NIWA
Taihoro Nukurangi

Population study of Southern Buller's Albatrosses on The Snares

Population study of Buller's Albatrosses

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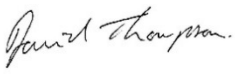

Dr David Thompson

Approved for release by

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Executive summary

This report presents a summary of the results of the collection of demographic data at three study colonies of Southern Buller's Albatross *Thalassarche bulleri bulleri* breeding at The Snares from 23-29 March 2015.

Demographic studies at the three study colonies have been undertaken annually since 1992, and so this report incorporates some of these data in the current analysis. Estimates of the numbers of breeding pairs, made by recording the contents of each nest mound, showed slight decreases in all three colonies over the numbers recorded during 2014. With the assumption that the combined total number of breeding pairs in the three study colonies was representative of North East Island as a whole then the breeding population probably peaked in 2005-2006 and has since undergone marked annual variations.

A total of 295 birds that had been banded previously in the study colonies as breeding adults of unknown age were recaptured. A further 26 breeding birds were banded in the study colonies - these are presumed to be first-time breeders. During the period 1992-2004 all chicks that survived to near-fledging in the study colonies were banded and their survival to return to the study colonies in subsequent years has been monitored. This year 134 of these birds were recaptured, with birds from cohorts banded from 1999 to 2004 being recaptured for the first time, and so showing the long-term monitoring required to obtain reliable estimates of survival of such known-age birds. A further 36 known-age birds, from cohorts banded 1996-2004, were found breeding for the first time, and so were recorded as being recruited to the breeding population.

1 Background

This project was funded by the Conservation Services Programme of the Department of Conservation. The specific objectives of the project were to:

1. Resurvey three established study colonies.
2. Establish the numbers of pairs breeding in the three established study colonies.
3. Establish annual survival of banded birds from recapture data.

This report describes the field work completed at The Snares under permits (Entry 41724-LND and Research and Collection SO-32541-FAU) granted by the Department of Conservation.

Field work centred on obtaining information about the population dynamics of Southern Buller's Albatross, particularly population size, adult survival, breeding frequency, and recruitment of known-age birds in three long-term study colonies. This was the 24th consecutive year of recording demographic data of Southern Buller's Albatrosses in these study colonies at The Snares.

2 Methods

2.1 Logistics

Logistical support was provided by *RV Tiama* (skipper/owner Henk Haazen). The field team (comprising Paul Sagar (NIWA) and Igor Debski (Department of Conservation)), were dropped off at North East Island on 23 March 2015. *Tiama* returned to The Snares on 29 March, picked up the field team and returned them to Bluff on 30 March 2015.

2.2 Study colonies

All of the three study colonies (Mollymawk Bay, Lower Punui Bay and Upper Punui Bay) were visited; Upper and Lower Punui Bay on 24, 26, 27 and 29 March, and Mollymawk Bay on 23, 25 and 28 March 2015. On the first visit to each colony all nests were inspected and the contents recorded. Band numbers of all adult birds associated with these nests were recorded, and any unbanded birds incubating or guarding a chick were captured and fitted with a uniquely numbered stainless steel leg band. All adult birds recorded on this first visit were marked with blue raddle (a temporary stock marker) so that they were not recaptured on the subsequent visits. The large majority of the partners of the birds recaptured on this first visit were at sea, and so subsequent visits were made to allow time for these birds to have returned to the colony and taken over incubation or chick-guarding duties. On these subsequent visits to each colony, all nests were checked again and any birds not marked with raddle were captured and band numbers recorded or leg bands applied, as appropriate. In addition, on each visit an attempt was made to recapture as many as possible of the banded non-breeding birds that were loafing in the colonies.

2.3 Banded birds outside study colonies

Surveys of breeding albatrosses in colonies immediately adjacent to and up to 300 m from to the study colonies were made to check for banded birds. This information was used to estimate the dispersal rate of birds banded in the study colonies.

