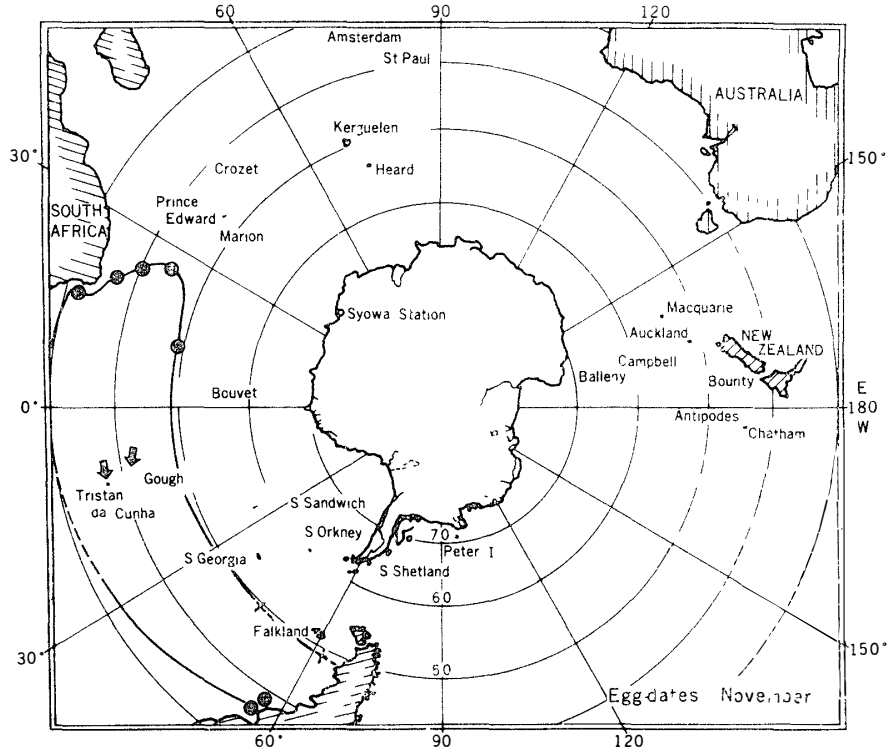

Fig. 18. Map showing the distribution limits of greater shearwater.

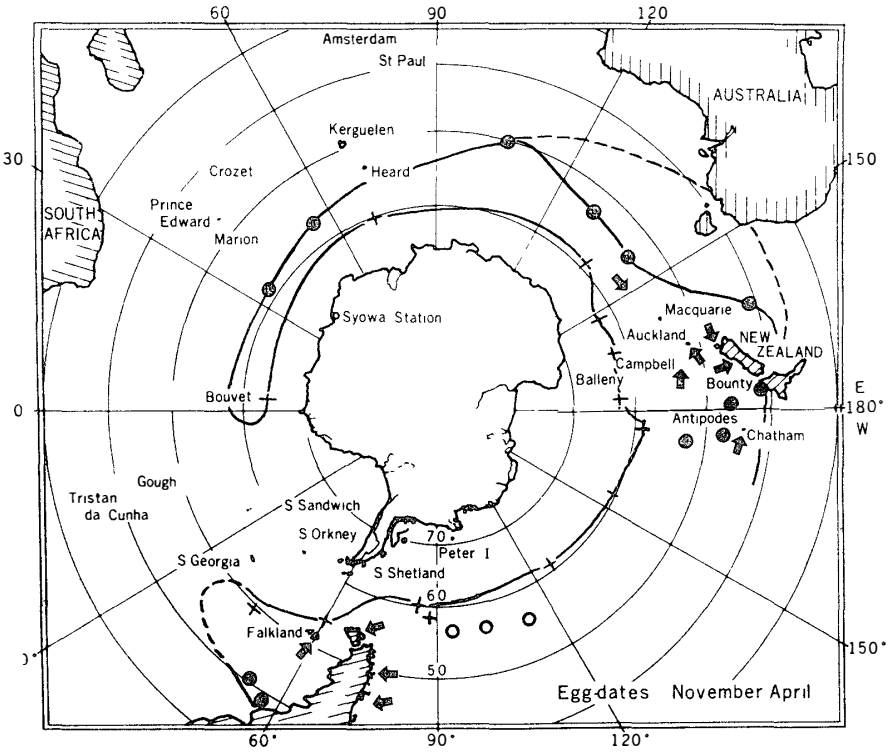

Fig. 19. Map showing the distribution limits of sooty shearwater.

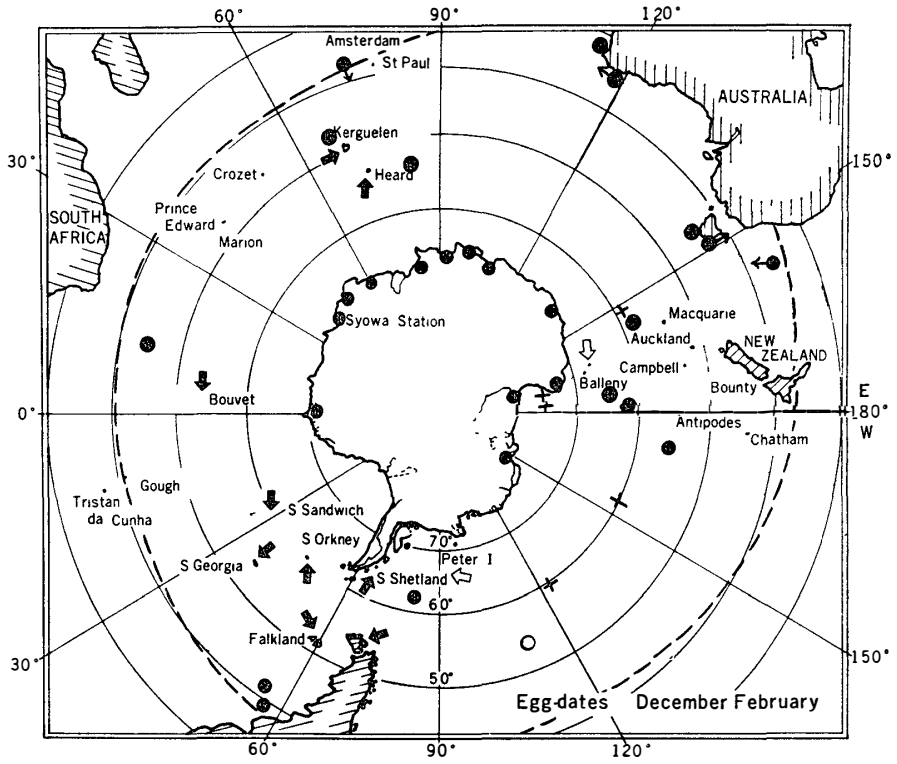

Fig. 20. Map showing the distribution limit (northern limit) of Wilson's storm-petrel.

