Light-mantled sooty albatross on Campbell Island, 1995-96: a pilot investigation

SCIENCE FOR CONSERVATION: 41

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Published by
Department of Conservation
PO. Box 10-420
Wellington, New Zealand

Frontispiece: Light-mantled sooty albatross.

Science for Conservation presents the results of investigations contracted to science providers or for work within the Department which is deemed to be funded by outside agencies. Reports are subject to peer review within the Department and, in some instances, to a review from outside both the Department and the science providers.

ISSN 1173-2946
ISSN 0-478-018444

This publication originated from work done by Peter Moore, Science & Research Division, Department of Conservation, Wellington. The work was funded in part by the New Zealand fishing industry through the 1995/96 Conservation Sciences LevyThis document was approved for publication by the Director, Science and Research Division, Department of Conservation,Wellington.

Cataloguing-in -Publication data

Moore,Peter J.(Peter John),1960-
Light-mantled sooty albatross on Campbell Island, 1995-96 : a pilot investigation/P.J. Moore.Wellington, N.Z. : Dept. of Conservation, 1996.
1 v ; 30 cm. (Science for Conservation, 1173-2946 ; 41)
Includes bibliographical references.
ISBN 0478018444
1. Phoebetria palpebrata. 2.Albatrosses--New Zealand--Campbell Island. I.Title. II. Series: Science for conservation ; 41.
598.42099399 20
zbn96-101733

CONTENTS

Abstract

A pilot census of light-mantled sooty albatross *Phoebetria palpebrata* nests was conducted on western Campbell Island in November 1995. An extrapolation from 292 nests counted on 19 km of coastline, more than 77 seen on offshore islands, and 32 found in four inland areas, suggests that there were at least 1600 nests on the island in 1995-96. Standard vantage points were established for future index counts. Sixty nests were monitored, and 50% were still successfully rearing chicks in January-February. Five nests at Beeman Hill and 12 nests at north-west Lyall ridge were monitored more closely, and adults banded.

1. Introduction

The light-mantled sooty albatross *Phoebetria palpebrata* is a widespread species, breeding on many islands of the subantarctic. Eggs are laid in late October-early-November and chicks fledge in May-June. The species is considered a biennial breeder, although 25% of successful breeders take more than one year off between breeding attempts (Jouventin & Weimerskirch 1988). Observations of light-mantled sooty albatrosses breeding in the 1940s on Campbell Island provide us with the only published information from the New Zealand region (Sorensen 1950, Bailey & Sorensen 1962). The majority of eggs are laid during the first few days of November (Sorensen 1950), or from before 27 October to 2 November (n=9, 1970; M. Crompton unpubl. data). The earliest observed egg was on 23 October (in 1984, G. Taylor, pers. comm.).

Because of the birds' habit of nesting on steep coasts and cliffs, the size or status of light-mantled sooty populations are little known, with accurate counts only available for Macquarie Island and Possession Island (Gales, in press). Population estimates in the New Zealand region are considered very crude (C. Robertson, pers comm in Gales 1993). These include c.5000 pairs annually at the Auckland Islands (Bell 1975), much fewer than 1000 pairs at the Antipodes (Warham & Bell 1979) and more than 1000 pairs at Campbell Island (Sorensen 1950). The subantarctic islands to the south of New Zealand (including Macquarie Island) (c. 8500 pairs annually) probably rank as an important population centre, ahead of South Georgia (5000-7500 pairs), Kerguelen Islands (3000-5000) and Crozet Islands (2150) (Gales 1993, Gales, in press). It has been estimated that there are 22,500 pairs breeding annually in the southern islands, or 140,000 individuals in total (Gales, in press). Only at Isle de la Possession (Crozet Islands) is there a known population trend, a 13% decline in numbers since 1980 (Weimerskirch & Jouventin, in press).

In an assessment of conservation measures required for albatrosses, Gales (1993) recommends an accurate population assessment over several consecutive years, and measurement of demographic parameters (breeding

frequency, adult survival, recruitment), breeding success and migration rates before the status of populations can be determined.

