Buller's Albatross
Thalassarche bulleri

Albatros de Buller
Albatros de Buller

CRITICALLY ENDANGERED | ENDANGERED | VULNERABLE | NEAR THREATENED | LEAST CONCERN | NOT LISTED

Sometimes referred to as
Buller's Mollymawk
Southern Buller's Albatross
Northern Buller's Albatross
Pacific Albatross
Pacific Mollymawk

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TAXONOMY

Order Procellariiformes
Family Diomedeidae
Genus *Thalassarche*
Species *T. bulleri*

Originally described as *Diomedea bulleri* (Rothschild 1893) and *D. platei* (Reichenow 1898) the two taxa were long considered to be subspecies [1] until recently when it was suggested that they should be treated as distinct species [2]. It was also suggested that the type specimen of *T. platei* was in fact an immature *T. bulleri* [2], however, the recognition of the taxa as two separate species remained controversial [3, 4]. In 2006, following scrutiny of morphological data, and in the absence of genetic data, the ACAP Taxonomy Working Group recommended that these taxa do not warrant specific status [5]. The Second Meeting of Parties adopted this recommendation listing both taxa as a single species *T. bulleri* under Annex 1 of the Agreement pending the collection and analysis of additional morphological, behavioural and molecular genetic data [6].

CONSERVATION LISTINGS AND PLANS

International

- Agreement on the Conservation of Albatrosses and Petrels – Annex 1 [7]
- 2008 IUCN Red List of Threatened Species – Near Threatened [8]
- Convention on Migratory Species - Appendix II (as *Diomedea bulleri*) [9]

Australia

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC ACT)* [10]
  - Vulnerable
  - Migratory
  - Marine
- Recovery Plan for Albatrosses and Giant Petrels (2001) [11]
- Threat Abatement Plan 2006 for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations [12]

South Australia

- *National Parks and Wildlife Act 1972* – Vulnerable [13]

Chile

- National Plan of Action for reducing by-catch of seabirds in longline fisheries (PAN-AM/CHILE) 2007 [14]

New Zealand

- New Zealand Conservation Status 2008 – Naturally Uncommon (listed separately, as *Thalassarche bulleri bulleri* and *Thalassarche bulleri platei*) [15]
- Action Plan for Seabird Conservation in New Zealand; Part A: Threatened Seabirds [16]

BREEDING BIOLOGY

Thalassarche bulleri is a colonial, annual breeding species with each breeding cycle lasting about eight months. On the Snares, most eggs are laid during January, hatch March-April, and the chicks fledge in August-September (Table 1) [17]. At least three years after fledging, immature birds begin to return to a breeding colony. However, the average age of first breeding is 10-11 years, when they begin breeding annually, with males mostly returning to their natal colony while only about half the females do so, the rest breed in adjacent colonies (P. Sagar and J.C. Stahl, unpublished data). On the Chatham Islands, eggs are laid in October-November, hatch in January, and the chicks fledge in June-July (Table 1) [18].

Table 1. *Breeding cycle of* T. bulleri.

	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Snares and Solander Islands												
At colonies	■	■	■	■			■	■	■	■	■	■
Egg laying								■	■			
Incubating								■	■	■	■	
Chick provisioning	■	■	■	■						■	■	■
Chatham Islands and Three Kings												
At colonies	■	■			■	■	■	■	■	■	■	■
Egg laying					■	■						
Incubating					■	■	■	■				
Chick provisioning	■	■						■	■	■	■	■

BREEDING STATES

Table 2. *Distribution of the global* T. bulleri *population among Parties to the Agreement.*

	New Zealand
Breeding pairs	100%

BREEDING SITES

Thalassarche bulleri is a New Zealand breeding endemic (Table 2) with colonies on only four island groups: the Snares Islands, Solander Islands, the Sisters and Forty-Fours in the Chatham Islands, and Rosemary Rock in the Three Kings Islands; Figure 1, Table 3). In 1998 the total population was estimated to be 50-55,000 individuals [18]. Based on latest available data, *c.* 30,500 pairs breed annually at all sites, about half that number on the Forty-Fours alone (Table 3).

