

Observations of penguins and other pelagic bird species in the Balleny Islands, Antarctica

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Summary. On 27–28 February 2014, at the Balleny Islands in Antarctica, penguins on two islands were observed by close approach via zodiac craft, and counts of all pelagic bird species were made from a passing ship. Most penguins on Sabrina Island and Chinstrap Islet were Adelie Penguins *Pygoscelis adeliae*. Percentage of Chinstrap Penguins *P. antarcticus* to Adelie Penguins was 7.3 on Sabrina Island and 10.7 on Chinstrap Islet. Four species—Campbell Albatross *Thalassarche impavida*, White-headed Petrel *Pterodroma lessonii*, Mottled Petrel *P. inexpectata*, and King Penguin *Aptenodytes patagonicus*—were recorded for the Balleny Islands for the first time.

Introduction

The Antarctic Circle passes through the archipelago, of volcanic origin, known as the Balleny Islands, situated ~325 km north of the Pennell Coast, Northern Victoria Land, and ~220 km south-south-west of New Zealand. It is the only oceanic archipelago in the Antarctic Coastal Current (Secretariat of the Antarctic Treaty 2009). From south to north, the largest islands are Sturge (67°28'S, 164°38'E; 437 km², elevation 1705 m), Buckle (66°50'S, 163°12'E; 124 km², elevation 1238 m) and Young (66°25'S, 162°24'E; 225 km², elevation 1340 m) (Alberts 1995). The islands are devoid of vegetation and, in summer, all but steep slopes, cliff-faces and a narrow fringe at the shore-line are covered in ice (Front cover, Figure 1). Sabrina Island (66°55'S, 163°19'E; 0.2 km², highest point 90 m) and the smaller Chinstrap Islet, ~1 km to the north-east, are roughly in the middle of the archipelago and at the southern end of Buckle Island. They were designated as an Antarctic Specially Protected Area (ASPAs) (No. 104) in 1966, thus precluding any landings without a permit (Secretariat of the Antarctic Treaty 2009). Permits are not issued to tourist vessels.

The earliest faunal survey of the Balleny Islands was in the 1964–1965 austral summer, when the total number of penguins on Sabrina Island was estimated to be 1500–2000: mostly Adelie *Pygoscelis adeliae*, at least 11 Chinstrap *P. antarcticus* and one Macaroni Penguin *Eudyptes chrysolophus* that was collected for study (Hatherton *et al.* 1965). The penguins were in different stages of moult, almost complete in most individuals (Hatherton *et al.* 1965). In 1973, 10 pairs of Chinstrap Penguins were breeding on Chinstrap Islet, comprising 1.3% of the penguin population there (Robertson *et al.* 1980). In 2000, 24 Chinstrap Penguin nests were recorded on Sabrina Island (Macdonald *et al.* 2002). In 2006,

202 adult and 109 chick Chinstrap Penguins were recorded on Sabrina Island but no counts were made on Chinstrap Islet for either Adelie or Chinstrap Penguins (Sabrina Island Management Plan; see Secretariat of the Antarctic Treaty 2009). Penguin counts across the years are patchy (Table 1). Little is known of the long-term success of Adelie and Chinstrap Penguins on the Balleny Islands because of the extreme difficulty of access and rarity of landings (Macdonald *et al.* 2002).

Opportunities for collection of data on pelagic species of birds in the Balleny Islands are limited because few vessels visit the archipelago. In February 2014, benign weather conditions permitted sailing alongside the Islands, affording the rare opportunity to make counts from on board ship of pelagic species. They also allowed close access to Sabrina Island and Chinstrap Islet, via zodiac inflatable rafts, to gather data on penguin species, numbers, moult and behaviour.

Method

During 27 and 28 February 2014, the ship, *Professor Kromov*, cruised northwards through the Balleny Islands: off eastern and northern Sturge, southern Buckle [including Eliza Cone (66°55'S, 163°12'E)] and western Buckle, and western Young. (Bearings on 27 February, 0600–2000 h, were 67°20'S, 166°26'E–66°55'S, 163°14'E, and on 28 February, 0600–1800 h, were 66°55'S, 163°14'E–65°50'S, 162°31'E.)