Mortality associated with fishing activities could be a major threat to light-mantled sooty albatross populations (Gales 1993), particularly as they are better divers than most other albatrosses and retreive more baits on longlines (Gales, in press). As light-mantled sooty albatrosses travel south to Antarctic waters to feed during the breeding season, they do not encounter longline fisheries (Weimerskirch & Robertson 1994). There is, however, bycatch during non-breeding periods, when the birds move northwards (Gales, in press). During a study of fisheries bycatch by the Japanese longline industry in the Australian Fishing Zone (off Tasmania) from May-June 1988, three out of 45 albatrosses captured were light-mantled sooties (Brothers 1991). Based on the capture rates of albatrosses per hooks set, it was suggested that 4125 light-mantled sooty albatrosses were killed annually in southern waters (Brothers 1991). This extrapolation may not be valid though, since in the New Zealand region (the Exclusive Economic Zone), no light-mantled sooty albatross were incidentally caught by the Japanese Southern bluefin tuna longline industry from April-August in the years 1988-1992 (Murray et al. 1993).

In 1995-96, during field trips to Campbell Island to study other albatross species, I assessed the feasibility of conducting a census of light-mantled sooty albatross, and looked for areas of accessible nests that would be available for future banding studies and nest monitoring. This study was necessitated by the potential threat to light-mantled sooty albatrosses as detailed above, and because there is no baseline population data for the species in New Zealand. The work was funded in part by the Conservation Services Levy which is part of the cost recovery mechanism set up by the 1994 amendment to the Fisheries Act (1983).