3 Results

3.1 Numbers of occupied nests

Totals of 123, 55 and 75 nests with an egg were counted in the Mollymawk Bay, Lower Punui Bay and Upper Punui Bay study colonies, respectively. Of these totals, two nests in Mollymawk Bay each contained the remains of a broken egg or a dead chick, in the Lower Punui Bay colony three nests contained the remains of a broken egg, and two nests contained the remains of a broken egg in the Upper Punui Bay study colony.

These totals represent decreases, relative to numbers counted in February 2014 (Figure 3-1), in the Mollymawk Bay, Lower Punui Bay and Upper Punui Bay colonies of 6.8%, 14.1% and 11.8%, respectively.

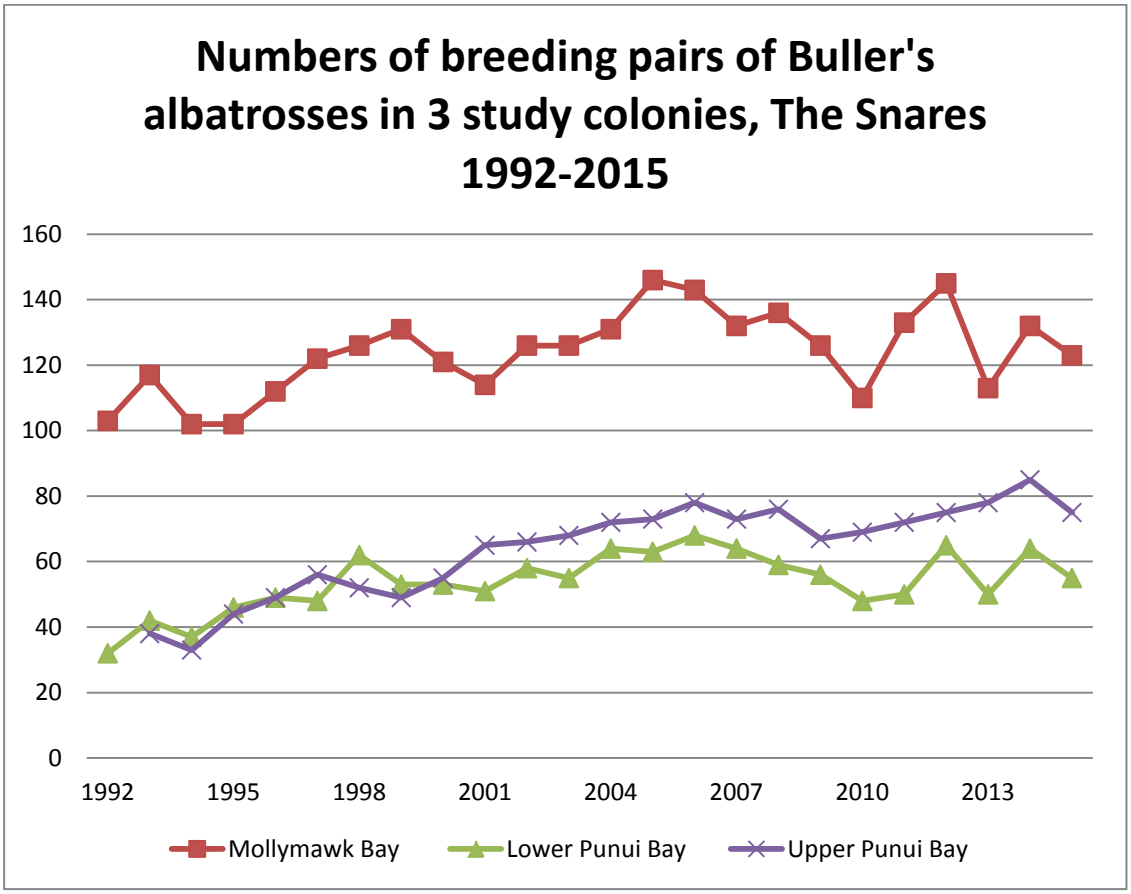

Figure 3-1: Numbers of breeding pairs of Southern Buller's albatrosses counted annually at three study colonies, The Snares 1992-2015.