Penguin study

Zodiac cruises on 27 February 2014 (1530–1730 h) were possible at Sabrina Island and Chinstrap Islet. A distance of 30–50 m was maintained from shore to avoid disturbing penguins and to enable identification, using 10 × 40 binoculars. Because of sea conditions, only the south-western side of Sabrina Island and north-western Chinstrap Islet could be surveyed. For Sabrina Island, the total number of Chinstrap Penguins that could be identified from front or side posture was counted by two observers (using binoculars) and the counts averaged. Total counts of penguins were obtained from photographs (taken with a Canon G15 Powershot camera). A further six close-up photographs were taken of non-overlapping areas of the Island, where penguins were most abundant, to obtain the proportions of each species in moult. For Chinstrap Islet, where penguins were spread over a much smaller area, photographs were used to obtain the numbers of each species present and details of moult. Opportunistic observations of behaviour were noted.

Species identification was validated and counts of birds in moult were made from enlarged prints of the photographs overlain with a grid. Any individual that could not be identified because its back was towards the camera was counted as 'indeterminate'.

Pelagic bird count

During daylight hours, counts were made of all bird species sighted around the Balleny Islands from the ship and notes made of the proximity of the birds to land.

Results

Penguin study

The penguins on Sabrina Island were on the landing beach: no counts could be



Figure 1. Sabrina Island and, to the left and behind, Chinstrap Islet, Balleny Islands, Antarctica, 27 February 2014. Photo: Sonia C. Tidemann

Table 1. Counts of adult penguins, and proportion of Chinstrap (C) to Adelie (A) Penguins (C/A, %) on Sabrina Island (SI) and Chinstrap Islet (CI), Balleny Islands, Antarctica, in this study and recorded by others. a = number of Chinstrap Penguins deducted from estimate of total; b = could include a small number of Chinstrap Penguins.

Source	Date	SI		CI		C/A (%)
		C	A	C	A	
This study	Feb. 2014	84	1158	40	373	7.3 (SI) 10.7 (CI)
Secretariat of the Antarctic Treaty (2009)	2006	202				
Macdonald <i>et al.</i> (2002)	Dec. 2000	48	7532 ^a	4596 ^b		0.6 (SI)
Taylor <i>et al.</i> (1990)	Summer 1984		6942	3998 ^b		
Donaldson (1978) (cited in Harper <i>et al.</i> 1984)	Summer 1978	Present (no count)	~2500	2000		
Robertson <i>et al.</i> (1980)	Jan. 1973			20	~1500	1.3 (CI)
Robertson <i>et al.</i> (1980)	Feb. 1965	4	~9000	22	~2500	~0.9 (CI)
Hatherton <i>et al.</i> (1965)	Mar. 1964	11	~1750			

made of the rookery on the plateau accessed by MacDonald *et al.* (2002). The area occupied on Sabrina was larger than that on Chinstrap Islet. On Sabrina Island, three species were identified: >1000 Adelie, <100 Chinstrap and a single King Penguin *Aptenodytes patagonicus*. From the photographs, the King Penguin was identified as subadult, based on the pale-yellow colour of its head-patch (Marchant & Higgins 1990), and was moulting. On Chinstrap Islet, >350 Adelie and <100 Chinstrap Penguins were counted (Table 1).

If it is assumed that all the indeterminate identifications are Adelie Penguins (i.e. erring on the side of a conservative count of Chinstrap Penguins), then the ratio of Chinstrap to Adelie Penguins (expressed as a percentage) was 7.3% on Sabrina Island and 10.7% on Chinstrap Islet (Table 1). On the ridgetops of Sabrina Island, almost all the penguins seen were Chinstrap Penguins.

