Population studies of southern Buller's albatrosses at Tini Heke / The Snares Islands and Hautere / Solander Islands

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Prepared for Conservation Services Programme, Department of Conservation, POP2023-02

July 2024

PARKER CONSERVATION

Population studies of southern Buller's albatrosses at Tini Heke / The Snares Islands and Hautere / Solander Islands 2024

Final report to Department of Conservation, Conservation Services Programme

July 2024

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Please cite as:

Sagar, P., Rexer-Huber, K., Thompson, D., Parker, G. 2024. Population studies of southern Buller's albatrosses at Tini Heke / The Snares Islands and Hautere / Solander Islands. Final report to the Conservation Services Programme, Department of Conservation. Parker Conservation, Dunedin. 14 p.

Summary

This report presents a summary of the results of demographic studies at three study colonies of southern Buller's albatrosses *Thalassarche bulleri bulleri* breeding at Tini Heke / The Snares from 6 to 16 April 2024. We also describe a brief visit to southern Buller's albatross colonies on Solander Island on 9 March 2024.

Demographic studies at the three study colonies on The Snares' North East Island have been undertaken annually 1992–2024, with the exception of 2018 and 2021. Estimates of the numbers of breeding pairs, made by recording the contents of each nest mound, decreased substantially in all three study colonies compared to 2023, with numbers in the Mollymawk Bay study colony being the lowest recorded during the current study. 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, with decreases in the past two years. If the decreases of 27.3% to 34.8% in the three study colonies are reflected in the population as a whole, then this will be a major concern for the conservation status of the species.

A total of 315 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. Although the most recent estimate of annual survival of birds banded as breeders (0.93 ± 0.03) was similar to the previous year's estimate of 0.94 ± 0.01, the last four estimates over the period 2018 to 2023 have varied between 0.84 and 0.94. 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 92 of these birds were recaptured, with birds from cohorts banded from 1994 and 2002 recorded as breeding for the first time. This demonstrates the long-term monitoring required to obtain reliable estimates of survival of such known-age birds. In addition, five birds that had been banded as near-fledging in the study colonies during Sep 2013 and Sep 2014 were also recaptured for the first time.

At Solander, 20 trackers were deployed on breeding Buller's albatrosses to follow year-round at sea distributions. At the Snares Time Depth Recorders (TDRs), Global Location Sensing (GLS) light-based geolocators and IgotU Global Positioning System (GPS) data loggers were deployed on 13 breeding Buller's albatrosses to investigate diving behaviour and at sea distribution patterns. These deployments were short-term, and 12 of 13 devices were recovered during the trip. Eight Druid satellite transmitting tags paired with eight GLS were also fitted to breeding Buller's albatrosses and these were securely attached for long term deployments to inform year-round at sea distributions.

In 2020 50 GLS tags were attached to the metal leg bands of breeding birds in the Mollymawk Bay study colony at The Snares; of these, 31 were retrieved in 2022, a further three during the 2023 field season, and one this year. A further 26 GLS tags were deployed at Mollymawk Bay study colony in the visit reported here.

Twelve replacement trail cameras were deployed to upgrade those previously installed in 2022 at breeding colonies on The Snares and set to record one photograph every hour during daylight for a further year.

Contents

Background

This project was funded by the Conservation Services Programme, Department of Conservation (CSP, DOC). The purpose of the project was to continue the demographic study at three study colonies of breeding southern Buller's albatrosses *Thalassarche bulleri bulleri*, which had been initiated in 1992 and continued annually to 2024, with the exception of 2018 and 2021. The specific objectives of the project were to:

- Establish the numbers of pairs breeding in the three established study colonies.
- Establish annual survival of banded birds from recapture data.
- Retrieve SD cards and replace existing cameras at The Snares colonies with 12 new ones to record nest survival over a further full 12-month period.
- Deploy satellite tracking devices on breeding birds at Solander Island and collect nest-contents ground-truthing data during helicopter-based aerial photography of the Buller's albatross colonies
- Deploy Time Depth Recorders (TDRs), Druid satellite transmitters, IgotU Global Positioning System (GPS) data loggers and Global Location Sensing (GLS) light-based geolocators on breeding birds at The Snares to investigate diving behaviour and distribution patterns. In addition, as required, the retrieval of tracking devices deployed in previous years.

This report describes the field work completed at The Snares and Solander Islands under contract POP2020-03 to the Department of Conservation.

Fieldwork centred on 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. Demographic data of southern Buller's albatrosses in these study colonies at The Snares were recorded annually 1992–2017 and 2019–20 and 2022–23.