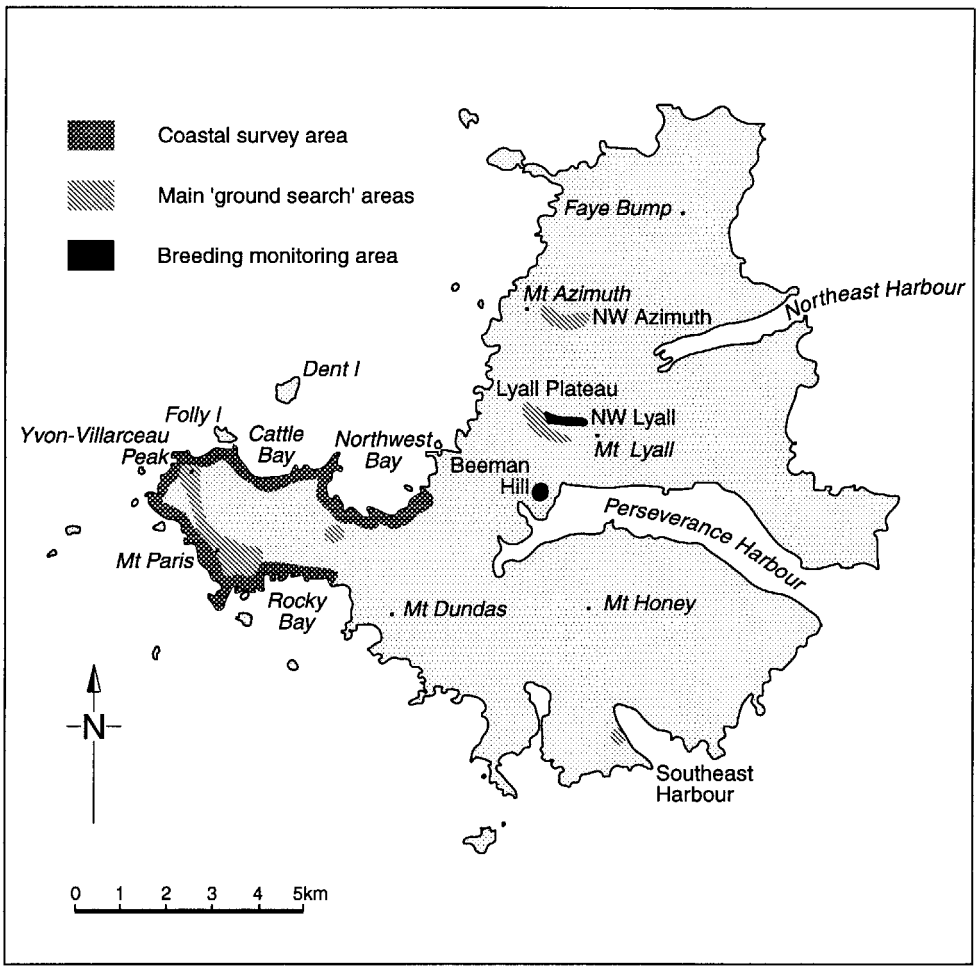
2. Methods

2.1 POPULATION SURVEY

The method for surveying light-mantled sooty albatross on Macquarie Island (Disney 1995) was adapted for use along the Campbell Island coast. This entails the use of standard vantage points to count albatrosses using binoculars and telescope.

In early November 1995, steep slopes and cliffs of Northwest Bay, Yvon Villarceau-Paris and Rocky Bay (Fig. 1: coastal survey area), (Fig. 2) were searched for nests by two people using binoculars and/or telescope from suitable vantage points on the cliff-tops. The survey was conducted on four clear days with light wind conditions. Thirteen vantage points ("main" vantage points) that offered sizeable views were chosen, photographs were taken, and a telescope was used to count nests. Nest locations were marked on sketch maps. At viewpoints with nests in close proximity, a person with binoculars checked

Figure 1 Lightmantled sooty albatross survey areas, Campbell Island, 1995-9G.



nest locations while the other person counted the same area with the telescope. At viewpoints where nests were outside the range of easy spotting with binoculars, one person used the telescope. Because of time constraints, the scattered, patchy nature of nests and the variable nature of the coast topography, birds were counted at as many other "minor" vantage points as were necessary to fill in gaps between the "main" vantage points, and to re-scan pieces of coast from different angles. Small accessible nesting areas were searched on foot ("ground searching") if they did not have convenient vantage points to view them from, as were inland bluffs and steep hillside. Hence the survey of the western island included a mixture of methods: "main" vantage points for a repeatable index, and "minor" vantage points and "ground searching" to fill in the gaps (all represented collectively as the coastal survey area in Fig. 1), and "ground searches" of inland bluffs and hillside (main "ground search" areas in Fig. 1).

2.2 GROUND SEARCHES

Accessible nests were found by systematically searching steep slopes or exposed rock outcrops at four areas: north-east Azimuth, north-west Lyall ridge, Beeman Hill, and Southeast Harbour (Fig. 1). In these areas, nests could not be

located by scanning with binoculars or telescope because the vegetation and topography usually hid them from view. However, the presence of birds flying in an area was a good indication of nesting activity.

2.3 BREEDING SUCCESS

At north-west Lyall (Fig. 3) and Beeman Hill, nests were marked with numbered orange PVC pipe and their breeding success was followed from November 1995 to January-February 1996. Except for one bird, which deserted its nest after handling, birds were banded while they sat on their nests. The most nervous or aggressive birds were not banded.

3. Results

3.1 POPULATION SURVEY

Table 1 shows the number of light-mantled sooty albatross nests counted during the survey of western Campbell Island (Fig. 1) in early November 1995. It is assumed that figures are more accurate for Northwest, Cattle and Rocky Bays because viewpoints were generally closer and nests seemed easier to locate. Yvon and Paris cliffs were difficult to survey, because of their large size, and the angle of light for some areas. Also, there were areas of inaccessible steep foreshore below the Yvon-Paris cliffs which may have harboured nests, but could not be viewed from the cliff-tops. Fortunately, the weather was calm and viewing conditions were clear on the days chosen for survey.

The total of 292 nests include 16 that were found on inland bluffs and slopes of Mt. Paris, close to the coast (Table 1). Most of the likely inland or previously recorded nesting areas (Guard 1968: unpublished wildlife distribution map, Taylor 1986) were visited. The landward side of five islands close to the shore were viewed, and of the 55 nests seen, most were from a dense concentration (41 nests) on Folly Island. Nests were also visible by telescope on Dent Island, although the distance was too great for this to be anything but a bare minimum count (Table 1).

