

Population estimate for northern giant petrels (*Macronectes halli*) on Antipodes Island, New Zealand

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Abstract Northern giant petrel (*Macronectes halli*) populations are thought to be increasing at some locations around the world, decreasing at others. The size and status of their breeding populations within the New Zealand region, in particular, is poorly understood: reliable population estimates have never been made at 3 of the 5 breeding locations. A survey of pre-fledging northern giant petrel chicks on Antipodes Island, New Zealand during Jan 2000 yielded a count of 130. The total population was estimated to be *c.* 230 breeding pairs. Because of an absence of accurate historical surveys, the status of the Antipodes Is population is unknown.

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INTRODUCTION

Northern giant petrels (*Macronectes halli*) have a southern circumpolar distribution. In general, breeding populations occur on subantarctic islands between 44°S and 54°S and the total world breeding population is estimated to be 11,500 pairs (Patterson *et al.* in press). The populations of northern giant petrels are thought to be increasing at some locations and decreasing at others (Woehler *et al.* 2001; Patterson *et al.* in press). The causes of population change have not often been identified but, particularly where long-term population decreases have been recorded, factors such as human disturbance, introduced predators, and fisheries activities have been suggested as potential causes (Environment Australia 2001; Wiltshire & Scofield 2000; Patterson *et al.* in press).

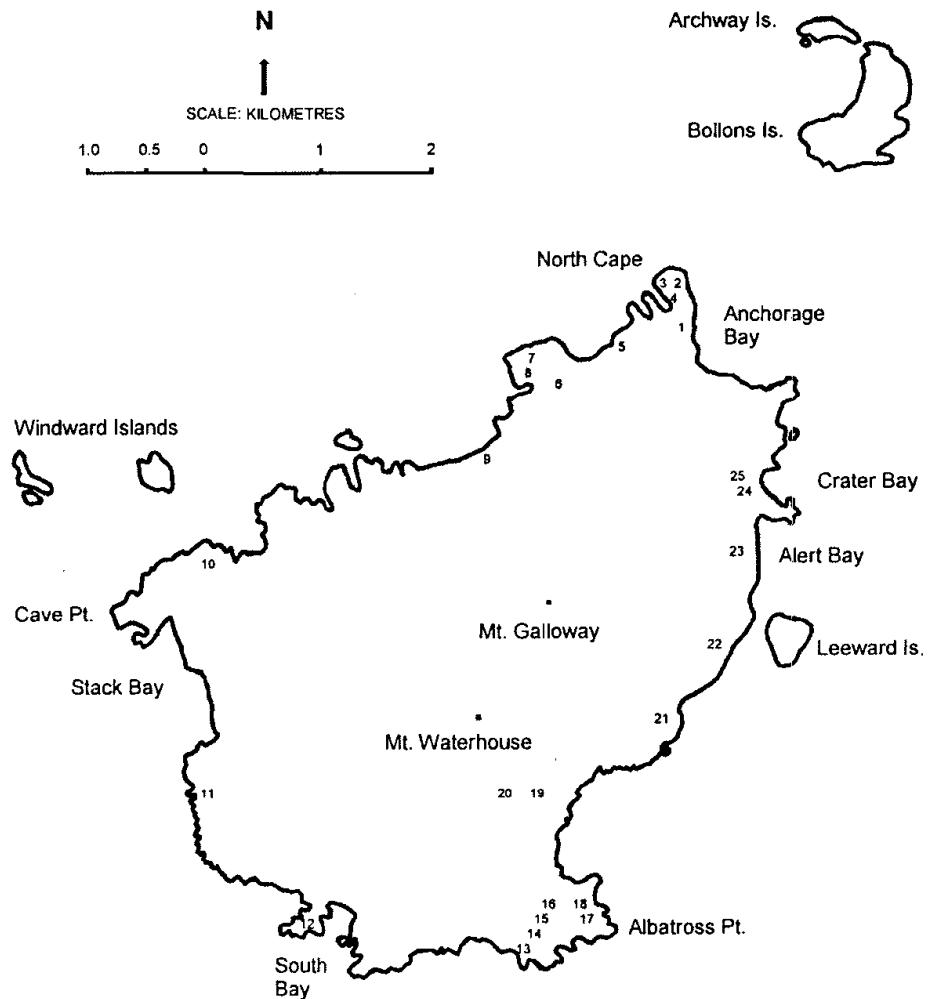
In the New Zealand region, northern giant petrels breed or are thought to have bred on 5 island groups: Chatham Is, Stewart Is, Antipodes Is, Auckland Is, and Campbell Is. The population size and status at these 5 breeding localities is poorly understood: very few reliable surveys have been undertaken and population trends remain