Methods

Logistics

Transport to and from The Snares was provided by the vessel Awesome (skipper, plus two to three crew). The field team (comprising Graham Parker, Kalinka Rexer-Huber and Paul Sagar) were dropped off at Boat Harbour, North East Island at 10:00 on 6 April 2024, after a 2-day delay due to weather and sea conditions. The pick-up by the Awesome was brought forward by a day due to weather and sea conditions and the party was returned to Bluff on 17 April.

The Snares (48°01'S, 166°36'E) comprise North East Island (280 ha) and Broughton Island (90 ha), plus numerous islets and stacks (Figure 1). The laying period of southern Buller's albatrosses at The Snares extends from late December to the end of February, with most eggs laid by late January (Sagar & Warham 1998). Hatching occurs from mid-March with a peak in the 1st week of April. Therefore, in 2024 the timing of counts was scheduled to occur close to the end of incubation, when most birds sitting on a nest were assumed to have shorter incubation stints, and so change-overs at the nests were more frequent and allowed a greater proportion of partners to be captured/recaptured. Capturing a greater number of breeding birds reduces the standard errors around estimated mean annual survival rates, and so allows greater confidence in the data.

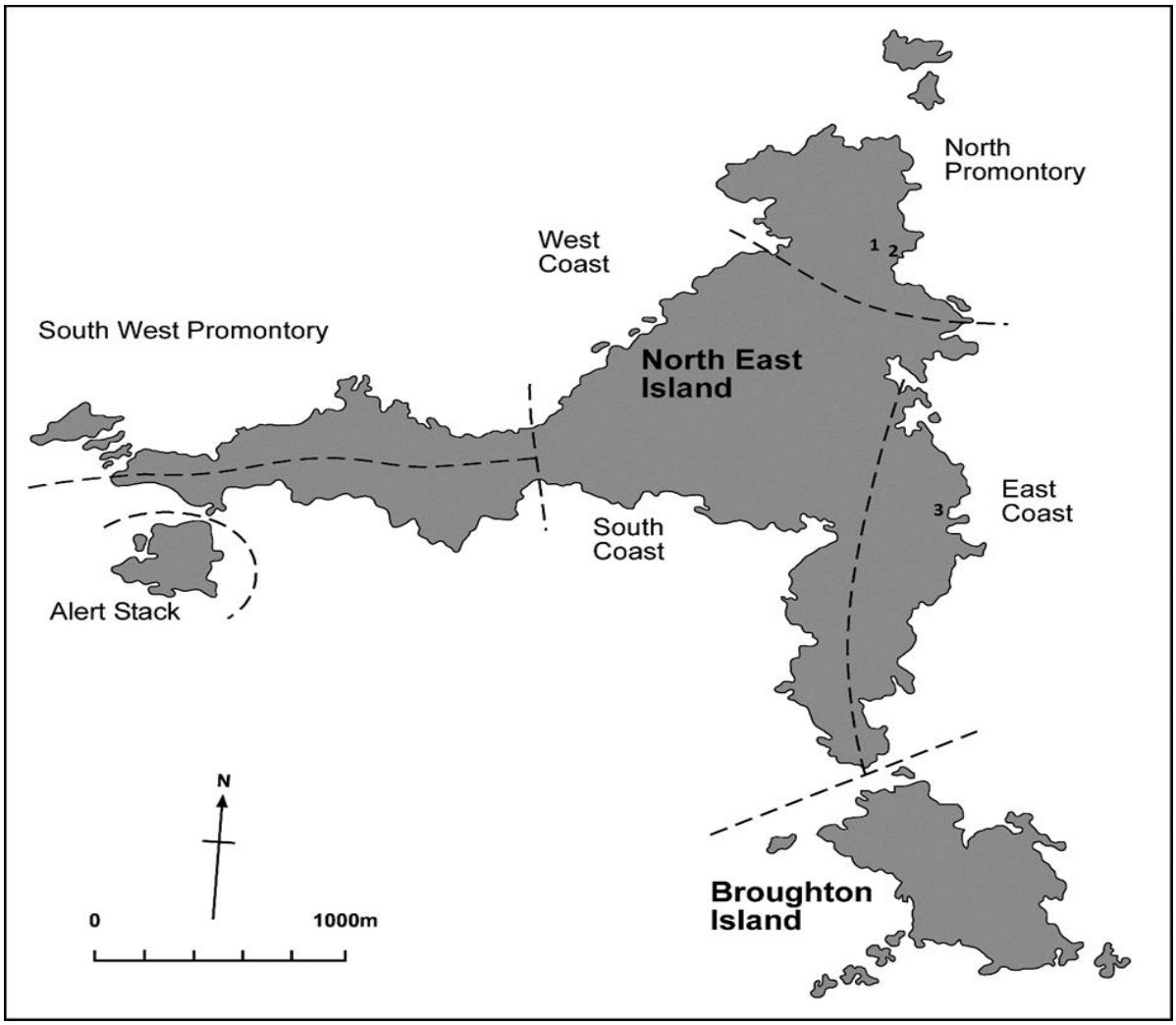

Figure 1. Tini Heke | The Snares, showing locations of the study colonies on North East Island. 1, Upper Punui Bay; 2, Lower Punui Bay; 3, Mollymawk Bay. Dashed lines indicate boundaries of areas for whole-island counts of breeding pairs of southern Buller's albatross (although such counts were not undertaken in 2024).