Fifty-four percent ($n = 1158$) of Adelie Penguins were moulting on Sabrina Island and 43% ($n = 373$) on Chinstrap Islet. For Chinstrap Penguins, 25% ($n = 57$) and 5% ($n = 40$) were moulting on Sabrina Island and Chinstrap Islet, respectively.

On each of the islands, Adelie and Chinstrap Penguins occurred in mixed flocks as they descended the rocky slopes, in tight clusters (12–15 birds in a cluster), to enter the water ($n = 8$). On these occasions, the ratio of Adelie: Chinstrap Penguins was 10:2 on Sabrina Island but was the reverse on Chinstrap Islet. On one occasion, as a group moved towards the water on Chinstrap Islet, a Leopard Seal *Hydrurga leptonyx* (probably female from its size: M. Cawthorn pers. comm.) lunged out of the water towards them. The penguins retreated quickly without any being taken.

Pelagic bird count

The eastern and northern coasts of Sturge were bound in pack-ice (floes >20 m across) and brash-ice (fragments <2 m across) while Buckle, Borrodaille and Young Islands were ice-free. Nineteen species of birds were seen, four of which have not been recorded previously in the Balleny Islands (Table 2).

Discussion

Penguin study

The biggest drawback to our counts of penguins was that no landings were allowed on Sabrina Island (an ASPA). There is a strong argument for provisions to allow bona fide researchers on tourist expeditions to be able to obtain a permit to make opportunistic landings on the rare occasions that they can access sites on the Balleny Islands, especially when the expeditions are accompanied by a Department of Conservation (DOC) observer. Elsewhere on our expedition, the DOC observer controlled quarantine checks and person–bird distance to prevent interference, and these measures could be extended to the ASPAs of the Balleny Islands. Collection of more complete information on the number of juveniles as well as individuals moulting, identification of indeterminates by viewing their ventral sides, and a visit to other parts of the islands would have been undertaken had a landing been possible.

Table 2. Bird species sighted and number observed at the Balleny Islands, Antarctica, 27–28 February 2014. * = new records for the Balleny Islands or surrounding sea. Location: 1 = rookery, 2 = open water, 3 = land (cliffs), 4 = mostly brash-ice.

<i>Species</i>	27 Feb.	28 Feb.	Location
Wilson's Storm-Petrel <i>Oceanites oceanicus</i>	10	15	2
Wandering Albatross <i>Diomedea exulans</i>		1	2
*Campbell Albatross <i>Thalassarche impavida</i>		3	2
Grey-headed Albatross <i>Thalassarche chrysostoma</i>		2	2
Light-mantled Sooty Albatross <i>Phoebastria palpebrata</i>	1	2	2
Southern Giant-Petrel <i>Macronectes giganteus</i>	10	10	2
Southern Fulmar <i>Fulmarus glacialisoides</i>	3200	1500	4
Antarctic Petrel <i>Thalassoica antarctica</i>	50	1	2, 3
Cape Petrel <i>Daption capense</i>	500	300	2, 3
Southern Snow Petrel <i>Pagodroma nivea confusa</i>	100	500	2, 3
Antarctic Prion <i>Pachyptila desolata</i>	1	2	2
Sooty Shearwater <i>Ardenna grisea</i>	1	1000	2
*White-headed Petrel <i>Pterodroma lessonii</i>		5	2
*Mottled Petrel <i>Pterodroma inexpectata</i>	5	6	4
*King Penguin <i>Aptenodytes patagonicus</i>	1		1
Adelie Penguin <i>Pygoscelis adeliae</i>	1531		1
Chinstrap Penguin <i>Pygoscelis antarcticus</i>	124		1
South Polar Skua <i>Stercorarius maccormicki</i>	20	10	2, 3
Arctic Tern <i>Sterna paradisaea</i>	200	5	2, 4

Within these constraints, it appears from our counts that the number of Chinstrap Penguins on Sabrina Island is increasing. The view in the management plan that the number of Adelie Penguins on Sabrina Island is 'growing very rapidly' (Secretariat of the Antarctic Treaty 2009) could not be addressed because previous counts included all rookeries there. As well as the inability to survey the whole island, the lower number of Adelie Penguins may have been related to the time of the visit. All rookeries visited in the Antarctic had relatively few penguins because most young had moulted and gone to sea. The large number of moulting birds counted in this study, especially Adelie Penguins (average 49%), supports the view that the last of the rookery birds were preparing to leave. The number of moulting Adelie Penguins was almost double that in February 1965 (Robertson *et al.* 1980) but whether this is related to regional warming (see Chown *et al.* 2012) is not known.