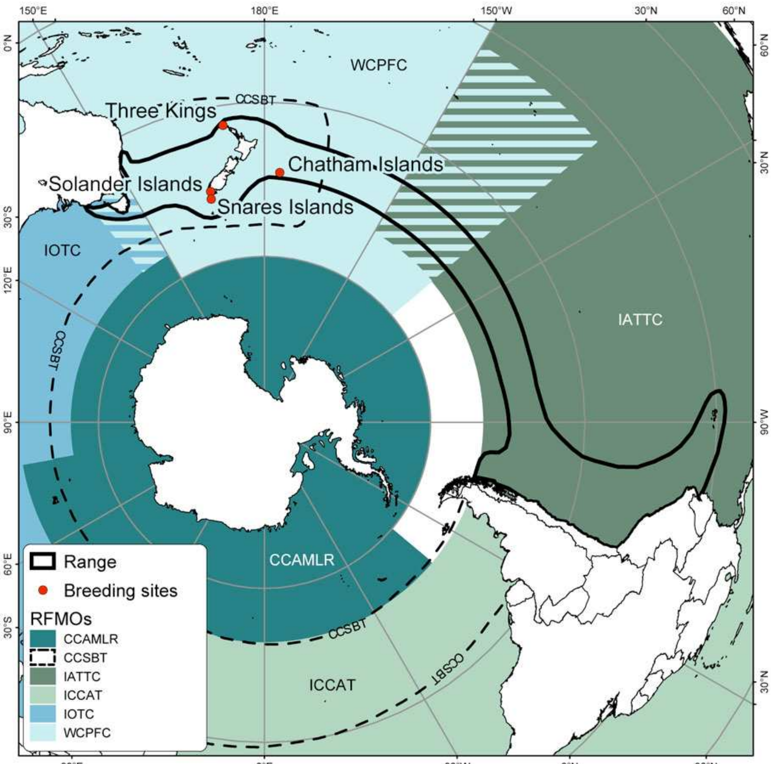

Figure 1. The location of the breeding sites and approximate range of T. bulleri *with the boundaries of selected Regional Fisheries Management Organisations (RFMOs) also shown.*

CCAMLR – Commission for the Conservation of Antarctic Marine Living Resources
CCSBT - Convention for the Conservation of Southern Bluefin Tuna
IATTC - Inter-American Tropical Tuna Commission
ICCAT - International Commission for the Conservation of Atlantic Tunas
IOTC - Indian Ocean Tuna Commission
WCPFC - Western and Central Pacific Fisheries Commission

Table 3. Monitoring methods and estimates of the population size (annual breeding pairs) for each breeding site. Table based on unpublished New Zealand Department of Conservation (DOC) data submitted to ACAP in 2005 and published references as indicated. See Glossary and Notes for explanation of monitoring method and accuracy codes.

Breeding site location	Jurisdiction	Years monitored	Monitoring method	Monitoring accuracy	Annual breeding pairs (last census)
Snares Islands 48°02'S, 166°36'E	New Zealand	1969, 1992-2005	A	High	8,713 (2002) [19]
Solander Islands 46°35'S, 166°54'E	New Zealand	1996, 2002	A & D	High	4,912 (2002) [19]
Chatham Islands					
Forty-Fours 43°55'S, 176°10'W	New Zealand	1970s, 1996, 2007-2008	C	High	14,674 (2008)[1] [20]
The Sisters 43°34'S, 176°50'W	New Zealand	1970s, 1994-1996	F	High	2,150 (1994-96) [21]
Three Kings Islands Rosemary Rock 34°10'S, 172°08'E	New Zealand	1985	A	High	11 (1985) [22]
Total					***30,460***

[1] includes empty nests

CONSERVATION LISTINGS AND PLANS FOR THE BREEDING SITES

International

Snares Islands

- UNESCO World Heritage List (inscribed 1998) [23]

New Zealand

Snares Islands, Solander Islands and Rosemary Rock

- National Nature Reserve – *Reserves Act 1977* [24]

Snares Islands and Solander Islands

- Conservation Management Strategy. Subantarctic Islands 1998-2008. [25]

Sisters and Forty-Fours

- None (under private ownership)

Rosemary Rock

- None

POPULATION TRENDS

Snares Islands

Island-wide ground counts of breeding pairs, completed during incubation, have been undertaken in 1969, 1992, 1997 and 2002. These censuses showed that the population increased from an estimated 4,448 pairs in 1969 to an estimated 8,713 pairs in 2002 [19], an average annual increase of 2.3% (95% Confidence Interval: 2.2%, 2.4% [26]), excluding Broughton Island data. In addition to these censuses, annual counts of breeding pairs undertaken on the North Promontory, North East Island, 1992-2005 (Figure 2) suggest that the population continued to increase at over 3% per annum (Table 4). No data are available that allow an estimate of numbers before 1969.