Study colonies

Each of three study colonies (Mollymawk Bay, Lower Punui Bay and Upper Punui Bay; Fig. 1) on North East Island was visited 2–5 times; Upper Punui Bay on 7, 10, 12, 14 and 16 April), Lower Punui Bay on 7, 10, 12 and 16 April 2024, and Mollymawk Bay on 8 and 14 April 2024. On the first visit to each colony, all nests were inspected, and the contents recorded. The presence of abandoned or broken eggs and dead chicks were also recorded. This figure is useful because unlike at other colonial albatross colonies, predation of albatross eggs or small chicks by red-billed gulls (*Chroicocephalus novaehollandiae*) and subantarctic skuas (*Stercorarius antarcticus*) has not be recorded at The Snares. Therefore egg/chick remains were included in the estimated total numbers of breeding pairs, and so provided comparable data across all years, despite variation of up to a month in the timing of visits. Band numbers of all adult birds associated with these nests were recorded and any unbanded birds incubating 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 visit. On the second

and 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.

GLS devices were deployed on 26 breeding birds in the Mollymawk Bay study colony on 15 April 2024.

Twelve replacement trail cameras and SD cards were deployed with each camera attached to either a warratah or a suitable branch so that it overlooked 4–6 breeding birds. Where necessary the position of cameras was changed to allow coverage of more active nests.

Banded birds outside study colonies

As many birds as possible were checked for leg bands in breeding colonies adjacent to the study colonies. This information was used to estimate the dispersal rate of birds banded in the study colonies.

Survival estimation

Survival was estimated from the banded birds with maximum likelihood mark-recapture statistical methods using MARK via the R package RMark (White & Burnham 1999; Laake 2013; R Core Team 2023) and the standard Cormack-Jolly-Seber model. As best as possible, methods followed the approach used for previous southern Buller's albatross survival analyses from The Snares (Thompson & Sagar 2022; 2023). The model was run using data from 1,847 breeding birds banded 1992 to 2024, including data on sex assigned using the measurement of minimum bill depth and tarsus width (Sagar et al. 1998), and by cross-referencing with the partner of each bird, where this was known. There were no field visits to the island in 2018 and 2021, so survival has not been estimated for these years.

We first tested a range of models for best fit, comparing models using AICc. Specifically, we created models where both survival and resighting probability (or detection probability) either varied by time, sex, or were held constant. Annual survival was then estimated using the best-fitting model.

Solander Island

In addition to the Snares trip, a single day visit via helicopter to Hautere / Solander Island in early March, dependent on weather, was planned for demographic and at sea data. Travel to Solander Island was with Southern Lakes Helicopters, piloted by Michael Hayes. The helicopter departed Aparima Marae Colac Bay ~09:00 and returned to there at ~15:30.

Wildlife Computer TAVs were deployed on breeding southern Buller's albatrosses. In addition, ground-based calibration transects were conducted while aerial photographs of colonies were being taken, to estimate the ratio of pretend-nesters (apparently-nesting birds with no egg) present in aerial-image nest counts at the time of photography. Along each transect, the contents of the nest cup were checked if a bird appeared to be nesting (sitting in incubation posture or ANA, apparently nesting albatross). The estimated has-egg rate (n ANA sitting on an egg/total ANA checked) is calculated from these nest-contents checks.

Results

Numbers of occupied nests

Totals of 59, 40 and 86 nests with an egg or chick were counted in the Upper Punui Bay, Lower Punui Bay and Mollymawk Bay study colonies, respectively (Fig. 2). Included in these totals were four nests in Upper Punui Bay each containing an abandoned (cold) egg or egg fragments indicating that the egg had been broken earlier that breeding season. At each of both Lower Punui Bay and Mollymawk Bay there were three abandoned or broken eggs.

The 2024 totals represent decreases, relative to numbers counted in March 2023, in the Upper Punui Bay, Lower Punui Bay and Mollymawk Bay study colonies of 28.5%, 27.3% and 34.8%, respectively.