On Sabrina Island, the number of Adelie Penguins present in 2014 was ~15% of those present in 2000. Fifteen percent of the Chinstrap Penguins present in 2000 would equate to ~7 (compared with 84 in 2014), suggesting that there has been an increase in the number of Chinstrap Penguins. The 2014 count of Chinstrap Penguins on Chinstrap Islet compared with those of Robertson *et al.* (1980) also suggests that numbers have increased there. Although Chinstrap Penguins were mixed with the Adelie Penguins, it appeared that there was a loose separation, with a greater ratio of Adelie to Chinstrap Penguins on the lower slopes compared with the upper slopes.

Pelagic bird count

Four new species—Campbell Albatross, White-headed Petrel, Mottled Petrel and King Penguin—and a seasonal westerly extension of the range of Cape Petrel *Daption capense* were recorded for the Balleny Islands.

The Campbell Albatross *Thalassarche impavida*, a vulnerable species (Peat 2003), was previously considered a subspecies of the Black-browed Albatross *T. melanophrys* that is recorded in the ASPA management plan for Sabrina Island; AW (pers. obs.) has also seen the Campbell but never the Black-browed Albatross here (2010 and 2011). The Southern Fulmar *Fulmarus glacialisoides* was the most abundant species seen in the Balleny Islands, and its feeding in brash-ice is well documented by Marchant & Higgins (1990). Although the Southern Fulmar has been recorded as breeding in the Balleny Islands, principally on Sturge (Robertson *et al.* 1980), counts away from the breeding sites have not been made previously for the archipelago. That the Cape Petrel was landing on cliffs on Sabrina Island and Eliza Cone suggests that the rocky ledges and overhangs may be suitable breeding sites (cf. Marchant & Higgins 1990). Its distribution is described as ‘disjunct ... between Aust.[ralia] and Antarctica’ although a circumpolar distribution is likely (Marchant & Higgins 1990, p. 393). Cliffs on Eliza Cone and Borradaile Island suggest suitable breeding sites for the Southern Snow Petrel *Pagodroma nivea confusa* (also reported by Robertson *et al.* 1980). Our records of White-headed Petrel *Pterodroma lessonii* are the first for the Balleny Islands, though the species has been recorded previously as far south as 65°S (Bretagnolle & Thomas 1990) and in the Ross Sea (Marchant & Higgins 1990). Although Mottled Petrels *P. inexpectata* have been recorded in the shallow shelf-waters of the Antarctic continent (Ainley *et al.* 1984), sightings in the brash-ice are the first records for the Balleny Islands [also observed here by AW (pers. obs.) in 2010 and 2011]. The pelagic distribution of the King Penguin is poorly known but is apparently not circumpolar (Marchant & Higgins 1990). The King Penguin occasionally reaches the Antarctic continent, with five records from Adélie Land in January–March (Thomas & Bretagnolle 1988). The South Polar Skua *Stercorarius maccormicki* and Brown Skua *S. antarcticus lonnbergi* have been seen previously on and above Sabrina Island (Hatherton *et al.* 1965). Both species were also recorded by Robertson *et al.* (1980), but no Brown Skuas were seen during the present survey. Although *Sterna paradisaea* [sic] is reported in the ASPA management plan, it is attributed to Antarctic Tern (*Sterna vittata*); it is probable that this should read ‘Arctic Tern *Sterna paradisaea*’.