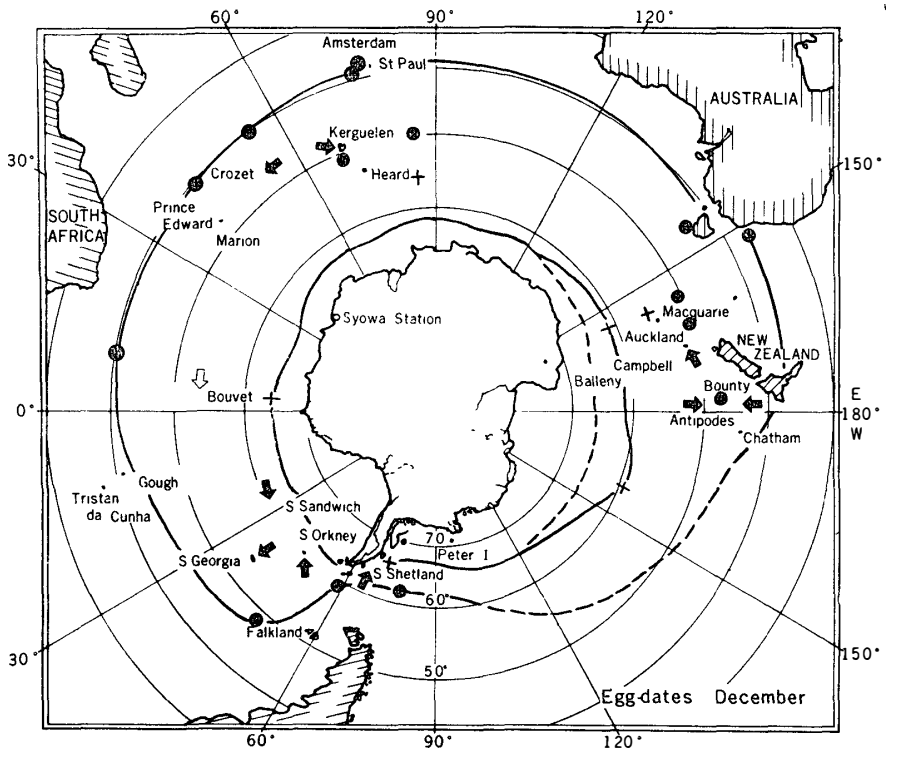

Fig. 21. Map showing the distribution limits of black-bellied storm-petrel

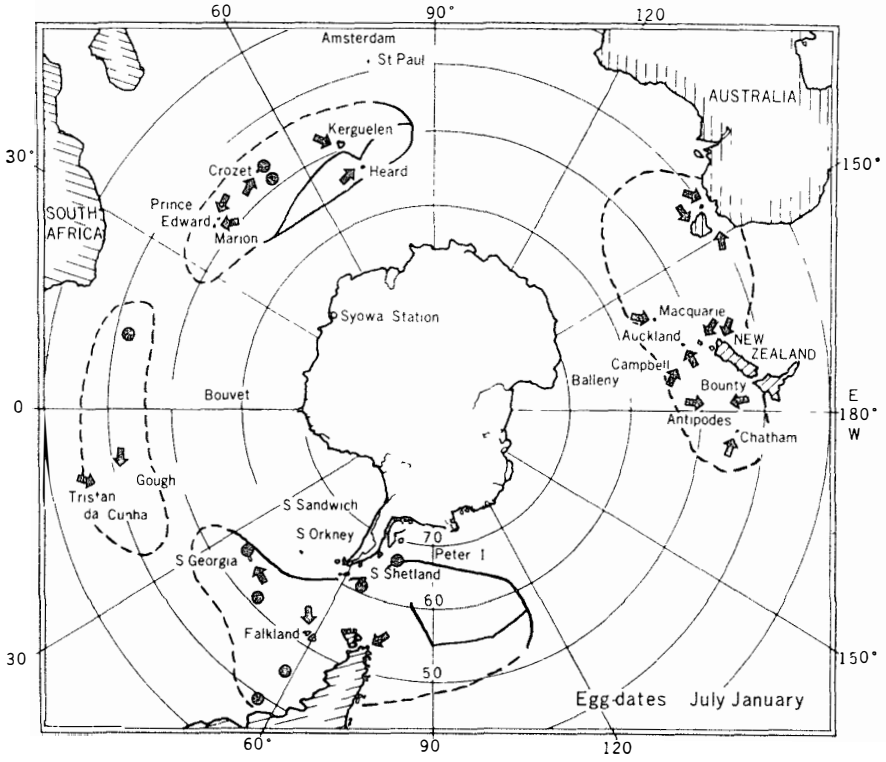

Fig 22 Map showing the distribution limits of diving petrels

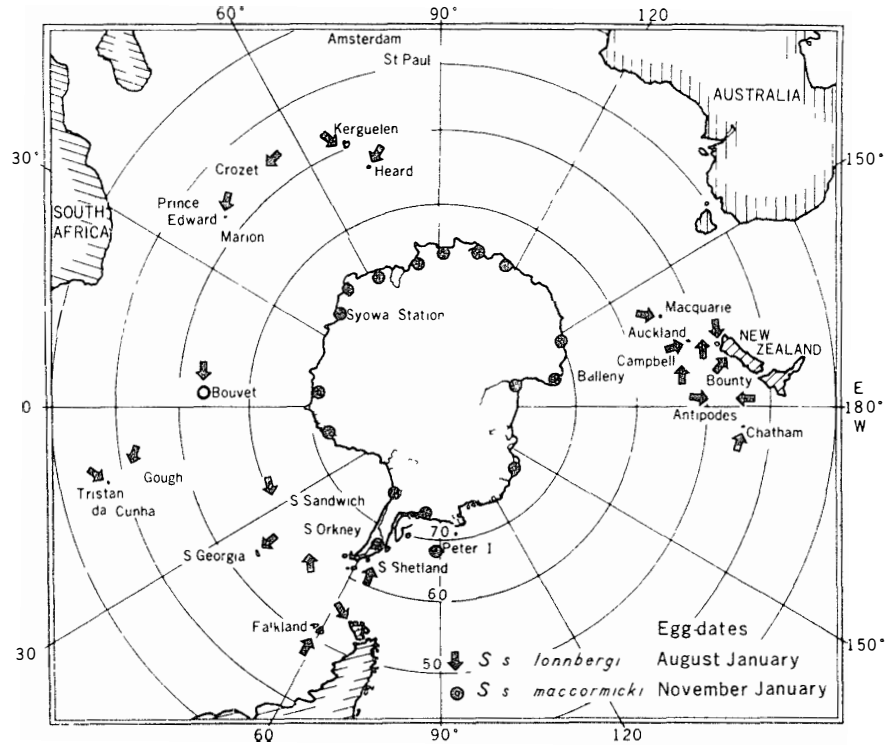

Fig 23 Map showing the known breeding grounds of skuas

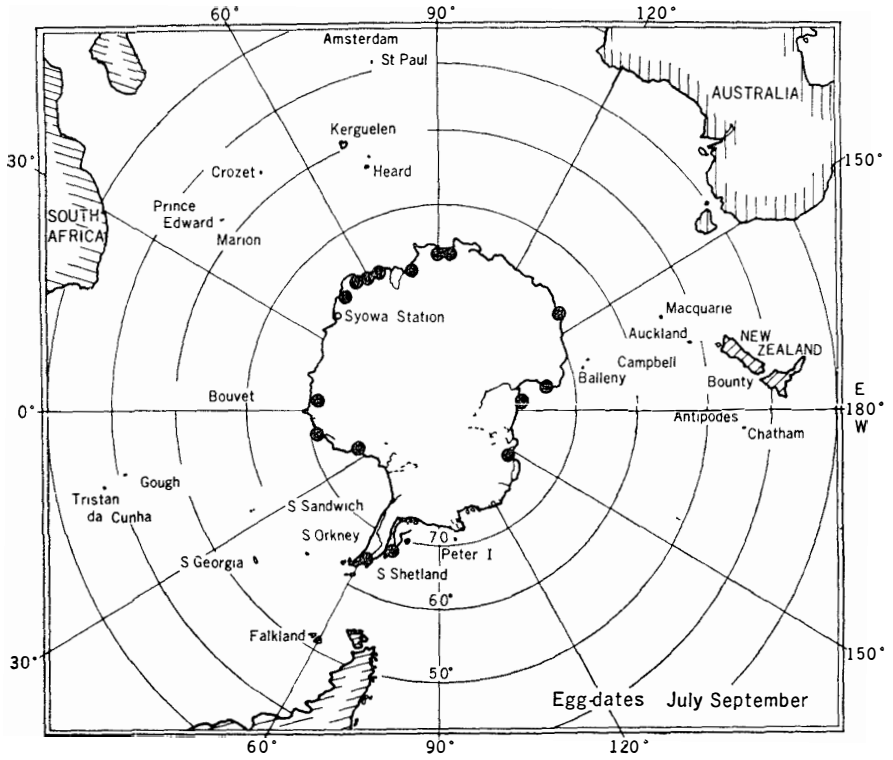

Fig. 24. Map showing the known breeding grounds of emperor penguin.