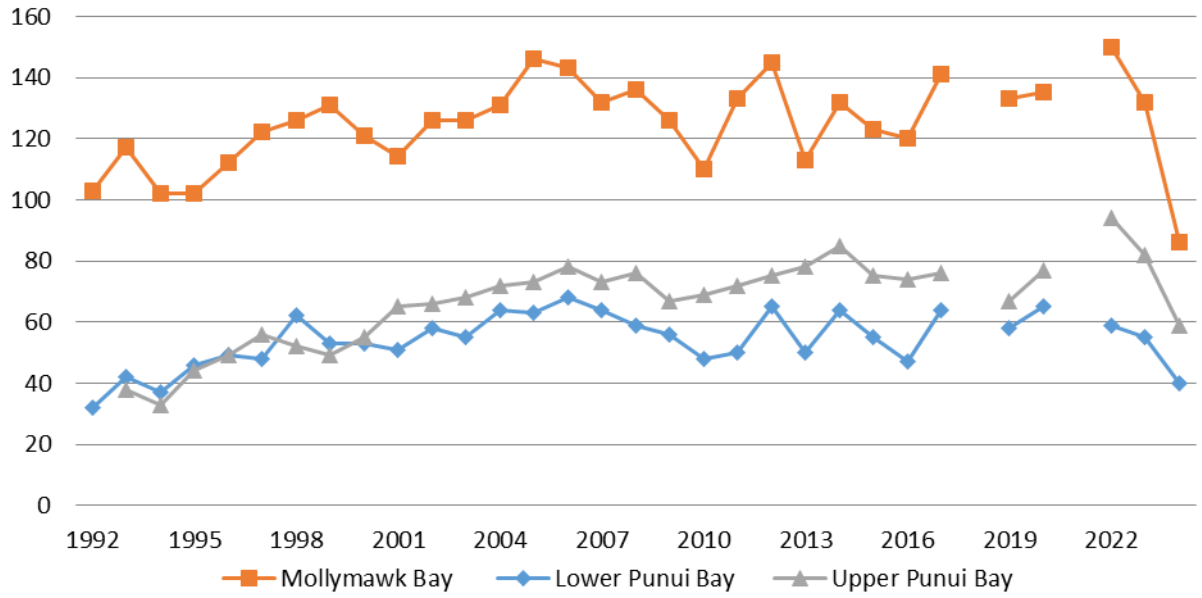

Figure 2. Numbers of breeding pairs of southern Buller's albatrosses counted annually at three study colonies, The Snares 1992-2024. No visits were made to the study colonies in 2018 and 2021, hence the gaps in the data.

Adult survival

A total of 315 birds that had been banded previously as breeding adults of unknown age in the study colonies 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 brooding a chick) were banded within the study colonies. Because birds breeding in the study colonies have been checked annually, and new birds banded since 1992, we assumed that 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).

At The Snares, breeding birds were banded during studies in 1948, 1961 and most years from 1967 to 1977. No banded birds from these years were recorded during April 2024.

All banding data (newly banded birds plus recaptures) have been submitted to the Banding Office, Department of Conservation, Wellington.

A range of mark-recapture models for southern Buller's albatrosses were compared using AICc. The best supported model was one where both survival rate and resighting probability differ over time (model 1, Table 1); in other words, the model that best fit the data was one that explicitly accounts for the varied resighting effort and survival rates seen in the dataset over time. There was less support for survival being constant over time or survival differing by sex (models 2 and 3, Table 1). There was no indication that resighting probability should be treated as a constant over time, or that it varies by sex (models lower-ranking therefore not shown).

Table 1. Model selection table for the top three models of southern Buller's albatross survival

Model		npar	AICc	ΔAICc
1.	Survival varies with time, resighting probability varies with time	60	22161.68	0.00
2.	Survival constant, resighting probability varies with time	31	22358.39	196.7166
3.	Survival varies by sex and resighting probability varies with time	32	22358.41	196.7358

Using the best-supported model to estimate annual survival rates—accounting for varying survival and resighting probabilities over time—annual survival was relatively high before 2012, with values varying around an average of 0.95 ± 0.01 (± 1 SE). Since 2012, point estimates have tended to decline, with average annual survival of 0.91 ± 0.02 (Table 2, Figure 3). The last four estimates over the period 2018 to 2023 have varied between 0.84 and 0.94 (Table 2). The most recent estimate of annual survival of birds banded as breeders was 0.93 ± 0.03.