unknown. Only Campbell Is has been recently and accurately surveyed, with ≥ 234 breeding pairs having been recorded in the 1995/96 season (Wiltshire & Scofield 2000). There is a need for repeatable and accurate surveys of entire populations from all localities. Partial counts are inadequate because giant petrels may move nest localities from season to season (Voisin 1968; Wiltshire & Scofield 2000).

Antipodes Is (49°41' S 178°48' E) was discovered in 1800 and was the scene of extensive sealing activity between 1804 and 1809 (Richards 1994). Before 1969, northern giant petrels were noted by personnel from scientific or sealing vessels visiting Antipodes Is but there was no attempt to count the birds (Warham & Johns 1975). Giant petrels were mentioned as a food source or collected as specimens. The 1st recorded ship wreck was in 1893 when 11 survivors were marooned for 87 days before they were rescued. They lived on "limpets, giant petrel chicks, mutton birds, albatrosses and the roots of a plant that tasted like celery" (Warham & Johns 1975).

The 1st major scientific expedition to Antipodes Is was from 28 Jan to 6 Mar 1969 (Warham & Bell 1979). At this time the giant petrel breeding season was nearly over and only a few fully-feathered

Fig. 1 Location of northern giant petrel (*Macronectes halli*) chicks on Antipodes Island in Jan 2000. Numbers 1-25 on map refer to 'Colony number' in Table 1.



chicks remained on or near their nests. Expedition members banded 29 chicks and 50 adults and estimated the population to be c. 320 breeding pairs (Warham & Bell 1979). The only other known count was in Nov 1995 when 127 northern giant petrel nests were recorded on the island (Tennyson *et al.* 2002).

The aim of this study was to estimate the 1999/2000 breeding population of northern giant petrels on Antipodes Is by counting all pre-fledging chicks on the island.

METHODS

The Antipodes Is group consists of the main Antipodes Is (2025 ha) and 5 small (6-48 ha) islets (Bollons, Archway, Leeward, 2 Windward Is) (Fig. 1). Between 7 and 24 Jan 2000, pre-fledging northern giant petrel chicks were counted on Antipodes Is. All the coastal escarpment, low-lying coastal areas, and inland ridges with suitable giant petrel nesting habitat were searched. The island was surveyed on foot by 2 people and the survey took c. 6 days. Some of the coastal slopes were viewed initially with binoculars, then the area was searched on foot if giant petrels were observed in the area, or the habitat looked suitable. All nesting sites recorded by Warham & Bell (1979) and

A. Tennyson (pers. comm.) were visited. None of the 5 small islets was visited. Low numbers of giant petrels could breed on the islets and they were all examined using binoculars from various vantage points on the main island.

The breeding success of northern giant petrels has not been calculated for any of the 5 breeding localities within New Zealand. The nearest population where breeding success has been studied is at Macquarie Is (54°30'S 158°57'E), where breeding success over the 5 years 1994-1998 was 45.9-62.5%, with a mean of 55.8% (R. Gales pers. comm.). These data were applied to our count of pre-fledging chicks to estimate the number of pairs that bred during the 1999/2000 season. Information on the size of the 5 New Zealand breeding populations of northern giant petrels was collated.