During October, birds were very active (flying, displaying and prospecting nest sites) along the cliffs at the northern end of the island. No attempt to survey numbers was made, although at least 16 nests or probable nests were seen incidentally, two of which were on inland bluffs. Three nests that were visited on 22-23 October had no eggs.

TABLE 1 NUMBER OF LIGHT-MANTLED SOOTY ALBATROSS NESTS COUNTED ON WESTERN CAMPBELL ISLAND, 1-11 NOVEMBER 1995 (SEE FIG. 1 FOR LOCALITIES).

LOCALITY	DATE	EFFORT (HOURS')	NO. NESTS
Northwest Bay	1-2 Nov	14	55
Cattle Bay	2 Nov	12	109
north-west Yvon Villarceau cliffs	3 Nov	8	11
Yvon Villarceau-Paris cliffs	3,11 Nov	11	80
Rocky Bay	11 Nov	4	37
Coastal Total			292
Inshore islands			55
Dent Is.			17
Nests elsewhere			83

' figure is the number of person hours spent counting; for 1-3 November there were two people, and on 11 November, one person.

3.2 GROUND SEARCHES

Eight nests were found on 26 October in an area of inland bluffs on the north-east side of Mt. Azimuth (Fig. 1), at the head of Hooker Valley. Most were concentrated on a prominent line of bluffs a few hundred metres long, at about 250 m altitude. Birds were nest-building and copulation was observed at two nests.

On 27 October, four nests were found below the bluffs on the north side of the Lyall Plateau (Fig 1). Adjacent to this area, on north-west Lyall ridge, 14 more birds on bowls (i.e., nests or birds prospecting) were found on steep slopes at about 200 m altitude (Fig 4.). The nesting area was c. 750 x 100 m, with a higher concentration of nests at each end of the area, and with groups of one to three nests. Nests were found at the base of small rock bluffs, on ledges or on steep tussock-clad slopes. One of the birds was already banded (in a previous year), and four of the 14 nests contained eggs. No birds were found on the south-west side of the ridge.

At Beeman Hill (Fig. 1) on 8 November, five nests with eggs were found, and all the adults were banded (in previous years). The nests were on tussock slopes or ledges above bluffs on the north side of the hill.

A cursory search of a small area of steep tussock/scrub on the western side of Southeast Harbour (Fig. 1) on 7 November revealed 14 nests with eggs and a further seven nonbreeders on empty bowls or near nests.

TABLE 2 BREEDING SUCCESS OF LIGHT-MANTLED SOOTY ALBATROSS NESTS ON CAMPBELL ISLAND, NOVEMBER 1995-FEBRUARY 1996

AREA	EARLY NOV	EARLY JAN	EARLY FEB	MAXIMUM BREEDING SUCCESS %[1]
NW Lyall ridge	12 eggs	7 chicks		58.3
Beeman Hill	5 eggs	2 chicks, 1 egg	1 chick	20.0
Folly Island	41 nests		21 chicks	51.2
Hooker Valley	2 eggs		1 chick	50.0
Total	60 nests			50.0

% of eggs that produced chicks to Jan.-Feb. Further chick losses would be expected by fledging time (May), hence this is a maximum figure.

3.3 BREEDING SUCCESS

Breeding success was monitored to varying degrees in four areas, and results are summarised in Table 2.

Sixteen occupied nests were found on North-west Lyall ridge (Fig. 1) in late October, and eggs were eventually laid in 12 of these. Five eggs had been laid by 27 October and seven more by 31 October. The other sites may have been occupied by non-breeders or breeders that failed to lay; some potentially because of disturbance from being visited or banded. At two of these sites, birds were either standing beside a bowl or stood up on approach, and/or they were intermittently present. At two other sites, birds were sitting tightly for three visits but had not laid by 6 November. Disturbance caused the desertion of one nest with an egg; the bird flew away after it was banded. In total, four visits were made to the area during October-November 1995, and a final visit was made on 8 January 1996 when chicks were approximately one week old.