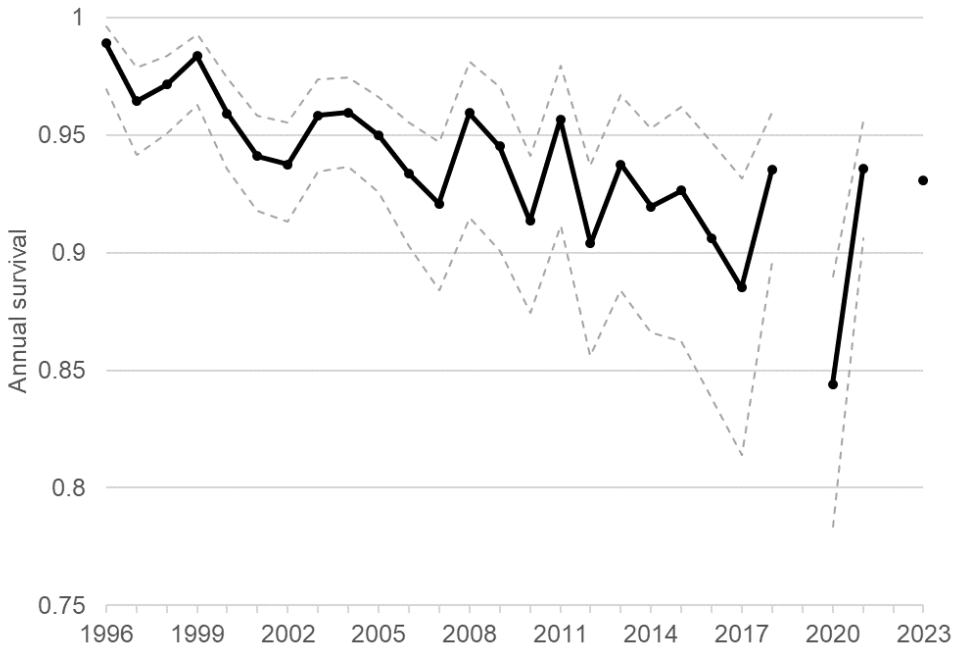

Figure 3. Estimated annual survival of southern Buller's albatrosses at The Snares. Survival estimates are black dots and black lines; variance estimates (upper and lower 95% confidence intervals) are grey dashed lines. Note: the date convention, where 1993 refers to the 1992–1993 breeding season.

Table 2. Estimated annual survival ± 1 SE, for southern Buller's albatross at The Snares, from field visits 1992–2024. Note we follow the convention where the 1993 estimate is that for the year 1992–1993. There were no research visits in 2018 and 2021. The 2024 estimated is omitted since mark-recapture estimates for the most recent year of data are not accurate and precise enough to be useful.

Year	Survival estimate	Standard error
1993	0.995	0.005
1994	1.000	0.000
1995	1.000	0.000
1996	0.989	0.006
1997	0.965	0.009
1998	0.971	0.008
1999	0.984	0.007
2000	0.959	0.010
2001	0.941	0.010
2002	0.938	0.011
2003	0.958	0.010
2004	0.960	0.009
2005	0.950	0.010
2006	0.934	0.013
2007	0.921	0.016
2008	0.960	0.016
2009	0.945	0.017
2010	0.914	0.017
2011	0.957	0.016
2012	0.904	0.020
2013	0.938	0.020
2014	0.920	0.021
2015	0.927	0.024
2016	0.906	0.027
2017	0.885	0.029
2018	0.935	0.016
2019		
2020	0.844	0.027
2021	0.936	0.013
2022		
2023	0.931	0.032

There were no research visits in 2018 and 2021. Mark-recapture estimates tend to be poor for the most recent year of data collection, and so the 2024 survival estimate is not shown.

The best-fitting model does not require sex to best describe southern Buller's albatross survival rates (Table 1). However, for comparison with previous work we present annual survival estimates for males and females. Male and female survival estimates were similar, as would be expected, and tracked very closely with estimates for the population as a whole (Figure 4).