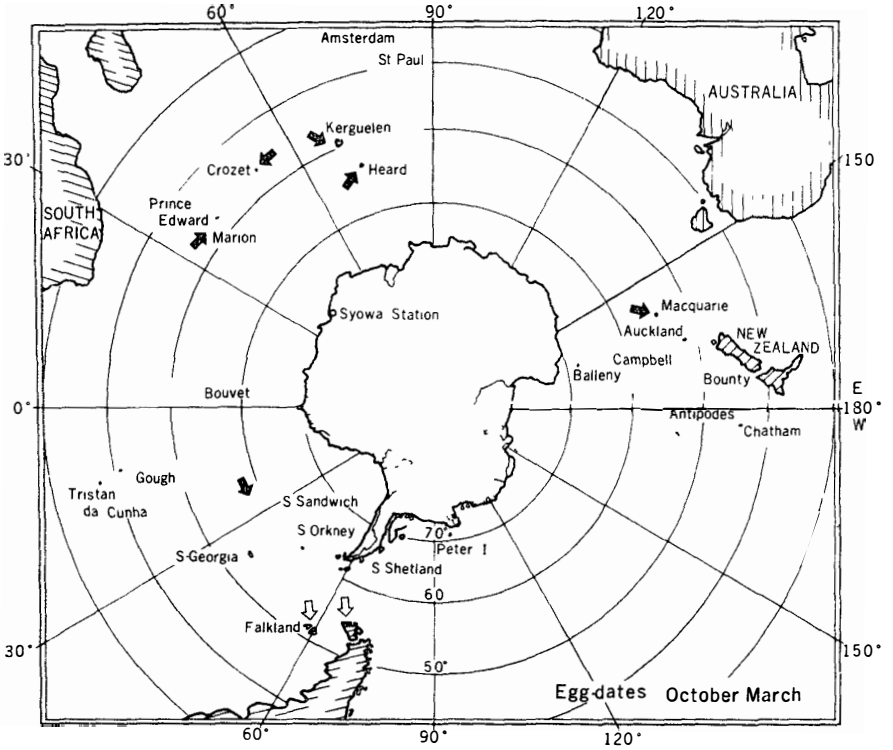

Fig. 25. Map showing the known breeding grounds of king penguin.

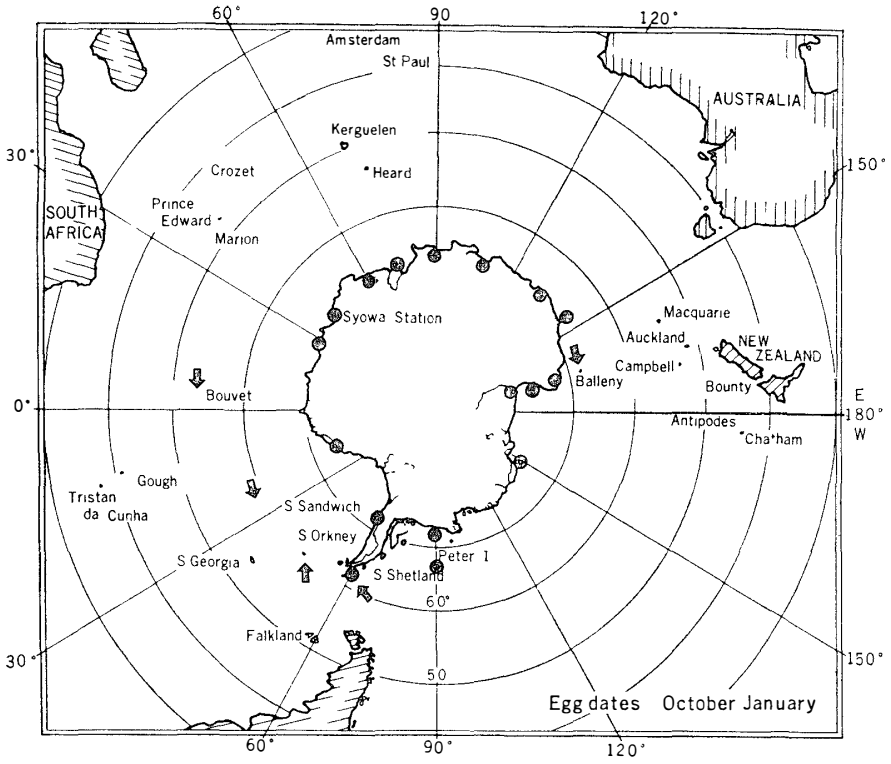

Fig 26 Map showing the known breeding grounds of Adelie penguin

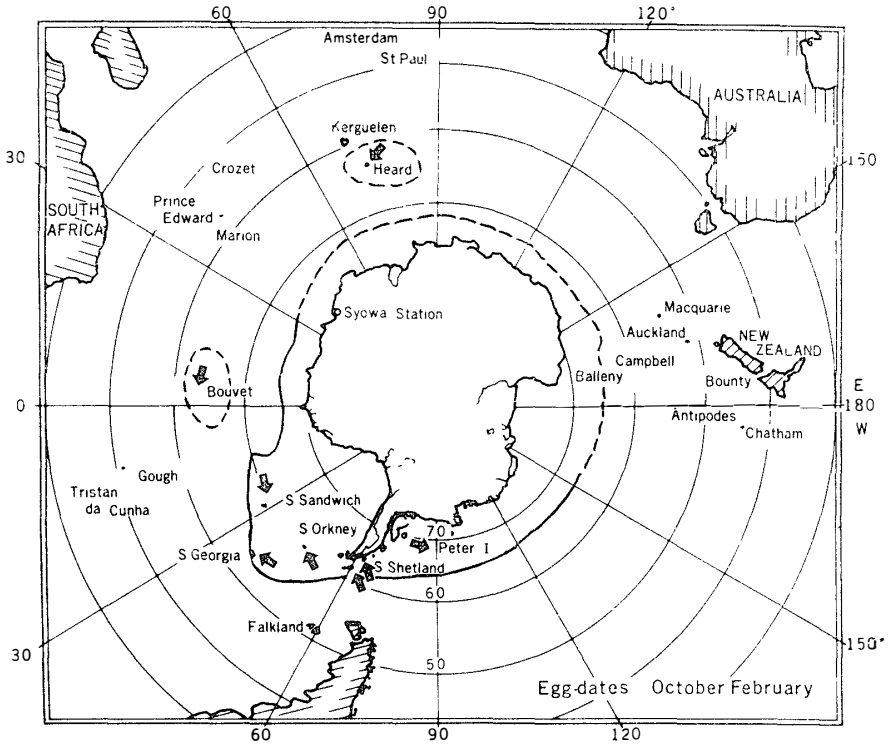

Fig 27 Map showing the distribution limits of chinstrap penguin

Appendices

The northern and southern limits or occurrences of the principal species.