3.2 Adult survival

A total of 295 birds that had been banded previously as breeding adults of unknown age were recaptured. This total comprised breeding birds, non-breeding birds, and failed breeders. In addition, a further 26 breeding birds (i.e. birds that were incubating or guarding a chick) were banded within the study colonies. Because birds breeding in the study colonies have been checked annually and any new birds banded since 1992 we assumed that any birds captured that are not banded are first-time breeders, and so likely to be 10-12 years old, the average age of first breeding (Francis & Sagar 2012).

Banding schedules for all newly banded birds have been submitted to the Banding Office, Department of Conservation, Wellington.

3.3 Survival and recruitment of known-age birds

Return rate of known-age birds

The return rate of known-age Southern Buller's Albatrosses is the proportion of a cohort of chicks that is recaptured several years after banding. Of the 2765 birds banded as chicks near fledging in the study colonies and adjacent colonies between 1992 and 2004, 134 were recaptured during March 2015. These birds were from cohorts banded between 1992 and 2004. The oldest known-age birds recaptured for the first time were from the 1997 cohort, and so were 17 years old. This indicates that

many more years of recapture effort are required to obtain reliable estimates of the survival of these known-age birds.

Of the 1991 birds banded as chicks near fledging in the study colonies during the period 1992-2004 (which would now be at least ten years old), 497 (25.0%) have been recaptured. The lowest rate of return (4.7%, five recaptured from 107 banded) is for the 2003 cohort in Punui Bay (Lower and Upper Punui Bay study colonies combined) and the highest rate of return (44.3%, 27 recaptured from 61 banded) from the 1995 cohort in these same colonies (Table 3-1).

Table 3-1: Number (% of total banded) of Southern Buller's Albatrosses, banded as well-grown chicks in 1992-2004, returning to The Snares, by colony of provenance.

Colony/cohort	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Mollymawk Bay	19 (27.1)	27 (30.7)	26 (37.1)	6 (26.1)	19 (22.4)	20 (21.0)	32 (39.5)	31 (35.2)	20 (22.5)	17 (21.0)	20 (21.1)	20 (21.1)	14 (14.1)
Punui Bay	20 (43.5)	12 (20.7)	18 (41.9)	27 (44.3)	21 (32.3)	26 (34.7)	17 (22.1)	9 (17.7)	18 (21.4)	17 (20.7)	15 (16.0)	5 (4.7)	21 (23.6)

With no new birds recaptured during March 2015 from the 1992 to 1998 cohorts banded in the study colonies it is unlikely that any further birds from these cohorts will be recorded. A plot of the overall return rate (all three study colonies combined; Figure 3-2), shows that the percentage of banded known-age birds returning varied from 26.7% (1993 and 1996 cohorts) to 39.3% (1995 cohort) for the cohorts banded 1992 to 1999. Currently, the return rate of cohorts banded 2000-2004 varies from 12.4% (2003 cohort) to 22.0% (2000 cohort) indicating that more birds from these cohorts have yet to be recaptured.

Recruitment rate of known-age birds

The recruitment rate of known-age Southern Buller's Albatrosses is the proportion of a cohort of chicks that is recaptured as breeding adults several years after banding: the recruitment rate is invariably less than the return rate because usually there are several years difference between when the birds first return to the breeding colonies and when they make their first breeding attempt. Consequently, mortality in the years between returning and the first breeding attempt accounts for the lower recruitment over return rate.

In March 2015, 36 known-age birds, banded as chicks in the study colonies, were found breeding for the first time i.e. they had recruited to the breeding population. Of these, three were aged 11 years (banded as chicks in 2004), seven were aged 12 years (banded as chicks in 2003), six were aged 13 years (banded as chicks in 2002), nine were aged 14 years (banded as chicks in 2001), three were aged 15 years (banded as chicks in 2000), two were aged 16 years (banded as chicks in 1999), three were aged 17 years (banded as chicks in 1998), one was aged 18 years (banded as a chick in 1997), and two were aged 19 years (banded as chicks in 1996).