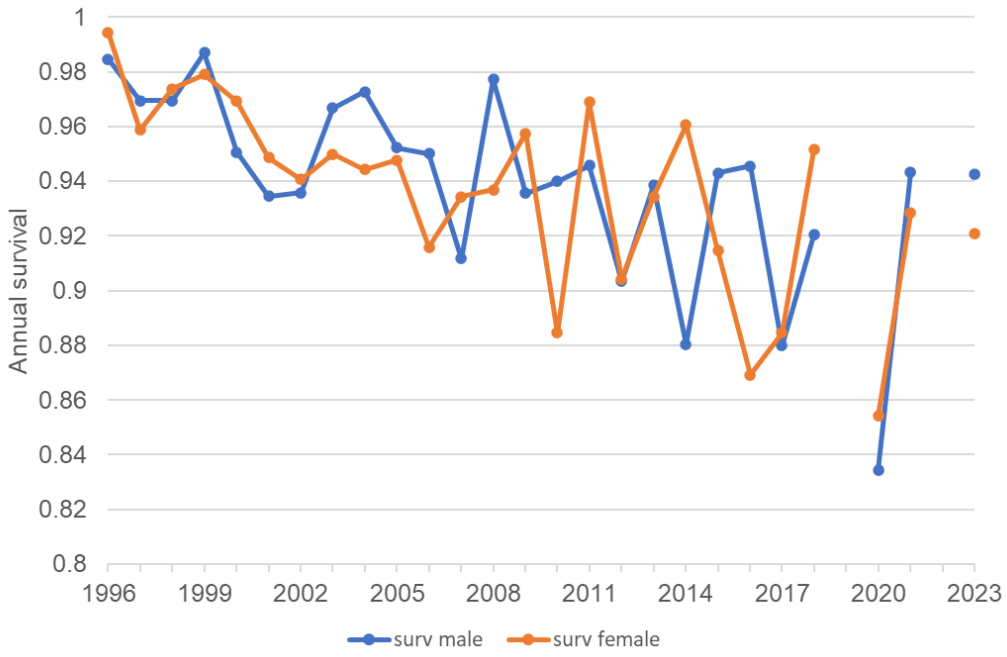

Figure 4. Annual survival estimates for male (blue) and female (orange) southern Buller's albatross at The Snares.

Return rate of known-age birds

The return rate of known-age southern Buller's albatrosses is the proportion of a cohort of chicks banded close to fledging, and subsequently recaptured. Of the 2,765 birds banded as chicks near fledging in the study colonies and adjacent colonies between 1992 and 2004, 92 were recaptured during April 2024. The oldest known-age bird recaptured in the three study colonies for the first time was from the 1996 cohort, and so was 28 years old. This indicates that many years of recapture effort are required to obtain reliable estimates of the survival of these known-age birds.

Of the 1,991 birds banded as chicks near fledging in the study colonies during the period 1992–2004 (which would now be at least 20 years old), 578 (29.0%) have been recaptured. The lowest rate of return (14.9%, 16 recaptured from 107 banded) is for the 2003 cohort in Punui Bay (Lower and Upper Punui Bay 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).

Table 3. Number banded, number recaptured and *% recaptured of total banded in each cohort* of southern Buller's albatrosses, banded as well-grown chicks in 1992–2004, returning to The Snares. Data are presented by colony of provenance, with Punui Bay colonies combined.

Colony/ cohort	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Mollymawk Bay	70	88	70	23	85	95	81	88	89	81	95	95	99
	19	28	26	6	19	19	32	34	26	17	21	30	31
	27.1	*31.8*	*37.1*	*26.1*	*22.4*	*20.0*	*39.5*	*38.6*	*29.2*	*21.0*	*22.1*	*31.6*	*31.3*
Punui Bay	46	58	43	61	65	75	77	51	84	82	94	107	89
	18	12	17	27	22	29	21	12	20	17	24	16	35
	39.1	*20.7*	*39.5*	*44.3*	*33.3*	*38.7*	*27.3*	*23.5*	*23.8*	*20.7*	*25.5*	*15.0*	*39.3*

A plot of the overall return rate (all three study colonies combined; Figure 5), shows that from these cohorts the percentage of banded known-age birds returning varied from 20.9% (2001 cohort) to 39.3% (1995 cohort).

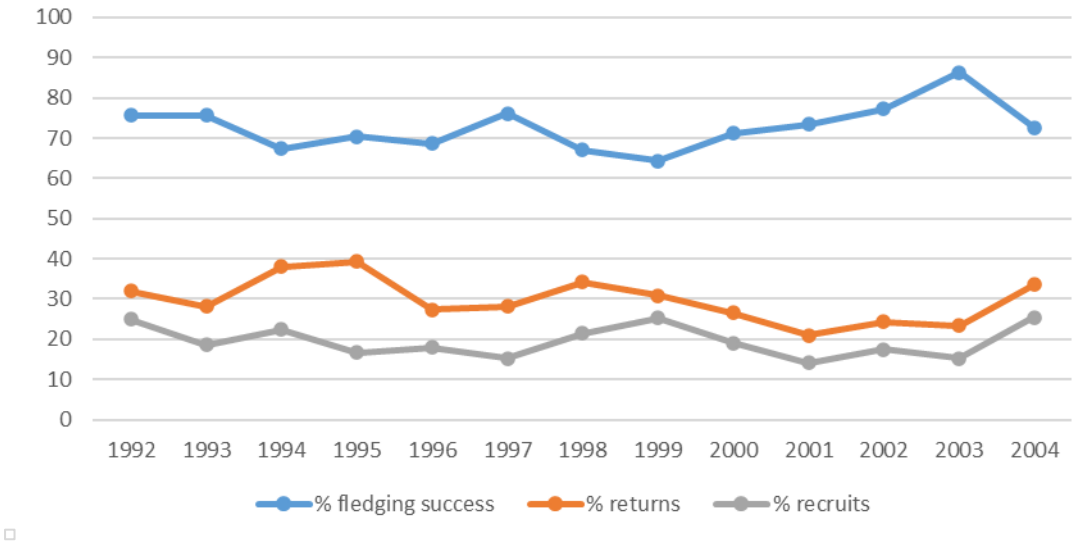

Figure 5. Fledging success and return and recruitment rates of southern Buller's albatrosses banded as chicks in three study colonies at The Snares 1992–2004. Blue=fledging success; orange=return rate; grey=recruitment rate.