1. Wandering albatross, *Diomedea exulans.*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp
UM 2	*Dec. 6, 1961	39°35′S, 104°32′E	12 3°			
	*Jan. 27, 1962	42°22′S, 16°25′E	12. 1°		Pack ice	
UM 3	*Dec. 1, 1964	Tasmanian waters	15 0°		Pack ice	
	*Dec. 27, 1964	Cook Strait		*Jan 24, 1965	67°38′S, 164°59′W	−0. 2°
	*Feb. 13, 1965	36°51′S, 158°29′E	17. 4°	*Feb. 4, 1965	60°22′S, 150°13′E	3. 2°
UM 4	Nov. 1, 1966	29°34′S, 153°48′E	22 8°	Nov 27, 1966	62°08′S, 150°16′W	−1. 1°
	*Dec. 9, 1966	54°24′S, 107°35′W	6 4°	Dec. 3, 1966	63°53′S, 130°15′W	0. 0°
				Dec. 15, 1966	63°27′S, 75°44′W	1. 1°
	*Dec. 26, 1966	45°24′S, 60°09′W	13 1°	Dec. 20, 1966	61°43′S, 57°36′W	0. 4°
	Jan. 7, 1967	42°26′S, 53°31′W	18 6°	Jan. 16, 1967	57°54′S, 28°24′W	0. 7°
	Feb. 11, 1967	35°48′S, 105°09′E	17. 2°	Jan 19, 1967	61°42′S, 13°59′W	0 1°
27 KN	Nov. 11, 1965	29°22′S, 84°28′E	17. 5°			
	Mar. 21, 1966	34°03′S, 81°40′E	20 5°			
20 KN	Nov. 6, 1966	34°00′S, 81°42′E	14 3°			
	Mar. 18, 1967	35°04′S, 82°10′E	19 6°			
Dell	*Dec. 20, 1958	Cook Strait		Dec. 27, 1958	65°49′S, 179°22′E	
	*Feb. 15, 1959	Cook Strait		Feb 8, 1959	66°53′S, 173°10′E	
Fleming	Dec. 5, 1948	33°20′S, 148°43′W	19. 0°			
	Mar. 6, 1931	29°44′S, 139°20′W				
Harrison	Jan.	34°53′S, 152°36′W	17. 8°			
	Feb.	33°58′S, 149°26′W	20. 6°			
	Oct. 1939	29°20′S, 133°45′W				
Falla	Oct. 20, 1929	100′ off Cape Town		Dec. 7, 1929	58°S, 77°E	0. 0°
	Mar. 26, 1930	35°30′S, 125°58′E		Jan. 29, 1930	63°S, 54°E	0. 6°
				Feb. 23, 1931	62°S, 69°E	1. 1°

2 Black-browed albatross, *Diomedea melanophris*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp
UM 2	Dec 19, 1961	49°56′S, 90°00′E	4 4°	Dec 29, 1961	56°43′S, 11°38′E	−0 6°
UM 3	Dec 2, 1964	44°04′S, 147°15′E	11 3°	Dec 7, 1964	56°47′S, 137°02′E	3 0°
	*Dec 26, 1964	Cook Strait	15 8°	Dec 13, 1964	63°38′S, 139°47′E	−1 0°
	*Jan 3, 1965	Cook Strait	16 5°	Jan 16, 1965	66°19′S, 168°18′W	0 4°
	Feb 11, 1965	43°26′S, 163°29′E	15 4°	Jan 22, 1965	66°25′S, 165°37′E	0 8°
UM 4	Nov 8, 1966	34°14′S, 151°55′E	19 5°	Nov 26, 1966	60°21′S, 155°04′W	0 6°
	*Dec 7, 1966	56°02′S, 113°53′W	6 3°	Dec 15, 1966	63°16′S, 76°06′W	2 0°
	Dec 28, 1966	37°50′S, 56°13′W	19 7°	Dec 21, 1966	60°20′S, 59°52′W	1 2°
	Jan 6, 1967	38°19′S, 57°15′W	21 4°	Jan. 15, 1967	55°47′S, 33°35′W	0 7°
	Feb 11, 1967	36°31′S, 104°21′E	17 4°	Jan 29, 1967	56°13′S, 47°51′E	1 6°
20 KN	*Dec. 1, 1966	41°38′S, 08°44′E	9 6°			
	*Dec 13, 1966	40°04′S, 13°11′E	13 2°			
	Mar. 7, 1967	46°05′S, 53°47′E	5 2°			
Dell	Dec. 21, 1958	45°15′S, 175°21′E		Dec 26, 1958	Scott Island	
	Feb. 13, 1959	49°S, 174°E		Feb 8, 1959	66°53′S, 173°10′E	
Fleming	Dec 8, 1948	38°08′S, 168°03′W	16 6°			
Harrison	Mar	41°13′S, 179°17′W	17 2°			
Falla	Oct 21, 1929	200′SE of Cape Town				
	Mar 16, 1930	38°42′S, 108°55′E		Jan. 23, 1931	64°25′S, 113°E	
				Mar 1, 1931	55°S, 85°E	

3 Grey-headed albatross, *Diomedea chrysostoma*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp
UM 3	*Dec. 4, 1964	50°13′S, 143°57′E	7.9°	Dec 19, 1964	58°07′S, 151°04′E	0 6°
	Dec 24, 1964	49°17′S, 176°26′E	9 8°			
	Feb 11, 1965	45°05′S, 164°24′E	14 6°	Feb 8, 1965	48°04′S, 166°53′E	12.4°
UM 4	Nov 22, 1966	51°03′S, 172°35′W	7 4°	Nov. 25, 1966	57°29′S, 161°34′W	2 7°
	Dec 19, 1966	54°24′S, 107°35′W	6 4°	Dec. 6, 1966	58°34′S, 118°37′W	4 5°
				Dec 15, 1966	63°27′S, 75°44′W	1.1°
	Dec 24, 1966	54°27′S, 59°30′W	6 3°	Dec 21, 1966	61°29′S, 59°50′W	0 3°
	Jan 6, 1967	48°20′S, 47°17′W	11 7°	Jan 11, 1967	54°16′S, 38°14′W	1.9°
	Feb 6, 1967	48°25′S, 86°25′E	6 5°	Jan 26, 1967	61°00′S, 30°47′E	0 9°
27 KN	Nov. 20, 1965	46°13′S, 51°22′E	3 7°			
20 KN	Nov 8, 1966	38°22′S, 75°52′E	12 7°			
	Mar 6, 1967	46°30′S, 53°42′E	3 7°			
Fleming	Dec 8, 1948	30°08′S, 168°03′W				
Dell	Feb 10, 1959	61°S, 173°E		Feb. 9, 1959	63°S, 173°E	
Falla	Oct 27, 1929	41°20′S, 30°52′E		Feb. 1, 1930	59°30′S, 53°11′E	
	Nov. 24, 1930	45°06′S, 146°58′E		Dec. 8, 1930	59°16′S, 106°57′E	
	*Mar. 11, 1931	Near Tasmania		Feb 23, 1931	61°59′S, 69°27′E	