RESULTS

Antipodes Is chick count

Between 7 and 24 Jan 2000, 130 live northern giant petrel chicks and 1 dead chick were recorded at 25 locations on Antipodes Is (Table 1, Figure 1). No sign of giant petrels breeding (e.g., aerial displays, presence of adults) was observed on or over any of the 5 small islets. We are confident that the chick

Table 1 The location and number of pre-fledging northern giant petrel (*Macronectes halli*) chicks counted on Antipodes Is in Jan 2000. Grid references are from NZMS 272/4, Antipodes Is. Colony number refers to Fig. 1. *, includes 1 large dead chick; †, viewed with binoculars.

Date	Colony number	Location description	Grid ref.	No. of chicks
7 Jan 2000	1	North Cape area	112/106	1
7 Jan 2000	2	North Cape area	111/110	5
7 Jan 2000	3	North Cape area	110/110	4
7 Jan 2000	4	North Cape area	110/109	10
7 Jan 2000	5	North Cape area	107/104	9
14 Jan 2000	6	North of Hill 208	102/100	2
14 Jan 2000	7	Hill 208 area	098/103	4
14 Jan 2000	8	Hill 208 area	098/101	1
14 Jan 2000	9	SW of Hill 208	095/093	1
11 Jan 2000	10	NE of Cave Point	071/085	12
11 Jan 2000	11	South of Stack Bay	069/063	3
24 Jan 2000	12	West of South Bay	078/052	2 [†]
8 Jan 2000	13	Albatross Point area	098/049	4
8 Jan 2000	14	Albatross Point area	099/050	8
8 Jan 2000	15	Albatross Point area	100/051	3
8 Jan 2000	16	Albatross Point area	101/051	15
8 Jan 2000	17	Albatross Point area	103/052	1
8 Jan 2000	18	Albatross Point area	103/053	1
8 Jan 2000	19	Saddle SE of Mt. Waterhouse	096/066	10
8 Jan 2000	20	Saddle SE of Mt. Waterhouse	100/066	2
8 Jan 2000	21	Hill 294 area	109/072	2
10 Jan 2000	22	SW of Hill 186	114/076	12*
10 Jan 2000	23	Above Alert Bay	117/086	12
10 Jan 2000	24	Above Crater Bay	118/090	5
10 Jan 2000	25	Above Crater Bay	117/092	2
Total				131*

count reflects the total number of chicks on the Antipodes Is group and that we adequately searched all available habitat.

Using the average breeding success from Macquarie Is (55.8%), extrapolating from the 130 live pre-fledging chicks counted in Jan 2000, yielded an estimate of the breeding population of 233 pairs on Antipodes Is for the 1999/2000 season. However, based on the range of breeding success at Macquarie Is (45.9-62.5%), the number of breeding pairs could have been as low as 208 or as high as 283.

Summary of the size of New Zealand populations of northern giant petrel

Population estimates of the 5 northern giant petrel populations in New Zealand are given in Table 2. The status of these populations is unknown.

DISCUSSION

We estimated that the population of northern giant petrels on Antipodes Is in the 1999/2000 season to be c. 230 (range 208-283 pairs) breeding pairs. Although we only physically surveyed the main Antipodes Is, it is unlikely that very many pairs

would nest on the 5 smaller islets and, using binoculars, we did not observe any sign of giant petrels breeding on the islets. Warham & Bell (1979) did not record giant petrels breeding on any of the islets during their 1969 expedition but also viewed the islets only from the main island. Giant petrels were not recorded nesting on Bollons Is during a short visit there in Oct 1995 (A. Tennyson pers. comm.).

The Antipodes Is population was estimated to be 320 pairs in 1969 (Warham & Bell 1979). This would suggest a population decline in the order of 12-35% between 1969 and our 1999/2000 estimate of 208-283 pairs. However, the 1969 estimate was based on 29 chicks and 50 adults being present at the very end of the breeding season and, consequently, is not reliable. Therefore, it is not possible to say whether or not the population has changed since 1969.