Of 40 birds banded as chicks near fledging in the study colonies during September 2013, eight (20%) have now be recaptured. Likewise, of 82 birds banded as chicks in the study colonies during September 2014, four (4.9%) have been recaptured. It is likely that more of these cohorts will be recaptured in the future.

Recruitment of known-age birds

The recruitment 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 of mortality in the years between returning and the first breeding attempt.

In April 2024, three known-age birds, banded in the study colonies in the period 1992–2004, were found breeding for the first time i.e., they had recruited to the breeding population. Of these, two were aged 22 years (banded as chicks in 2002) and one was aged 30 years (banded as a chick in 1994). The proportion of chicks from each study colony recruiting to the breeding population varies by cohort and location (Table 4).

Table 4. Number banded, number recruited and *% recruited of total banded* (i.e. returning to breed) of southern Buller's albatrosses recruits, at The Snares. Data are presented by colony of provenance, with Punui Bay colonies combined.

Colony/ cohort	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Mollymawk Bay	70	88	70	23	85	95	81	88	89	81	95	95	99
	14	20	15	2	11	8	17	24	18	10	11	17	20
	20.0	*22.7*	*21.4*	*8.7*	*12.9*	*8.4*	*21.0*	*27.3*	*20.2*	*12.3*	*11.6*	*17.9*	*20.2*
Punui Bay	46	58	43	61	65	75	77	51	84	82	94	107	89
	15	8	11	12	15	19	16	11	15	13	21	14	28
	32.6	*13.8*	*25.6*	*19.7*	*23.1*	*25.3*	*20.8*	*21.6*	*17.9*	*15.9*	*22.3*	*13.1*	*31.5*

It is likely that few additional records of recruitment will be recorded in future, given that just three new recruitment records were recorded in 2024. Currently, recruitment rates for all three study colonies combined range from 15.9% in 1997 to 25.5% in 2004. A plot of recruitment rate, by cohort, of birds banded as chicks from 1992 to 2004 (Figure 5) shows an apparent decline during the period 1992 to 1997, followed by an increase 1998 to 1999 and then a general decrease 1999 to 2003.

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 and recruitment rates noted here should be considered as minima.

A total of 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). None of these birds were recorded during April 2024.

Tracking device deployments and retrievals

At The Snares, TDRs, GLS light-based geolocators and IgotU GPS data loggers were deployed on 13 breeding southern Buller's albatrosses to investigate diving behaviour and at sea distribution patterns. These deployments were short-term, and 12 of 13 devices were recovered during the trip. Eight Druid satellite transmitting tags paired with eight GLS tags were fitted to breeding southern Buller's albatrosses and these were securely attached for long term deployments to inform year around at sea distributions.

At the Mollymawk Bay study colony, a total of 26 GLS tags were deployed on breeding birds.

In 2020 50 GLS tags were attached to the metal leg bands of breeding birds in the Mollymawk Bay study colony; of these, 31 were retrieved in 2022, a further three during the 2023 field season, and one this year.

Trail cameras

During March–April 2023, SD cards and batteries were replaced in 12 trail cameras deployed in 2022 to cover 4–6 occupied southern Buller's albatross nests and collect nest survival data. In April 2024, these SD cards and cameras were retrieved and replaced with new ones. Wherever possible, the new cameras were deployed in the same locations as those that they replaced. However, for some cameras doing so would have produced coverage of too few occupied nests, and so they were re-positioned to allow for a greater number of nests to be surveyed.

Solander Island

On Hautere / Solander Island 9 Mar 2024, 20 Wildlife Computer TAVs were deployed on breeding southern Buller's albatrosses (back mounted using Tesa tape). In addition, seven nest-contents transects were conducted as aerial photos were being taken, to estimate the ratio of pretend-nesters (apparently-nesting albatrosses with no egg) present in aerial-image nest counts at the time of photography. 54 apparently-nesting albatrosses (ANA) were checked, with 33 of these sitting on an egg and the rest sitting on an empty nest (Table 5). The estimated has-egg rate (n ANA sitting on an egg/total ANA checked) is therefore 0.623 ± 0.073 (mean ± SE).

The nest-contents estimate could be improved with a bigger sample (i.e., more nests checked before helicopter pickup). However, the data are useful because their timing was exactly concurrent with aerial photography, and because they are representative of the open nesting habitat countable in aerial photographs. (We expect nest-contents rates will be different under trees, but are not needed for aerial photo counts since nests under the canopy are obviously not detectable).