4. Yellow-nosed albatross, *Diomedea chlororhynchos.*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp.
UM 4	Feb 10, 1967	39°15′S, 101°37′E	16 6°	Feb 7, 1967	47°20′S, 90°55′E	7 8°
27 KN	Mar 20, 1966	36°18′S, 79°29′E	18 2°			
20 KN	Nov. 5, 1966	32°50′S, 82°45′E	15 9°			
	*Nov 30, 1966	41°12′S, 14°08′E	10 8°			
	*Dec 26, 1966	40°45′S, 26°53′E	14 5°			
	Mar 18, 1967	31°06′S, 85°50′E	21 8°			
Falla	*Oct 20, 1929	Off Cape Town		Oct 29, 1929	42°38′S, 37°50′E	
	Apr. 4, 1930	Adelaide-Melbourne		Mar. 15, 1930	39°40′S, 106°18′E	

5. Light-mantled sooty albatross, *Phoebetria palpebrata*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp.
UM 2	Dec. 8, 1961	45°46′S, 95°45′E	7.8°	Pack ice		
	Jan 26, 1962	45°20′S, 16°28′E	9 5°			
UM 3	Dec. 3, 1964	47°30′S, 144°59′E	9 1°	As far south as the pack ice		
	Dec. 24, 1964	49°17′S, 167°26′E	9 8°			
	Jan 5, 1965	48°52′S, 178°36′E	12.2°			
	Feb 7, 1965	50°56′S, 163°29′E	10 1°			
UM 4	Nov 20, 1966	45°08′S, 177°32′E	11.4°	Nov. 29, 1966	64°19′S, 143°50′W	−1 1°
	*Dec. 11, 1966	55°20′S, 96°38′W	7 0°	Dec. 3, 1966	63°33′S, 129°26′W	1 3°
	Dec 21, 1966	61°01′S, 59°55′W	1 2°	Dec 15, 1966	63°29′S, 75°30′W	0.7°
	Jan 10, 1967	51°28′S, 43°08′W	4 4°			
	Feb 6, 1967	48°25′S, 86°25′E	6.5°			
27 KN	Nov. 18, 1965	42°25′S, 62°20′E	13 4°			
20 KN	Jan. 16, 1967	43°13′S, 47°44′E	7.9°			
	Mar. 13, 1967	41°22′S, 71°47′E	13.8°			
Dell	Dec. 22, 1958	50°S, 176°E		Dec. 27, 1958	65°49′S, 179°22′E	
	Feb. 11, 1959	58°07′S, 173°07′E		Feb. 7, 1959	70°S, 174°E	
Falla	Oct 28, 1929	42°38′S, 37°50′E		Dec. 1929	Pack ice	
	Mar 5, 1930	47°10′S, 78°51′E		Jan 1930	66°29′S, 43°17′E	
	Nov 24, 1930	45°06′S, 146°58′E				
	Mar 15, 1931	45°30′S, 136°11′E				

6 Sooty albatross, *Phoebetria fusca.*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp.	Date	Position	Sea temp.
UM 4	Feb 11, 1967	35°55′S, 105°02′E	17 3°	Feb. 7, 1967	47°17′S, 91°09′E	7.9°
27 KN	Mar 20, 1966	36°18′S, 79°29′E	18 2°			
20 KN	Nov. 7, 1966	37°30′S, 78°11′E	12.9°	*Jan. 13, 1967	45°09′S, 40°12′E	7.4°
	Mar 18, 1967	31°06′S, 85°50′E	21.8°			
Falla	Oct. 23, 1929	36°51′S, 23°05′E		Feb. 1930	50°30′S, 53°11′E	
	Mar. 19, 1930	36°41′S, 114°55′E		Mar. 7, 1930	45°53′S, 84°14′E	

7. Giant petrel, *Macronectes giganteus*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp.
UM 3	Dec 1, 1964	42°28′S, 148°27′E	13 6°	Dec 9, 1964	62°45′S, 133°27′E	0.0°
	*Dec 26, 1964	Cook Strait	15 8°			
	*Jan 3, 1965	Cook Strait	16 5°			
	Feb 11, 1965	43°26′S, 163°29′E	15 4°			
UM 4	Nov 13, 1966	40°19′S, 171°24′E	15 4°	Dec 1, 1966	65°07′S, 135°34′W	−0.4°
	*Dec 7, 1966	56°31′S, 114°46′W	5 6°	As far south as the pack ice		
	Dec 26, 1966	45°21′S, 59°57′W	13 2°			
	Jan 1, 1967	38°19′S, 57°15′W	21 4°			
	Feb. 7, 1967	47°24′S, 90°40′W	7 4°			
27 KN	Nov 19, 1965	43°25′S, 59°20′E	13 0°			
	Mar 11, 1966	44°30′S, 40°07′E	7 4°			
20 KN	Nov 8, 1966	38°22′S, 75°52′E	12 3°			
	*Dec 1, 1966	41°46′S, 07°40′E	10 2°			
	Mar 10, 1967	46°09′S, 52°22′E	4 9°			
Dell	Dec 20, 1958	Cook Strait		Dec 30, 1958	72°43′S, 178°30′E	
	Feb 15, 1959	Cook Strait		Feb 15, 1959	East of South Island	
Fleming	Dec 8, 1948	38°08′S, 168°03′W	16 6°			
Harrison	Jan	41°S, 174°30′W				
	Mar	41°S, 179°W				
Falla	*Oct. 20, 1929	Off Cape Town				

8 White-chinned petrel, *Procellaria aequinoctialis*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp
UM 3	Dec. 2, 1964	44°04′S, 147°15′E	11 3°	Dec 13, 1964	62°50′S, 137°40′E	−0 1°
	Dec 26, 1964	44°04′S, 173°16′E	12 7°	Dec 23, 1964	50°26′S, 165°55′E	9 6°
UM 4	Nov 20, 1966	45°47′S, 178°01′E	10 9°	Nov 26, 1966	59°29′S, 157°23′W	1 8°
	Dec 27, 1966	41°20′S, 57°47′W	17 3°	Dec 5, 1966	59°40′S, 120°41′W	3 2°
	Jan 6, 1967	38°50′S, 56°48′W	20 0°	Jan 15, 1967	56°33′S, 32°00′W	0 4°
	Feb 11, 1967	36°08′S, 104°47′E	17.2°			
27 KN	Nov 13, 1965	29°30′S, 84°30′E	17 5			
	Mar 21, 1966	33°44′S, 81°58′E	19 9			
20 KN	Nov 5, 1966	32°16′S, 83°18′E	15 9°			
	*Nov 30, 1966	41°18′S, 11°45′E				
	Mar 17, 1967	35°04′S, 82°10′E	19 6°			
Falla	Oct 29, 1929	Off Cape Town		Dec 9, 1929	61°S, 77°E	
	Mar 16, 1930	38°42′S, 100°55′E		Jan 31, 1930	61°S, 53°E	
	Mar 11, 1931	47°54′S, 120°30′E				