Breeding and banding studies have been undertaken at the Snares Islands in 1948, 1961, most years 1967-1977 and 1982-87, and annually 1992-2009. Breeding success in 1972 was 57% [17], but ranged from to 64.4 to 86.3% with an average of 72.8% eggs laid fledging a chick during the period 1992-2004 (P. Sagar and JC. Stahl unpublished) (Table 5). Analysis of juvenile survival is in progress (2009), but adult annual survival exceeded 0.95 in 1961-68, declined to 0.91-0.93 in 1969-91 before increasing again to above 0.95 in 1992-1997 [27]. Analysis of adult survival 1997-2009 is in progress (P. Sagar, pers. comm. 2009).

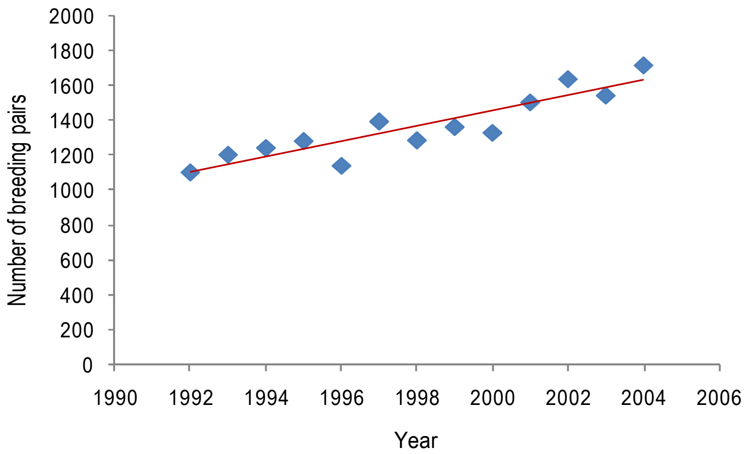

Figure 2. Annual counts of breeding pairs at North Promontory, North East Island, The Snares Islands, from Sagar and Stahl 2005 [19]. See text for assessment of population trends.

Table 4. Summary of population trend data for T. bulleri. Snares Islands calculations based on Sagar and Stahl 2005 [19]

Breeding site	Current Monitoring	Trend Years	% average change per year (95% Confidence Interval) [21]	Trend	% of population for which trend calculated
Snares Islands	Yes	1992 - 2004	3.2 (2.8, 3.7)*	Increasing	*c.* 22%
Solander Islands	Yes	1996 - 2002	-	Increasing? [19]	-
Chatham Islands	Yes	1971 - 1973, 1994 -1996, 2005	-	Stable? [22]	-
Three Kings Islands	Yes	1983, 1985	-	Unknown	-

** trend calculated for North Promontory, Mollymawk Bay, Lower Punui Bay and Upper Punui Bay*

Solander Islands

Aerial and ground counts of breeding birds completed during incubation in 1996 and 2002 showed that the estimated population increased from 4,147 to 4,912 breeding pairs [19]; however, more data are needed to assess the current population trend. There are no counts of albatrosses on the Solander Islands before 1996, but banding of chicks on Little Solander Island during 1985 and allowing for an estimated breeding success of 69.6% results in an estimated 203 breeding pairs that year [19]. This compares with estimates from aerial surveys of 262 (1996) and 333 (2002) occupied nests; increases of 29.1% in the 11 years 1985-1996 and 27.1% in the six years 1996-2002 (on average 3.1% per annum) in this small sub-colony which comprises 6-7% of the total Solander Island population [19].

Breeding success estimated at a study colony of 109-133 breeding pairs on Big Solander Island during four seasons (1996, 1997, 2002, 2003) averaged 69.6% (range 67.6-73.5%) [19]. Survival of juveniles and adults was also studied in detail during these years at this study colony and analyses of these data are in progress (P. Sagar, pers. comm. 2008; Table 5).