Five nests with eggs were found on 8 November 1995 at Beeman Hill (Fig. 1). Five visits were made to the area up until 11 February, when only one nest still had a chick (Table 2).

Folly Island had 41 occupied nests visible on 3 November 1995, and 21 chicks on 4 February 1996 Q. Scott, pers. comm.).

Two nests that were found on on 23 October 1995 (prior to laying) on the slopes of Hooker Valley, near Faye Bump, had one chick still present in early February.

The maximum possible success rate for 60 nests in four areas was 50% (Table 2). Further chick losses prior to fledging (in May) probably occurred, particularly at north-west Lyall ridge, because the last visit was early in the chick period (January).

3.4 BANDED BIRDS

Six of nine breeding birds on Beeman Hill had been banded prior to 1995, two were banded in 1995 and the remaining partner was not seen. One bird was banded as a non-breeding adult in December 1963, and was breeding two years later (NZ Banding Scheme). If the minimum age of breeding is 7 years (Marchant & Higgins 1990), then that bird was at least 37 years old. Two other birds had been banded as breeding adults in 1970, and the other three were banded as chicks in 1971, 1980 and 1985. The latter two were banded at Beeman Hill, and the other was recorded breeding as a 13 year-old there.

One bird at north-west Lyall was banded in about 1972 at an unknown locality (NZ Banding Scheme). In this area in October-November 1995, both partners at seven nests were banded, and one bird at each of five other nests was banded.

4. Discussion

4.1 POPULATION

The only previous attempt to estimate numbers of light-mantled sooty albatross nests on Campbell Island was in the 1940s. Based on counts at various parts of the island there "cannot be less than a thousand mated pairs nesting annually" (Sorensen 1950). Sorensen banded birds and studied their breeding at Beeman Hill, which was near the coast-watching station during the Second World War. The banding tradition at this site was continued by Meteorological Station staff in the 1960s-1980s, although little detail of nest numbers or banding locality was recorded. In 1958, the locations of 41 nests or pairs were noted, and the species was described as "a fairly common breeding bird" (Westerskov 1960). In 1964-1968, the localitions of 284 nests were identified (Guard 1968, unpublished wildlife distribution map). In 1984-85, Taylor (1986) noted the localition of 112 nests or nesting areas, and found them to be widespread in coastal and inland areas, and on offshore islands.

The accuracy of any survey of the inaccessible cliffs on Campbell Island cannot realistically be tested. During a census of Macquarie Island, counts using different methods were compared with the numbers of nests found during ground searches (Disney 1995). An initial circumnavigation of the coastal beaches found 43-51% of the known number of nests on two sections of coast. The counting method was by walking the coast and selecting viewing sites to count birds from, using binoculars. Another more intensive survey used viewpoints, from which nests were carefully located using binoculars and spotting scope. For the same two sections of coast, 57-76% of nests were seen (Disney 1995).

These figures cannot be strictly applied to the Campbell Island survey, because the terrain type is not comparable. Much of the Macquarie Island coastline is

steep, tussock-clad slopes, hence the vegetation would obscure nests, and in many cases it was possible to view nesting areas from sea-level (T. Disney, pers. comm.). Most of the Campbell Island survey was from cliff-top vantage points, looking down and across at the cliff faces. Some sectors of open cliff nesting habitat on Campbell Island which had good vantage points (e.g., Northwest and Cattle Bays), were probably accurately surveyed. Usually, we were confident that most, if not all nests were seen in some of the easier stretches of coast. In contrast, the Paris coastline was probably less accurately surveyed, because of the extensive cliffs. The counts provide a minimum estimate of nest numbers and the "main" vantage points provide sites for repeatable index counts in the future. A standard set of photographs and schematic drawings will be prepared for this purpose. Ground searching was the only feasible method to survey inland areas because the vegetation and terrain obscured nests.

The approximate length of Campbell Island coastline surveyed in November 1995 was 19 km, i.e., nest density was at least 15.4 nests/km, if the bluffs close to the coast were included. The remaining coast, omitting most of Perseverance and Northeast Harbours, is about 70 km. Assuming a similar average nesting density around the island, there were at least 1400 nests present in 1995-96. A similar extrapolation was used for a population estimate of South Georgia (Thomas et al. 1983).