Young (1995) stated that although long-term ecological studies have flourished on continental Antarctica, similar research is lacking for New Zealand’s sub-antarctic islands, the difference being attributed to how research is promoted and supported in the two regions. Because of the difficulties of surveying on the Balleny Islands, only seven surveys have been carried out previously. We suggest that greater attention needs to be extended to these Islands. One way to encourage this would be to insert a clause relating to permits in the management plans of ASPAs. Tourist vessels carrying ornithological researchers could be issued with a permit to access Sabrina Island and Chinstrap Islet, if oceanic conditions allow, to realise the potential of adding to current, though patchy, knowledge.

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References

- Ainley, D.G., O'Connor, E.D. & Boekelheide, R.J. (1984). The marine ecology of birds in the Ross Sea. *American Ornithologists Union Ornithological Monograph* **32**, 1–97.
- Alberts, F.G. (Ed.) (1995). *Geographic Names of the Antarctic*. 2nd edn. United States Board on Geographic Names, Arlington, Virginia, USA.
- Bretagnolle, V. & Thomas, T. (1990). Seabird distribution between Tasmania and Adélie Land (Antarctica), and comparison with nearby Antarctic sectors. *Emu* **90**, 97–107.
- Chown, S.L., Lee, J.E., Hughes, K.A., Barnes, J., Barrett, P.J., Bergstrom, D.M., Convey, P., Cowan, D.A., Crosbie, K., Dyer, G., Frenot, Y., Grant, S.M., Herr, D., Kennicutt II, M.C., Lamers, M., Murray, A., Possingham, H.P., Reid, K., Riddle, M.J., Ryan, P.G., Sanson, L., Shaw, J.D., Sparrow, M.D., Summerhayes, C., Terauds, A. & Wall, D.H. (2012). Challenges to the future conservation of the Antarctic. *Science* **337**, 158–159.
- Harper, P.C., Knox, G.A., Spurr, E.B., Taylor, R.H., Wilson, G.W. & Young, E.C. (1984). The status and conservation of birds in the Ross Sea sector of Antarctica. *International Council for Bird Preservation Technical Publication* **2**, 593–608.
- Hatherton, T., Dawson, E.W. & Kinsky, F.C. (1965). Balleny Islands reconnaissance expedition, 1964. *New Zealand Journal of Geology and Geophysics* **8**, 164–179.
- MacDonald, J.A., Barton, K.J. & Metcalf, P. (2002). Chinstrap penguins (*Pygoscelis antarctica*) nesting on Sabrina Islet, Balleny Islands, Antarctica. *Polar Biology* **25**, 443–447.
- Marchant, S. & Higgins, P.J. (Eds) (1990). *Handbook of Australian, New Zealand & Antarctic Birds, Volume 1A: Ratites to Petrels*. Oxford University Press, Melbourne.
- Peat, N. (2003). *Subantarctic New Zealand: A Rare Heritage*. Department of Conservation Te Papa Atawhai, Invercargill, NZ.
- Robertson, C.J.R., Gilbert, J.R. & Erickson, A.W. (1980). Birds and seals of the Balleny Islands, Antarctica. *Records of the National Museum of New Zealand* **1**, 271–279.
- Secretariat of the Antarctic Treaty (2009). *Final Report of the Thirty-second Antarctic Treaty Consultative Meeting, Baltimore, United States 6–17 April 2009*. Secretariat of the Antarctic Treaty, Buenos Aires. Available online: www.ats.aq/documents/ATCM32/fr/ATCM32_fro02_e.pdf (retrieved 12 March 2014).
- Taylor, R.H., Wilson, P.R. & Thomas, B.W. (1990). Status and trends of Adélie penguin populations in the Ross Sea region. *Polar Record* **26**, 293–304.
- Thomas, T. & Bretagnolle, V. (1988). Non-breeding birds of Point Géologie Archipelago, Adélie Land, Antarctica. *Emu* **88**, 104–106.
- Young, E.C. (1995). Conservation, research and New Zealand's responsibilities in the Southern Ocean islands and Antarctica. *Pacific Conservation Biology* **2**, 99–112.