A plot of recruitment rate, by cohort, of birds banded as chicks 1992-2004 (Figure 3-2) shows an apparent decline throughout this period. However, given that the mean age of first breeding of Southern Buller's Albatrosses at The Snares is 10-12 years (Francis & Sagar 2012), more birds from the later cohorts are likely to be recorded breeding in future. Therefore, it is probably prudent to estimate recruitment only for the 1992-1999 cohorts i.e. birds aged 16-23 years. Currently, these range from 8.7% for the 1995 cohort from Mollymawk Bay to 28.7% for the 1992 cohort from Punui

Bay (Table 3-2). However, it is also worth noting that there is considerable variation in the recruitment rate both between years and between colonies in the same year (Table 3-2);

Table 3-2: Numbers (% of total banded as well-grown chicks) of known-age Southern Buller's Albatrosses recruiting (i.e. returning to breed) to The Snares, by colony of provenance, for cohorts banded 1992-1999.

Colony/cohort	1992	1993	1994	1995	1996	1997	1998	1999
Mollymawk Bay	14 (20.0)	18 (20.5)	14 (20.0)	2 (8.7)	9 (10.6)	8 (8.4)	11 (13.6)	21 (23.9)
Punui Bay	13 (28.3)	8 (13.4)	11 (25.6)	12 (19.7)	14 (21.5)	20 (26.7)	13 (17.3)	8 (15.7)