In addition, during this study at least 77 nests were seen on five islands, and another eight islands were likely or known to have light-mantled sooty albatross nests (Taylor 1986). There were also at least thirty-two nests in four inland areas in 1995-96, but because nesting habitat appeared to be very patchy, a more thorough survey would be required to assess an average density for such inland nesting areas. Guard (1968, unpublished map) and Taylor (1986) noted nests in at least seven other inland areas not visited in 1995-96. Consequently, I have made an estimate of a further 200 nests on islands and inland areas, making the overall estimate for the island group at least 1600 nests.

Nesting numbers may vary widely between years. For example, 29 nests were noted on Folly Island on 24 November 1984, 32 on 4 November 1986 (G. Taylor, pers. comm.), 9 on 15 December 1987 (pers. obs.) and 41 on 2 November 1995 (this study)

The banding record for birds from Beeman Hill had not been analysed, but it is probably too small and variable to be of much use to assess albatross survival or recruitment. Between 1961-1970 at least 59 birds (40 adults and 19 chicks) were banded on Beeman Hill (Owens & Crompton 1970), and at least some chicks are known to have returned to breed there. Adults and chicks were banded also elsewhere on the island, but the banding locality was not always recorded (NZ Banding Scheme).

4.2 NESTING SUCCESS

The nesting success of light-mantled sooty albatross on Campbell Island by the end of the 1995-96 breeding season probably would have fallen within the previously recorded range on other islands of 20-66% (Marchant & Higgins 1990). Success of nests on Beeman Hill prior to 1995 has usually been >50%

TABLE 3 BREEDING SUCCESS (CHICKS FLEDGED FROM EGGS LAID) OF LIGHT-MANTLED SOOTY ALBATROSS ON CAMPBELL ISLAND

YEAR	BEEMAN NO. NESTS	% SUCCESS	OTHER AREAS NO. NESTS	% SUCCESS
1942	3	67		
1965	7-12	58-100		
1966	6	33	16	19
1967	7	57	18	50
1969	6	50		
1970	11	55		
1984	6	33		
1985			29	55
1995	5	S 20	55	S 53

Refs.: 1942 (Sorensen 1950)
1965-1966 (D. Paull & C.G. Surrey, unpubl. data); other areas: Col coast, Rocky Bay
1967 (Anon 1968); other areas: Col coast, Rocky Bay
1969 (Owens & Crompton 1970)
1970 (M. Crompton, unpubl. data)
1984-1985 (G. Taylor, unpubl. data); other area: Folly Island
1995 (this study, to Jan.-Feb); other areas: Folly Is., NW Lyall ridge, Hooker Valley, Southeast Harbour

(Table 3). Disturbance of pairs prior to laying in 1965 may have caused desertion (or they may have been non-breeders), but the seven nests that produced eggs were all successful. (Paull & Surrey 1969). There are few recent records, but at least seven chicks fledged from Beeman Hill in 1994-95 (M. Fraser, pers. comm.). Because the light-mantled sooty albatross tends to breed every 2-3 years, and has an average chick production per pair of only one chick every five years, the species is one of the least productive albatrosses (Weimerskirch et al. 1987). This low fecundity is apparently regulated by its pelagic foraging in non-productive waters, but is offset by high adult survival (97.3%)(Touventin & Weimerskirch 1988, Weimerskirch & Robertson 1994).

Nests have failed on Campbell Island after molestation by skuas at the egg and chick stage (Owens & Crompton 1970). In 1995-96, skuas were occasionally seen flying around the breeding areas and swooping near nests. In addition, the light-mantled sooty albatross is prone to human disturbance. Sorensen (1950) noted that caution was required in the early part of the breeding season because eggs or potential nests were sometimes deserted if birds were visited or handled for banding. This was also noted in this study, as one bird deserted an egg and some other birds may have been disturbed prior to laying. Apart

from very nervous or aggressive birds that were avoided, most could be banded without removing them from the nest.