9. Cape pigeon, *Daption capensis.*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp.
UM 2	Dec. 7, 1961	42°10′S, 100°50′E	12.0°	Dec. 22, 1961	65°02′S, 34°50′E	−0.8°
	Jan 25, 1962	50°39′S, 15°09′E	2.7°			
UM 3	Dec. 20, 1964	58°10′S, 151°47′E	1.2°	Dec. 9, 1964	61°36′S, 134°45′E	−0.1°
	Dec. 26, 1964	Cook Strait		Dec. 22, 1964	54°11′S, 159°39′E	6 3°
	Jan 3, 1965	Cook Strait		Jan. 7, 1965	58°13′S, 169°18′W	6.1°
	Jan. 9, 1965	61°50′S, 161°01′W	0 6°	Jan. 25, 1965	65°23′S, 161°17′E	0.1°
	In UM 3, data on Dec 9, 20, 1964 and Jan 9, 25, 1965 are for *D c capensis*, the others show that of the northern race, *D. c. australia.*					
UM 4	Nov. 10, 1966	36°50′S, 157°06′E	16.9°	Nov. 29, 1966	65°29′S, 139°51′W	−1.3°
	Dec. 6, 1966	58°24′S, 118°18′W	4 7°			
	*Dec. 11, 1966	55°20′S, 97°26′W	6 7°	Dec. 16, 1966	65°22′S, 70°31′W	−0 1°
	Dec. 21, 1966	59°54′S, 59°47′W	3 1°			
	Jan. 9, 1967	48°38′S, 46°57′W	11.8°	Jan 18, 1967	59°54′S, 21°40′W	0 5°
				Jan. 21, 1967	64°30′S, 04°15′E	1 0°
	Feb. 3, 1967	52°52′S, 73°34′E	2 0°	Jan 24, 1967	62°48′S, 22°33′E	0 7°
27 KN	Nov 13, 1965	34°02′S, 78°16′E	17.0°			
20 KN	Nov 9, 1966	38°03′S, 75°20′E	13.4°			
	*Nov. 30, 1966	41°00′S, 12°53′E	10 8°			
	Mar. 10, 1967	46°09′S, 52°22′E	4.9°			
Dell	Dec. 20, 1958	Cook Strait		Dec. 23, 1958	54°S, 177°E (*D. c a*)	
	Dec 26, 1958	61°S, 178°E (*D c c.*)		Dec 28, 1958	68°S, 180°E (*D c. c*)	
Sibson	Oct. 20, 1939	36°S, 166°W				
Falla	Oct. 21, 1929	34°49′S, 19°06′E				
	Mar. 1930	Kerguelen-Adelaide, entire absence				
	Nov. 1930	S of Tasmania				
	Mar. 2, 1931	54°35′S, 88°36′E				

10. Silver-grey fulmar, *Fulmarus glacialoides.*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp
UM 2	Dec 13, 1961	59°06′S, 84°49′E	0 5°	As far south as the pack ice		
	Dec. 31, 1961	54°37′S, 04°16′E	0 3°			
	Jan 16, 1962	58°47′S, 29°26′W	0 8°			
	Jan 23, 1962	57°17′S, 12°30′E	0 2°			
UM 3	Dec. 9, 1964	62°45′S, 133°27′E	0 0°			
	Dec 16, 1964	63°52′S, 149°26′E	−1 3°			
	Jan 10, 1965	63°42′S, 156°01′W	0 0°			
	Feb. 1, 1965	65°36′S, 150°49′E	0 4°			
UM 4	Nov 27, 1966	61°26′S, 152°19′W	−0 2°			
	Dec 6, 1966	57°20′S, 116°20′W	5 2°			
	Dec 15, 1966	61°48′S, 79°03′W	3.0°			
	Dec 22, 1966	57°40′S, 59°35′W	4.1°			
	Jan 15, 1967	56°20′S, 32°27′W	0 6°			
	Jan 24, 1967	63°25′S, 18°43′W	0 6°			
27 KN	Nov. 20, 1965	46°13′S, 51°22′E	3.7°	(Near Crozet Island)		
Falla	Dec. 8, 1929	60°17′S, 77°52′E				
	Dec 9, 1930	60°52′S, 162°13′E				

11 Antarctic petrel, *Thalassoica antarctica*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp
UM 2	Dec 15, 1961	62°41′S, 75°25′E	−0 5°	Pack ice		
	Dec 27, 1961	59°13′S, 20°36′E	−1 3°			
	Dec 31, 1961	52°45′S, 04°16′E	1 6°			
	(seemed to be breeder on Bouvet I)					
	Jan 19, 1962	59°25′S, 09°12′W	−1 0°			
	Jan 22, 1962	59°42′S, 09°46′E	0 2°			
UM 3	Dec 9, 1964	62°45′S, 133°27′E	0 0°			
	Dec. 11, 1964	63°40′S, 134°00′E	−0 4°			
	Jan 11, 1965	65°41′S, 151°08′W	0 0°			
	Jan 25, 1965	65°23′S, 161°17′E	0 1°			
UM 4	Nov 27, 1966	61°44′S, 151°23′W	−0 1°			
	Dec 3, 1966	64°14′S, 131°08′W	0 1°			
	Dec 16, 1966	64°20′S, 73°26′W	0 7°			
	Dec 18, 1966	63°39′S, 64°05′W	0 5°			
	Jan. 19, 1967	56°46′S, 31°32′W	0 3°			
	Jan 25, 1967	61°40′S, 27°09′E	1 1°			
Dell	About a day north of the pack ice seems the northern limit for this species in December					
Falla	Dec 1929 About 80′ north of the belt of pack in that area (61°S, 77°E)					

12. Snow petrel, *Pagodroma nivea*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp.
UM 2	Dec. 15, 1961	62°41′S, 75°25′E	−0 5°	Pack ice		
	Dec 28, 1961	58°33′S, 18°47′E	−1 1°			
	Jan 9, 1962	55°17′S, 35°30′W	2 2°			
UM 3	Dec 9, 1964	62°45′S, 133°27′E	0 0°			
	Dec 11, 1964	63°40′S, 134°00′E	−0 4°			
	Jan 11, 1965	65°41′S, 151°08′W	0 0°	(more than 260′ north of pack edge)		
	Jan 25, 1965	65°23′S, 161°17′E	0 1°			
	Feb 1, 1965	65°35′S, 150°25′E	0 4°			
UM 4	Nov 28, 1966	63°20′S, 146°24′W	−0 6°	(about 120′ north of pack edge)		
	Dec 1, 1966	65°07′S, 135°51′W	−1.2°	(outer edge of pack ice)		
	Dec 17, 1966	64°50′S, 66°01′W	−0 1°			
	Dec 20, 1966	61°47′S, 57°08′W	0 6°			
	Jan 11, 1967	54°51′S, 36°41′W	1 7°	(South Georgian water)		
	Jan 21, 1967	64°20′S, 03°12′E	1 2°	(more than 100′ north of pack egde)		
Dell	Dec 1958	The northern limit is the edge of the floating pack				
Falla	Snow petrel associates with pack-ice during the summer months					