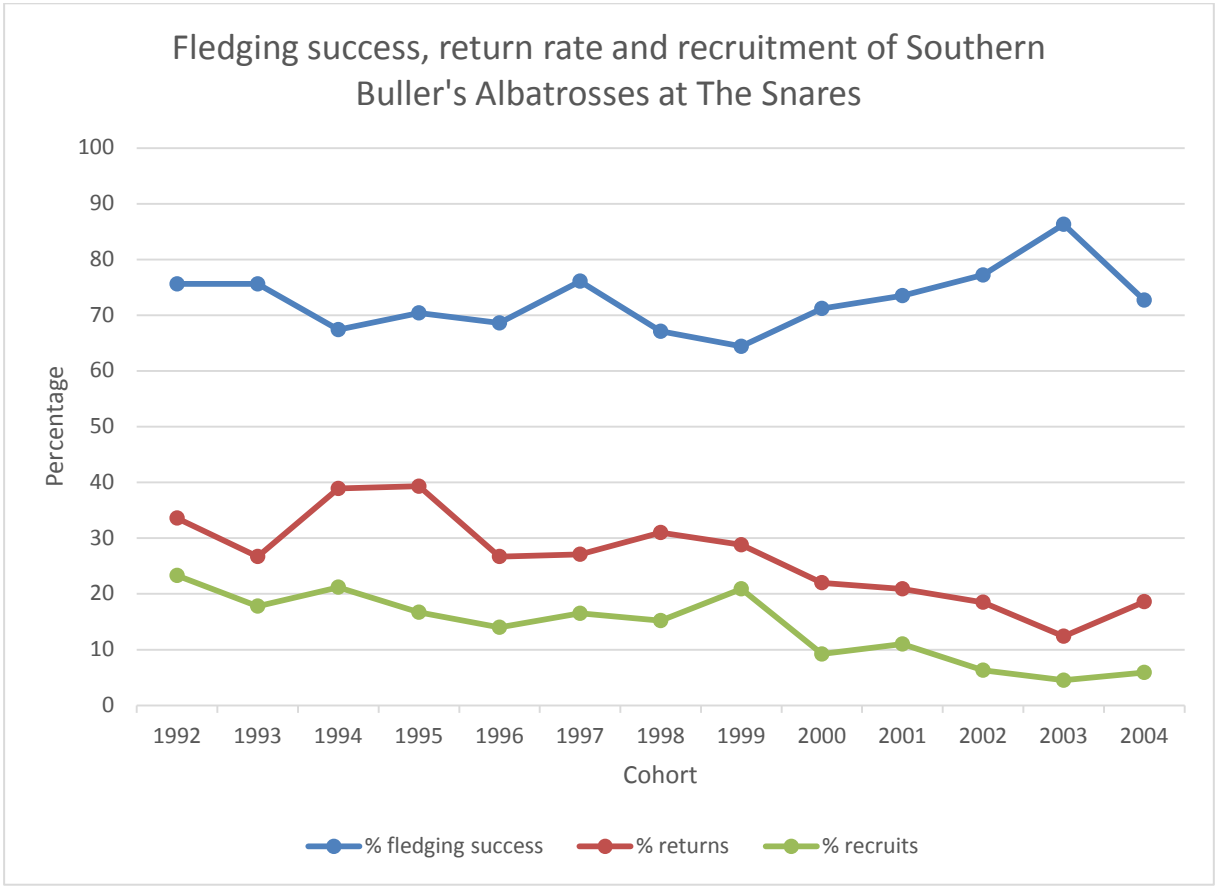

Figure 3-2: Fledging success and return and recruitment rates of Southern Buller's Albatrosses banded as chicks in three study colonies at The Snares, 1992-2004.

A plot of the overall recruitment rate (all three study colonies combined; Figure 3-2), shows that the percentage of banded known-age birds from the 1992 to 1999 cohorts that returned and survived to breed varied from 13.3% (1998 cohort) to 23.3% (1992 cohort). Currently, the recruitment rate of known-age birds banded 2000-2004 varies from 4.5% (2003 cohort) to 11.0% (2001 cohort), with more birds likely to be recorded from these cohorts in future.

Despite searches for banded birds being made in other colonies adjacent to the three study colonies, some birds, particularly females, will have settled to breed elsewhere on North East Island (Sagar et al. 1998), and so the percentage returns from each cohort should be considered as a minimum.

3.3.1 Birds banded before 1992

At The Snares breeding birds were banded during studies in 1948, 1961 and most years 1967-1977. No banded birds from these years were recorded during Mar 2015. In addition, 859 well-grown chicks were banded at a large number of colonies distributed over much of North East Island during August 1972 (Sagar et al. 1998). Two of the latter were recorded during March 2015, both incubating. At 43 years these are the oldest known-age Southern Buller's Albatrosses.

4 Discussion

Information from annual counts of the numbers of Southern Buller's Albatrosses breeding in three study colonies 1992 to 2015 indicates that such annual counts provide a useful index of trends in the whole-island population.

4.1.1 Study colonies

Information from the three study colonies suggests that the breeding population peaked during 2005-2006, then trended downward until 2010 and subsequently has had marked annual increases and decreases. The trends until 2007 broadly reflect changes in annual adult survival (Sagar et al. 2000; Francis & Sagar 2012), with higher annual adult survival rates 1992-1997 (Sagar et al. 2000) followed by declines through to 2007 at least. (Francis & Sagar 2012).

The return and recruitment rates of known-age birds banded 1992-2004 shows considerable variation both within colonies between years and between colonies within the same year. Although future fieldwork is likely to increase both return and recruitment rates for the cohorts 2000-2004, few new birds are likely to be recaptured from cohorts banded 1992-1999 inclusive. Currently, the return rates for cohorts banded in 1994 and 1995 are higher than in any other years and there appears to be an annual decline in the recruitment rate for cohorts banded 1992-1998.

A combination of an apparent recent decline in annual survival rates of breeding birds and reduced recruitment of known-age birds could lead to a decline in overall abundance. Incorporation of the 2014 whole-island count data and the mark-recapture data from the three study colonies 2008-2014 into an updated SEABIRD model analysis, as proposed by the Ministry for Primary Industries, will provide a more robust estimation of population trend in this species.

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