In Nov 1995, 127 nests of northern giant petrels were counted, including 13 empty nests (A. Tennyson pers. comm.; Table 2). Because of the timing of this survey, some birds were still incubating and some nests contained small chicks (A. Tennyson pers. comm.). One area not surveyed in

Table 2 Summary of the population size of northern giant petrels (*Macronectes halli*) at the 5 New Zealand breeding locations. BP, breeding pairs; NC, no. of occupied nests at late incubation/guard stage; NE, no estimate; E, estimate based on anecdotal evidence; GSC, nest count during late incubation/guard stage; ND, nest density extrapolation; TC, extrapolated from total chick count; TN, total nests or total incubating birds on nests (= breeding pairs).

Breeding location	Population	Year	Census	Reference
Campbell Is	100 BP	1958	E	Bailey & Sorensen (1962)
	150 BP	<1986	E	Robertson, in Hunter (1986)
	234 BP	1996/97	TN	Wiltshire & Scofield (2000)
Auckland Is	50 BP	1972/73	E	Bell (1975)
	200 BP	<1986	E	Robertson, in Hunter (1986)
	~50 BP	1987/88	E	Taylor (1988)
Stewart Is	No estimate	<1955	NE	Oliver (1955)
	Birds present, not breeding ('Nelly Island', Port Pegasus)	1960	NE	Stonehouse, in Patterson <i>et al.</i> in press
Chatham Is	2150 BP	<1986	E	Robertson, in Hunter (1986)
	2000 BP (Motuhara only)	1993	ND	Robertson & Sawyer (1994)
Antipodes Is	320 BP	1968/69	E	Warham & Bell (1979)
	≥14 NC	1995/96	GSC	Tennyson <i>et al.</i> (2002)
	233 BP	1999/00	TC	This study

1995, and where Warham & Bell (1979) recorded nests in 1969, was Cave Point (Fig. 1). However, we visited this area in Jan 2000 and found no sign of nests. Because the Nov 1995 count included nests at both egg and chick stage, and data on hatching success and early chick survival are not available for this population, it is difficult to calculate the number of breeding pairs in the 1995/96 season.

However, the Nov 1995 count of 114 "occupied" nests near to hatching stage was less than our Jan 2000 count of 130 nests with pre-fledging chicks. More data, particularly on annual variation in numbers of breeding pairs, are needed before the status of the Antipodes Island population can be determined. Successive counts also need to be made at the same time during the breeding season.

For the Auckland, Chatham, and Stewart islands, the lack of recent survey data is clear (Table 2). Confirmation of breeding of northern giant petrels in the Stewart Is group is particularly needed. The small breeding population formerly present may be extinct as we have not found any evidence that giant petrels have bred recently at Port Pegasus. A re-survey of Auckland and Chatham Is populations is also needed but, because of the location, size, and habitat of these islands, accurate counts would be difficult.

There is no long-term monitoring of any population of giant petrels in the New Zealand region (Taylor 2000). Without such data, it is impossible to assess whether these populations are increasing, decreasing, or stable. Population trends cannot be assessed from the results of 1 or a few surveys because a high proportion of adults can be

absent from breeding colonies in a given year and the breeding success of the previous season may affect the proportion of birds that are present at the colony the following season (Wiltshire & Scofield 2000). Additionally, where possible, surveys should incorporate the entire breeding locality because northern giant petrels often move their breeding area from season to season (Voisin 1968; Wiltshire & Scofield 2000).

The population dynamics of northern giant petrels in New Zealand are poorly understood (Taylor 2000). Giant petrel populations are under threat from marine pollutants, introduced predators, habitat degradation, and fisheries (Wiltshire & Scofield 2000; Environment Australia 2001; Patterson *et al.* in press). If reliable surveys reveal population changes, it is then vital to know whether the trends result from changes in adult survival rate, breeding success, or recruitment.

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