13. Blue petrel, *Halobaena caerulea*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp.	Date	Position	Sea temp.
UM 3	*Dec. 7, 1964	56°S, 136°59′E	2 6°	*Dec. 9, 1964	63°10′S, 132°50′E	0 0°
UM 4	*Nov. 26, 1966	60°15′S, 155°22′W	0.8°	Dec. 1, 1966	65°15′S, 132°47′W	−0.7°
	*Dec. 7, 1966	56°12′S, 114°11′W	6.7°			
	*Dec. 13, 1966	58°53′S, 84°49′W	5 1°	Dec. 16, 1966	63°26′S, 75°45′W	1.0°
	*Jan. 15, 1967	55°46′S, 33°34′W	0 9°			
	*Jan. 27, 1967	59°29′S, 37°32′E	1.6°			
	*Feb. 3, 1967	52°59′S, 73°00′E	3.6°			
27 KN	Nov. 20, 1965	45°10′S, 52°51′E	5.5°			
Falla	Nov 1, 1929	W of the Crozet Islands		Dec. 9, 1929	61°36′S, 77°53′E (pack)	
	Dec. 8, 1931 56°16′S, 160°57′E (two birds)					

14. Prions or whale birds, *Pachyptila* spp

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp.	Date	Position	Sea temp.
UM 2	Dec. 7, 1961	43°11′S, 99°27′E	12.2°	As far south as pack ice		
	Jan 27, 1962	42°22′S, 16°25′E	12 1°			
UM 3	Dec. 2, 1964	44°04′S, 147°15′E	11.3°			
	Dec. 26, 1964	New Zealand waters				
	Feb 12, 1965	41°16′S, 163°26′E	14 8°			
UM 4	Nov. 13, 1966	40°15′S, 171°05′E	14.9°			
	Dec. 9, 1966	54°39′S, 106°30′W	7.2°			
	Dec. 25, 1966	49°19′S, 60°46′W	11.9°			
	Jan. 7, 1967	41°46′S, 54°10′W	18.8°			
	Feb. 9, 1967	42°06′S, 98°30′E	12.6°			
27 KN	Nov. 16, 1965	40°19′S, 89°56′E	12.5°			
	Mar 18, 1966	40°22′S, 75°48′E	15.4°			
20 KN	Nov. 6, 1966	35°41′S, 80°56′E	14.5°			
	Mar. 13, 1967	42°22′S, 75°48′E	15.4°			
Fleming	December 1948 No birds on the voyage to Wellington from E. N. E.					
Harrison	Dec.	41°38′S, 169°25′W				
	Mar.	41°13′S, 179°17′E				
Falla	Nov.	39°S, 153°W				
	Oct. 26, 1929	40°S, S of Port Elizabeth				

15 White-headed petrel, *Pterodroma lessoni*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp
UM 2	Dec 8, 1961	47°30′S, 93°11′E	8 2°			
	Jan 2, 1962	57°30′S, 03°10′W	1 5°	Dec. 29, 1961	57°09′S, 13°16′E	−1 1°
	Jan 27, 1962	43°06′S, 16°52′E	10 7°	Jan. 20, 1962	59°30′S, 04°17′W	−1 7°
UM 3	Dec 2, 1964	44°59′S, 146°11′E	10 6°	Dec 9, 1964	62°45′S, 133°27′E	0 0°
	Dec 23, 1964	50°26′S, 165°55′E	9 6°	Dec 20, 1964	58°10′S, 151°46′E	1.2°
	Jan 5, 1965	48°52′S, 178°36′E	12 2°	Jan. 14, 1965	69°15′S, 159°48′W	0 4°
	Feb 8, 1965	49°01′S, 165,06′E	11 3°	Feb 1, 1965	65°36′S, 150°25′E	0 4°
UM 4	Nov 21, 1966	49°17′S, 177°43′W	8 5°	Nov 26, 1966	59°54′S, 156°26′W	1 6°
	Dec 8, 1966	54°50′S, 111°51′W	6 8°	Dec 4, 1966	61°47′S, 125°01′W	1 8°
	Jan 9, 1967	48°38′S, 46°57′W	11 7°	Jan 27, 1967	59°40′S, 36°51′E	1 5°
	Feb 8, 1967	44°53′S, 95°13′E	10 4°			
27 KN	Mar 14, 1966	44°26′S, 50°32′E	6 7°			
20 KN	Nov 7, 1966	39°00′S, 77°57′E	12 5°			
Dell	Dec 23, 1958	53°05′S, 176°41′E		Feb 10, 1959	61°42′S, 172°41′E	
Falla	Oct 29, 1929	42°38′S, 37°50′E	6 7°			
	Mar 7, 1930	45°53′S, 84°14′E				
	Nov 24, 1930	45°S, 146°E		Dec 9, 1930	60°S, 162°E	
				Jan 30, 1931	63°40′S, 95°56′E	
	Feb 18, 1931	Off Tasmanian coast		Feb 21, 1931	64°S, 63°E	

16 Soft-plumaged petrel, *Pterodroma mollis*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp
UM 4	Dec 28, 1966	38°28′S, 56°09′W	18 3°			
	Dec 27, 1966	39°16′S, 56°04′W	16 9°			
	Jan 6, 1967	42°55′S, 53°02′W	18 9°	Jan 9, 1967	48°38′S, 46°57′W	11 8°
	Feb 9, 1967	40°38′S, 100°08′E	15 1°	Feb 5, 1967	50°41′S, 80°26′E	4 4°
27 KN	Mar. 21, 1966	33°44′S, 81°58′E	19 9°			
20 KN	Nov 5, 1966	32°16′S, 83°18′E	16 6°			
	*Jan 11, 1967	40°15′S, 05°47′E	9 9°			
	*Mar 17, 1967	35°04′S, 82°10′E	19 6°			
Falla	Oct 20, 1920	Off Cape Town		Oct. 28, 1929	42°S, 35°E	
				Nov 11, 1929	47°36′S, 70°17′E	
	Mar 12, 1930	42°04′S, 98°45′E		Mar 6, 1930	46°37′S, 80°52′E	
	Mar 18, 1930	37°17′S, 112°47′E		Mar 15, 1930	40°S, 105°E	
	Mar 8, 1931	49°38′S, 112°08′E		Mar 1, 1931	55°48′S, 88°36′E	

17 Schlegel's petrel, *Pterodroma incerta*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp
UM 2	Jan 26, 1962	45°20′S, 16°28′E	9 5°	Jan 25, 1962	59°39′S, 15°09′E	2 7°
UM 4	Jan 7, 1967	41°25′S, 54°30′W	17 6°	Jan 9, 1967	50°14′S, 44°52′W	6 1°
27 KN	*Dec 7, 1965	45°00′S, 07°45′W	6 7°			
Falla	Oct 26, 1929	40°27′S, 27°58′E		Oct 29, 1929	42°38′S, 37°50′E	