Chatham Islands

Monitoring of the populations on the Forty-Fours and the Sisters has not been repeated systematically. In the early 1970s there were an estimated 16,000 breeding pairs on the Forty-Fours (based on area occupied and "probable nesting density", and correcting for non-breeders), and 1,500 breeding pairs on Big Sister ("roughly estimated") [28, 29]. An estimated 630-670 pairs were breeding on Little Sister in 1994-96 [21]. In January 2005 there was no evidence from a photographic survey (in progress) that there had been any significant change in the population on the Forty-Fours [22]. On Little Sister during late January 1995 there were only an estimated 200 nests with chicks, with many unoccupied nests [22]. A five-year annual aerial photographic survey of albatrosses breeding on the Forty-Fours and Sisters began in 2006; this is being supplemented by ground counts in 2007, 2008 and 2009 (P. Sagar, pers. comm. 2008).

On Little Sister, annual productivity between 1994 and 1996 was 57-60%, and mean adult survival for 1974-1995 was 0.935 [21].

Table 5. *Demographic data for the* T. bulleri *breeding sites. Table based on P. Sagar and J.C. Stahl unpublished data (Snares Islands) and published references as indicated. Analyses of adult survival at the Snares Islands between 1997 and 2009 are in progress.*

Breeding site	Mean breeding success (±SD; study period)	Mean juvenile survival	Mean adult survival (study period)
Snares Islands	72.7% (±5.6%, 1992 - 2004)	1997-2009 in progress	93% (1969 – 1997*) [27]
Solander Islands	69.6% (±2.7%, 1996 - 2003*) [19]	In progress	In progress
Chatham Islands	57-60% (1994 – 1996) [21]	No data	93% (1974 – 1995*) [21]
Three Kings Islands	No data	No data	No data

*Missing data: Snares Islands 1978-1982, 1987-1991; Solander Islands 1998-2001; Chatham Islands 1976-1989

Three Kings Islands

On Rosemary Rock 13 occupied nests were recorded during a ground count in January 1985, compared with five occupied nests found during a more limited survey in December 1983 [30]. No further information is available for this site.

BREEDING SITES: THREATS

Table 6. Summary of known threats at the breeding sites of T. bulleri*. Table based on unpublished Department of Conservation (DOC) data submitted to the ACAP Breeding Sites Working Group in 2008.*

Breeding site	Human disturbance	Human take	Natural disaster	Parasite or Pathogen	Habitat loss or degradation	Predation (alien species)	Contamination
Snares Islands	No	No	No	No	No	No	No
Solander Islands	No	No	No	No	No	No [a]	No
Chatham Islands	No [b]	No [b]	No [c]	No	No	No	No
Three Kings Islands	No	No	No	No	No	No	No

[a] Weka *Gallirallus australis* were introduced to Big Solander Island and may take eggs and chicks [16].

[b] All colonies on the Chatham Islands are on privately owned islands [31], and legal protection would add to the future security of the site. There is a history of harvesting of fledgling *T. bulleri* by Moriori and other settlers on the Chatham Islands [29]. Annual harvesting of chicks may still occur, although this is likely to be limited in extent.

[c] A severe storm in 1985 almost completely removed soil and vegetation from the Forty-Fours and Sisters Islands. Although *T. bulleri* seems to have been unaffected, further habitat degradation could result in those populations decreasing [29].

FORAGING ECOLOGY AND DIET

Although *T. bulleri* usually forage singly, large numbers may gather to feed at concentrated food sources such as swarms of crustaceans, occasionally making surface plunges or shallow dives [32]. The diet of *T. bulleri* has been examined through food delivered to chicks at the Snares and Solander Islands [33]. Fish (mostly fishery discards comprising hoki *Macruronus novaezelandiae* and jack mackerel *Trachurus* sp.) dominated the diet occurring in 92% of samples and forming 65% by weight of solid food. Cephalopod remains (mostly *Notodarus* spp. and *Histioteuthis atlantica*) occurred in 53% of samples, but salps (*Pyrosoma* sp. and *Iasis zonaria*) were the most abundant prey items (44% by number and 24% by weight of all prey). These results are in contrast to those of a smaller study of 27 food samples from birds at the Snares and Chatham Islands collected during the 1970s [34], where cephalopods were the preferred food, with fish, crustaceans and salps successively less common.