4.3 FUTURE WORK

Because there was little evidence for current fisheries bycatch of light-mantled sooty albatross in the New Zealand region, further work in 1996-97 was not considered for funding under the Conservation Services Levy. However, as the species is known to be caught by fisheries elsewhere (Brothers 1991, Gales, in press) and new threats may establish themselves in the future, it would be desirable to have a baseline of population trends, breeding success and banding. If this was considered appropriate, the minimum work outlined below would be required. Alternatively, some aspects of the work could be done contemporaneously with other research being conducted on the island.

Census

Annual censuses of the western area of Campbell Island (Fig. 1) would need to be repeated for at least five consecutive years every decade, to establish population trends of this biennial breeder. Each survey would take at least five days. Other areas of coast (e.g., parts of north, east and south coasts) could also be surveyed to build up the sample size of standard repeatable vantage points from areas of different nesting density and to establish a more complete estimate of population trends. If a full coastal census was contemplated, it would require about 25 days of fine calm weather. A variety of inland sites (e.g., Honey, Dumas, Fizeau) could be searched to assess the density of nests. At least 14 days would be required.

Breeding monitoring

Nests at Beeman Hill, north-west Lyall ridge could be monitored for breeding success, and adults and chicks banded for at least five consecutive years, alternated with intervals of five years. Southeast Harbour, with a high concentration of accessible nests, and a nearby hut, is a potential monitoring area. Nesting areas should be visited after eggs are laid e.g., after 10 November. At least three or four visits at weekly intervals would be required to find partners, followed by a check in early January, and banding of chicks in late February. A check in early May would be ideal to determine breeding success. Nests at Folly Island can be monitored by counting nests and chicks from a viewpoint on the main island.

Banding

Banding of breeding adults must be done by an experienced bander, preferably while the birds are on the nest, and after the laying period (e.g., after 10 November). Aggressive and nervous birds are to be avoided, especially at the egg stage.

4.4 PROBLEMS FOR FUTURE WORK

There are a number of problems to be considered or overcome before embarking on light-mantled sooty albatross work on Campbell Island.

1. Nests that are on coastal cliffs are inaccessible. Hence, although most of the coastline can be censused by using binoculars and telescope, the accuracy of counts cannot be tested. Censuses are prone to the vagaries of weather, light conditions, time available and enthusiasm of the observers. However, they provide minimum estimates of the size of the breeding population. Also, it is feasible to measure rates of population change over time, by using the same "main" vantage points for index counts. Banding birds close to coastal areas seems of little value, as they may not use accessible sites every breeding attempt and future recruitment would be more difficult to monitor.
2. Nests in inland areas are on steep, heavily vegetated slopes and bluffs, and are patchily distributed and low in density. Such terrain does not lend itself to the use of vantage points, as very few nests would be visible. Searching for nests is very time-consuming (e.g., 12 nests on north-west Lyall ridge took one person about six hours to locate, and 5 nests on Beeman Hill took three hours), and for census purposes, counts will vary with the enthusiasm and capabilities of the personnel. However, small areas could be searched thoroughly each year to monitor breeding. Known concentrations of nests are one to three hours walk from base, and by extending the search areas, it should be possible to find about 50 nests for intensive monitoring and banding of adults.
3. Beeman Hill is relatively easy to search and monitor, however there are few nests there. There is a history of banding and nest monitoring at this site, but effort and data collection has been sporadic and inconsistent because of its voluntary nature. Folly Island is a potential monitoring site, however access is difficult, and visits should be avoided as the slope appears steep and fragile.
4. Breeding adults are very prone to disturbance early in incubation.
5. The light-mantled sooty albatross breeds at lower frequency (every 2-3 years if successful) and is less productive than any other albatross species (Jouventin & Weimerskirch 1988). Hence, detailed population studies to follow banded individuals and monitor recruitment will take longer and require more effort than for other species.

5. Acknowledgements

Thanks to Nadine Parker for field assistance. Helpful comments on the manuscript were made by Ralph Powlesland, Graeme Taylor and Don Newman.

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