18. Greater shearwater, *Puffinus gravis*.

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp.	Date	Position	Sea temp.
UM 4	Dec. 28, 1966	36°59′S, 56°17′W	21.1°	Dec. 25, 1966	48°31′S, 61°06′W	12.9°
	Jan. 6, 1967	38°40′S, 56°57′W	19.8°	Jan. 9, 1967	49°56′S, 45°17′W	6.4°
27 KN	Dec. 6, 1965	49°26′S, 13°06′E	3 6°	(Easterly distributor)		
	Mar. 8, 1966	44°41′S, 26°46′E	8.6°	(〃)		
20 KN	Jan. 2, 1967	40°27′S, 22°19′E	19.1°	(〃)		
FALLA	Oct 19, 1929	Off Cape Town				
	Oct 21, 1929	36°49′S, 19°06′E				

19 Sooty shearwater, *Puffinus griseus*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp.
UM 3	Dec 6, 1964	55°54′S, 134°36′E	2 8°	Dec 8, 1964	58°03′S, 136°14′E	2 6°
	Jan 4, 1965	New Zealand waters	14 3°	Dec. 22, 1964	52°42′S, 161°29′E	8.8°
				Jan. 7, 1965	58°13′S, 169°18′W	6 1°
	Feb 12, 1965	41°16′S, 163°26′E	14 8°	Jan. 30, 1965	64°02′S, 151°34′E	1.3°
UM 4	Nov. 19, 1966	41°31′S, 174°54′W	14.2°	Nov. 26, 1966	60°01′S, 155°58′W	1 1°
	*Dec 12, 1966	55°30′S, 91°53′W	6 0°	Dec 13, 1966	59°59′S, 82°42′W	4 4°
	Dec. 28, 1966	39°04′S, 56°06′W	17.2°	Dec. 24, 1966	54°13′S, 59°18′W	6 1°
	Jan 7, 1967	41°05′S, 54°49′W	16.3°	Dec. 9, 1967	49°29′S, 46°54′W	7.6°
	Jan 27, 1967	59°21′S, 38°01′E	1.3°	Jan. 21, 1967	63°38′S, 00°42′E	0.7°
DELL	Dec 1958	New Zealand waters		Dec. 1958	62°S, 174°E	
FALLA	Oct 1929	Off the African coast				
	Nov. 24, 1930	45°S, 146°30′E		Dec. 10, 1930	62°24′S, 163°36′E	
	Mar. 7, 1931	50°20′S, 107°53′E		Feb 25, 1931	60°54′S, 74°38′E	

20 Wilson's storm-petrel, *Oceanites oceanicus*.

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp.
UM 3	Dec 2, 1964	44°04′S, 147°15′E	11.3°	Dec. 19, 1964	58°08′S, 151°04′E	0 6°
	Jan 6, 1965	55°57′S, 173°19′W	8 7°			
	Feb 5, 1965	59°02′S, 152°32′E	2.9°			
UM 4	Nov 10, 1966	36°50′S, 157°06′E	16.7°	Nov 26, 1966	60°29′S, 154°46′W	0 5°
	*Dec. 8, 1966	54°33′S, 110°46′W	6.6°	Dec. 5, 1966	59°40′S, 120°41′W	3.2°
	*Dec 15, 1966	62°03′S, 78°33′W	3 4°	Dec 16, 1966	64°47′S, 69°24′W	−0.9°
	Dec 28, 1966	38°40′S, 56°08′W	18.2°	Dec 1966	South Shetland Islands	
	Jan 7, 1967	41°36′S, 54°20′W	16 5°			
	Feb 9, 1967	40°38′S, 100°08′E	15.1°			
27 KN	Nov 14, 1965	35°54′S, 76°30′E	15.0°			
	Mar. 3, 1966	44°08′S, 13°41′E	8 8°			
DELL	Dec 26, 1958	63°S, 178°E		Dec 30, 1958	74°S, 175°E	
	Feb. 8, 1959	65°S, 173°E		Feb 6, 1959	74°S, 173°E	
FALLA	Nov 11, 1929	NE of Kerguelen				
	Mar 22, 1930	35°S, 119°E				
	Nov 4, 1930	E of Tasmania		Feb 18, 1931	Cape Bruce	
	Mar 1, 1931	55°S, 85°E				

21. Black-bellied storm-petrel, *Fregetta tropica*

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp.
UM 3	Dec 23, 1964	50°26′S, 155°55′E	9.6°	Dec 21, 1964	56°39′S, 157°23′E	4 8°
	Jan 4, 1965	46°59′S, 177°07′E	14 4°	Jan 10, 1965	62°50′S, 158°28°W	0 2°
	Feb 7, 1965	50°56′S, 163°29′E	10 1°			
UM 4	Nov 10, 1966	37°28′S, 152°45′E	17 0°	Nov 25, 1966	58°47′S, 159°05′W	2.3°
	Dec 15, 1966	63°24′S, 75°45′W	1 0°	Dec 16, 1966	65°19′S, 70°58′W	0 3°
	Dec 21, 1966	59°54′S, 59°47′W	3 1°			
	Jan. 9, 1967	48°38′S, 46°57′W	11 8°	Jan 21, 1967	64°34′S, 03°34′E	1.2°
	Feb 5, 1967	50°20′S, 81°33′E	5 9°	Feb 2, 1967	50°37′S, 70°19′E (W of Kerguelen)	4 4°
27 KN	Mar 19, 1966	38°33′S, 77°42′E	16 4°			
20 KN	Nov. 16, 1966	40°20′S, 55°13′E	14 7°			
	*Nov. 20, 1966	40°50′S, 41°34′E	9 8°			
	*Nov 30, 1966	41°18′S, 11°45′E	10 4°			
	Mar 15, 1967	38°35′S, 77°51′E	16 6°			
FALLA	End-Oct 1929	Between Cape Town and Crozed Is they occurred daily				
	Mar. 16, 1931	S of Tasmania		Mar. 1, 1931	55°48′S, 85°20′E	

22. Diving petrels, *Pelecanoides* spp

Observer	Northern limit or occurrence			Southern limit or occurrence		
	Date	Position	Sea temp	Date	Position	Sea temp
UM 3		Dec 23, 1964	Around Auckland Island			
		Jan 5, 1965	Around Antipodes Island			
		Feb 9, 1965.	Around Snares Island			
UM 4		Nov 21, 1966	Around Bounty Islands			
	Dec 6, 1966	57°20′S, 116°20′W	5 2°	(the westernmost distributor)		
	*Dec 9, 1966	54°25′S, 107°44′W	6 6•			
	Dec 14, 1966	60°57′S, 80°39′W	3 5°	(lasted from Dec 9)		
				Dec. 16, 1966	65°25′S, 70°40′W	0 3°
	Dec 28, 1966	39°04′S, 56°06′W	17 2°	Dec 19, 1966	63°09′S, 61°55′W	0 1°
	Jan 10, 1967	51°37′S, 42°57′W	4 1°	Jan 14, 1967	Around South Georgia	3 5°
	Feb 6, 1967	48°45′S, 86°12′E	6 3°	Jan. 29, 1967	56°13′S, 47°51′E	1.7°
		(common distributors between the above localities)				
27 KN	Nov. 20, 1965	45°10′S, 52°51′E	5 5°	(Near Crozet Island)		
20 KN	Dec 1, 1966	41°44′S, 10°06′E	9 6°			
	Mar. 10, 1967	46°09′S, 52°22′E	4 9°			