MARINE DISTRIBUTION

The distribution and movements of *T. bulleri* in Australasian seas, by month, have been analysed using information from ship-borne surveys, counts from trawlers, banding data, recoveries on beaches and on fishing vessels, and records from the literature [35]. During the breeding season, highest abundances of *T. bulleri* from Snares and Solander Islands were found over shelves and slopes off southern New Zealand. Highest abundances of what probably were Chatham Islands birds occurred around the Chatham Islands and oceanic subtropical waters east of New Zealand. Satellite tracking studies of *T. bulleri* from the Snares and Solander Islands [36, 37, 38, 39] show that the distribution of the breeding birds varies with the stage of the breeding cycle. During incubation (Jan-Mar) birds range along the shelf slope off the east and west coasts of the South Island, New Zealand, and into the Tasman Sea; during the guard stage (Mar-Apr) birds are usually found along the shelf slope and shelf areas east and west of the southern New Zealand; and during the post-guard stage (May-Aug) birds occur along the shelf slopes of both coasts of the South Island, New Zealand. After breeding, birds of all ages (including fledglings) migrate to slopes off Chile and Peru [35, 40]. No remote sensing data are available for Chatham Islands and Three Kings populations.

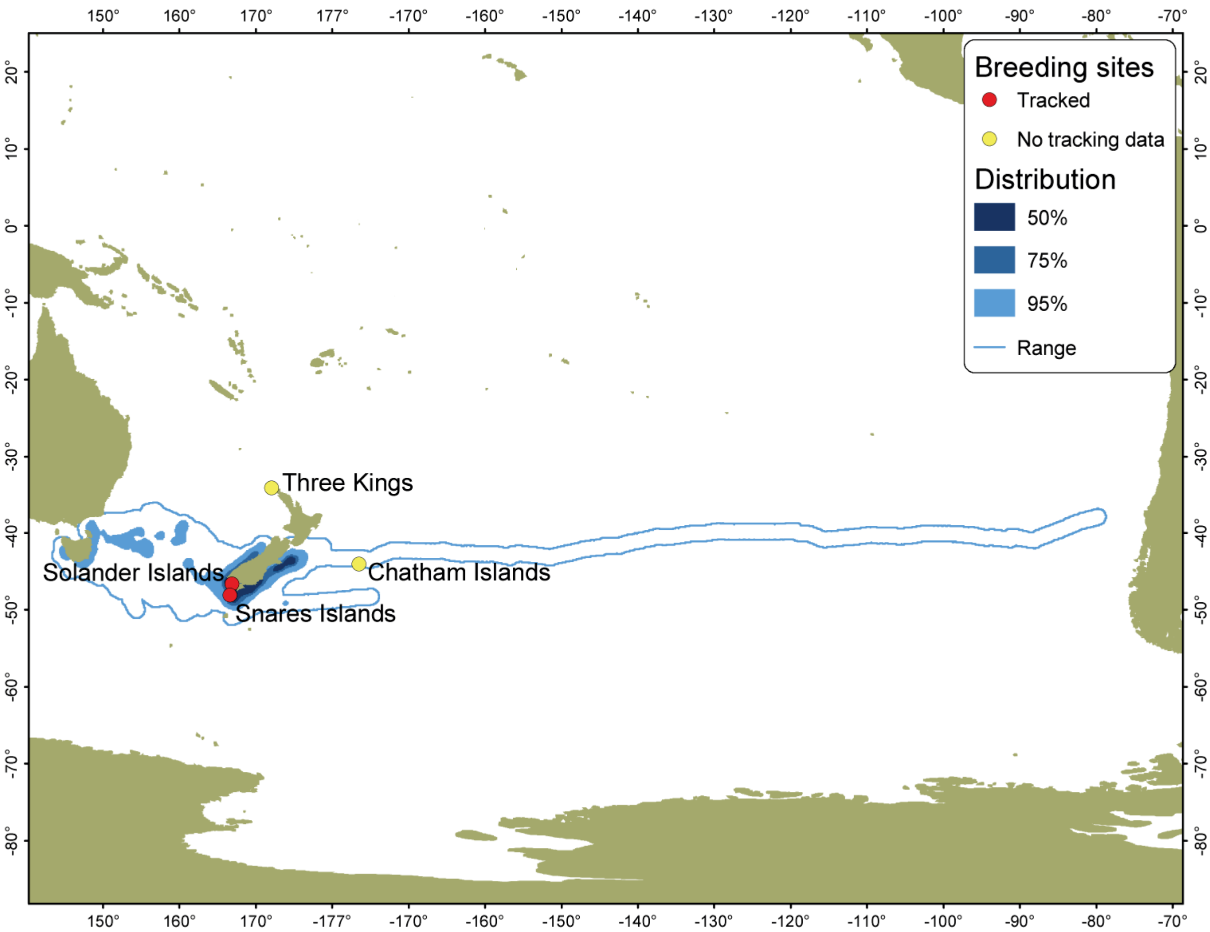

Figure 3. *Satellite-tracking data of breeding adult* T. bulleri *from The Snares and Solander Islands (Number of tracks = 229). Map based on data contributed to the BirdLife Global Procellariiform Tracking Database* [41].