Table 5. Nest contents of apparently-nesting southern Buller's albatross at Solander Isl during aerial photography on 9 March 2024

Transect	time start	time end	Bird on nest, egg	Bird on nest, no egg	Loafer sitting	Loafer standing	observer	Has-egg rate
k1	1444	1450	9	6	1	6	KRH	0.6
k2	1451	1456	7	1	1	4	KRH	0.88
k3-k4	1456	1515	2	4	0	0	KRH	0.33
j1	1444		3	3	1	0	JF	0.5
j2			3	1	0	1	JF	0.75
j3		1500	4	1	1	1	JF	0.8
g1	1348	1407	5	5	3	3	GP	0.5

Discussion

Study colonies

Information from the three Snares Islands study colonies overall suggests that the breeding population peaked during 2005–2006, then trended downward until 2010. Subsequently the breeding population has been variable in the Lower Punui Bay and Mollymawk Bay study colonies with marked annual increases and decreases, whilst numbers in the Upper Punui Bay colony have tended to increase in most years. The numbers of breeding pairs in all three study colonies in 2024 were substantially lower than those recorded in 2022 and 2023. In fact, the numbers of breeding pairs recorded in the Mollymawk Bay study colony (86) were the lowest since this study began, the previous lowest totals being 102 pairs in each of 1993 and 1994. The Mollymawk Bay study colony was previously monitored in five breeding seasons 1969–1977 (Sagar & Warham 1998) when the numbers of breeding pairs declined from 96 (in 1969) to 85 (in 1977).

The trends in the numbers of pairs breeding in the study colonies until 2007 broadly reflect changes in annual adult survival (Sagar et al. 2000; Francis & Sagar 2012), with higher annual adult survival rates 1992–2004 (Sagar et al. 2000) followed by declines through to 2016 (Francis & Sagar 2012; Sagar et al. 2017; Figures 3–4). Since 2012 the annual recruitment rate (calculated from the numbers of newly banded birds and recaptures of known-age birds) increased from 10–11% to 16–21%, which

led Sagar et al. (2017) to suggest that this is likely sustaining the breeding population and without it the population would decline. The suggestion that a reducing pool of recruits may be starting to impact the numbers of breeding birds is supported by the results of 2023 and 2024, with substantial declines observed. However, an additional factor leading to the low breeding numbers could be that reduced food availability resulted in adults not being in sufficient condition to breed, and so taking a sabbatical year. Consequently, an improvement in marine conditions before the 2025 breeding season could result in the breeding population rebounding.

Estimated adult survival

The two most recent survival estimates, for 2021 and 2023, are relatively high at around 0.93, approaching the survival rates more-commonly recorded before 2013. Nevertheless, the longer-term decline of the estimated annual survival rates of birds banded as breeding birds is concerning. Since 2011 the estimated annual survival has usually been below the accepted level (0.92) to maintain a stable population and at 0.84, the estimate for 2020 is the lowest recorded during the 32 years of the current study.

Return and recruitment rates

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 field work 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, as evidenced from the April 2024 visit when no new birds were recaptured and just three were recorded breeding for the first time.

Recommendations

- Additional trips to The Snares Islands in August–September to record breeding success and band fledglings. POP2023-02 is a three year project, with visits to the Snares are planned for two further breeding seasons.
- Attach plastic uniquely numbered alpha-numeric bands to all birds, in addition to metal bands.
- Plan for longer trips to enable recapture of a greater number of birds.
- Conduct satellite tracking of fledgling southern Buller’s albatrosses.

Acknowledgements

We thank Nga Rūnaka ki Murihiku (comprised of Te Rūnaka o Awarua, Oraka-Aparima Rūnaka, Te Rūnaka o Waihopai and Hokonui Rūnanga) and the Department of Conservation for permission to work on the islands. The 2023/2024 field work was funded via the Department of Conservation's Conservation Services Programme (CSP project POP2020-03). This work was partially funded through a levy on the quota holders of relevant commercial fish stocks, so we thank the fishing industry for their contribution.

We thank Ros Cole, Sharon Trainor, Janice Kevern, Bronwyn Jeynes and Ian Rout from the Department of Conservation for their help with organization, equipment, transport and quarantine checks. Thanks to Karen Middlemiss for overall contract management including transport and equipment procurement, and review of the draft report, and Johannes Fischer for facilitating resources and help on Hautere / Solander Island. Thanks also to Michael Hayes and Richie from Southern Lakes Helicopters for safe passage to and from Solander Island. Finally, thanks to the skippers and crew of the *Awesome* for providing cheerful, efficient and helpful assistance in getting us to and from The Snares. We appreciate the input from TWG attendees, particularly the constructive engagement by Richard Wells and Peter Frost.

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