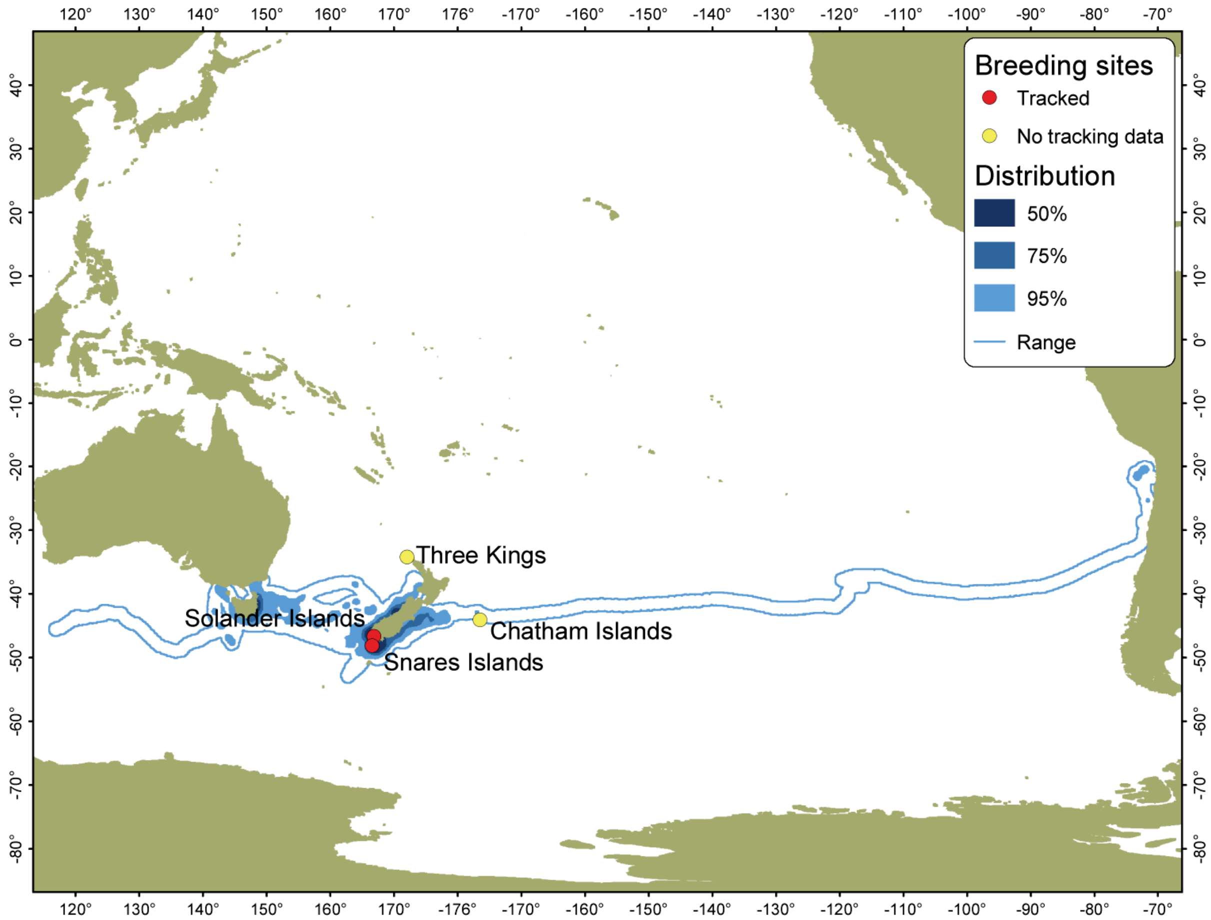

Figure 4. *Satellite-tracking data of juvenile and non-breeding adult* T. bulleri *from Snares and Solander Islands (Number of tracks = 19 GPS + 234 PTT). Map based on data contributed to the BirdLife Global Procellariiform Tracking Database* [41].

Satellite tracking data indicate that *T. bulleri* overlap with four Regional Fisheries Management Organisations known to be particularly important to albatross and petrel conservation – IOTC, WCPFC, IATTC and CCSBT (Figure 1, Table 7). The species also overlaps with the soon to be established South Pacific Regional Fisheries Management Organisation (SPRFMO) that would cover both pelagic and demersal fisheries in the region (predominantly discrete high seas stocks and those stocks which straddle the high seas and the EEZs of coastal states). Australia, New Zealand, Chile and Peru are the principal Range States for *T. bulleri*.

Table 7. *Summary of the known ACAP Range States, non-ACAP Exclusive Economic Zones and Regional Fisheries Management Organisations that overlap with the marine distribution of* T. bulleri.

	Resident/ Breeding and feeding range	Foraging range only	Few records - outside core foraging range
Known ACAP Range States	New Zealand	Australia Chile Peru	-
Exclusive Economic Zones of non-ACAP countries	-	-	-
Regional Fisheries Management Organisations[1]	WCPFC CCSBT	IATTC IOTC SPRFMO[2]	-

[1] See Figure 1 for list of acronyms
[2] Not yet in force

MARINE THREATS

Incidental mortality in fishing operations probably poses the greatest threat to *T. bulleri* populations, although the extent of the threat appears to vary with breeding island. Birds from Snares and Solander Islands have been caught regularly in a range of fisheries operations in New Zealand, particularly pelagic and demersal longline and squid and fish trawl fisheries; in Australia it has been reported caught by pelagic longliners [42, 43] . In contrast, there are very few records of Chatham Islands or Three Kings populations having been caught in fisheries operations [43]. Recent data from Chile show that *T. bulleri* is one of several bycatch species in the pelagic longline swordfish fishery [44].

KEY GAPS IN SPECIES ASSESSMENT

Thalassarche bulleri is one of the more comprehensively studied albatross species. However, most of the information is available for birds breeding on the Snares and Solander Islands; birds breeding on the Chathams and Three Kings Islands are relatively little studied and the taxonomic position of these populations needs to be settled. The monitoring of population trends and demographic parameters on the Chatham Islands should be continued in order to determine rates of adult and juvenile survival. Likewise, information is required on the at-sea distribution of Chatham Islands birds of different age classes and at different stages of the annual cycle.

Although population trends, breeding success, and adult survival of birds on Snares and Solander Islands have all been investigated, relatively little is known of juvenile survival because long-term studies are required to acquire such information. The marine distribution of these birds is reasonably well known from satellite tracking studies, but gaps remain in our knowledge of the movements of juveniles from fledging to age of first breeding, particularly with respect to the overlap of this component of the population with fisheries operations.

A key deficiency for the species is information on the incidental capture rate by fisheries off Chile and Peru.

Thalassarche bulleri on Chatham Islands, photo © Tui De Roy, Roving Tortoise Photos, not to be used without photographer's permission

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RECOMMENDED CITATION

Agreement on the Conservation of Albatrosses and Petrels. 2009. ACAP Species assessment: Buller's Albatross *Thalassarche bulleri.* Downloaded from http://www.acap.aq on 21 September 2009.

GLOSSARY AND NOTES

(i) **Years**.
The "split-year" system is used. Any count (whether breeding pairs or fledglings) made in the austral summer (e.g. of 1993/94) is reported as the second half of this split year (i.e. 1994).

The only species which present potential problems in this respect are *Diomedea* albatrosses, which lay in December-January, but whose fledglings do not depart until the following October-December. In order to keep records of each breeding season together, breeding counts from e.g. December 1993-January 1994 and productivity counts (of chicks/fledglings) of October-December 1994 are reported as 1994.

If a range of years is presented, it should be assumed that the monitoring was continuous during that time. If the years of monitoring are discontinuous, the actual years in which monitoring occurred are indicated.

(ii) Methods Rating Matrix (based on NZ rating system)

METHOD
A Counts of nesting adults (Errors here are detection errors (the probability of not detecting a bird despite its being present during a survey), the "nest-failure error" (the probability of not counting a nesting bird because the nest had failed prior to the survey, or had not laid at the time of the survey) and sampling error).
B Counts of chicks (Errors here are detection error, sampling and nest-failure error. The latter is probably harder to estimate later in the breeding season than during the incubation period, due to the tendency for egg- and chick-failures to show high interannual variability compared with breeding frequency within a species).
C Counts of nest sites (Errors here are detection error, sampling error and "occupancy error" (probability of counting a site or burrow as active despite it's not being used for nesting by birds during the season).
D Aerial-photo (Errors here are detection errors, nest-failure error, occupancy error and sampling error (error associated with counting sites from photographs), and "visual obstruction bias" - the obstruction of nest sites from view, always underestimating numbers).
E Ship- or ground- based photo (Errors here are detection error, nest-failure error, occupancy error, sampling error and "visual obstruction bias" (the obstruction of nest sites from view from low-angle photos, always underestimating numbers)
F Unknown
G Count of eggs in subsample population
H Count of chicks in subsample population and extrapolation (chicks x breeding success - no count of eggs)

RELIABILITY
1 Census with errors estimated
2 Distance-sampling of representative portions of colonies/sites with errors estimated
3 Survey of quadrats or transects of representative portions of colonies/sites with errors estimated
4 Survey of quadrats or transects without representative sampling but with errors estimated
5 Survey of quadrats or transects without representative sampling nor errors estimated
6 Unknown

(iii) Population Survey Accuracy
High Within 10% of stated figure;
Medium Within 50% of stated figure;
Low Within 100% of stated figure (eg coarsely assessed via area of occupancy and assumed density)
Unknown

(iv) Population Trend
Trend analyses were run in TRIM software using the linear trend model with stepwise selection of change points (missing values removed) with serial correlation taken into account but not overdispersion.

(v) Productivity (Breeding Success)
Defined as proportion of eggs that survive to chicks at/near time of fledging unless indicated otherwise

(vi) Juvenile Survival
defined as:

1 Survival to first return/resight;
2 Survival to x age (x specified), or
3 Survival to recruitment into breeding population
4 Other
5 Unknown

(vii) Threats
A combination of scope (proportion of population) and severity (intensity) provide a level or magnitude of threat. Both scope and severity assess not only current threat impacts but also the anticipated threat impacts over the next decade or so, assuming the continuation of current conditions and trends.

		Scope (% population affected)			
		Very High (71-100%)	High (31-70%)	Medium (11-30%)	Low (1-10%)
Severity (likely % reduction of affected population within ten years)	Very High (71-100%)	**Very High**	**High**	**Medium**	**Low**
	High (31-70%)	**High**	**High**	**Medium**	**Low**
	Medium (11-30%)	**Medium**	**Medium**	**Medium**	**Low**
	Low (1-10%)	**Low**	**Low**	**Low**	**Low**

(viii) Maps
The tracking maps shown were created from platform terminal transmitter (PTT) and global-positioning system (GPS) loggers. The tracks were sampled at hourly intervals and then used to produce kernel density distributions, which have been simplified in the maps to show the 50%, 75% and 95% utilisation distributions (i.e. where the birds spend x% of their time). The full range (i.e. 100% utilisation distribution) is also shown. Note that the smoothing parameter used to create the kernel grids was 1 degree, so the full range will show the area within 1 degree of a track. In some cases the PTTs were duty-cycled: if the off cycle was more than 24 hours it was not assumed that the bird flew in a straight line between successive on cycles, resulting in isolated 'blobs' on the distribution maps. It is important to realise that these maps can only show where tracked birds were, and blank areas on the maps do not necessarily indicate an absence of the particular species.